



United States  
Department of  
Agriculture

Forest  
Service

Francis Marion and  
Sumter National Forests

4931 Broad River Road  
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803-561-4000

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File Code: 1900

Date: July 2, 2008

Dear Interested Party:

On behalf of the Sumter, Chattahoochee and Nantahala National Forests, I am asking for your comments on the attached pre-decisional Environmental Assessment (draft EA) for the Management of Recreation Uses on the Upper Chattooga River.

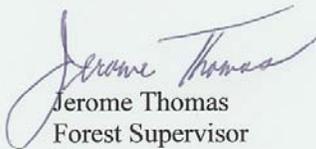
After careful consideration of the analysis in the draft EA, we have selected Alternative 4 as the agency's preferred alternative. This alternative maintains the existing high quality trout fishing experience and other recreational opportunities on the upper Chattooga while providing some additional opportunities for challenging whitewater boating in a remote setting. Boating will be allowed from County Line Road Trail in North Carolina to Burrells Ford Bridge between December 1 and March 1 when mean daily flow levels average 450 cfs or more, which is above those levels considered optimal for fishing.

This alternative also calls for limiting overnight camping in the upper Chattooga to designated sites and closing and/or rehabilitating a number of user-created campsites and trails. To relieve congestion and reduce impacts, roadside parking will also be prohibited within ¼ mile of Burrells Ford Bridge.

Alternative 4 is not the agency's final decision. Based on your comments, we will finalize our decision in December 2008. I would appreciate your comments on potential environmental effects of the alternatives, the range of alternatives and suggested changes to the alternatives. Please send those comments via e-mail to [comments-southern-francismarion-sumter@fs.fed.us](mailto:comments-southern-francismarion-sumter@fs.fed.us) or via surface mail to: Chattooga Planning Team at the address above. All submitted comments will become part of the project record and available for public review. Please send your comments by August 1, 2008. Hard copies of the draft EA are available upon request by calling (803) 561-4000.

For more information on this process, please visit our website at <http://www.fs.fed.us/r8/fms>.

Sincerely,



Jerome Thomas  
Forest Supervisor

Enclosure



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United States  
Department of  
Agriculture

Forest  
Service

Pre-Decisional  
July, 2008



# Environmental Assessment

## Managing Recreation Uses on the Upper Chattooga River

**Sumter National Forest:** Oconee County, South  
Carolina

**Chattahoochee National Forest:** Rabun County,  
Georgia

**Nantahala National Forest:** Jackson County, North  
Carolina

### Responsible Officials:

**JEROME THOMAS**  
Forest Supervisor  
Francis Marion and Sumter National Forests

**GEORGE BAIN**  
Forest Supervisor  
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**MARISUE HILLIARD**  
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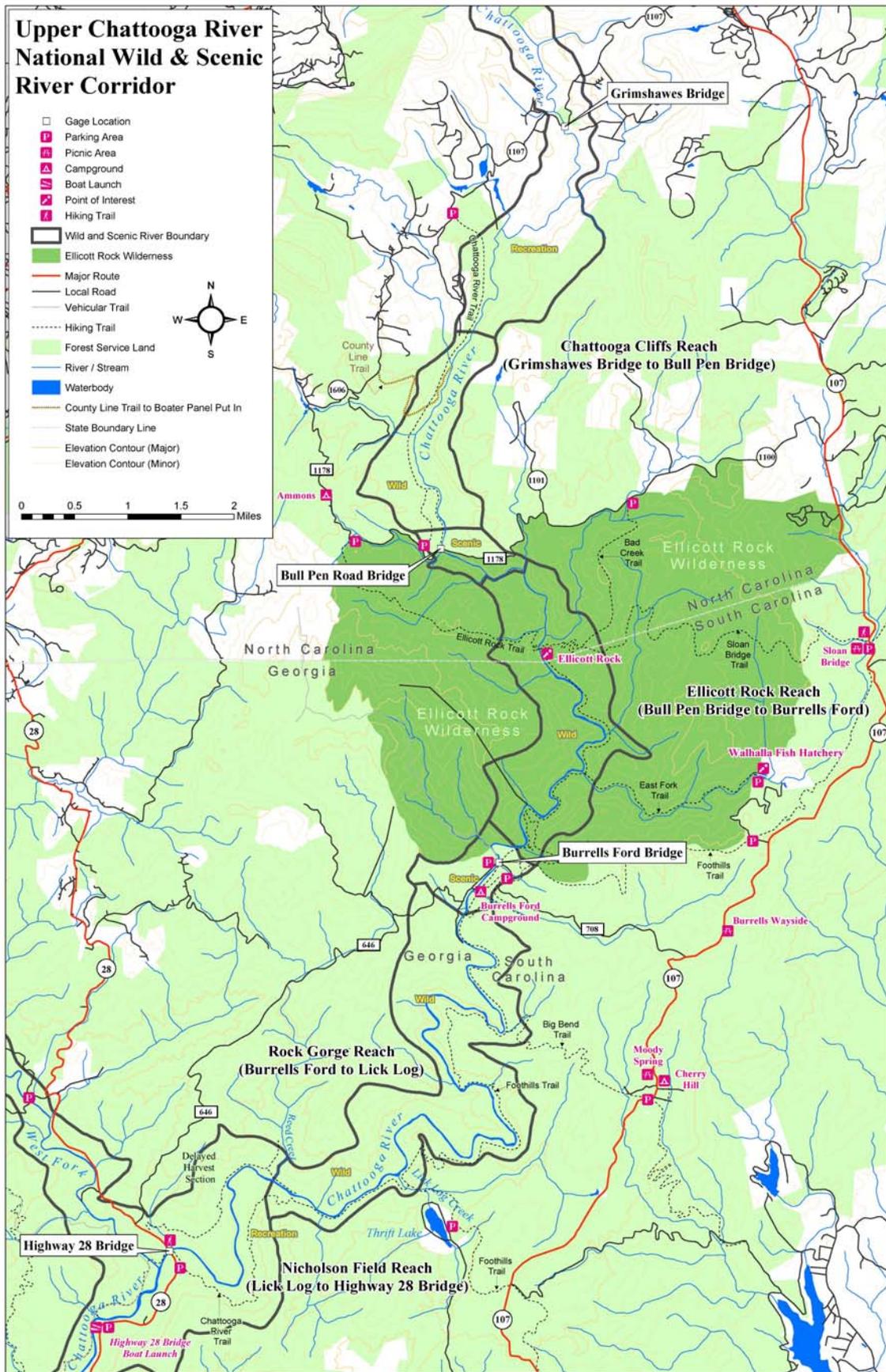
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# Table of Contents

<b>Chapter 1 – Purpose and Need for Action</b> .....	<b>1</b>
1.1 Need for the Proposed Actions.....	1
1.2 Proposed Actions.....	3
1.3 Decisions to be Made.....	3
<b>Chapter 2 – Alternatives</b> .....	<b>5</b>
2.1 Alternative Considered in Detail .....	5
Alternative 1 .....	5
Alternative 2 .....	7
Alternative 3 .....	7
Alternative 4 .....	8
Alternative 5 .....	9
Alternative 8 .....	10
Alternative 9 .....	11
Alternative 10 .....	12
2.2 Alternatives Considered But Not Evaluated in Detail .....	13
2.3 Comparison of the Alternatives Considered in Detail .....	13
<b>Chapter 3 – Affected Environment and                     Environmental Consequences</b> .....	<b>21</b>
3.1 Physical Resources .....	21
3.1.1 Water and the Riparian Corridor .....	21
3.1.2 Soils .....	37
3.2 Biological Resources .....	44
3.2.1 Vegetation .....	45
3.2.2 Terrestrial Wildlife .....	62
3.2.3 Aquatic Species and Habitat .....	74
3.3 Social Resources .....	88
3.3.1 Recreation .....	88
3.3.2 Scenery .....	123
3.3.3 Human Health and Safety .....	126
3.3.4 Heritage Resources.....	128
<b>List of Preparers and Agencies/Persons Consulted</b> .....	<b>130</b>
<b>Appendices</b> .....	<b>132</b>
Appendix A – Outstandingly Remarkable Values .....	132
Appendix B – Implementation Strategy .....	134
Appendix C – Mean Daily Flow and Boatable Days .....	132
Appendix D – Encounter Calculation and Working Paper.....	139
Appendix E – All Rare Wildlife Species Listed on the CONF, NNF and SNF.....	132
<b>References Cited</b> .....	<b>151</b>

Figure 1.1



## **Chapter 1. PURPOSE AND NEED FOR ACTION**

Three national forests, the Sumter, Chattahoochee and Nantahala, are proposing to establish new management direction for the 21-mile section of the Chattooga Wild and Scenic River above the Highway 28 Bridge known as the upper Chattooga (Figure 1.1)

The purpose of these proposed changes would be: to ensure continued enjoyment of the upper Chattooga by a variety of outdoor recreationists; to maintain or improve biological and physical conditions in the Chattooga corridor; to ensure the Outstandingly Remarkable Values (ORVs) for the river are protected and enhanced (see Appendix A) and to protect water quality and free flow as required under the Wild and Scenic Rivers Act.

New management direction would be established by amending the Land and Resource Management Plans for the three national forests.

### **1.1 Need for the Proposed Actions**

The 57-mile Chattooga Wild and Scenic River includes lands in three National Forests: the Nantahala in North Carolina, the Chattahoochee in Georgia and the Sumter in South Carolina. It passes through approximately five miles of the 8,724-acre Ellicott Rock Wilderness and provides important recreation opportunities for visitors to the area, such as high quality fishing, whitewater boating, hiking, swimming, camping and hunting. The highly scenic nature of the river corridor has attracted substantial numbers of people which, in turn, has led to increased concern about visitor impacts.

The Chattooga is considered one of the best trout streams in the country according to a national survey (Ross 1999) and “has long been recognized as one of the finest stocked trout fisheries in the region” (Robertson 1999). It is the largest self-sustaining trout stream in South Carolina (Frampton 2007) and one of the southernmost coldwater stream systems – therefore suitable for trout – in the United States (Burrell et al. 2000). The 21-mile stretch above the Highway 28 Bridge known as the upper Chattooga is highly valued for the unique fishing experience, the solitude and scenery, as well as the quality of the trout fishery. Heavy stocking and institution of a delayed-harvest section in the Nicholson Fields Reach have recently made the fishing experience even more attractive (Samsel 2007). While limited fishing occurs below Highway 28, water temperature and habitat changes make it less attractive for trout fishing.

The Chattooga is described as “one of the premier whitewater destinations in the world” (<http://www.georgia.org/Travel/Discover/Hidden+Gems/Chattooga+River.htm>) and “THE premier whitewater destination in the southeast” (<http://www.chattooga-river.net/>). The 36-mile stretch below the Highway 28 Bridge is extremely popular with whitewater enthusiasts. Several sections offer varying levels of difficulty from beginner to advanced, and all provide excellent scenery in a remote natural setting. Boating is currently not allowed above the Highway 28 Bridge. Advanced whitewater paddlers and creek boaters are interested in experiencing these upper sections which contain very scenic, remote, narrow stretches of river.

The need for the proposed actions is described in more detail below.

### **1.1.1 Action is needed to respond to an appeal decision on the Sumter Land and Resource Management Plan (2004).**

In 2004, the Sumter revised its Land and Resource Management Plan (LRMP or Forest Plan). This revision included reconsideration of recreation issues in the Chattooga corridor. As part of that plan, a 1985 decision to allow whitewater boating only on the lower 36 miles of the river was retained. As a result of administrative appeals, the Forest Service was directed to reassess that decision as part of a broader analysis of visitor capacity issues on the upper Chattooga. The Forest Service was specifically directed to “conduct the appropriate visitor use capacity analysis, including non-commercial boating use, and to adjust or amend, as appropriate, the LRMP to reflect a new decision based on the findings” (see Appeal Decision at <http://www.fs.fed.us/r8/fms/forest/projects/chattbackground.shtml>).

The capacity study took place in the latter half of 2006 and first half of 2007 and included collection of biophysical data, social impact information, hydrology (flow) data, and information from user trials. The report, *Capacity and Conflict on the Upper Chattooga River* (Whitaker and Shelby 2007), integrates this information and is used to inform much of the analysis in this EA. That report documents existing recreational opportunities and analyzes the potential for adding boating opportunities on the upper river. It also identifies existing environmental impacts from current users.

### **1.1.2 Action is needed to support the Outstandingly Remarkable Values of the Chattooga.**

For a river to be eligible for consideration under the Wild and Scenic Rivers Act, it must be free-flowing and possess one or more Outstandingly Remarkable Values (ORVs). To be assessed as outstandingly remarkable, a river-related value must be a unique, rare, or exemplary feature that is significant at a comparative regional or national scale.

The established ORVs for the Chattooga are geology, biology, scenery, recreation, and history. Each ORV is described in more detail in Appendix A. While this proposal focuses predominantly on managing recreation uses on the upper Chattooga, other values may also be affected by the proposed actions.

The Wild and Scenic Rivers Act directs the managing agency to “protect and enhance” those identified outstandingly remarkable values. The relationship between uses and potential impacts on affected ORVs is described below:

- Erosion and compaction of soils and loss of vegetation associated with inappropriately located trails and campsites may have biological and scenic impacts.
- Potential overuse can cause biological impacts and multiple encounters with others can detract from the recreation experience for many visitors.
- The unique angling opportunity that exists on the upper Chattooga needs to be carefully managed.

- Opportunities on the upper Chattooga for whitewater floating need to be evaluated as an enhancement to the whitewater boating recreation experience and its effects evaluated.
- For potential adaptive management purposes, more information on the amount and patterns of uses needs to be gathered to guide future management.

Current use levels have led to concerns with litter, the expansion of unauthorized trails and campsites, and the likelihood of unwanted encounters between users. The *Capacity and Conflict* report found that “recreation use trend information suggests that Chattooga use is likely to increase at the rate of population increases for the region, which may exceed 20% over the next decade” (Whittaker and Shelby 2007). The Forests are seeking to take appropriate action now, in order to prevent adverse impacts to ORVs from increasing use levels.

## 1.2 Proposed Actions

The Forests propose to establish new management direction for their respective Forest Plans that will address the needs described above. The following management approaches have been combined to produce various alternatives, which are presented in detail in Chapter 2 of this environmental assessment.

- Manage biophysical impacts on natural resources by limiting trails, campsites, group size, number of groups per day, parking, types of use, and by establishing standards for woody debris recruitment and retention.
- Manage encounters among existing users by limiting trails, campsites, group size, number of groups per day, and parking.
- Manage encounters among users by establishing zone, season, group size restrictions, and flow limits (including prohibition in some alternatives) on boating opportunities.
- Improve information about use patterns and levels by establishing visitor registration and permitting systems.

## 1.3 Decisions to Be Made

The decisions to be made by the Forest Supervisors:

1. Should there be new direction in the Forest Plans limiting trailheads, trails and/or campsites?
2. Should there be new direction in the Forest Plans limiting group sizes, encounters between user groups and/or access?
3. Should there be additional boating opportunities in the Chattooga River Corridor (above Highway 28)?

4. Should there be new direction in the Forest Plans limiting group sizes, encounters between user groups and/or access if additional boating opportunities in the Chattooga River Corridor are allowed?
5. Should there be new direction in the Forest Plans establishing standards for woody debris recruitment and retention?

## Chapter 2. ALTERNATIVES

### 2.1 Alternatives Considered in Detail

#### 2.1.1 Alternative 1

Alternative 1 maintains current management on all three national forests.

**Table 2.1.1. Alternative 1**

#1	Maintain Current Management (includes all three forest standards)																		
	<b>Actions</b>																		
<i>Boating</i>	<ul style="list-style-type: none"> <li>Does not provide additional boating opportunities on the Chattooga River (above the Highway 28 Bridge).</li> </ul>																		
<i>Encounters</i>	<p>SUMTER NATIONAL FOREST – No current standard</p> <p>CHATTAHOOCHEE AND OCONEE NATIONAL FOREST – No current standard</p> <p>NATIONAL FORESTS IN NORTH CAROLINA – Applies only to Wilderness:</p> <ul style="list-style-type: none"> <li>Manage use within the specified limits for the following indicators and zones:</li> </ul> <table border="1"> <thead> <tr> <th colspan="3">Number of encounters with other parties:</th> </tr> <tr> <th>Zone 1 (No trails)</th> <th>Zone II (Secondary trails)</th> <th>Zone III (Primary trails and access points)</th> </tr> </thead> <tbody> <tr> <td>80% probability of 0 per day</td> <td>80% probability of 3 or fewer per day</td> <td>80% probability of 5 or fewer per day</td> </tr> </tbody> </table> <table border="1"> <thead> <tr> <th colspan="3">Number of other parties camped within sight or continuous sound:</th> </tr> <tr> <th>Zone I</th> <th>Zone II</th> <th>Zone III</th> </tr> </thead> <tbody> <tr> <td>80% probability of 0 per day</td> <td>80% probability of 1 or fewer per day</td> <td>80% probability of 3 or fewer per day</td> </tr> </tbody> </table> <p>Reduce use when it exceeds the limits on more than 10 days during the peak-use season.</p>	Number of encounters with other parties:			Zone 1 (No trails)	Zone II (Secondary trails)	Zone III (Primary trails and access points)	80% probability of 0 per day	80% probability of 3 or fewer per day	80% probability of 5 or fewer per day	Number of other parties camped within sight or continuous sound:			Zone I	Zone II	Zone III	80% probability of 0 per day	80% probability of 1 or fewer per day	80% probability of 3 or fewer per day
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Zone I	Zone II	Zone III																	
80% probability of 0 per day	80% probability of 1 or fewer per day	80% probability of 3 or fewer per day																	
<i>Group size</i>	<p>SUMTER NATIONAL FOREST</p> <ul style="list-style-type: none"> <li>Group size is limited to 12 people within existing wilderness areas; the commercial and organized group size is limited to 12.</li> </ul> <p>CHATTAHOOCHEE AND OCONEE NATIONAL FOREST</p> <ul style="list-style-type: none"> <li>For the Ellicott Rock Wilderness, group camping size is limited to 12 people.</li> </ul> <p>NATIONAL FORESTS IN NORTH CAROLINA</p> <ul style="list-style-type: none"> <li>For the Ellicott Rock Wilderness, limit the size of commercial and organized groups to 10.</li> </ul>																		
<i>Trails</i>	<p>SUMTER NATIONAL FOREST</p> <ul style="list-style-type: none"> <li>New non-motorized trail construction is allowed to improve existing trail configuration and to improve access to specific locations along streams, lakes and the riparian corridor.</li> <li>Motorized and non-motorized trail reconstruction and relocation within the riparian corridor are allowed to reduce impacts to riparian and aquatic resources.</li> </ul> <p>CHATTAHOOCHEE AND OCONEE NATIONAL FOREST</p> <ul style="list-style-type: none"> <li>Recreation trails, campsites and other permanent recreational developments are located, designed and constructed outside the ephemeral stream zone (25 feet on either side). Those causing unacceptable resource damage will be closed and/or rehabilitated.</li> <li>All trail construction, reconstruction and maintenance must be accomplished in accordance with current Manual for Erosion and Sediment Control in Georgia, applicable state or local erosion control regulations and the current Forest Service Trail Handbook direction.</li> </ul>																		

<p>[Trails cont.]</p>	<p>NATIONAL FORESTS IN NORTH CAROLINA</p> <ul style="list-style-type: none"> <li>• Design and manage the trail system consistent with wilderness objectives for solitude, physical and mental challenge, spirit of adventure and self-reliance.</li> <li>• Manage the long distance hiking trails, such as Mountain to Sea Trail, which pass through Wilderness consistent with wilderness management objectives.</li> <li>• Construct and maintain trails to the minimum standard necessary for protection of the soil, water, vegetation, visual quality, user safety and long-term maintenance. Emphasize a wilderness experience. Use trail design as a method to control levels of public use.</li> </ul>
<p>Woody debris</p>	<p>SUMTER NATIONAL FOREST</p> <ul style="list-style-type: none"> <li>• Perennial and intermittent streams are managed in a manner that emphasizes and recruits large woody debris. The desired condition is approximately 200 pieces of large woody debris per stream mile.</li> <li>• The removal of large woody debris (pieces greater than 4 feet long and 4 inches in diameter on the small end) is allowed if it poses a risk to water quality, degrades habitat for riparian-dependent species, for recreational access, or when it poses a threat to private property or National Forest infrastructures (i.e. culverts, bridges). The need for removal must be determined (<i>by the Forest Service</i>) on a case-by-case basis. Except in unusual circumstances, woody debris embedded within the channel materials will not be removed.</li> </ul> <p>CHATTAHOOCHEE AND OCONEE NATIONAL FOREST</p> <ul style="list-style-type: none"> <li>• The removal of large woody debris (pieces greater than four feet long and four inches in diameter on the small end) is allowed only if the debris poses a risk to water quality, degrades habitat for riparian-dependant species, or when it poses a threat to private property or Forest Service infrastructures (i.e. bridges). The need for removal must be determined on a case-by-case basis.</li> </ul> <p>NATIONAL FORESTS IN NORTH CAROLINA</p> <ul style="list-style-type: none"> <li>• The Desired Condition for LWD is 100 pieces per stream mile (9" min width and 6' min length) reasonably distributed. Retain all LWD unless conditions exceed the desired condition.</li> <li>• Base decisions regarding retention, addition or removal of large woody debris on site specific analysis. Coordinate with scenery and recreation objectives.</li> </ul>
<p>Campsites:</p>	<p>SUMTER NATIONAL FOREST</p> <ul style="list-style-type: none"> <li>• Dispersed camping occurs at least 50 feet from lakes and streams to protect riparian areas, 50 feet from trails and ¼ mile from a road on the Andrew Pickens District.</li> <li>• Mitigate resource damage at existing campsites.</li> </ul> <p>CHATTAHOOCHEE AND OCONEE NATIONAL FOREST</p> <ul style="list-style-type: none"> <li>• Recreation trails, campsites and other permanent recreational developments are located, designed and constructed outside the ephemeral stream zone (25 feet on either side). Those causing unacceptable resource damage will be closed and/or rehabilitated.</li> <li>• Manage campsites and other areas of concentrated use for a low level of change in naturalness recognizing that different areas or zones in wilderness have varying degrees of human influence.</li> </ul> <p>NATIONAL FORESTS IN NORTH CAROLINA</p> <ul style="list-style-type: none"> <li>• Allow primitive camping except in areas where such use is in conflict with other Forest users or creates resource damage. Determine conflict and damage on a case-by-case basis.</li> </ul>

### 2.1.2 Alternative 2

User-created trails and campsite densities are greatly reduced and camping is allowed only in designated sites. Roadside parking within ¼ mile of the Burrells Ford Bridge also is eliminated. A “boat-free” recreation experience is maintained as a substantive component of the upper river’s uniqueness compared to other rivers in the south and east. All users are required to register. The encounter levels are lower than current levels.

**Table 2.1.2. Alternative 2**

<b>#2</b>	Increase solitude by managing encounters through a permit system and reducing user-created features.
	<b>Actions</b>
<i>Boating</i>	<ul style="list-style-type: none"> <li>Does not provide additional boating opportunities on the Chattooga River (above the Highway 28 Bridge).</li> </ul>
<i>Group Encounters</i>	<ul style="list-style-type: none"> <li>No more than three encounters per day except within the Burrells Ford campground and within ¼ mile of all roads and bridges. No more than six encounters between ¼ mile north of the Highway 28 Bridge and Reed Creek.</li> </ul>
<i>Group size</i>	<ul style="list-style-type: none"> <li>Maximum of 12 per group on trails; six at campsites except at group campsites; four for anglers.</li> </ul>
<i>Trails</i>	<ul style="list-style-type: none"> <li>Designated trails only. Close redundant trails; trails where resource damage cannot be mitigated; and trails where closure is needed to limit encounters.</li> <li>Rerouting may be necessary to correct existing problems on designated trails.</li> <li>No new trail construction except where needed to enhance solitude.</li> </ul>
<i>Woody debris</i>	<ul style="list-style-type: none"> <li>Maintain current management.</li> </ul>
<i>Dispersed Camping</i>	<p><i>Campsites</i></p> <ul style="list-style-type: none"> <li>Camping only in designated sites; reservations required.</li> <li>No more than approximately one campsite per ¼ mile of river.</li> <li>Campsites limited to no more than three tents, except for group designated campsites.</li> <li>Designated fire ring locations.</li> <li>Permanently close and rehabilitate excessive and unsustainable campsites.</li> </ul>
<i>Parking</i>	<ul style="list-style-type: none"> <li>Close roadside parking within ¼ mile of Burrells Ford Bridge.</li> <li>Lost parking spaces will not be replaced.</li> <li>No net gain in parking capacity.</li> </ul>
<i>User Registration</i>	<ul style="list-style-type: none"> <li>Self-registration for all users/visitors. A permit system that manages use will be implemented for all users to maintain appropriate level of encounters.</li> </ul>
<i>Monitoring</i>	<ul style="list-style-type: none"> <li>Periodically assess amount of use occurring more than ¼ mile from roads and bridges.</li> </ul>

### 2.1.3 Alternative 3

Alternative 3 maintains current estimated encounter levels rather than reducing them. Campsites and trails are reduced but not to the levels of Alternative 2. Like alternatives 1 and 2, this alternative maintains a “boat free” recreation experience on the upper Chattooga.

**Table 2.1.3. Alternative 3**

<b>#3</b>	Emphasize, protect and enhance exceptional, year-round, high-quality trout fishing.
	<b>Actions</b>
<i>Boating</i>	<ul style="list-style-type: none"> <li>Does not provide additional boating opportunities on the Chattooga River (above the Highway 28 Bridge).</li> </ul>
<i>Encounters</i>	<ul style="list-style-type: none"> <li>Trails: maximum 4 encounters above Bullpen; maximum 9 on weekends, 4 on weekdays Bullpen to Burrells Ford; maximum 15 on weekends, 8 on weekdays Burrells Ford to Reed Creek; maximum 15 on weekends, 8 on weekdays Reed Creek to Hwy 28 Bridge. Exceptions: ¼ mile around bridges and Burrells Ford Campground.</li> <li>In River: maximum 4 above Bullpen; maximum 6 Bullpen to Burrells Ford; maximum 6 Burrells Ford to Reed Creek; maximum 8 Reed Creek to 28. Exceptions: ¼ mile around bridges and Burrells Ford Campground.</li> </ul>
<i>Group Size</i>	<ul style="list-style-type: none"> <li>Same as Alternative 2.</li> </ul>
<i>Trails</i>	<ul style="list-style-type: none"> <li>Designated trails only. Close redundant trails; trails where resource damage cannot be mitigated; and trails where closure is needed to limit encounters.</li> <li>Rerouting may be necessary to correct existing problems on designated trails.</li> </ul>
<i>Woody debris</i>	<ul style="list-style-type: none"> <li>Same as Alternative 2.</li> </ul>
<i>Dispersed Camping</i>	<ul style="list-style-type: none"> <li>Camping only in designated sites.</li> <li>Campsites limited to no more than three tents, except for group-designated campsites.</li> <li>Designated fire ring locations.</li> <li>Permanently close and rehabilitate excessive and unsustainable campsites.</li> </ul>
<i>Parking</i>	<ul style="list-style-type: none"> <li>Close roadside parking within ¼ mile of Burrells Ford Bridge.</li> <li>No net gain in parking capacity.</li> <li>Lost parking spaces will not be replaced.</li> </ul>
<i>User Registration</i>	<ul style="list-style-type: none"> <li>Manage encounters using adaptive management strategy that may include user registration, monitoring, surveys, etc., followed by indirect and direct measures.</li> </ul>
<i>Monitoring</i>	<ul style="list-style-type: none"> <li>Periodically assess amount of use occurring more than ¼ mile from roads and bridges.</li> </ul>

**2.1.4 Alternative 4**

This alternative is designed to minimize conflict between anglers and boaters by providing boating opportunities from County Line Road trail in North Carolina south to Burrells Ford Bridge at a mean daily flow level (see Appendix C) of 450 cubic feet per second (cfs) and above from December 1 – March 1. A mean daily flow level of 450 cfs is the highest optimal flow level for fly, spin and bait angling on the upper Chattooga; it also provides optimal standard boating opportunities. Therefore, anglers are less likely to be present when boaters would be floating the upper reaches in this alternative (Whittaker and Shelby 2007). The County Line Road Trail was chosen as the uppermost put-in since it provides more suitable access to the river than is available farther upstream. This alternative also addresses biological and physical resource concerns by applying the same campsite, trail and parking standards as Alternative 3.

In this and other alternatives that consider boating at specific flow levels, the term "boatable day" is based on a predictable 24-hour flow average rather than on a prediction that the river may reach a certain flow level for a limited amount of time on a given day. For example, in Alternative 4, the corresponding number of "boatable days" is the estimated number of days when the water level would be predicted to average 450 cfs over the course of a 24-hour period, not simply when the flow level is expected to hit 450 cfs for a limited time.

**Table 2.1.4. Alternative 4**

<b>#4</b>	Adds additional boating opportunities in the Chattooga Wild and Scenic River Corridor while continuing to emphasize, protect and enhance optimal, year-round, high-quality trout fishing
	<b>Actions</b>
<i>Boating from County Line Road trail in NC south to Burrells Ford Bridge (not including tributaries)</i>	<ul style="list-style-type: none"> <li>• Craft type: tandem/single-capacity hard boats and inflatable kayaks.</li> <li>• Boating at a mean daily flow of 450 cfs or higher (Burrells Ford gauge) or approximately 2.5 feet or higher (HWY 76 gauge). Provides an average of 6 boatable days/year; range of 0 to 11.</li> <li>• From the the user-created County Line Road Trail to the confluence of Norton Mill Creek in North Carolina south to Burrells Ford Bridge December 1 - March 1.</li> <li>• Maximum 4 groups per day between County Line Road trail and Bull Pen Bridge. Groups permitted to make one trip per day.</li> <li>• Maximum 4 groups per day between Bull Pen Bridge and Burrells Ford Bridge. Groups permitted to make one trip per day.</li> <li>• Self-registration.</li> <li>• Put-ins: County Line Road trail (NC); Bull Pen Bridge (NC)</li> <li>• Take-outs: Bull Pen Bridge (NC); Burrells Ford Bridge (SC)</li> <li>• No commercially guided floating or shuttles.</li> </ul>
<i>Encounters</i>	<ul style="list-style-type: none"> <li>• Same as Alternative 3.</li> </ul>
<i>Group size</i>	<ul style="list-style-type: none"> <li>• Same as Alternative 3.</li> <li>• Boaters: maximum six per group; minimum two craft per group.</li> </ul>
<i>Woody debris</i>	<ul style="list-style-type: none"> <li>• Maintain current management. No LWD removal to accommodate boating.</li> </ul>
<i>Trails</i>	<ul style="list-style-type: none"> <li>• Same as Alternative 3.</li> <li>• Designated portage trails may be necessary to accommodate boating only if impacts can be mitigated.</li> </ul>
<i>Dispersed camping</i>	<ul style="list-style-type: none"> <li>• Same as Alternative 3.</li> </ul>
<i>Parking</i>	<ul style="list-style-type: none"> <li>• Same as Alternative 3.</li> </ul>
<i>User registration</i>	<ul style="list-style-type: none"> <li>• Same as Alternative 3</li> <li>• Safety equipment for boaters would be determined at the district level and would be a condition of the self-registration permit.</li> </ul>
<i>Monitoring</i>	<ul style="list-style-type: none"> <li>• Periodically assess amount of use occurring more than ¼ mile from roads and bridges.</li> <li>• Periodically assess the condition of LWD.</li> <li>• Prior to opening of boating season or after significant wind or ice events, assess need for designation of portage areas/trails to ensure rare plants are not adversely impacted (See Appendix B).</li> </ul>

**2.1.5 Alternative 5**

This alternative responds directly to concerns that boating should be an approved recreation use above Highway 28 while also taking into consideration the unique characteristics of the more remote, less-visited, less-impacted Chattooga Cliffs section. Boating is allowed between Bull Pen Bridge and Lick Log Creek when the mean daily flow is 350 cfs or higher at the Burrells Ford gauge. A mean daily flow level of 350 cfs is the highest optimal flow level for fly and spin angling on the upper Chattooga (bait angling is optimal up to 450 cfs); it also provides optimal standard or technical boating opportunities (Whittaker and Shelby 2007). This alternative addresses biological and physical resource concerns by applying the same trail and LWD actions as Alternative 4 and the same campsite and parking actions as Alternative 3.

**Table 2.1.5. Alternative 5**

<b>#5</b>	Adds a boating zone in the upper Chattooga with flow and groups-per-day restrictions. The boating zone excludes the Chattooga Cliffs reach and the delayed-harvest area to address a combination of biological and social concerns.
	<b>Actions</b>
<i>Boating from Bull Pen Bridge south to Lick Log Creek (not including tributaries)</i>	<ul style="list-style-type: none"> <li>• At a mean daily flow of 350 cfs or higher (at Burrells Ford gauge) or approximately 2.3 feet (HWY 76 gauge) and above only. Provides an average of 37 boatable days; range of 12 to 64.</li> <li>• Boating limited to tandem/single-capacity hard boats and tandem/single-capacity inflatable kayaks.</li> <li>• Maximum six groups per day (self-reservation in advance) between Bull Pen Bridge and Burrells Ford Bridge. Groups permitted to make one trip per day.</li> <li>• Maximum eight groups per day (self-reservation in advance) between Burrells Ford Bridge and Lick Log Creek. Groups permitted to make one trip per day.</li> <li>• Put-ins: Bull Pen Bridge (NC); Burrells Ford Parking Lot (GA).</li> <li>• Take-outs: Burrells Ford Bridge (SC); Lick Log Creek (SC); Fisherman’s Trail/Big Bend Road (SC).</li> <li>• No commercially guided floating or shuttles.</li> </ul>
<i>Encounters</i>	<ul style="list-style-type: none"> <li>• Same as Alternative 3.</li> </ul>
<i>Group size</i>	<ul style="list-style-type: none"> <li>• Same as Alternative 4.</li> </ul>
<i>Woody debris</i>	<ul style="list-style-type: none"> <li>• Same as Alternative 4.</li> </ul>
<i>Trails</i>	<ul style="list-style-type: none"> <li>• Same as Alternative 4.</li> </ul>
<i>Dispersed camping</i>	<ul style="list-style-type: none"> <li>• Same as Alternative 3.</li> </ul>
<i>Parking</i>	<ul style="list-style-type: none"> <li>• Same as Alternative 2.</li> </ul>
<i>User registration</i>	<ul style="list-style-type: none"> <li>• Safety equipment for boaters would be determined at the district level and would be a condition of the self-registration permit.</li> </ul>
<i>Monitoring</i>	<ul style="list-style-type: none"> <li>• Same as Alternative 4.</li> </ul>

**[Alternatives 6 and 7 were considered but not evaluated in detail; they are discussed further in Section 2.2]**

**2.1.6 Alternative 8**

This alternative responds directly to the concern that the Forest Service should allow natural flows to regulate paddling and any resulting conflicts, rather than implementing zone, season and/or flow restrictions. Therefore, it allows boating from just below private property to the Highway 28 Bridge year round with no flow restrictions. This alternative also allows the use of rafts, a craft type not considered in any other alternative. In addition, it takes an adaptive management approach to managing carrying capacity by applying limits to all users through indirect and direct measures over a five-year period.

This alternative addresses biological and physical resource concerns by applying the same trail and LWD actions as Alternative 4 and the same campsite and parking actions as Alternative 3.

**Table 2.1.6. Alternative 8**

<b>#8</b>	Opens the upper Chattooga to private boating opportunities with no zone, season, or flow restrictions.
	<b>Actions</b>
<i>Boating from below private land to Highway 28 Bridge (not including tributaries)</i>	<ul style="list-style-type: none"> <li>• Boating allowed from the existing user-created trail stemming from the Chattooga River Trail (approximately 4/10 mile below private land on the west side of the river) to the Highway 28 Bridge. Provides an average of 125 boatable days; range of 85 to 168.</li> <li>• Craft type: Tandem/single-capacity hard boats, tandem/single-capacity inflatable kayaks and up to four-person rafts.</li> <li>• Minimum group size of two craft.</li> <li>• Put-ins: Chattooga River Trail west bank (NC); County Line Road trail (NC); Bull Pen Bridge (NC); Burrells Ford Parking Lot (GA); Fisherman’s Trail/Big Bend Road (SC); Lick Log Creek (SC).</li> <li>• Take-outs: County Line Road trail (NC); Bull Pen Bridge (NC); Burrells Ford Bridge; Fisherman’s Trail/Big Bend Road; Lick Log Creek (SC); Highway 28 Bridge (SC).</li> <li>• No commercially guided floating or shuttles.</li> </ul>
<i>Encounters</i>	<ul style="list-style-type: none"> <li>• Trails: max 6; In River: max 4 above Bullpen; max 6 Bullpen to Burrells Ford; max 6 Burrells Ford to Reed Creek; max 8 Reed Creek to 28. Exceptions: ¼ mile around bridges and Burrells Ford Campground.</li> <li>• If encounters are exceeded on more than 5% of days per year for three consecutive years, the agency will implement indirect limits such as reducing group size, educating the public about alternative recreation opportunities, changing access areas and/or changing camping opportunities. Then, after two full years of implementing indirect measures, if standards are exceeded, a permit system will be implemented for all users to manage level of encounters.</li> </ul>
<i>Group size</i>	<ul style="list-style-type: none"> <li>• Maximum of 6 for all users; minimum of two craft for boaters.</li> </ul>
<i>Trails</i>	<ul style="list-style-type: none"> <li>• Same as Alternative 4.</li> </ul>
<i>Woody debris</i>	<ul style="list-style-type: none"> <li>• Same as Alternative 4.</li> </ul>
<i>Dispersed Camping</i>	<ul style="list-style-type: none"> <li>• Same as Alternative 3.</li> </ul>
<i>Parking</i>	<ul style="list-style-type: none"> <li>• Same as Alternative 2.</li> </ul>
<i>User registration</i>	<ul style="list-style-type: none"> <li>• Same as Alternative 5.</li> </ul>
<i>Monitoring</i>	Same as Alternative 4

**2.1.7 Alternative 9**

Alternative 9 provides floating opportunities in the two highest-ranked sections of the river for boating – the Chattooga Cliffs reach (top 10 best runs) just below private land and the Ellicott Rock reach (top 5 best runs) (Berger 2007) terminating at the East Fork Trail. Boating is allowed at a mean daily flow of 350 cfs or higher November 1 – March 31. This alternative addresses biological and physical resource concerns by applying the same trail and LWD actions as Alternative 4 and the same campsite and parking actions as Alternative 3.

**Table 2.1.7. Alternative 9**

<b>#9</b>	Adds a boating zone in the stretch of river most highly rated for creek boating with season and flow restrictions. Boating is excluded from areas with the highest volume of existing users.
	<b>Actions</b>
<i>Boating from below private land south to East Fork Trail (not including tributaries)</i>	<ul style="list-style-type: none"> <li>• Boating allowed from the existing user-created trail stemming from the Chattooga River Trail (approximately 4/10 mile below private land on the west side of the river) south to East Fork Trail. Provides an average of 21 boatable days; range from 4 to 38.</li> <li>• Boating allowed November 1 – March 31.</li> <li>• Mean daily flow of 350 cfs or higher (at Burrells Ford gauge) or approximately 2.3 feet (HWY 76 gauge).</li> <li>• Craft type: Tandem/single-capacity hard/inflatable boats.</li> <li>• Put-ins: Chattooga River Trail west bank (NC); County Line Road trail (NC); Bull Pen Bridge (NC).</li> <li>• Take-outs: County Line Road trail (NC); Bull Pen Bridge (NC); East Fork Trail (SC).</li> <li>• No commercially guided floating or shuttles.</li> </ul>
<i>Encounters</i>	<ul style="list-style-type: none"> <li>• Same as Alternative 8 (excluding adaptive management approach to managing encounters).</li> </ul>
<i>Group size</i>	<ul style="list-style-type: none"> <li>• Same as Alternative 4.</li> </ul>
<i>Trails</i>	<ul style="list-style-type: none"> <li>• Same as Alternative 4.</li> </ul>
<i>Woody debris</i>	<ul style="list-style-type: none"> <li>• Same as Alternative 4.</li> </ul>
<i>Dispersed Camping</i>	<ul style="list-style-type: none"> <li>• Same as Alternative 3.</li> </ul>
<i>Parking</i>	<ul style="list-style-type: none"> <li>• Same as Alternative 2.</li> </ul>
<i>User registration</i>	<ul style="list-style-type: none"> <li>• Same as Alternative 5.</li> </ul>
<i>Monitoring</i>	<ul style="list-style-type: none"> <li>• Same as Alternative 4.</li> </ul>

**2.1.8 Alternative 10**

Like Alternative 8, this alternative permits boating from just below private property to the Highway 28 Bridge but implements season and flow limits. This alternative addresses biological and physical resource concerns by applying the same trail and LWD actions as Alternative 4 and the same campsite and parking actions as Alternative 3.

**Table 2.1.8 Alternative 10**

<b>#10</b>	Opens the upper Chattooga River to boating with season and flow restrictions.
	Actions
<i>Boating below private land south to Highway 28 Bridge (not including tributaries)</i>	<ul style="list-style-type: none"> <li>• Boating allowed from approximately 0.4 mile below private to the Highway 28 Bridge November 1 - March 1.</li> <li>• Mean daily flow of 350 cfs and above (at Burrells Ford gauge) or approximately 2.3 feet (HWY 76 gauge). Provides an average of 14 boatable days; range from 0 to 28.</li> <li>• Craft type: Tandem/single-capacity hard boats/inflatable kayaks from below private to Lick Log Creek.</li> <li>• Tandem/single-capacity hard boats and inflatables from Lick Log Creek to Highway 28 Bridge.</li> <li>• Put-ins: Chattooga River Trail west bank (NC); County Line Road trail (NC); Bull Pen Bridge (NC); Burrells Ford Parking Lot (GA); Fisherman's Trail/Big Bend Road (SC); Lick Log Creek (SC).</li> <li>• Take-outs: County Line Road trail (NC); Bull Pen Bridge (NC); Burrells Ford Bridge; Fisherman's Trail/Big Bend Road; Lick Log Creek (SC); Highway 28 Bridge (SC).</li> <li>• Self-registration.</li> <li>• No commercially guided floating or shuttles</li> </ul>
<i>Encounters</i>	• Same as Alternative 9.
<i>Group size</i>	• Same as Alternative 9.
<i>Woody debris</i>	• Same as Alternative 4.
<i>Trails</i>	• Same as Alternative 4.
<i>Dispersed camping</i>	• Same as Alternative 3.
<i>Parking</i>	• Same as Alternative 3.
<i>User registration</i>	• Same as Alternative 5.
<i>Monitoring</i>	• Same as Alternative 4.

## 2.2 Alternatives Considered But Not Evaluated In Detail

### **Preliminary Alternatives 2, 3, 4 and 5:**

Some components of these preliminary alternatives were modified in direct response to comments received during scoping. The standards for campsites, trails, LWD and management of encounters changed slightly or were clarified for these alternatives as they appear in Section 2.1.

### **Preliminary Alternative 6:**

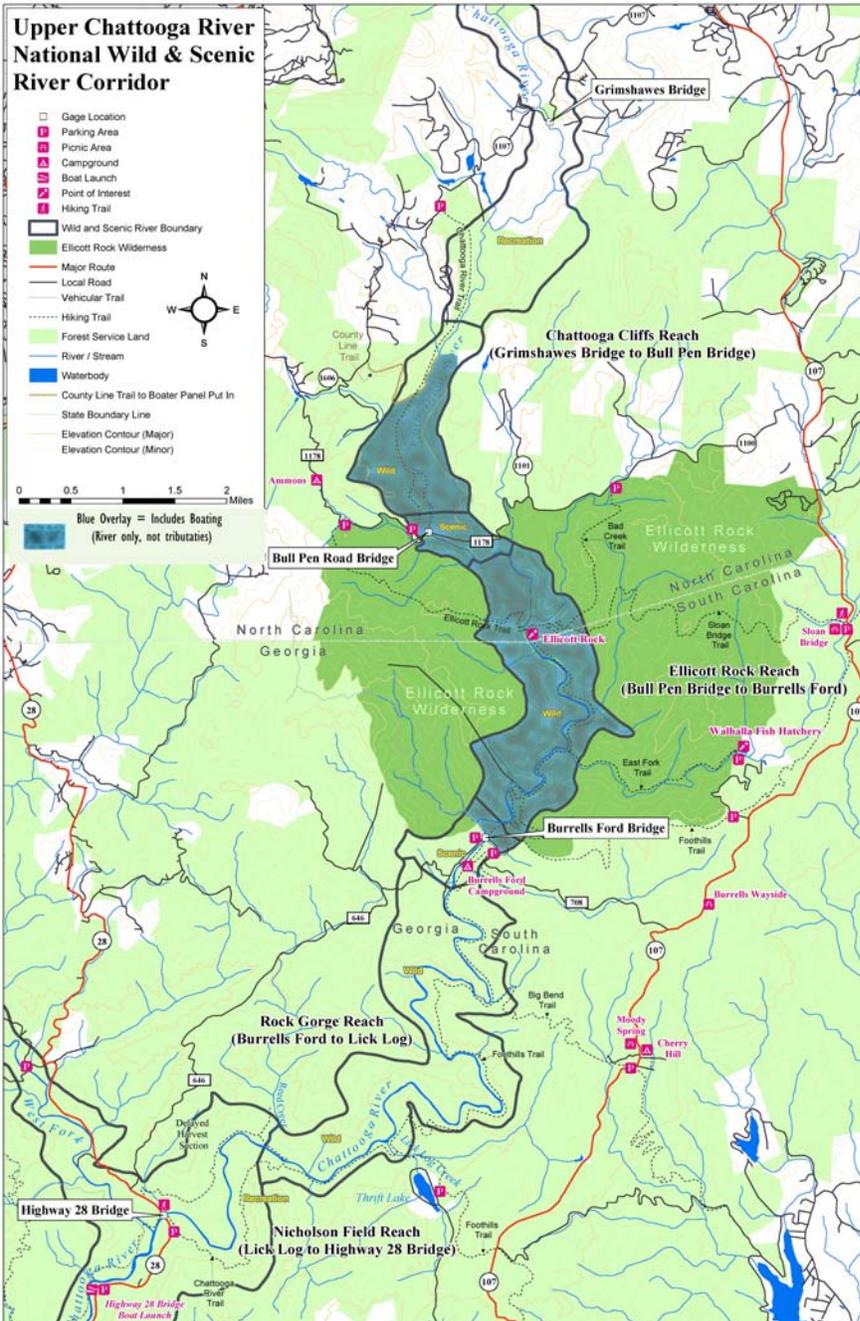
This alternative was eliminated from detailed consideration because Alternative 8 was developed as a replacement. Alternative 6 provided the most boating opportunities of the preliminary alternatives. Alternative 8 was developed as a substitute to better reflect the desires of the boating community.

### **Preliminary Alternative 7:**

Preliminary Alternative 7 was presented at the September 29, 2007, public meeting for review and comment. Some components of this alternative were rolled into alternatives 4 and 5; therefore, Alternative 7 became unnecessary.

## 2.3 Comparison of the Alternatives Considered in Detail

Figures 2.3-1 through 2.3-5 are graphic representations of the upper Chattooga areas open to boating in alternatives 4, 5, 8, 9 and 10, along with a synopsis of boating conditions. Table 2.3 displays the alternatives in a comparison chart.



**Figure 2.3-1 Alternative 4**

**ZONES:** County Line Road Trail to Bull Pen Bridge; Bull Pen Bridge to Burrells Ford Bridge [±7 miles].

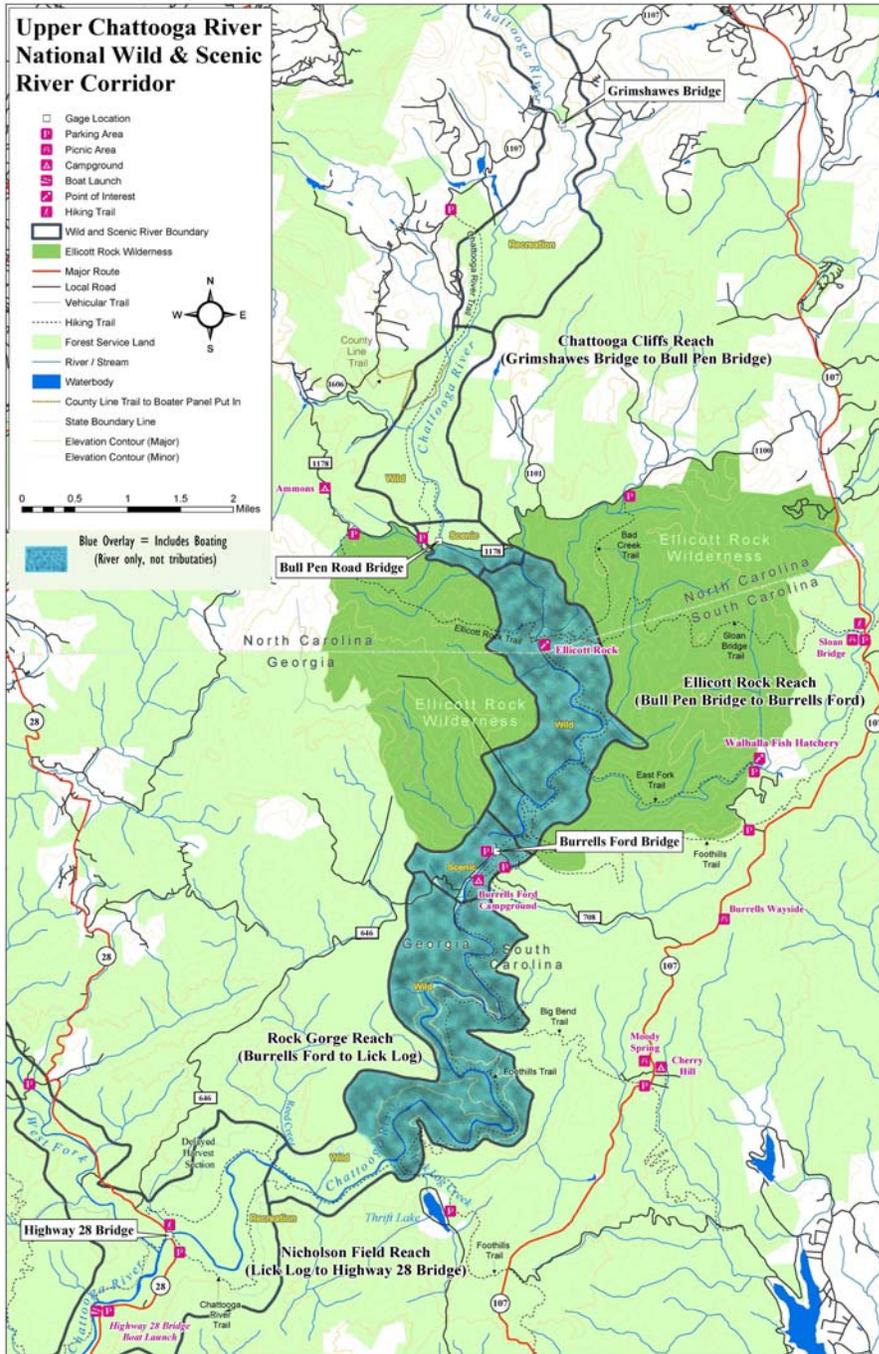
**SEASON:** December 1-March 1.

**GROUPS PER DAY:** Four groups per day per reach. Each group permitted to make one trip per day.

**FLOW:** Mean daily flow of 450 cfs and above at Burrells Ford gauge.

**TYPE OF CRAFT:** Single/tandem hardboats and inflatable kayaks.

[Average Boatable Days per Year: 6; range 0 to 11]



**Figure 2.3-2 Alternative 5**

**ZONES:** Bull Pen Bridge to Burrells Ford; Burrells Ford to Lick Log Creek [+/- 13 miles].

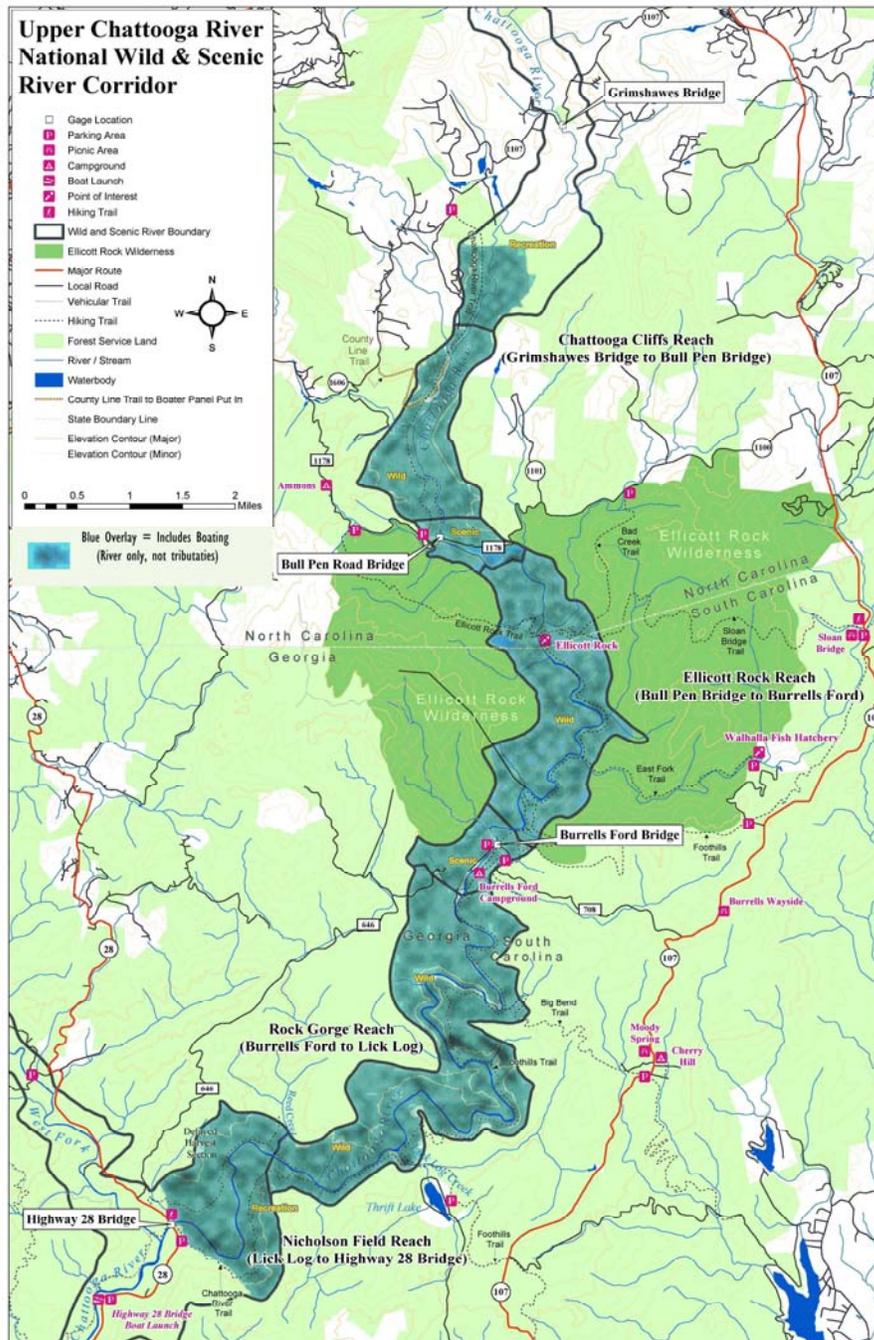
**SEASON:** All year.

**GROUPS PER DAY:** Six groups per day Bull Pen Bridge to Burrells Ford; eight groups per day Burrells Ford to Lick Log Creek. Each group is permitted to make one trip per day.

**FLOW:** Mean daily flow of 350 cfs and above at Burrells Ford gauge.

**TYPE OF CRAFT:** Single/tandem hardboats and inflatable kayaks.

[Average Boatable Days per Year: 37; range 12 to 64]



**Figure 2.3-3 Alternative 8**

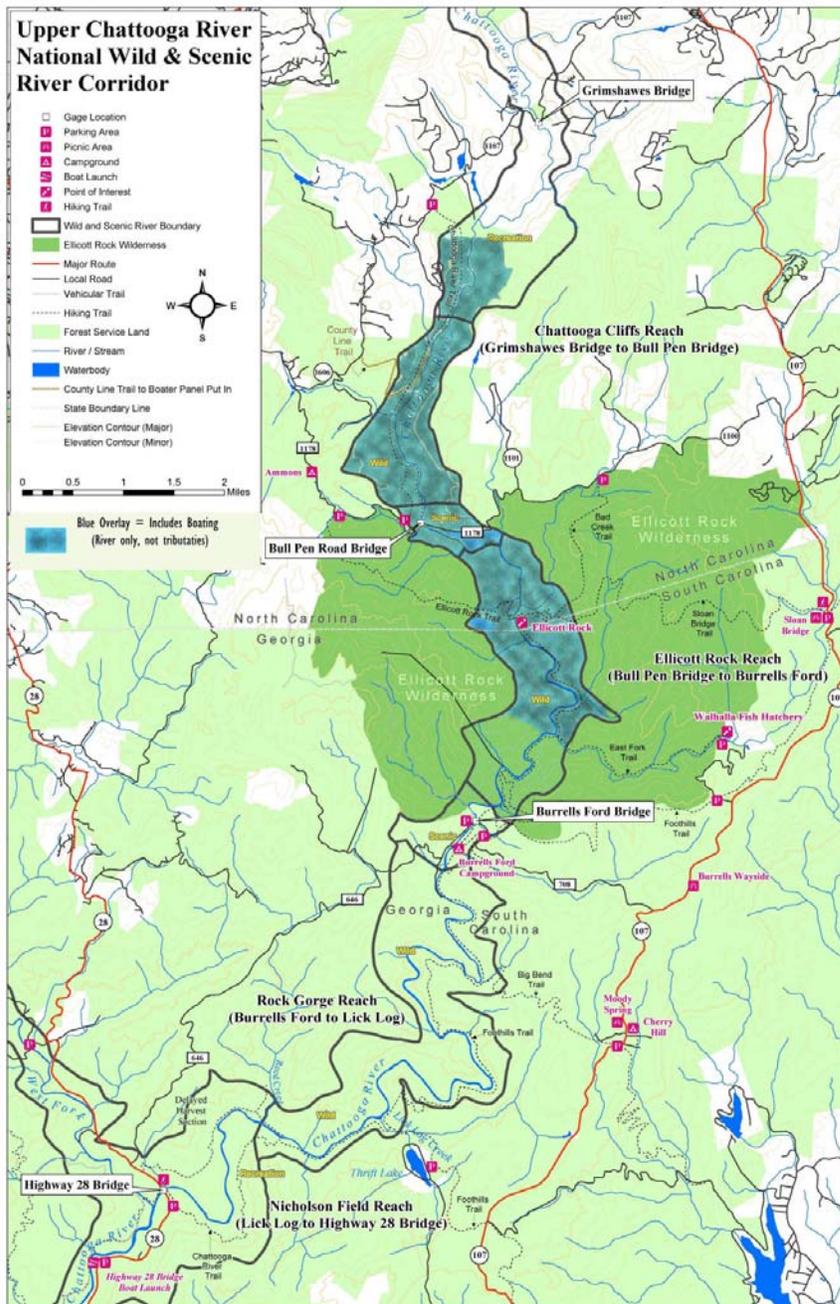
ZONE: 4/10 mile below private property to Highway 28 Bridge [+/- 20 miles].

SEASON: All year.

GROUPS PER DAY: No limit.

FLOW: All flow levels.

TYPE OF CRAFT: Single/tandem hardboats and inflatable kayaks, up to four-person rafts  
 [Average Boatable Days per Year: 125; range 85 to 168]



**Figure 2.3-4 Alternative 9**

ZONE: 4/10 mile below private property to East Fork Trail [ +/- 6 miles].

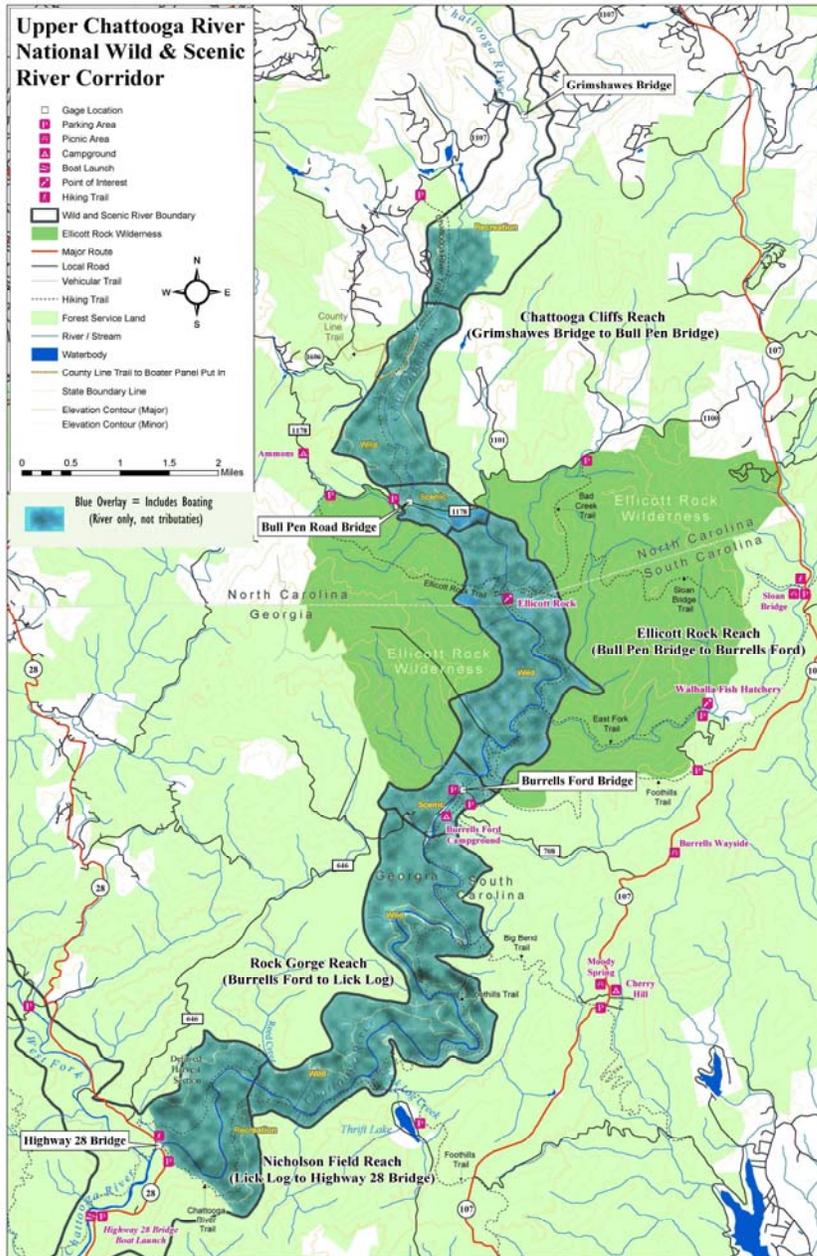
SEASON: November 1 - March 31.

GROUPS PER DAY: No limit.

FLOW: Mean daily flow 350 cfs or above at Burrells Ford gauge.

TYPE OF CRAFT: Single/tandem hardboats.

[Average Boatable Days per Year: 21; range 4 to 38]



**Figure 2.3-5 Alternative 10**

ZONE: 4/10 mile below private property to Highway 28 Bridge [+/- 20 miles].

SEASON: November 1 - March 1.

GROUPS PER DAY: No limit.

FLOW: Mean daily flow of 350 cfs or above at Burrells Ford gauge.

TYPE OF CRAFT: Single/tandem hardboats and inflatables Lick Log Creek to Highway 28 Bridge.

[Average Boatable Days per Year: 14; range 0 to 28]

**Table 2.3-1 Comparison of Alternative Components**

BP = Bull Pen Bridge; BF = Burrells Ford Bridge; RC= Reed Creek; 28 = Highway 28 Bridge; CLR = County Line Road trail; CRT = Chattooga River Trail; EF = East Fork; BFPL = Burrells Ford Parking Lot; FT = Fisherman's Trail/Big Bend Road; LLC = Lick Log Creek

	<b>Alt. 1</b>	<b>Alternative 2</b>	<b>Alternative 3</b>	<b>Alternative 4</b>																														
<b>THEME</b>	Current Management	Increase solitude by managing encounters through a permit system and reducing user-created features	Emphasize, protect, enhance exceptional, year-round, high-quality trout fishing	Provide additional boating opportunities while continuing to emphasize, protect and enhance exceptional, year-round, high-quality trout fishing.																														
<b>BOATING</b>																																		
<i>Zone</i>				CLR – BF																														
<i>Single/Tandem-capacity hardboats &amp; inflatable kayaks</i>				Yes																														
<i>Up-to-four person rafts</i>																																		
<i>Groups/day</i>				4 CLR – BP; 4 BP – BF. Each group allowed to make 1 trip.																														
<i>Season</i>				Dec. 1 – March 1																														
<i>Flow level</i>				Mean daily flows ≥ 450 cfs																														
<i>Designated put-ins</i>				CLR; BP																														
<i>Designated take-outs</i>				BP; BF																														
<i>Days/year</i>				Avg. 6; low 0; high 11																														
<b>ENCOUNTERS PER DAY</b>		≤ 3 BP - RC ≤ 6 RC - 28	<table border="1"> <thead> <tr> <th colspan="3">Trails</th> </tr> <tr> <th>Area</th> <th>Weekends</th> <th>Weekdays</th> </tr> </thead> <tbody> <tr> <td>Above BP</td> <td>≤ 4</td> <td>≤ 4</td> </tr> <tr> <td>BP-BF</td> <td>≤ 9</td> <td>≤ 4</td> </tr> <tr> <td>BF-28</td> <td>≤ 15</td> <td>≤ 8</td> </tr> </tbody> </table> <table border="1"> <thead> <tr> <th colspan="3">In River</th> </tr> <tr> <th>Area</th> <th>Weekends</th> <th>Weekdays</th> </tr> </thead> <tbody> <tr> <td>Above BP</td> <td>≤ 4</td> <td>≤ 4</td> </tr> <tr> <td>BP-RC</td> <td>≤ 6</td> <td>≤ 6</td> </tr> <tr> <td>RC-28</td> <td>≤ 8</td> <td>≤ 8</td> </tr> </tbody> </table> <p>[exceptions w/in ¼ mile of all roads bridges and BF Campground]</p>	Trails			Area	Weekends	Weekdays	Above BP	≤ 4	≤ 4	BP-BF	≤ 9	≤ 4	BF-28	≤ 15	≤ 8	In River			Area	Weekends	Weekdays	Above BP	≤ 4	≤ 4	BP-RC	≤ 6	≤ 6	RC-28	≤ 8	≤ 8	Same as 3.
Trails																																		
Area	Weekends	Weekdays																																
Above BP	≤ 4	≤ 4																																
BP-BF	≤ 9	≤ 4																																
BF-28	≤ 15	≤ 8																																
In River																																		
Area	Weekends	Weekdays																																
Above BP	≤ 4	≤ 4																																
BP-RC	≤ 6	≤ 6																																
RC-28	≤ 8	≤ 8																																
<b>GROUP SIZE</b>		12 trails 6 camping 4 anglers	Same as Alternative 2	Same as 2 + 6 boaters (min. 2 craft per group)																														
<b>WOODY DEBRIS</b>		Maintain current management.	Same as Alternative 2	Maintain current mgmt. No LWD removal to accommodate boating.																														
<b>TRAILS</b>		No new except for solitude. Reroute ok.	Expect reroutes & possible closures	Expect reroutes, portage, and possible closures																														
<b>CAMPING</b>		Designated sites/fire rings; 1 site per 1/4 mile. No more than 3 tents except in group-designated sites. Close/rehabi excessive/unsustainable campsites.	Designated sites/fire rings; reservations. No more than 3 tents except in group-designated sites. Close/rehabilitate excessive/unsustainable campsites.	Same as Alternative 3																														
<b>PARKING</b>		No roadside parking within ¼ mile of BF; Lost parking not replaced; No net gain.	Same as Alternative 2	Same as Alternative 2																														
<b>MONITORING</b>		Backcountry use	Backcountry use	LWD; portage near rare plants; backcountry use																														
<b>REGISTRATION /PERMITS</b>		Self-registration /permits	Adaptive management	Adaptive management/ boaters register/boaters safety equipment																														

**Table 2.3-1 Continued**

	<b>Alternative 5</b>	<b>Alternative 8</b>	<b>Alternative 9</b>	<b>Alternative 10</b>
<b>THEME</b>	Provide a boating zone with flow and groups-per-day restrictions that excludes the Chattooga Cliffs reach and the Delayed Harvest area to address biological and social concerns.	Opens the upper Chattooga to private boating opportunities with no zone, season, or flow restrictions.	Provides a boating zone in the stretch of river most highly rated for creek boating, with season and flow restrictions. Boating excluded from areas with the highest volume of other users.	Opens the upper Chattooga to private boating opportunities with season and flow restrictions.
<b>BOATING</b>				
<i>Zone</i>	BP to LL	CRT to 28	CRT to EFT	CRT to 28
<i>Single/Tandem-capacity hardboats &amp; inflatable kayaks</i>	Yes	Yes	Yes	Yes
<i>Up-to-four person rafts</i>		Yes		
<i>Groups/day</i>	6 BP to BF; 8 BF to LL			
<i>Season</i>	Year-round	Year-round	Nov. 1 – March 31	Nov. 1 – March 1
<i>Flow level</i>	Mean daily flows $\geq$ 350 cfs		Mean daily flows $\geq$ 350 cfs	Mean daily flows $\geq$ 350 cfs
<i>Designated put-ins</i>	BP; BFPL	CRT; CLR; BP; BFPL; FT; LLC	CRT; CLR; BP	CRT; CLR; BP; BFPL; FT; LLC
<i>Designated take-outs</i>	BF; LLC; FT	CLR; BP; BFPL; FT; LLC; 28	CLR; BP; EFT	CLR; BP; BFPL; FT; LLC; 28
<i>Days/year</i>	Avg. 37; low 12; high 64	Avg. 125; low 85; high 168	Avg. 21; low 4; high 38	Avg. 14; low 0; high 28
<b>ENCOUNTERS PER DAY</b>	Same as Alternative 3	Trails: $\leq$ 6 in upper corridor  In-River: $\leq$ 4 above BP $\leq$ 6 BP-RC $\leq$ 8 RC-28  [exceptions w/in ¼ mile of all roads/bridges and BF Campground] Adaptive management.	Same as Alternative 8 without adaptive management	Same as Alternative 8 without adaptive management
<b>GROUP SIZE</b>	Same as Alternative 4	6 all users; minimum of 2 craft per group of boaters	Same as Alternative 4	Same as Alternative 4
<b>WOODY DEBRIS</b>	Same as Alternative 4	Same as Alternative 4	Same as Alternative 4	Same as Alternative 4
<b>TRAILS</b>	Same as Alternative 4	Same as Alternative 4	Same as Alternative 4	Same as Alternative 4
<b>CAMPING</b>	Same as Alternative 3	Same as Alternative 3	Same as Alternative 3	Same as Alternative 3
<b>PARKING</b>	Same as Alternative 2	Same as Alternative 2	Same as Alternative 2	Same as Alternative 2
<b>MONITORING</b>	Same as Alternative 4	Same as Alternative 4	Same as Alternative 4	Same as Alternative 4
<b>REGISTRATION /PERMITS</b>	Boaters register/ boaters safety equipment	Same as Alternative 5	Same as Alternative 5	Same as Alternative 5

### 3. AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

#### 3.1 PHYSICAL RESOURCES

##### 3.1.1 Water and Riparian Corridor

###### SUMMARY OF FINDINGS

Sediment is the primary pollutant of concern in the Chattooga watershed. Although unpaved dirt and gravel roads are the main contributors to stream sedimentation in the Chattooga River, some trails and campsites may also be sediment sources. While recreation management proposed in the alternatives would likely result in overall reduction in sediment from existing trails and campsites, increasing use, including the addition of boaters in some alternatives, would likely result in some new potential sediment sources from user-created features such as portage trails. Overall, the impact is not likely to be great from any of the alternatives; however, the potential impact does vary among the alternatives. Alternative 2 would likely result in the greatest reduction in impacts, while Alternative 8 has the most potential for increased impacts. None of the alternatives are likely to create cumulative impacts across the Chattooga watershed.

###### AFFECTED ENVIRONMENT

The Chattooga River watershed is located in the Southern Blue Ridge Ecological Province. Streams and rivers in the Southern Blue Ridge tend to be entrenched step/pool or pool/riffle systems with boulder and cobble substrate in riffles, and sand in pools. The Wild and Scenic River Corridor is situated mostly within the Chattooga River Gorge. Topography and landforms in the gorge include steep gorge walls, alluvial terraces, hillside ravines, low ridges, and bouldery river/waterfalls. The geology features weathered parent material, sensitive to disturbance and susceptible to erosion. When exposed to the elements, disturbed areas can become chronic sediment sources.

The upper Chattooga River Corridor is divided into four segments for analysis and reporting purposes. References to these segments (reaches) are made throughout this EA. Table 3.1-1 identifies the segments.

Table 3.1-1. Chattooga River Segments (Source: Whittaker and Shelby 2007)

Reach Name	Location	River miles
Chattooga Cliffs	Grimshawes Bridge to Bull Pen Bridge	5.3
Ellicott Rock	Bull Pen Bridge to Burrells Ford Bridge	5.4
Rock Gorge	Burrells Ford Bridge to Lick Log Creek	7.3
Nicholson Fields	Lick Log Creek to Hwy 28 Bridge	3.8
Total		21.8

### Water Resources

The following list displays the miles of stream by order for all lands in the Chattooga watershed and the upper Chattooga River Corridor:

Stream Order	Watershed Miles	Upper Chattooga Corridor miles
1	1814	75
2	642	24
3	299	7
4	156	3
5	94	2
6	54	22
7	29	0

The stream types for the watershed include approximately 28% perennial, 17% intermittent and 55% ephemeral streams (Hansen 2001). Most of the measured perennial and intermittent streams were entrenched to moderately entrenched, with low to high width to depth ratios.

### Riparian Resources

Most riparian areas in the river corridor are in the 100-year floodplain. The soils are predominantly well-drained alluvial deposits formed when sediment settles out from flowing water during flood events. Such soils are sensitive to ground disturbing activities, including dispersed recreation. Most recreational access to the river is through the riparian corridor and erosion and compaction impacts have been the result. Few, if any, wetland areas exist in the Chattooga riparian corridor.

### Water Quality

The Chattooga River and its tributaries have various classifications developed by each state water quality agency, in addition to the federally designated wild and scenic river status. The predominant beneficial use for the Chattooga and its tributaries is fishing, with waters designated as primary trout waters above Big Bend Falls. Below Big Bend Falls, a cool to warm temperature transition results in changes to the trout community.

Sediment is the primary pollutant of concern in forested watersheds in the Southeast (Coats and Miller, 1981). Excess fine sediment in stream systems fills interstitial space between larger rocks and reduces the amount of available fish and macroinvertebrate habitat. Many of the streams on the Chattooga River watershed have excess stored sediment from past land management activities in addition to the high erosive potential of micaceous and alluvial soils in the region.

Unpaved dirt and gravel roads are the primary contributors to stream sedimentation in the Chattooga River watershed; only 2.6% of sediment was attributed to recreational uses (Van Lear et al. 1995). However, data collection for this report did not specifically focus on pinpointing sediment from trails and campsites and did not estimate what portion of the road use and impacts were related to recreational use. Further, recreation uses have increased since 1995; therefore, recreation impacts to water quality in the Chattooga watershed are likely higher today. Managing impacts from these uses can improve water quality in the Chattooga watershed.

Under the Clean Water Act, if a stream does not have high enough water quality to meet its designated beneficial uses (fishing in the case of the Chattooga), it is listed as either “partially supporting” or “not supporting” based on the presence of certain pollutants. Streams that are not supporting or partially supporting their designated beneficial uses are added to the 303d list of impaired streams. As part of the Georgia Total Maximum Daily Load (TMDL) settlement agreement, the U.S. Environmental Protection Agency conducted an assessment of water quality conditions for streams in the Chattooga watershed from 1997 - 1999. Results of the assessment were used to determine if any stream reaches in Georgia were impaired due to sediment concerns. Stream reaches in South Carolina and North Carolina were also sampled and results were forwarded to the appropriate state water quality agency for further action.

Stream reaches of concern that are located at least in part in the upper Chattooga Corridor are East Fork, Norton Mill Creek, Fowler Creek, and Ammons Branch. Table 3.1-2 describes the beneficial use status and pollutants of concern for these stream reaches.

Table 3.1-2. Upper Chattooga stream reaches of concern

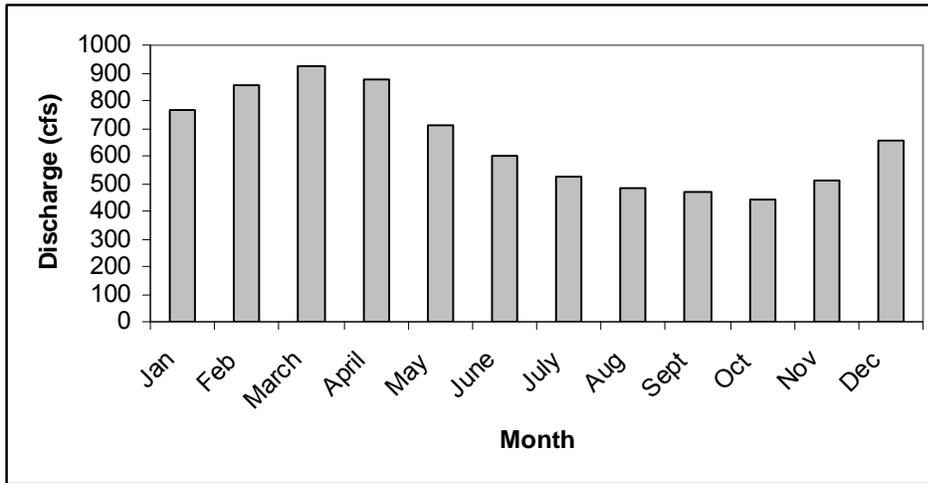
State	Stream	Use Support Status	Pollutant of Concern
<b>South Carolina</b>			
	East Fork Chattooga River (downstream of fish hatchery)	Partial Support	Unknown
<b>North Carolina</b>			
	Norton Mill Creek (already 303d listed)	Partial Support	Unknown
	Fowler Creek (downstream of Cashiers)	Not Supporting	Excessive Sedimentation
	Ammons Branch	Full Support-Watch List	Increased sediment

Source: US EPA, 1999.

**Chattooga River Flows**

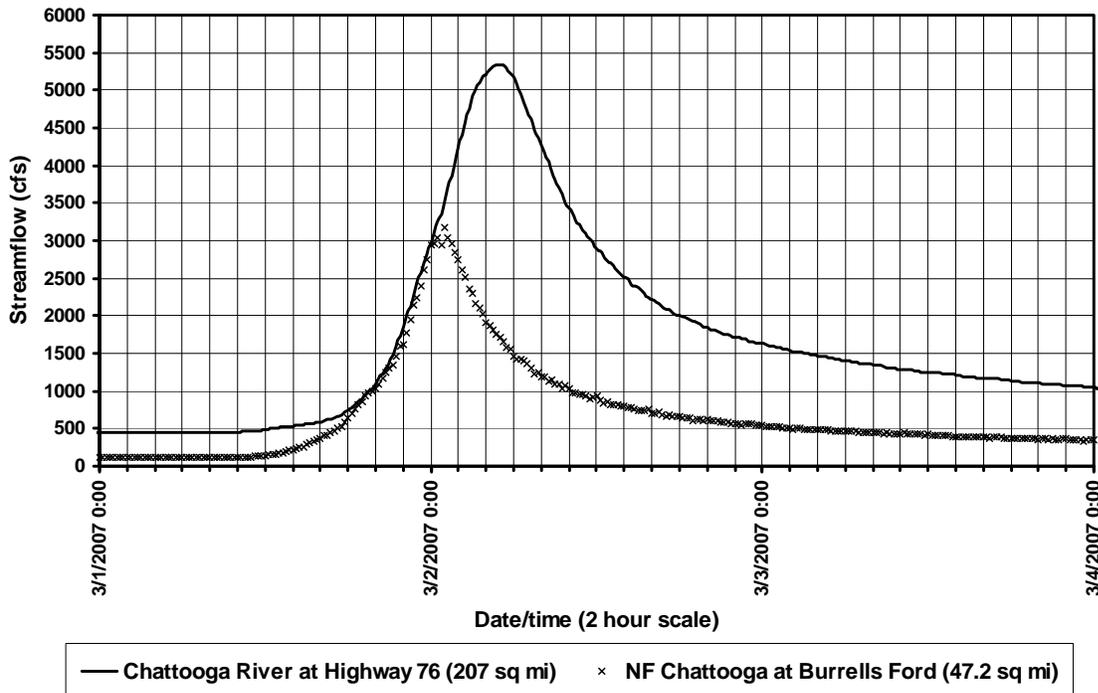
Average annual precipitation in the Chattooga watershed is 70 - 80 inches; mean water yield is about 40 – 45 inches. Figure 3.1-1 shows the mean monthly discharge (period of record from 1940-2006) at the U.S. Geological Survey (USGS) gauge station (USGS 02177000) on the Chattooga at Highway 76. Monthly streamflow is fairly constant throughout the year with the highest flows occurring December - April and lowest August - October. In a normal year, this region receives considerable rainfall, often in short, heavy thunder or tropical storms that produce flashy flows in the summer and early fall, and larger scale storms driven by frontal low movements in the winter months. The higher monthly flows are in the dormant season, and the decline from April - October is linked to vegetation growth and its impact on moisture stress and water table depth.

Figure 3.1-1. Mean monthly flow (cfs) for the Chattooga River at Highway 76.



A permanent water level recorder was installed in June 2006 on the upper Chattooga at the Burrells Ford Bridge. Correlations between the Highway 76 and Burrells Ford gauges show that during non-storm periods the two gauges are moderately to highly correlated. Figure 3.1-2 displays the hydrograph of a bankfull spring storm on the Chattooga River at Burrells Ford and Highway 76. Bankfull events occur about once a year, so they occur with enough frequency to affect channel morphology or structure but not frequently enough to suggest the duration of typical storms.

Figure 3.1-2. Hydrograph for a typical early spring storm at the Chattooga River at Burrells Ford and Highway 76.



The initial rise and fall of the hydrographs for both gauges is similar. The end portion of the falling limb of the hydrograph takes longer to even out than the rising limb. This dormant season bankfull event storm shows the fairly flashy nature of the storms in the upper Chattooga where flows from a single event increases and decreases during a two-three day period. However, it takes longer for the river to return to base flow levels after the initial storm peak. This hydrograph also shows the difference in the timing of storm peaks between the two gauges, with the Highway 76 gauge peaking approximately four hours after the Burrells Ford gauge. However, the timing of flows between the two gauges varies from approximately eight hours at low flows and three hours at very high flows (Hansen 2007).

### **Hemlock Woolly Adelgid**

Eastern hemlock is the one of the primary riparian tree species in the Southern Blue Ridge. The hemlock woolly adelgid (HWA) (*Adelges tsugae* Annand), a non-native insect, is killing the two Eastern U.S. species of native hemlock: Carolina hemlock (*Tsuga caroliniana* Engelm.) and Eastern hemlock (*Tsuga Canadensis* (L.) Carr). No effective natural control with native biota or physical environmental factors currently exists. Without active intervention, 90 percent of existing hemlock is forecast to be dead within five to ten years.

As hemlocks die slowly, they remain standing for several years, but eventually lose their larger branches. When the root-wad is lost, bank stability decreases. Loss of hemlock bank trees due to natural events such as flooding or wind throw may be accelerated by hemlock death. This has the potential to add a substantial amount of LWD to the Chattooga River and tributaries. Understory development and opportunistic expansion from associated vegetation would help maintain bank stability and mitigate effects from hemlock death.

Recent research from the U.S. Forest Service Southern Research Station suggests that fluctuations in tree water use as a consequence of hemlock death could result in: (1) increased soil moisture; (2) increased discharge; (3) decreased daily amplitude of streamflow; and (4) changes in streamside forest structure (Ford and Vose 2007).

### **Large Woody Debris**

LWD is important to stream ecosystem health from both a biological and physical perspective. It provides habitat for aquatic macroinvertebrates and fishes and increases the amount of nutrients available to aquatic organisms. LWD may also control channel morphology. Often pool frequency and type as well as the amount of sediment contained within a channel are a function of the amount of LWD found in the system (Bilby and Ward 1991). In larger, higher order streams such as the Chattooga, LWD tends to be larger and less abundant. Larger streams have wider channels, more stream velocity, and depth to move woody debris, so incorporation of the debris into the channel is often of a shorter duration than in smaller channels unless it is positioned so it can be buried in sediments. However, accumulations of wood in large channels can also reach enormous proportions and have an effect on channel morphology through the alteration of flow patterns (Bilby and Bisson 1998).

Removal of LWD can negatively impact stream channel morphology. Depending on flow levels, the presence of LWD in the channel can create areas of river that cannot be safely boated and require portage. Over time, a route that is consistently trampled by portaging boaters or other

users can also have negative impacts by causing erosion, resulting in sedimentation into the stream channel.

From a physical perspective, the primary effect of LWD removal is the alteration of channel morphology. In general, the effects of LWD removal are site specific and the consequences are highly variable depending on the size of the channel and wood size and placement. In some cases, removal could result in more bank and channel erosion; however, in others, wood removal could increase bank and channel stability.

Since LWD loading and transport is dynamic, and many of the reaches of the upper Chattooga are unscouted by boaters, it is unknown how much wood would ultimately be removed due to the addition of boating. In the expert boating reconnaissance, logs caused three to five portages depending on boater skill level, most of which were in the Chattooga Cliffs reach (Whittaker and Shelby 2007). However, none required portaging outside the stream channel. As hemlock mortality from HWA increases, it is estimated that there will be more loading of LWD of a size that could affect boating access in the upper Chattooga.

In November 2007, Forest Service personnel conducted an inventory of dead and down LWD in the upper Chattooga River, West Fork Chattooga River and two tributaries of the West Fork Chattooga River (Overflow and Holcomb Creeks). Crews counted all wood larger than 1 meter long and 10 centimeters in diameter that had the potential to influence stream channel shape and function; in practice, this meant all wood that impinged on the bankfull channel. Table 3.1-3 displays results of this recent inventory (Dolloff et al. 2008).

Table 3.1-3. Total LWD counts from Chattooga Watershed stream inventories conducted in November 2007.

River	Downstream Start Location	Length (miles)	Total LWD	LWD per mile
Chattooga	Confluence with West Fork Chattooga	20.4	4171	205
West Fork Chattooga	Confluence with mainstem Chattooga	6.0	2154	357
Holcomb Creek	Three Forks	2.7	1446	529
Overflow Creek	Three Forks	2.9	551	193

Source: Dolloff et al. 2008

Note: LWD per mile calculated from raw data, which were tallied using 500 meter reaches.

**EXISTING IMPACTS TO THE ENVIRONMENT**

The spatial bound for direct and indirect effects is ¼ mile on either side of the upper Chattooga River and the spatial bound for cumulative effects is the Chattooga River watershed. The temporal bound of analysis for cumulative effects analyzes projects and land usage within the watershed that have taken place within the last five years and the foreseeable projects in the next five years.

Estimates of biophysical impacts in the upper Chattooga Corridor are based on recent monitoring conducted in 2006-07 (USDA 2007) that included documenting all the designated and user-created trails, amount of litter along trails, the number and condition of campsites (bare ground, cleared area, cut trees, and amount of litter), sites with erosion problems and the proportion of

trail and camps within 20 feet of the river. The monitoring effort covered National Forest System (NFS) lands in the basin from Grimshawes Bridge to Tugaloo Lake, including the West Fork. This monitoring effort documents baseline information about biophysical impacts.

Increased use has resulted in an abundance of user-created trails, campsites, and stream crossings especially in areas that are important to a variety of user groups. Dispersed recreation is problematic because it often occurs in areas that are most sensitive to disturbance.

Dispersed recreation is especially detrimental to stream channels when it is located directly on streambanks. Impacts to vegetation in riparian areas can occur even with low to moderate usage levels (Whittaker and Shelby 2007). This user-created disturbance results in banks that are often denuded or stripped of vegetation and that increase the potential for erosion of soil into stream channels.

Sedimentation in stream channels is the primary indirect effect of erosion from dispersed recreation. The primary impact of sedimentation is a loss of quality habitat for aquatic organisms. Sediment can also increase turbidity, change stream temperature, alter substrate size and distribution, and alter channel morphology.

### Campsites

The number and size of user-created campsites is one outcome of dispersed recreation. Table 3.1-4 provides information on the number of campsites, cleared area and bare ground associated with those campsites. The greater the total bare ground and cleared area, the greater the erosion potential. The Rock Gorge reach has more campsites and associated bare and cleared ground than the other reaches; however 30 of these sites are in the designated walk-in campground off Burrells Ford Road.

**Table 3.1-4. Data on the size and number of campsites on the upper Chattooga.**

Reach	# of Camps	# of Camps within 20 ft. of the river	# of Camps/River Mile	Total Bare Ground (sq. ft.)	Total Cleared Area (sq. ft.)
Chattooga Cliffs	3	1	0.6	3,500	3,850
Ellicott Rock	40	4	7.5	13,944	60,113
Rock Gorge	*62	15	8.4	46,642	105,309
Nicholson Fields	22	6	5.8	5,076	20,853
Total	127	26	n/a	69,162 (1.6 acres)	190,125 (4.4 acres)

Sources: USDA 2007 and Whittaker and Shelby 2007

\*This number includes 30 designated campsites in the Burrells Ford campground.

### Designated and User-Created Trails

*Designated trails* are trails planned and designed to minimize impacts to soil and water resources by locating them on adequate grades with water diversion structures, proper slopes and stable soils. They are maintained to minimize erosion and off-site soil movement.

*User-created trails* are created by forest visitors during recreational activities such as fishing, camping or hiking. These trails are often poorly located, within close proximity to streams or streambanks, do not meet trail design specifications/standards, receive no maintenance, and do not meet erosion control specifications. User-created trails often lead off a designated trail and go down steep slopes to a major stream or the Chattooga River. Over time, continued use of these user-created trails contributes directly to compacted soils, development of entrenched areas and results in areas of concentrated flow. Direct and indirect effects include erosion with sediment delivery to streams. Designated trails can also cause erosion and sedimentation when they are poorly maintained and receive high use.

Table 3.1-5 displays the number of miles of designated and user-created trails in the upper Chattooga Corridor. This table also shows the number of erosion problems in each reach and gives standardized figures for the average number of erosion problems per trail and river mile.

**Table 3.1-5. Summary of trail information for the entire upper Chattooga River Corridor (all reaches and for a distance of ¼ mile on both sides of the Chattooga River).**

Reach	Designated Trail (mi)	User-created Trails (mi)	# of Erosion Points	User-Created Trail Miles per River Mile	# Erosion Points per Trail Mile	# Erosion Points per River Mile
Chattooga Cliffs	6.1	1.9	3	0.4	0.375	0.6
Ellicott Rock	13.4	2.5	17	0.5	1.1	3.2
Rock Gorge	11.1	8.4	44	1.1	2.5	6.0
Nicholson Fields	4.4	6.5	27	1.7	2.1	7.1
Total	35	19.3	91	n/a	n/a	n/a

Sources: USDA 2007, and Whittaker and Shelby 2007

Table 3.1-6 displays the mileage of a subset of all trails that are in close proximity to the Chattooga River (USDA 2007). The first two columns show miles of designated and user-created trails within 100 feet of the river. The last two columns show the mileage of a subset of trails that are in very close proximity to the river (within 20 feet).

**Table 3.1-6. Summary of trail information for trails within 20 and 100 feet of the Chattooga River (all upper Chattooga reaches).**

Reach	Designated Trails Within 100 ft of River (mi)	User-created Trails Within 100 ft of River (mi)	Designated Trails Within 20 ft of River (ft)	User-created Trails Within 20 ft of River (ft)
Chattooga Cliffs	1.7	0.3	1,300	360
Ellicott Rock	2.6	1.2	1,580	1,033
Rock Gorge	3.8	2.4	3,536	2,901
Nicholson Fields	0.9	5.9	0	3,170
Total	9	9.8	6,416 ft (1.21 mi)	7,464 ft (1.41 mi)

Sources: USDA 2007, and Whittaker and Shelby 2007

For the upper Chattooga Corridor, data from these tables indicate that the total distance of user-created trails within 20 feet of the Chattooga River is equal to or slightly greater than the total distance of designated trails (1.21 miles designated and 1.41 miles user-created). When the entire

Chattooga Corridor above Highway 28 is considered (including areas more than 20 feet from the river), there are 35 miles of designated trail and another 19 miles of user-created trails.

**ENVIRONMENTAL CONSEQUENCES**

**Effects of the Alternatives on Water and the Riparian Corridor**

Alternative 1 is considered the baseline for comparing direct, indirect and cumulative effects of the alternatives. Table 3.1-7 summarizes current plan direction for each of the three national forests for best management practices (BMPs).

Table 3.1-7. Current Forest Plan Direction for BMPs.

	Georgia	South Carolina	North Carolina
BMPs	<p><b>Standard FW-70:</b> Implement current GA Rules and Regulations for Water Quality Control for all projects as a minimum to meet water quality objectives. Georgia's BMPs for Forestry will be met or exceeded to meet water quality objectives for silviculture and related treatments.</p>	<p><b>Standard FW-1:</b> Water quality, soil productivity, and channel structure are protected using BMPs to avoid impacts to water quality and soils. Where riparian prescription direction differs from BMP, the more restrictive or protective prescription will be followed.</p> <p><b>Standard FW-2:</b> Where BMPs are not specifically designed for activities, apply similar preventive measures as published in Forestry BMPs to avoid, minimize or mitigate effects to water quality, Streamside Management Zones and soils.</p>	<p><b>FW Standard (soil &amp; water):</b> Prevent visible sediment from reaching perennial and intermittent stream channels and perennial water bodies in accordance with NC Forest Practice Guidelines Related to Water Quality (NC PGRWQ)</p>

Source: USDA 2004a, USDA 2004b, USDA 1994.

On all three national forests, riparian resources are managed to maintain a diversity of ecological and social benefits, including both dispersed and developed recreation opportunities. Although these activities can have potential impacts to riparian corridors, they are allowed because the majority of forest users prefer to recreate in or near bodies of water. Current recreation areas and facilities are maintained to minimize impacts to water quality, shorelines, and streambanks. Roads, trails and other activities in the riparian corridor that are causing undesirable resource impacts are identified for appropriate mitigation measures, including possible closure (USDA 2004a, USDA 2004b, USDA 2004c, USDA 1994).

The cumulative effects analysis assumes that baseline conditions in the Chattooga watershed are generally good, but some stream segments are impaired due to excessive sedimentation from a combination of past and existing activities and the associated legacy/stored sediment and existing sediment sources such as unpaved roads. Streams draining private lands generally show a higher level of impairment and would remain that way into the foreseeable future.

Future activities can contribute to these effects or alleviate some of the problems. Foreseeable future activities on private lands are assumed to be similar to those currently taking place in the watershed. Anticipated development and growth in the mountains is expected to result in

increased impervious surfaces. Agricultural practices are assumed to continue at a similar pace and will likely result in little change in riparian conditions on private lands within the foreseeable future. On NFS lands, the reasonably foreseeable future actions include continued road maintenance/use, trail maintenance/use, and developed and dispersed recreation. Table 3.1-8 summarizes existing land cover/use in the Chattooga River watershed for NFS and private lands, based on data from the Multi-Resolution Land Cover (MRLC) Data project.

Table 3.1-8. Summary of existing acres of land cover by uses within the Chattooga River watershed.

Land Cover	National Forest	Private	Total
Barren Land	131	83	214
Cultivated Crops	28	227	255
Deciduous Forest	82,791	27,944	110,735
Developed, High Intensity		50	50
Developed, Low Intensity	15	561	576
Developed, Medium Intensity		198	198
Developed, Open Space	2,369	6,324	8,693
Evergreen Forest	28,005	5,113	33,118
Hay/Pasture	484	5,434	5,918
Herbaceous	349	1,034	1,384
Mixed Forest	11,892	3,697	15,589
Open Water	62	422	484
Shrub/Scrub	585	696	1,280
Woody Wetlands	131	127	258

Source: MRLC data, 2001. Acres approximate

**Past, Present, and Reasonably Foreseeable Future Actions**

Table 3.1-9 displays known past, present and reasonably foreseeable future actions on National Forest lands within the Chattooga watershed that may contribute cumulatively to the direct and indirect effects of proposed activities within the Chattooga River Corridor. More information about the activities listed below is available from each District. Beginning year is 2002.

Table 3.1-9. Past, present, and reasonably foreseeable future actions within the Chattooga River watershed.

State	Activity	Year(s) Implemented	Acres/Miles Affected	Past	Present	Reasonably Foreseeable
GA	Finney Creek	2002	55	X		
	Burn 1 on Big Ridge	2003	1150	X		
	Licklog Prescribed (Rx) Burn	2003	790	X		
	Camp Creek Rx Burn	2004	1596	X		
	Roach Mill Rx Burn	2004	550	X		
	Wolf Creek Rx Burn	2005	130	X		

Section 3.1.1 Water and Riparian Corridor

State	Activity	Year(s) Implemented	Acres/Miles Affected	Past	Present	Reasonably Foreseeable
GA	Ducks Nest Gap Rx Burn	2006	1050	X		
	Highway 28 Wildfire	2006	180	X		
	Roach Mill Rx Burn	2008	695			X
	Chintilly Rx Burn	2008	230			X
	Buck Br./Dan Gap Thinnings	2009 – 2010	70			X
	Waterguage Road Woodland	2009	232			X
	Sarah's Creek Campground Invasive Plant Treatment	2009	7			X
	Wolf Creek Forest Health Thinnings	2008	100			X
	Woodall Shoals Rx Burn	2010 – 2011	1100			X
	Buckeye Branch/Lick Log Rx Burn	2010 – 2011	2470			X
	Large Scale Vegetative Assessment (several individual projects expected)	NEPA Decision expected late 2008	400 - 600			X
SC	Sandy Ford Rx Burn	2002, 2005	400	X		
	Loblolly Thinning/Removal	2008 – 2010	1000			X
	Crane Mountain Rx Burn	2008 – 2009	300			X
	Earls to Sandy Rx Burn	2008 – 2009	1000			X
NC	Cane Creek Road Project (storm project)	2005	1	X		
	Bull Pen Road Reconstruction (storm project)	2006	4	X		
	Chattooga River Trail Reconstruction (storm project)	2006	4	X		
	White Bull/Blue Ox Timber Sales	2007	225		X	
	Bull Pen/Journ McCall Paving Project (NCDOT proposal)	2008	1.5			X
	Whiteside Cove Paving (NCDOT Proposal)	2008	3			X
	Garnet Hill Paving (NCDOT proposal)	2008	.3			X
	County Line Road Parking Lot Construction	2009	1			X
All States	Wildlife Opening Maintenance	Ongoing			X	X
	System Road Maintenance	Ongoing			X	X
	Recreational activities including hiking, biking, and driving for pleasure.	Ongoing – various locations			X	X

Source: US Forest Service – Nantahala Ranger District, Andrew Pickens Ranger District, Chattooga River Ranger District

Since cumulative effects are considered for the entire Chattooga watershed, information about existing conditions downstream of Highway 28 are described below. Table 3.1-10 displays

information about dispersed campsites on Chattooga River downstream of Highway 28 and the West Fork Chattooga.

Table 3.1-10 Data on the size and number of camps on the lower Chattooga.

Reach	# of Camps	# of Camps within 20 Ft. of the river	# of Camps/River Mile	Total Bare Ground (sq. ft.)	Total Cleared Area (sq. ft.)
Hwy 28 to Hwy 76	70	12	3.5	26,788	82,552
Hwy 76 to Tugaloo	17	1	2.8	4,414	15,099
West Fork Chattooga	14	2	2.3	940	40,188
Total	101	15	n/a	32,142 (0.7 acres)	137,839 (3.2 acres)

Sources: USDA 2007 and Whittaker and Shelby 2007

Table 3.1-11 displays trail mileage and erosion problems for the lower Chattooga River and the West Fork. Table 3.1-12 summarizes additional trail information and extent of erosion associated with trails in close proximity to the lower Chattooga and West Fork.

Table 3.1-11. Summary of trail information for the lower Chattooga River and the West Fork Chattooga.

Reach	Designated Trails (mi)	User-created Trails (mi)	# of Erosion Points	User-created Trail Miles per River Mile	# of Erosion Points per Trail Mile	# of Erosion Points per River Mile
Hwy 28 to Hwy 76	36.8	18.6	72	0.9	1.3	3.6
Hwy 76 to Tugaloo	3.0	7.5	11	1.3	1	1.8
West Fork Chattooga	5.4	7.0	8	1.2	0.6	1.3
Total	45.2	33.1	91	n/a	n/a	n/a

Sources: USDA 2007, and Whittaker and Shelby 2007

Table 3.1-12. Summary of trail information for trails in close proximity to the lower Chattooga River and the West Fork Chattooga River.

Reach	Designated Trail Within 100 ft of River (ft)	User-created Trails Within 100 ft of River (ft)	Designated Trail Within 20 ft of River (ft)	User-created Trails Within 20 ft of River (ft)
Hwy 28 to Hwy 76	28,645	44,089	2,648	8,344
Hwy 76 to Tugaloo	1,001	6,135	307	1,690
West Fork Chattooga	254	16,704	312	10,517
Total	29,900 (5.7 mi.)	66,928 (12.7 mi.)	3,267 (0.6 mi.)	20,551 (3.9 mi.)

Sources: USDA 2007, and Whittaker and Shelby 2007

**Alternative 1 – Direct and Indirect Effects**

Implementation of Forestwide Standard 81 in the Sumter LRMP will rehabilitate and close all backcountry dispersed campsites within 50 feet of the Chattooga River and its tributaries in

South Carolina. Replacement campsites will likely be constructed outside the 50-foot zone although not as many campsites would be constructed as close to one another. This redistribution of campsites as well as closing or designating user-created trails will reduce erosion and sedimentation.

**Alternative 1 – Cumulative Effects**

This alternative would not create new sources of sedimentation; current sediment problems at campsites would be reduced through mitigation of existing resource damage. These improvements may be offset by further resource damage if the number of user-created camps and trails continues to increase as use increases. Ongoing management actions associated with the maintenance of roads, trails and recreation sites would continue.

Cumulative effects of the other alternatives are discussed at the end of section 3.1.1.

**Alternative 2 – Direct and Indirect Effects**

Overall, this alternative will result in reducing the potential for sedimentation. New campsite restrictions will alleviate some erosion and sedimentation as displayed in Table 3.1-13. As site-specific projects are implemented, the agency would ensure that water quality is maintained or improved through the use of vegetative buffers, minimizing concentrated flow or hardening of designated sites.

Table 3.1-13. Estimated number of potential campsites closed and ground rehabilitated, based on campground spacing described in Alternative 2.

Reach Name	Potential # Camps Closed <sup>1</sup>	Bare Ground Rehabilitated (sq. ft.) <sup>2</sup>	Cleared Area Rehabilitated (sq. ft.) <sup>2</sup>
Chattooga Cliffs	0	0	0
Ellicott Rock	20	7,000	30,000
Rock Gorge	0 (if designated campsites are not considered) 25 (when all campsites are considered)	0 18,750	0 42,500
Nicholson Fields	9	2,070	8,550
Total	54	27,820	81,050

<sup>1</sup> The potential number of camps closed in this alternative was calculated by determining the number of campsites in each reach that would result in an average of four sites per mile, and subtracting that number from the total number of current campsites.

<sup>2</sup> The bare ground and cleared area rehabilitated were calculated by multiplying the number of potential closed campsites by the average bare ground of each camp per reach and the number of potential closed campsites by the average cleared area per campsite by reach, respectively.

This alternative does not include standards that restrict camping near streams, but instead addresses conditions of unacceptable resource damage. New parking restrictions may result in reduced erosion and sedimentation; however, these effects would be minimal because roads and road use are still present

**Alternative 3 – Direct & Indirect Effects**

In this alternative, erosion and sedimentation from existing user-created trails would be reduced over time but to a lesser extent than Alternative 2. In addition, Alternative 3 does not have a campsite density limit and would result in fewer campsite closures than Alternative 2. Therefore,

somewhat less acreage of rehabilitated dispersed camping sites would occur under this alternative. As in Alternative 2, designated campsites would include features to mitigate erosion and sedimentation. Reduced impacts from parking would be the same as in Alternative 2.

**Alternative 4 – Direct and Indirect Effects**

Erosion and sedimentation from existing user-created trails would be the same as Alternative 3. Reduced impacts from parking would be the same as Alternative 2. As use increases in the corridor, user-created features such as campsites and trails would be expected to increase over time if not monitored.

Increased use of County Line Road Trail by boaters and the creation of new portage trails could result in slightly more compaction, erosion and sedimentation than in alternatives 2 or 3. The addition of boating in the upper Chattooga increases the potential for unauthorized LWD removal in sections of the upper Chattooga opened to boating.

**Alternative 5 – Direct and Indirect Effects**

Direct and indirect effects from existing trails and dispersed camping are expected to be similar to Alternative 4. Reduced impacts from parking would be the same as Alternative 2. Impacts from increased use in the corridor would be similar to Alternative 4. Potential sedimentation impacts from put-ins, take-outs and portage trails would be greater than Alternative 4 because an additional six miles of river would be open to boating. The level of boating and the time of year in which it occurs could also increase impacts. The addition of boating in the upper Chattooga increases the potential for unauthorized LWD removal in sections of the upper Chattooga opened to boating.

**Alternative 8 – Direct and Indirect Effects**

Direct and indirect effects from existing trails and dispersed camping are expected to be higher than alternatives 4 and 5. Increased visitor numbers, combined with increased numbers of scenic boaters, additional camping and associated impacts may occur. Potential sedimentation impacts from put-ins, take-outs, and portage trails are similar in type to those in alternatives 4 and 5, but would occur over a greater extent along 20 miles of river. Additional user-created trails due to scouting and portages around major rapids also may occur. Of all the alternatives, this alternative would likely result in the most potential impacts to water quality and the riparian corridor from sedimentation. Adding boating may result in more campsite use which could lead to increased soil and water impacts. Reduced impacts from parking would be the same as in Alternative 2. The addition of boating in the upper Chattooga increases the potential for unauthorized LWD removal in sections of the upper Chattooga opened to boating.

**Alternative 9 – Direct and Indirect Effects**

Direct and indirect effects from existing trails and dispersed camping are similar to Alternative 4. Reduced impacts from parking would be the same as in Alternative 2. Impacts from increasing use in the corridor would be similar to Alternative 5 and would include potential sedimentation impacts from put-ins, take-outs and portage trails as in alternatives 4 and 5, but along six miles of river – less distance than alternatives 4, 5, 8 or 10. However, boating under alternatives 8, 9, and 10 includes more of the steep Chattooga Cliffs reach which could increase the number of portages and associated erosion and sedimentation impacts. The addition of boating in the upper

Chattooga increases the potential for unauthorized LWD removal in sections of the upper Chattooga opened to boating.

**Alternative 10 – Direct and Indirect Effects**

Direct and indirect effects from existing trails and dispersed camping are similar to Alternative 4. Reduced impacts from parking would be the same as Alternative 2. Impacts from increasing use in the corridor would be similar to Alternative 5 and would include potential sedimentation impacts from put-ins, take-outs and portage trails as in alternatives 4 and 5, but along 20 miles of river. The potential for additional user-created trails due to scouting and portages around major rapids also would exist. While the length of river open to boating is the same as Alternative 8, flow and season restrictions would result in many fewer boatable days and therefore less potential sedimentation impacts than Alternative 8. The addition of boating in the upper Chattooga increases the potential for unauthorized LWD removal in sections of the upper Chattooga opened to boating.

**Alternatives 2, 3, 4, 5, 8, 9 and 10 – Cumulative Effects**

Studies indicate that unpaved roads and non-point source pollution from private lands are the major sources of sediment in the Chattooga watershed (Van Lear et al., 1995; US EPA, 1999; Clinton and Vose 2003). Historical land disturbances during the period when many lands in the eastern U.S. were first cleared have also contributed to current sediment loads. This is often referred to as “legacy sediment” within the stream channel. Bank erosion is another in-stream source of sediment that is considered when evaluating overall sediment loading.

The Forest Service has undertaken major projects to address the issue of water quality and sedimentation within the watershed. The Chattooga River Large Scale Watershed Restoration Project included an annual program of work to address roads, trails and erosion in all three states over approximately five years. Regular, ongoing management actions like road maintenance, campsite hardening/rehab and the implementation of BMPs have also contributed to the goal of reducing erosion and sedimentation. See Table 3.1-9 for both a list of activities currently taking place and activities expected in the watershed in the future.

Activities or requirements within each alternative would probably further contribute to reducing cumulative watershed effects from sedimentation. User-created trails and campsites would be eliminated or designated over time. Designated trails would be evaluated for possible reroutes to mitigate environmental degradation. Although sediment contributions from trails and campsites are estimated to be less than contributions from roads and other major sources, reducing recreation-related sediment sources would improve in-stream conditions over time. This conclusion is based, in part, on the recent biophysical inventory that documented intensive recreation use within the corridor, including numerous user-created features and erosion sites.

The alternatives that include boating would likely add varying amounts to the increasing numbers of users, thereby slightly increasing the potential for impacts from sedimentation. These increases could be offset by watershed improvements as impacts from user-created features (trails, camps, roadside parking) are addressed in all alternatives.

The limited designated parking within the watershed is a relatively minor sediment source compared to sediment from roads and other major sources. Closing parking near Burrells Ford Bridge would reduce impervious surfacing near this crossing. With the loss of parking spaces in several of the alternatives, these areas would also recover over time and result in less compacted or impervious surface. Rehabilitation of the lost parking areas would also reduce sediment originating from these sites. Cumulatively, there would be less parking effects over time (erosion and sedimentation) with most alternatives (2-5 and 8-10).

When all watershed impacts are considered in the Chattooga watershed, as well as associated mitigations, there would be no cumulative effects resulting from any alternative.

### 3.1.2 Soils

#### SUMMARY OF FINDINGS

In analyzing the proposed alternatives, the soils analysis examined impacts associated with trails, campsites, parking areas, roads and potential portaging needs in the upper Chattooga Corridor. The primary impacts on soils in the upper Chattooga River Corridor are expected to be associated with erosion, sedimentation and compaction. Although user-created trails, dispersed campsites, and parking areas, along with chronic erosion points, are ongoing sources of soil impacts, they are minor when compared with chief contributors to erosion and sediment input such as roads and road maintenance. Similarly, impacts from introducing boating also would be minor.

Over time, implementation of forest standards and BMPs in Alternative 1 would reduce existing levels of soil erosion and compaction, although these improvements may be slowed by continuing increases in overall use that create new biophysical impacts. The other alternatives propose reductions in impacts to soils by closing and rehabilitating problematic campsites, closing or mitigating damaged trails and eliminating roadside parking near Burrells Ford Bridge. Alternative 2 is expected to provide the greatest reduction in impacts by lowering current user levels and restricting all users. The boating alternatives all include the potential for designated portage trails around log jams in the river. Alternatives 4 and 5 would have the lowest portage impacts, and Alternative 8 is expected to have the highest likelihood of increased erosion and sedimentation from increased portages as well as the greatest additional impacts on trails from the largest potential increase in users.

#### AFFECTED ENVIRONMENT

Two primary soils exist in the upper Chattooga River Corridor: (1) micaceous soils, which erode easily and are prominent near the South Carolina and North Carolina border and (2) upland soils, which are located on gently sloping to very steep ridges and side slopes with a high level of clay and usually stable on gently sloping terrain. Two others make up less than 10% percent of soils: (1) alluvial flood plain soils, which are stable when undisturbed but susceptible to compaction and/or erosion when disturbed and (2) colluvial soils, which are sensitive to ground-disturbing activities due to their severely erosive and unstable nature.

These soils have various levels of sensitivity to impacts from trails, campsites and parking areas. Table 3.1-14 lists each activity and rates its potential effects to the soil resource. The following assumptions were used:

- Trails and campsites are located on grades of less than 12 percent, with dips and other structures that limit concentrated flows;
- At least a 20-foot buffer of vegetative cover of trees next to the river can be sustained through management;
- Parking lots are graveled and roadside parking is managed, with erosion control and stormwater mitigations installed and functioning.

Table 3.1-14. Soil ratings for recreation use activities

Soil Types	Trails	Campsites	Parking Areas
Micaceous (42.3%)	H	H	H
Upland (44.8%)	L-M	L	L-M
Colluvial (8.9%)	H	H	H
Alluvial (2.3%)	M	M	M

L = low effects, generally acceptable but some mitigation may be needed

M = medium effects, mitigation likely needed

H = high effects, difficult to mitigate, avoid if possible

## EXISTING IMPACTS TO THE ENVIRONMENT

Existing sources of soil disturbance include designated and user-created trails, dispersed campsites, parking lots, trailheads, roads and wildlife openings. Erosion is occurring along the entire trail system, on roads, parking areas, identified erosion sites, access points and at all campgrounds with bare soil. A total of 91 active sediment delivery erosion points have been identified, totaling 11,087 square feet of eroded areas within the upper Chattooga Corridor. A substantial amount of erosion occurs at river access points due to slope and soil types. Roads and parking areas have the potential for erosion depending on their location, condition, slope, grade and surface material. Many of the campsites occur in flat areas where erosion is not an issue. However, campsites and trails that are located on slopes in close proximity to the water are of most concern.

In addition to roads, which are the main sediment source, erosion is also associated with:

- *User-created trails* have more potential for erosion and sediment entering the stream because of their location and lack of design and maintenance. As a result, they are periodically eroded during storm and flood events and become more entrenched over time, as well as more efficient at eroding and delivering sediments.
- *Dispersed campsites* are of concern due to their sheer number, their lack of design and maintenance and their close proximity to the river. Many contain short segments of user-created trail that connect directly to the water's edge and provide a means for eroded soil to be transported directly into the river. The closer the sites are to the river, the less chance there is for vegetation and litter to trap soil particles.
- *Parking lots and associated trailheads* are of concern since ditch lines and access trails provide a means for soil to be transported and deposited directly into the river as sediment. All parking lots have graveled surfaces that are maintained by grading. The trailheads are sometimes located on steep grades and have a compacted soil surface, although a few that are adjacent to roads and stream crossings have rocked surfaces.
- *Roadside parking* is a concern since it can damage the road berms and roadside vegetation, leaving the soil exposed. The amount of erosion increases from roads during rainfall due to the lack of a vegetative cover protecting the soil surface. Where the road berm is used to control road surface drainage, damage to the berm can cause severe erosion of road fill materials and sediment into the river.

Tables 3.1-4, 3.1-5 and 3.1-6 in Section 3.1.1 display data on existing campsites and trails in the upper corridor and associated erosion points and bare ground for each reach. The following discussion provides additional descriptions of existing soils-related conditions in each reach.

### **Chattooga Cliffs Reach**

The graveled and maintained parking lots at Grimshawes Bridge provide the greatest potential for off-site soil movement because of their association with trailheads and trails that provide direct river access. The stream in this reach is dominated by fine sediment particulates above the Grimshawes Bridge that suggests that erosion sources exist and are actively contributing within the eight square mile drainage above this area.

Three erosion sites are located in this reach, most of which are small; however, some are long and narrow down steep grades and sometimes lead to the river. In the past, they were used as access points to the river or as old camp sites. A large percentage of private forested lands exist within this reach. No known agriculture or other ground disturbing activities on private lands occur here.

### **Ellicott Rock Reach**

As the elevation drops, the soils in this reach are somewhat less micaceous than in the Chattooga Cliffs reach. In general the floodplains and terraces become locally wider. Colluvial soils are found on several locations. The landscape has more floodplains and river terraces which would allow more camping opportunities. Two graveled roads cross the river in this reach (Highway 1178 at Bull Pen and Highway 708/646 at Burrells Ford Bridge).

### **Rock Gorge Reach**

The floodplains and terraces are broader here than in the Ellicott Rock reach. Colluvial soils are found on several locations. Burrells Ford Campground has roads and short access trails from campsites to the river's edge. The campground is slightly sloping, and evidence of erosion can be found at some roads and campsites. Vegetation is broken along the stream bank reflecting recreation use impacts. Most areas are not actively eroding but soil movement into the river likely occurs during high storm events. One gravel road crosses the river in this reach (Highway 708/646 at Burrells Ford Bridge).

### **Nicholson Fields Reach**

The soils in this reach are similar to the Rock Gorge reach, including the floodplains and terraces. Wider floodplains and terraces are located in this reach.

## **ENVIRONMENTAL CONSEQUENCES**

### **Effects of the Alternatives on Soils**

#### **Alternative 1 – Direct and Indirect Effects**

This alternative would reduce soil erosion and compaction over time through mitigation of existing resource damage and application of BMPs. However, these improvements may be counteracted by continuing increases in overall use that create new biophysical impacts. The

following discussions describe any differences in expected effects on soils for the four reaches in the upper corridor.

### **Chattooga Cliffs Reach**

Implementation of current Forest Plan standards and compliance with BMPs or similar soil and water conservation practices designed to limit erosion, sediment and other water quality impacts would reduce the current adverse effects to soils from user-created and designated trails, campsites and parking areas over time through site-specific projects.

### **Ellicott Rock Reach**

This reach occurs on all three National Forests and is mostly contained in the Ellicott Rock Wilderness. The small differences in the management of trails, campsites, and parking areas for each Forest Plan would not result in any substantial differences in the environmental effects over time if all were fully implemented. All three forests that manage this reach emphasize protecting riparian areas, soil, water and vegetation by closing, rehabilitating or reconfiguring designated trail systems. The user-created campsites in this reach are on locations with no design techniques employed and receive no maintenance. Although there are no specific campsite standards for the Chattooga Corridor itself, each forest relies on forest-wide standards for managing recreation. It is unclear how many campsites might be closed on the Nantahala and Chattahoochee National Forests through full implementation of forest plan direction. On the Sumter National Forest, the standard is clear that all campsites within 50 feet of the river would be closed. Over time, current adverse effects to soils from user-created and designated trails, campsites and parking areas would be reduced with implementation of Forest Plan and Wilderness standards.

### **Rock Gorge Reach**

Similar to the Ellicott Rock reach, current adverse effects to soils from user-created and designated trails, campsites and parking areas would be reduced over time with the implementation of current Forest Plan standards.

### **Nicholson Fields Reach**

Effects in this reach are the same as those for the Rock Gorge reach.

Cumulative effects for all alternatives are discussed at the end of section 3.1.2.

### **Alternative 2 – Direct and Indirect Effects**

In this alternative, trails, dispersed camping and parking areas affect the soil resource. The effects discussed under Alternative 1 by stream reach relative to erosion points, parking lots and trailheads, roads and bridges would not change.

Reservations for camping would likely reduce the chances of soil erosion from any new campsites. In addition, closing and re-routing trails would reduce chronic erosion from poorly located existing user-created trails, especially those directly on top of stream banks and in riparian areas.

For the other three reaches, the elimination of approximately 40 percent of campsites would result in a substantial reduction in soil erosion, compaction and disturbance. Closing and

rehabilitating campsites would allow stream bank vegetation to recover and reduce direct erosion into the river. With rehabilitation and signage to prohibit further camping, these sites would recover quickly and the soil litter layer would again rebuild where bare soil is exposed. This would lead to reduced overland water flow, reduced erosion from flooding and help in rebuilding soils.

User-created trail closures would reduce soil disturbance and compaction leading to improved soil productivity, especially in riparian areas. Fewer impacts on stream banks and limited access to the water's edge would lead to improved bank stability and protection over time. Tree, shrub and grass roots would help stabilize the riverbank and prevent accelerated erosion during flooding in riparian areas.

New parking restrictions would prevent rutting and damage to road ditch lines and cross-drain structures as well as protect roadside vegetation. They also would promote more control of water before it can erode away the ditches and damage or remove vegetation. This alternative also would reduce soil erosion that would result in sedimentation mainly associated with Burrells Ford. Permitting all users and restricting campsites would indirectly reduce erosion and compaction.

#### **Alternative 3 – Direct and Indirect Effects**

The effects discussed under Alternative 1 by stream reach relative to erosion points, parking lots and trailheads, roads and bridges are the same for Alternative 3. In addition, the effects of trails and campsites under this alternative are similar to Alternative 2 although not as restrictive.

In the Chattooga Cliffs, additional soil impacts are not expected from that already described for Alternative 1 for this reach. For the other three reaches, soil erosion, compaction and disturbance associated with camping would decrease but not to the level of Alternative 2. Effects of new parking restrictions on soils would be the same as under Alternative 2.

#### **Alternative 4 – Direct and Indirect Effects**

Under this alternative, effects associated with campsites and trails would be similar to those described in Alternative 3. The effects for all stream reaches relative to erosion points, parking lots and trailheads, roads and bridges are the same as Alternative 1.

As stated in Section 3.1.1, designated portage trails may occur under this alternative but not to the extent of the other alternatives that provide boating above Highway 28. As the length of the river available for boating, levels of use and number of portage trails increase, the potential for soil disturbance would increase.

Implementing designated portage trails rather than allowing user-created portage trails would minimize impacts to other resources such as sensitive plants and areas susceptible to soil erosion. Portage trails would move and proliferate depending on changes in the river and the anticipated felling of hemlock; their movement and proliferation may cause increased soil disturbance from compaction and displacement on the trail tread. Erosion and sediment would also increase from exposed soils during intense rainfall and runoff periods.

**Alternative 5 – Direct and Indirect Effects**

The effects discussed under Alternative 1 by stream reach relative to parking lots and trailheads, roads and bridges are the same for Alternative 5. Effects to campsites and trails (except portage trails) are the same as Alternative 3. Potential designated portage trails in this alternative would have similar impacts to those described in Alternative 4, although the distribution of potential portage trails is expected to be more than in Alternative 4, and use levels and degree of impacts would be slightly higher. Impacts from parking would be the same as in Alternative 3.

**Alternative 8 – Direct and Indirect Effects**

Under this alternative, effects associated with campsites and trails would be similar to Alternative 3, although this alternative has the potential for the largest increase in users and the greatest additional impacts on trails. The other effects discussed under Alternative 1 for all stream reaches relative to erosion points, parking lots and trailheads, roads, and bridges are the same for Alternative 8.

This alternative is expected to have the highest potential impact on soil erosion and compaction since it provides unlimited boating opportunities above Highway 28. Portage frequency and impacts are anticipated to be higher than Alternatives 4 and 5 due to higher levels of boating over greater distances. Also, the put-in point for boating starts further upstream than the previous alternatives, so the need for portaging in this steep section of the river is expected to be greater. Four-person rafts allowed in this alternative would likely further increase the number of portages. Overall, the potential for impacts from portage trails is highest for Alternative 8 compared to all other alternatives.

**Alternative 9 – Direct and Indirect Effects**

Under this alternative, effects to campsites and trails (except portage trails) are the same as those described for Alternative 3. The effects discussed under Alternative 1 by stream reach relative to parking lots and trailheads, roads and bridges are the same for Alternative 9. Impacts from portage trails are less than Alternative 8 and more like alternatives 4 or 5. Impacts from parking would be the same as in Alternative 3.

**Alternative 10 – Direct and Indirect Effects**

As with the other boating alternatives, effects to campsites and trails (except portage trails) are the same as those described for Alternative 3. The effects discussed under Alternative 1 by stream reach relative to parking lots and trailheads, roads and bridges do not change. The potential for portage trails is greater than in alternatives 4, 5 and 9 but less than in Alternative 8. Impacts from parking would be the same as in Alternative 3.

**Cumulative Effects for All Alternatives**

Up to 80 percent (Van Lear et al. 1995) of soil erosion comes from the 43 miles of existing roads, bridges and parking lots that enter and cross the Chattooga River Corridor. Road maintenance activities that blade road surfaces and clean ditch lines tend to cause erosion unless armoring is done and an adequate number of cross-drains are established. Variations for soil erosion, compaction, disturbance and overall productivity among any of the alternatives are not measurably different at the river corridor or Chattooga watershed scale.

Soil-disturbing recreational activities in the Chattooga River Corridor include activities that use roads, parking lots, trailheads, trails and campsites. Recreation management activities aimed at reducing resource impacts associated with water runoff and subsequent erosion include road, parking lot/trailhead and trail maintenance. They help decrease soil erosion in the corridor.

All of the proposed alternatives would result in closed and rehabilitated campsites, trails and erosion points, thus reducing adverse affects on soils. Reductions in erosion are likely under all alternatives with improved recreation management, but would still be minor when placed in context with contributions made from existing roads.

### 3.2 BIOLOGICAL RESOURCES

The Vegetation, Wildlife and Aquatic sections under Biological Resources reference a status rank to certain species in the analyses. Nature Serve (2007) assigns a global conservation status rank to species. The State Natural Heritage Programs use the same ranking standards, but on a state level instead of a global level (see Table 3.2-1)

Table 3.2-1 Global and state conservation status ranks to species (Nature Service 2007 and SC, NC and GA state natural heritage programs)

Global status rank	State status rank	Meaning
G1	S1	Critically Imperiled – at very high risk of extinction due to extreme rarity, very steep declines or other factors
G2	S2	Imperiled – at high risk of extinction due to very restricted range, steep declines or other factors
G3	S3	Vulnerable-at moderate risk of extinction due to a restricted range, relatively few populations, recent and widespread declines, or other factors
G4	S4	Apparently Secure – uncommon but not rare; some cause for long term concern due to declines or other factors
G4Q		G4 species with questionable taxonomy that may reduce conservation priority
G5	S5	Secure – common, widespread and abundant
GNR	SNR	Not Ranked – the rank has not been assessed
G4Q		G4 species with questionable taxonomy that may reduce conservation priority
	S?	Uncertain Rank – Inexact or uncertain numeric rank

To help evaluate the effects of management practices on plants, animals and fisheries, the management indicator species (MIS) concept is used in this section of the analysis. MIS are defined as an animal or plant species selected for use as a planning tool in accordance with 1982 National Forest Management Act regulations (36 CFR 219.19). They are used to help set objectives, analyze effects of alternatives and monitor plan implementation. MIS are chosen because their population changes are believed to indicate the effects of management on selected biological components. Management indicators refer to communities (all the plants and animals that represent that community) that serve the same function.

To further substantiate the findings in this section a Biological Assessment / Biological Evaluation will be prepared with publication of the final Environmental Assessment and decision.

For the purposes of this section, the Nantahala National Forest in North Carolina will be referred to as NNF; the Chattahoochee-Oconee National Forest in Georgia will be referred to as CONF; and the Sumter National Forest in South Carolina will be referred to as SNF.

### 3.2.1 Vegetation

#### SUMMARY OF FINDINGS

The vegetation assessment analyzes impacts to the following plant groupings: 1) ecological communities; 2) the plant species specifically associated with the biology ORV (see Appendix A); 3) MIS; and 4) the proposed, endangered, threatened, sensitive (PETS) and locally rare plant species in the Chattooga River Corridor. Potential effects on vegetation from the proposed alternatives fall into two primary categories—trampling of plants by recreation users and introduction of additional non-native invasive plant species.

The potential for introducing new outbreaks or new non-native invasive species to the riparian corridor from recreation visitors should be limited to small selected areas and is not expected to increase dramatically under any of the alternatives. Recent studies have shown that current use is already affecting vegetation along the corridor by trampling and clearing vegetation around campsites, erosion and loss of plants along user-created trails, damaged trees, denuded banks at stream crossings and the potential for damage to rare species in sensitive settings along rock cliffs and gorges. Additional effects from boating will depend on the level of use under the various alternatives but could increase impacts such as trampling of streamside plants due to increased access and portage trails and scraping of vegetation on rocks at different flow levels.

The degree of direct and indirect effects on vegetation will vary due to microhabitat preferences, susceptibility of individual plants and population sizes as well as the anticipated level of recreation use under the various alternatives. Increased visitation, particularly in the Chattooga Cliffs reach, could result in viability concerns for certain rare plant species that have limited populations across the forest and small population sizes. However, with the monitoring described in each alternative that provides boating in the upper corridor, potential impacts on vegetation would be reduced. While direct and indirect effects from the proposed actions may contribute to a reduction in the size of certain rare plant populations, none of the alternatives are anticipated to result in the loss from the corridor of any existing species, provided the monitoring measures are implemented and future decisions regarding portage trails adequately assess and avoid impacts.

#### AFFECTED ENVIRONMENT

The dominant geological characteristics of the Chattooga River Corridor have greatly influenced vegetation types. Both greywacke-schist and greywacke-schist-amphibolite comprise more than three-quarters of the watershed area (Hatcher 1978, USDA Forest Service 1995). Mica gneisses, feldspathic gneisses, quartzite and aluminum schist dominate the basin. The mafic derived rocks, amphibolites, are generally scarce, and as such, the soils tend to be less productive and plants within the heath family are particularly abundant across the watershed.

#### 1. Ecological Communities

Table 3.2-1 lists the acreage managed by the three national forest units for the different ecological types present within the Chattooga watershed and the upper and lower wild and scenic corridor. This database shows that about 46% of the watershed is dominated by hardwood types (primarily oaks), 27% by mixed yellow pine-oak types, another 15% by hemlocks and

hardwoods, and 11% by white pine and hardwoods. The remaining types, such as alluvial forest and rock outcrops, are much less common.

Table 3.2-1 Comparison of ecological type abundance on NFS lands within the Chattooga River Watershed and the upper and lower wild and scenic corridors.

Ecological Types	USFS Acres	% on USFS	Upper Corridor (USFS Ac)	% Upper Corridor	Lower Corridor (USFS Ac)	% Lower Corridor
High Elevation Red Oak Forest	1183	1%	23	0.4%	0	0%
Montane Oak-Hickory Forest	7156	6%	155	2%	0	0%
Montane White Oak Forest	828	1%	13	0.2%	0	0%
White Pine/Heath Forest	14127	11%	1248	19%	361	4%
Mesic Oak-Hickory Forest	20554	16%	636	10%	1671	18%
Table Mountain Pine-Oak/Heath Forest	168	0.1%	0	0%	0	0%
Pitch Pin-Oak/Heath Forest	13561	11%	921	14%	710	8%
Acidic Cove Forest	4951	4%	423	6%	1735	18%
Eastern Hemlock/ Rhododendron maximum Forest	14005	11%	679	10%	24	0.3%
Alluvial Forest/Island/River Bar	1217	0.2%	156	2.4%	573	6%
Chestnut Oak/Northern Red Oak/ Rhododendron	4548	4%	486	7%	275	3%
Chestnut Oak/Scarlet Oak/Heath Forest	8275	7%	490	7%	157	2%
Dry Oak-Hickory Forest	14862	12%	1032	16%	498	5%
Shortleaf Pine-Southern Red Oak-Blackjack Oak Forest	6316	6%	9	0.1%	401	4%
Shortleaf Pine-Southern Red Oak Forest	13531	11%	141	2%	2773	29%
Heath Bald	347	0.3%	0	0%	0	0%
Swamp Forest/Bog	84	0.1%	0	0%	0	0%
Rock Outcrops	178	0.1%	0	0%	0	0%
Water	400	0.3%	117	2%	264	3%
Totals	126291		6531		9444	

Acres approximate +/- 5%.

## 2. Plants Associated with the Biology ORV

Several plant species were identified in the description of the biology ORV in the Sumter 2004 Land Management Plan. All the listed species were Southern Appalachian endemics that were rare at the time of designation. A description of the habitat and status for each of the eight species or groups follows (Table 3.2-2). If the species is a PETS or locally rare plant species, it is described further in the PETS section.

**Table 3.2-2. Plants associated with the biology ORV for the Chattooga WSR Corridor.**

Species	Species Ranking		Forest List (Sites)*	Range and Habitat
	Global	State		
Pink shell azalea <i>Rhododendron vaseyi</i>	G3	S3 (NC)	NNF (15)	NC endemic present in the Chattooga River watershed but never documented within the Wild and Scenic River Corridor. Occurs in high elevations from closed canopy Northern Hardwood forests to partially open areas including seeps, boulderfields, meadows, and Southern Appalachian bogs.
Divided leaf ragwort <i>Packera millefolium</i>	G2	S2 (NC) S1 (GA) S2 (SC)	NNF (6) CONF (1)	Southern Appalachian endemic (NC, SC, and GA). Occurs in high elevation granitic domes and montane cedar woodlands.
Fraser's loosestrife <i>Lysimachia fraseri</i>	G2	S2 (NC) S1S2 (GA) S1 (SC)	NNF (35) CONF (9) SNF (50)	Mountains of NC, SC, and TN. Habitats include acidic cove forest, mesic oak-hickory forest, montane oak-hickory forest, dry oak-hickory forest, wet rock outcrops and river rocky shoals and islands. [See further analysis in the PETS section.]
Blue Ridge bindweed <i>Calystegia catesbiana</i> ssp. <i>sericata</i>	G3	S3 (NC) S1 (GA) SNR (SC)	NNF (48) CONF(12)	Carolinas and GA to the FL panhandle. Habitats are all early seral from meadows, openings in Oak-Hickory Forests, roadside edges to open rock outcrops.
Biltmore sedge <i>Carex biltmoreana</i>	G3	S3 (NC) S1 (GA) S1 (SC)	NNF (13) SNF (1)	Narrow Southern Appalachian endemic ranging within a 100-kilometer area from Brevard, NC to northwestern SC and northeastern GA. Habitat is restricted to rock outcrops either in woodlands or granitic domes.
Manhart's sedge <i>Carex manhartii</i>	G3G4	S3 (NC) S2 (GA) S2 (SC)	NNF (65) CONF (6)	Northern GA and eastern TN to southwestern VA and southern WV. Habitats include mesic areas ranging from coves to oak and hickory dominated forests.
Rock gnome lichen <i>Gymnoderma linerae</i>	G2	S2 (NC) S1 (GA) S1 (SC)	NNF ( 13) GA (1)	NC mountains with peripheral populations in the mountains of TN, GA and SC. Occurs on sloping to vertical rock faces with some seepage at higher elevations, generally above 5000 feet.
Liverworts				Known to be diverse across the watershed but no comprehensive survey has been conducted.

\* Number of sites listed for respective national forest if the species is present and tracked as rare by the national forest.

Liverworts are known to be diverse across the Chattooga River watershed; however, no comprehensive survey has been conducted. Based on current documentation of rare liverworts, diversity is greater in the Chattooga River watershed than four adjacent escarpment watersheds. Table 3.2-3 lists the number of rare liverworts known to occur within the upper Chattooga Corridor. Suitable habitat for the majority of the rare liverwort species is most prevalent in the Chattooga Cliffs and Ellicott Rock reaches and decreases in the Rock Gorge and Nicholson Fields reaches.

**Table 3.2-3. Rare liverwort species documented within different reaches of the main stem of the upper Chattooga River.**

Reach	Regionally Sensitive Liverworts	Locally Rare Liverworts
Chattooga Cliffs	10	1
Ellicott Rock	11	0
Rock Gorge	4	0
Nicholson Fields	0	0

### 3. Management Indicator Species

MIS serve as the system to monitor forest plan implementation and effects on diversity and population viability of all native and desirable non-native plants and animals. At the project scale, MIS are used to focus the effects of proposed activities on habitat types. When these effects are evaluated within a forest-wide context, it is determined whether or not any trends for MIS would change. An assessment of habitat changes linked to MIS is documented in this section. Of the three forests, only the Nantahala has any MIS plants (four). The animal MIS are discussed in sections 3.2.2 and 3.2.3. Table 3.2-4 identifies the four plant MIS and the biological communities they represent.

Table 3.2-4. Biological communities and associated MIS for the NNF

Biological Community	MIS Plant	Analyzed Further/Evaluation Criteria*
Fir dominated high elevation forests	Fraser fir	No further analysis/1
Northern hardwood forests	Ramps	No further analysis/1
Carolina hemlock bluff forests	Carolina hemlock	No further analysis/1
Rich Cove forests	Ginseng	Yes - further analysis/2

\*1 Biological community and its represented species do not occur in the activity area; therefore, this biological community will not be affected. Given no effects to the community, the alternatives will not cause changes to forest-wide trends or changes in population trends of species associated with this community.

\*2 Plant species seen along the access trail; however, optimal suitable habitat for this species is not present within the activity area.

All plant MIS potentially affected by project activities were initially evaluated. Information about forest-wide MIS habitats and population trends is contained in the Forest MIS report, “*Management Indicator Species Habitat and Population Trends*,” which is available for review by contacting the Nantahala National Forest Office. In surveying for the Chattooga River recreation management proposal, one MIS plant, American ginseng (*Panax quinquefolius*), was located along the northernmost access trail (Chattooga Trail) off Whiteside Cove Road. While this species was located within North Carolina along a single trail, the optimal habitat for this medicinal herb was not seen within the proposed activity area.

The estimated population trend for American ginseng is gradually decreasing across the Nantahala and Pisgah National Forests primarily due to commercial harvest, both legal and illegal. Its preferred habitat is rich cove forest with high soil nutrients and calcium content. Ginseng population sizes are limited for this species within the Southern Appalachians, generally with fewer than 50 individuals (Kauffman personal observation 2006). Populations are small because of annual harvest pressure and less suitable habitat with higher base content. Within the Chattooga Corridor, habitat is very limited since most sites have acidic soils with limited nutrients and are marginal for American ginseng.

### 4. PETS and Locally Rare Plants

All federally threatened or endangered plant species, Regional Forester’s sensitive plant species, and locally rare plant species that occur or could occur on the NNF, CONF, or SNF were initially considered in this botanical analysis. Both the NNF and CNF maintain a locally rare list while the SNF does not. Regionally sensitive species are believed to have viability concerns throughout the Southern Region and generally exhibit a global rank of G3 or T3 or lower or a national rank of N3 or lower. The regionally sensitive list was last updated in 2001. Forest concern plant

species are less globally restricted but typically grow at the periphery of their range or disjunct from their main range.

Eleven federally-listed (five threatened and six endangered), 139 sensitive and 228 locally rare plant species occur or could occur on these three forests. Of these 378 plants, 100 (one endangered species, two threatened species, 46 sensitive species, and 51 locally rare species) are known to occur on one of these three national forests where they are tracked as rare within the Chattooga River watershed.

NC Natural Heritage Program Element Occurrence (EO) records, Georgia Non-game Conservation Section EO records, South Carolina Department of Natural Resources EO records, U.S Fish and Wildlife Service species recovery plans, NatureServe© (2007) web applications and scientific literature were reviewed to determine the distribution, abundance and habitat requirements of species included in the analysis. A field survey was completed from mid-August to early October, 2007. The rare species located in 2007 were added to other previous documented survey information. A geographic information system was used to examine the distribution of EOs on the three forests and general vicinity. These records and distribution maps were reviewed to determine areas of known populations of rare plant species within the proposed project area and serve as the best available science. Based on these sources, the potential affected rare plant species list for the upper Chattooga River project was filtered to derive those species with the greatest likelihood of occurrence. Species were eliminated based on range information, such as only occurring at higher elevations in the North Carolina or Georgia mountains or in the foothills or Piedmont at lower elevations in South Carolina or Georgia.

Other species were excluded from further analysis because proper habitat did not occur within the proposed activity area. In addition, some species were eliminated if the project area is outside their current known range and if searches in the project area did not locate any populations in potential habitat.

Finally, species were eliminated from further analysis if they were known to occur within the project area but unlikely to be impacted by any project activities (category 3). For instance *Macrocoma sullivantii*, *Cheilolejeunea evansii*, and *Drepanolejeunea appalachiana* are known to occur on the bark of hardwood trees and have been documented near the Chattooga River in NC and/or SC depending on the individual species (Davison et. al 1996). However all three typically occur on the bark of older deciduous trees and are unlikely to be impacted by any alternative. Other rare species such as *Packera millefolium*, *Carex biltmoreana* and *Huperzia appressa* are known to occur in nearby rock outcrops, but they are either undetectable from the river or at a height on almost vertical rock that is essentially inaccessible to anyone except rock climbers. Forest herbaceous species, such as *Isotria medeloides*, *Monotropsis odorata*, *Carex woodii* and *Carex communis* var. *amplisquama* which do not occur under dense *Rhododendron maximum* thickets and are unlikely to be impacted by portage trails were also excluded. Species such as *Hymeophyllum tayloriae*, *Huperzia porophila*, *Pellia appalachiana* and *Aneura sharpii* are only known to occur in grottoes or overhangs near waterfalls. These four species were not located during the 2007 survey or prior surveys within easily accessible microsites that would tend to invite exploration by recreationists.

The final filtered list of species that occurs within the Chattooga River Corridor and might be affected by one of the eight alternatives includes one federally endangered species, 13 sensitive

species and 14 locally rare species. A current assessment of the existing condition for each of these species follows.

**Federally Listed Plants**

Rock gnome lichen (*Gymnoderma lineare*) is a Southern Appalachian endemic primarily occurring in the North Carolina mountains with peripheral populations in the mountains of Tennessee, Georgia and South Carolina (Weakley 2007). It was listed as federally endangered in the Federal Register in 1995 (U.S. Fish and Wildlife Service 1995). Threats to the species include heavy recreational use from trampling, air pollution and logging resulting in modification of the local microclimate and inappropriate collecting (U.S. Fish and Wildlife Service 1995).

Within the Chattooga River watershed, *Gymnoderma lineare* is restricted to the wild and scenic corridor in NC, occurring on boulders within Scotsman Creek, Fowler Creek and a newly discovered site along the main stem of the Chattooga just upstream of the NC/SC/GA border. The populations on Fowler Creek and the east bank of the Chattooga River represent the lowest elevation (approximately 2240 feet) located for the species across its range. There is no visible impact to the populations from any current recreational usage.

**Regionally Sensitive Plants**

Table 3.2-5 describes the 13 regionally sensitive plant species that occur within the Chattooga River Corridor and might be affected by the alternatives.

Table 3.2-5. Regionally sensitive plant species within the Chattooga River Corridor that could be affected by any of the alternatives.

Species	Species Ranking		Forest List (Occurrences)	Range and Habitat
	Global	State		
<i>Acrobolus ciliatus</i>	G3?	S1 (NC) SNR (GA) SNR (SC)	NNF (5) SNF (1)	Southern Appalachians within the Carolinas, TN, and GA. Humid or moist rocks in steep gorges or shaded outcrops.
<i>Cephalalozia macrostachya</i> ssp. <i>australis</i>	G4T1	S1 (NC)	NNF (1)	NC within Linville Gorge and Chattooga Gorge. Crevices of streamside rocks.
<i>Hydrothyria venosa</i>	G4	S3 (NC)	NNF (over 65)	Western NC, Va, Pa, southeastern Canada and Pacific Northwest. Aquatic lichen generally found attached to rocks partially submerged on the edge of swift-flowing, steep-gradient streams.
<i>Lejeunea bloomquistii</i>	G1G2	S2 (NC) S1 (GA) S1 (SC)	NNF (2) CONF (1)	KY, TN, Carolinas, and GA. Typically occurs on horizontal rock, dry, and in partial sun.
<i>Lophocolea appalachiana</i>	G1G2Q		NNF (7) CONF (1)	KY, TN, and Carolinas. Typically occurs on shaded wet rocks or seeps.
Fraser's loosestrife <i>Lysimachia fraseri</i>	G2	S2 (NC) S1S2 (GA) S1 (SC)	See table 3.2.2, 21 sites within the Chattooga corridor	Mountains of NC, SC, TN, and GA, disjunct to AL, Ky, and IL. Found in a variety of habitats including acidic cove forest, mesic oak-hickory forest, montane oak-hickory forest, dry oak-hickory forest, wet rock outcrops, and river rocky shoals and islands.
<i>Marsupella emarginata</i> var.	G5T1T2	S1 (NC)	NNF (2) Includes 1 site in upper	NC and VT. Typically occurs within damp shaded rock outcrops.

Section 3.2.1 VEGETATION

Species	Species Ranking		Forest List (Occurrences)	Range and Habitat
	Global	State		
<i>latiloba</i>			Chattooga	
<i>Plagiochila austinii</i>	G3	S1S2 (NC) SNR (GA)	NNF (5) 1 occurrence near Chattooga Bluffs; -	GA, NC and TN north to VT and Nova Scotia. Typically in damp shaded rock outcrops; occasionally associated with Spray Cliffs.
<i>Plagiochila caduciloba</i>	G2	S2 (NC) S1 (GA) S1 (GA)	NNF (13) CONF (1) SNF (1)	KY, TN, NC, GA, and SC. Shaded damp rocks on vertical rock walls or undersides of ledges; occasionally associated with spray cliffs.
<i>Plagiochila sharpii</i>	G2G4	S2 (NC) S1? (GA) S1 (SC)	NNF (8) CONF (2) SNF (1)	Southern Appalachian mountains of TN, NC, GA, and SC. Wet boulders and outcrops in river gorges.
<i>Plagiochila sullivantii</i> var. <i>sullivantii</i>	G2T2	S2 (NC) SH (GA) S? (SC)	NNF (4) CONF (1?)	WV south to the Carolinas. Deeply shaded overhung rock walls and ledges within gorges; can be associated with spray cliffs and shaded rock outcrops.
Carolina star moss <i>Plagiomnium carolinianum</i>	G3	S2 (NC) S2? (GA) S1 (SC)	NNF (3) CONF (4) SNF (1)	TN, NC, GA, SC. Wet, dripping rocks with a thin soil layer or wet humus in seepage areas.
<i>Radula sullivantii</i>	G3	S2 (NC) SNR (GA) SNR (SC)	NNF (15) CONF (5) SNF (6)	Northern SC, northeastern GA, western NC, and eastern TN. Locally abundant within escarpment gorges on shaded rock outcrops near streams and rivers, most abundantly collected rare liverwort in 2007 survey,

**Locally Rare Plant Species**

Table 3.2-6 describes the 14 locally rare species that occur within the Chattooga River Corridor and might be affected by the alternatives.

Table 3.2-6. Locally rare plant species within the Chattooga River Corridor that could be affected by any of the alternatives.

Species	Species Ranking		Forest List (Occurrences)	Range and Habitat
	Global	State		
Sword moss <i>Bryoxiphium norvegicum</i>	G5?	S1 (NC)	NNF (2)	Widely distributed across the U.S but very rare across eastern states. Shaded moist rocks on ledges or sometimes overhanging water.
Blue Ridge bindweed <i>Calystegia catesbiana</i> ssp. <i>sericata</i>	G3	S3 (NC) S1 (GA) SNR (SC)	NNF (48) CONF (12)	Carolinas and GA to the FL panhandle. Historically distributed within xeric openings in upland forests or associated with outcrops. Typically restricted to roadside edge, powerlines, or trails.
Manhart's sedge <i>Carex manhartii</i>	G3G4	S3 (NC) S2 (GA) S2 (SC)	In Chattooga corridor NNF (4) CONF (1) SNF (2)	Northern GA and eastern TN to southwestern VA and southern WV. Habitat ranges from moist montane oak-hickory forest to rich cove forest and open acidic cove forest.
<i>Chiloscyphus muricatus</i>	G5	S1 (NC)	NNF (2)	NC and TN. Rock outcrops within humid gorges.
<i>Ephebe solida</i>	G3G4	S1 (NC)	NNF (8)	Quebec south to NC, GA, and AL. Aquatic lichen that adheres to rocks.
Lime homalia <i>Homalia trichomanoides</i>	G5	S1 (NC)	NNF (3)	WA, WI, MI, and VT south to TN and NC. Within outcrops in humid gorges or spray cliffs.

Section 3.2.1 VEGETATION

Species	Species Ranking		Forest List (Occurrences)	Range and Habitat
	Global	State		
Seep rush <i>Juncus gymnocarpus</i>	G4	S3 (NC) S2S3 (GA) SNR (SC)	CONF (16)	Eastern PA south to eastern TN, northeastern GA, and northern SC. Abundant across escarpment gorges.
Kidneyleaf twayblade <i>Listeria smallii</i>	G4	S4 (NC) S2 (GA) SNR (SC)	CONF (1)	PA south to TN, GA, and SC. Occurs in mesic hemlock forest typically underneath rhododendron thickets.
Climbing fern <i>Lygodium palmatum</i>	G4	S3 (NC) S2 (GA) S1S2 (SC)	CONF (2)	MA west to MI south to KY, MS, and FL. Moist thickets, islands, and bogs.
<i>Pohlia lescuriana</i>	G4?	S1? (NC)	NNF (2)	Nova Scotia to WI south to NJ, TN, and NC. Wet soil in open areas and on the banks of streams or ditches.
Bog stitchwort <i>Stellaria alsine</i>	G5	S1 (G5)	NNF (3)	Quebec south to OH, TN, and FL. Within riparian zones, seeps, and bogs.
Mountain camellia <i>Stewartia ovata</i>	G4	S2 (NC) S3 (GA) S2 (SC)	NNF (6)	VA and KY south to MS and FL. Acidic bluffs typically in rhododendron thickets.
Appalachian bristle fern <i>Trichomanes boschianum</i>	G4	S1 (NC) S1 (GA) S1 (SC)	NNF (5) CONF (3) SNF (2)	OH and WV south to the Carolinas. Vertical or overhanging rock outcrops, usually in deeply shaded grottos.
Dwarf filmy fern <i>Trichomanes petersii</i>	G4G5	S2 (NC) S2 (GA) S2 (SC)	NNF (6) CONF (2) SNF (3)	Western NC and eastern TN south to FL and LA and north to AR and IL. Vertical faces of acidic rocks; typically on drier rocks within humid gorges.

**EXISTING IMPACTS TO THE ENVIRONMENT**

Current recreation use in the upper corridor is causing numerous areas of vegetation damage including trampling and clearing of vegetation around campsites, erosion and loss of plants along user-created trails, damaged trees and bare banks at stream crossings. Existing impacts to rare species from current use are unknown. In addition, the loss of Eastern hemlocks from HWA is occurring; this loss is expected to become even more prevalent in coming years. While hemlocks occur across most of the 21-mile stretch of the upper corridor, they are much more abundant in the Chattooga Cliffs and Ellicott Rock reaches. Table 3.2-7 shows the relative density and distribution of hemlocks among the primary reaches of the upper Chattooga.

The ongoing decline will result in continued changes in species composition, structure, and microclimate along with likely increases in downed trees and LWD in the river. Downed logs that span the river create log jams that may necessitate portages for anglers and hikers who currently traverse the river. These portages can create user-trails and result in trampling of vegetation. The amount of LWD currently on the upper corridor is displayed in Figures 3.2-1 and 3.2-2 and increased woody debris is likely over the next few years.

Trampling of vegetation is a concern in high-use areas around bridges and popular frontcountry fishing and recreation locations which are expected to continue to attract users. However, impacts are even more of a concern in the upper reaches of the corridor where rare plant species and a greater density of hemlocks are more commonly found

Table 3.2-7. Eastern hemlock communities within different reaches of the main stem of the upper Chattooga River

River Reach	River Segment	Hemlock-Hardwood % Adjacent to River	Acidic Cove % Adjacent to River
Chattooga Cliffs	Grimshawes Bridge south to Bull Pen Bridge	86%	0%
Ellicott Rock	Bull Pen Bridge south to Ellicott Rock	65%	0%
	Bull Pen Bridge south to East Fork	59%	0.1%
	Bull Pen Bridge south to Burrells Ford	54%	0.3%
Rock Gorge	Burrells Ford south to Lick Log	1%	64%
Nicholson Fields	Lick Log south to Highway 28	0.2%	33%

## ENVIRONMENTAL CONSEQUENCES

The primary effects on vegetation from the proposed alternatives are trampling of plants (including scraping plants off rocks) and increased introduction of non-native invasive plants.

For assessment purposes, the upper Chattooga River Corridor (above the Highway 28 Bridge) is used as the analysis boundary to examine the direct and indirect effects that each alternative may have on vegetation. The cumulative effects analysis area will vary in size based on species distributions and foreseeable future actions.

### 1. Ecological Communities – Direct, Indirect and Cumulative Effects

The primary impacts of the proposed actions would be on riparian communities including Eastern hemlock-hardwoods, acidic cove, alluvial forest, alluvial island and rocky shoals. None of the alternatives would result in loss of a plant community. The ongoing decline of hemlock would result in more species composition and structural changes than the proposed actions and would not be influenced by any of the alternatives.

Alternatives that attract more users to the remote upper stretches of the river increase the likelihood of portage needs and trampling of vegetation, although the degree of potential impacts varies by anticipated use levels. Although impact levels are difficult to quantify, it is likely that effects would be greatest under alternatives 8, 9 and 10 which have the fewest user restrictions; followed by alternatives 4 and 5. Comparative effects under alternatives 4 and 5 are difficult to distinguish since Alternative 4 has greater flow restrictions, a shorter boating season and fewer boaters than Alternative 5 which allows more boating over a year-long season but covers fewer reaches. Implementation of Forest Service monitoring to check for log jams and analyze and manage portage needs would help minimize effects under all the alternatives.

Another potential impact on ecological communities would be the continued introduction of additional non-native invasive plant species (NIS plants) from visiting recreation users. NIS species observed throughout the riparian areas of the river corridor included *Microstegium vimineum*, *Paulownia tomentosa*, *Pueraria lobata*, *Ailanthus altissima*, *Rosa multiflora*, *Ligustrum sinense*, *Dioscorea polystachya*, *Miscanthus sinensis*, *Lespedeza bicolor*, *L. cuneata*, *Lonicera japonica*, *Albizia julbrissin* and *Elaeagnus umbellulata*. Generally, most outbreaks

were small and did not dominate any one plant community. An exception is the large open field just north of Highway 28 which has a large outbreak of numerous invasive species.

NIS plants tend to be more frequent within riparian areas and increase with greater flood frequency (Brown and Peet 2003). The additional influx of boaters or any additional recreation users within the upper portions of the Chattooga River has the potential for introducing new outbreaks or new NIS plants to the riparian corridor. However, this should be limited to small selected areas, primarily islands in the lower reaches of the upper corridor, given the dense mass of *Rhododendron maximum* in the shrub layer, which tends to impede establishment of NIS plants. Acidic cove forests and Eastern hemlock forests with *Rhododendron maximum* were found to have the lowest number of outbreaks in an inventory completed across selected watersheds in the Nantahala and Pisgah National Forests (Kauffman personal observation 2007). Invasive species are not expected to increase dramatically as a result of boating.

Ground-disturbing activities, including timber harvest, road construction and prescribed burning, have the potential to introduce non-native invasive plants. (See Table 3.1-9 for a list of past, present, and reasonably foreseeable future actions within the Chattooga watershed.) The additional introductions of NIS plants from recreation use in the upper Chattooga would be additive to non-native introductions that occur as a result of other management activities. Projects to remove non-native invasives, such as the one planned for Sarah's Creek Campground, would subtract from these additions. However, it is likely that a net increase in introductions of NIS plants would occur over time under any of the alternatives. Alternative 2 would result in the fewest new introductions since it restricts the number of recreationists to a lower level than at present.

## **2. Plants Associated with the Biology ORV – Direct, Indirect and Cumulative Effects**

The following discussion addresses direct and indirect effects on each of the eight plant species associated with the biology ORV for the Chattooga Wild and Scenic River Corridor.

### Pink shell Azalea (*Rhododendron vaseyi*)

Though documented in the Chattooga watershed, Pink shell Azalea has never been documented in the Wild and Scenic River Corridor. Therefore none of the alternatives would directly, indirectly or cumulatively affect this species.

### Divided Leaf Ragwort (*Packera millefolium*)

This population occurs within a steep granitic outcrop approximately 300 to 500 feet above the narrow confines of Chattooga Cliffs. Presently this area receives very little visitation due to the inaccessibility of the site. Boaters would float by this area of the river with *Packera millefolium* upslope in alternatives 4, 8, 9 and 10. However, due to the steep terrain, it is doubtful that any users would be visiting this site. As such, this species was excluded from any further analysis. None of the alternatives should directly, indirectly or cumulatively affect this species.

### Fraser's Loosestrife (*Lysimachia fraseri*)

Impacts to the species have been noted from road widening projects, herbicide use and road grading (Kauffman personal observation). Fraser's loosestrife is a Region 8 sensitive plant. Further analysis has been completed for Fraser's loosestrife within the PETS effects section of this document.

Blue Ridge Bindweed (*Calystegia catesbiana* ssp. *sericata*)

All alternatives call for a review and possible closure of user-created trails that are unsustainable. Closure of a steep user-created trail off Bull Pen Road approximately one mile east of the bridge could result in less suitable habitat for this species within the white pine-heath community; however, this population is expected to persist surrounding the large opening on the toe ridge next to Bull Pen Road. The anticipated use in any of the alternatives may affect some individuals but will not result in the loss of sites and therefore populations should remain stable. This species is also addressed in locally rare section of this document.

Biltmore Sedge (*Carex biltmoreana*)

Alternatives 4, 5, 8, 9 and 10 all allow boating where at least one of the three separate populations occurs 20 to 500 feet upslope on vertical to steep rock outcrops either within the Chattooga Cliffs reach or the Rock Gorge reach. However, due to the steep terrain it is doubtful that users would be tempted to visit and possibly impact individuals. For this reason, this species was excluded from any further analysis. None of the alternatives should directly, indirectly or cumulatively affect this species.

Manhart's Sedge (*Carex manhartii*)

Current use is probably not greatly impacting this species. An individual may be occasionally trampled if it occurs next to a trail, but this scenario is probably rare. Direct impacts, such as digging or crushing individuals, could occur with construction of new campsites and/or relocation of inappropriate trails under any of the action alternatives. These potential effects can be mitigated since another decision with appropriate field review would occur before this is implemented. In addition, slightly more impacts could occur in Alternatives 5 as boaters take out at Lick Log Creek, where a new population was documented in 2007. This species is also addressed in locally rare section of this document.

Rock Gnome Lichen (*Gymnoderma lineare*)

Further analysis for this lichen is detailed in the PETS section.

Liverworts

Existing recreational use, including negative impacts such as trampling as users traverse the river, could be affecting these rare species. These impacts are probably minimal since the optimal suitable habitat for the rare liverworts is in more remote portions of the corridor that receive little visitation. The ongoing death and toppling of surrounding Eastern hemlocks within the forested canopy are anticipated to result in negative impacts either by directly crushing individuals or indirectly modifying humidity and light levels. However, the dense *Rhododendron maximum* shrub layer throughout the Chattooga River gorge may lessen these microclimate effects.

Alternatives 4, 5, 8, 9 and 10 could increase negative impacts to the rare liverworts if large numbers of portage trails are required. The level of impact is difficult to predict and would vary based on the location and density of log jams and the level of use. Potential impacts to liverworts are anticipated to be greater in the uppermost portion of the corridor since habitat is more suitable here, the river is narrower and a higher density of hemlocks occurs here, many of which are already dead.

Table 3.2-8 compares the potential impacts to liverworts by each of the alternatives. A more complete analysis for rare liverwort species is detailed in the PETS analysis.

Table 3.2-8. Risk analysis and anticipated impacts to rare liverwort species as a group for the eight analyzed alternatives.

Alternative	Impacts Rank	Risk Assessment
No-Action	6	3 <sup>rd</sup> least impact. Existing camping/angling impacts
2	8 = least impact	Least impact overall. Anticipate reduced impacts with lower camping densities and designated campsites
3	7	2 <sup>nd</sup> least impact. Slightly less impacts than no-action by limiting trails and parking
4	5	Boating alternative least impact given greatly reduced frequency with 3 month season and highest minimum flow
5	4	Boating action with second least impact since alternative excludes boating activity north of Bull Pen Bridge, however there is no seasonal restriction
8	1 = greatest impact	Greatest likelihood of impacts due to all upper corridor reaches open to boating and no seasonal or flow restrictions
9	2	Impacts less than Alternative 8 since fewer boating opportunities with season and time restrictions and fewer proposed boating stretches
10	3	Impacts less than Alternative 9 since fewer boating opportunities with slightly shorter boating season

### Management Indicator Species – Direct, Indirect and Cumulative Effects

None of the alternatives would change the amount of suitable habitat for American Ginseng. However, it would be most impacted by Alternative 8 because it would encourage access along the trail when ginseng would be visible. However, even if the few individuals near the trail were harvested when encountered, this impact would be minimal in comparison to the greater harvest intensity on the rest of the NNF. Cumulatively, implementation of any alternative would not change the forest-wide downward trend for American ginseng populations.

### PETS and Locally Rare Plants – Direct, Indirect and Cumulative Effects

All users potentially could affect these 28 plant species. Potential direct and indirect effects from the eight proposed alternatives include trampling while users traverse the river, trampling of vegetation within campsites and along trails, scraping of rocks from boats traversing the river at different high flows and portaging of boats around log jams which are anticipated to increase with the decline of Eastern hemlock. Table 3.2-9 provides a crosswalk of potential impacts on rare species from each of the proposed alternatives.

Table 3.2-9. Potential Direct or Indirect Effects on Rare Plants by Alternative (organized by type of effect)

Scientific Name	Forest Status	Potential Effects	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5	Alt 8	Alt 9	Alt 10
<i>Gymnoderma lineare</i>	Endangered	Not likely to adversely affect	No							
<i>Acrobolbus ciliatus</i>	Sensitive	Trampling/scraping on rocks in river and river bank	Yes							
<i>Cephalozia macrostachya</i> ssp. <i>Australis</i>	Sensitive	Same as above	No	No	No	Yes	No	Yes	Yes	Yes
<i>Hydrothyria venosa</i>	Sensitive	Same as above	No	No	No	Yes	No	Yes	Yes	Yes
<i>Lejeunea blomquistii</i>	Sensitive	Same as above	Yes							
<i>Lophocolea appalachiana</i>	Sensitive	Same as above	No	No	No	Yes	Yes	Yes	Yes	Yes
<i>Marsupella emarginata</i> var. <i>latiloba</i>	Sensitive	Same as above	No	No	No	Yes	No	Yes	Yes	Yes
<i>Plagiochila austinii</i>	Sensitive	Same as above	No	No	No	Yes	No	Yes	Yes	Yes
<i>Plagiochila caduciloba</i>	Sensitive	Same as above	Yes							
<i>Plagiochila sharpie</i>	Sensitive	Same as above	Yes							
<i>Plagiochila sullivantii</i> var. <i>sullivantii</i>	Sensitive	Same as above	Yes							
<i>Plagiomnium carolinianum</i>	Sensitive	Same as above	No	No	No	Yes	No	Yes	Yes	Yes
<i>Radula sullivantii</i>	Sensitive	Same as above	Yes							
<i>Bryoxiphium norvegicum</i>	Locally Rare	Same as above	Yes							
<i>Chiloscyphus muricatus</i>	Locally Rare	Same as above	Yes							
<i>Pohlia lescuriana</i>	Locally Rare	Same as above	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes
<i>Homalia trichomanoides</i>	Locally Rare	Same as above	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes
<i>Trichomanes boschianum</i>	Locally Rare	Same as above	Yes							
<i>Trichomanes petersii</i>	Locally Rare	Same as above	Yes							
<i>Lysimachia fraseri</i>	Sensitive	Trampling on islands	Yes							
<i>Juncus gymnocarpus</i>	Locally Rare	Trampling on islands	Yes							
<i>Stellaria alsine</i>	Locally Rare	Trampling on islands	Yes							
<i>Carex manhartii</i>	Locally Rare	Trampling from portage trails, campsites	Yes	No	No	Yes	Yes	Yes	Yes	Yes
<i>Listera smallii</i>	Locally Rare	Trampling on portage trails	No	No	No	Yes	Yes	Yes	Yes	Yes
<i>Lygodium palmatum</i>	Locally Rare	Trampling at campsites	Yes	No	No	Yes	Yes	Yes	Yes	Yes
<i>Stewartia ovata</i>	Locally Rare	Trampling at campsites	Yes							
<i>Calystegia catesbiana</i> var. <i>sericata</i>	Locally Rare	Impacted by trail closures (loss of early seral habitat)	Yes							
<i>Epebe solida</i>	Locally Rare	Low Impact	No	No	No	Yes	Yes	Yes	Yes	Yes

All of the proposed alternatives are expected to have some level of effect on vegetation depending on the anticipated type, intensity and location of recreation uses. Increasing river use in sections currently infrequently visited by recreationists is likely to result in increased impacts from trampling, especially in areas with rare plant populations near or in the river. Likewise, a high density of Eastern hemlocks adjacent to the river increases the likelihood of portage needs for boaters. Impacts are expected to vary by individual rare species. However, with

implementation of the monitoring guidelines, including periodic assessment of portage needs, adverse impacts would be minimized.

### **Alternative 1 – Direct, Indirect and Cumulative Effects**

Direct effects under current management include trampling and/or manipulation of the shrub and herb layers while creating campsites and user trails in the three forests and vegetation damage while creating camp fires on islands. Existing users could also directly affect rare bryophytes and lichens by scraping occupied rocks and trampling streamside vegetation. Trampling and removal of vegetation associated with the creation of campsites and user-created trails have an indirect effect on competition among associated understory species. Species such as *Juncus tenuis* or nonnative invasive species that favor compacted soils may increase and displace rare species in the forests such as *Carex manhartii* or *Lygodium palmatum* or other rare species on the islands such as *Lysimachia fraseri*, *Juncus gymnocarpus* or *Stellaria alsine*.

Recent and future decline and death of Eastern hemlock along the adjacent riparian forest have resulted in cumulative effects to rare plant species within the corridor, primarily from crushing plants and modifying the microclimate, although the latter is less evident within the deep gorge since the area is densely covered with the evergreen shrub, *Rhododendron maximum*

In the past 10-20 years, increased recreational use on the trails and on the river within the wild and scenic corridor has affected individual rare plants. Current recreational activities are anticipated to continue in the future in the most accessible portions of the river corridor. On private property and the watershed, recent home development, road construction and reconstruction have contributed to the loss of suitable habitat for the forest-associated species and to a lesser extent to the river gorge-associated species. The cumulative effects associated with private property are expected to continue for the foreseeable future given the high land value across the watershed.

The cumulative effects from these past and future effects on rare plant species within the corridor are not anticipated to result in the loss of any existing species but may contribute to a reduction in population size of individual species listed in Table 3.2-9 and having a yes under the column addressing Alternative 1.

### **Alternative 2 – Direct, Indirect and Cumulative Effects**

Direct and indirect effects to rare species are the same as Alternative 1 except there would be no effects from new user-created trails or new dispersed campsites. Blue Ridge bindweed would be indirectly affected when the steep eroding trail off Bull Pen Road is decommissioned. The effect of limiting recreational usage would not eliminate potential direct effects to rare bryophytes in the river; however, it should reduce the frequency of adverse encounters. As result, impacts to these species would be less compared to Alternative 1.

Cumulative effects to the river-associated species would primarily be from the continued death and dropping of Eastern hemlocks and effects to forest species from private property. As in Alternative 1, the cumulative effects from fallen hemlocks on rare plant species within the corridor are not anticipated to result in the loss of any existing species but may contribute to a reduction in population size of individual species listed in Table 3.2-9 and having a yes under the column addressing Alternative 2.

**Alternative 3 – Direct, Indirect and Cumulative Effects**

The direct, indirect and cumulative effects to individual species would be the same as Alternative 2. However, the frequency of impacts would be greater since the higher campsite density would potentially allow more users within the corridor on any given day. Therefore, the impacts to vegetation from this alternative are expected to be less than Alternative 1 but more than Alternative 2.

**Alternative 4 – Direct, Indirect and Cumulative Effects**

The same direct and indirect effects as detailed for Alternative 1 will occur to rare species with Alternative 4. However these effects will be potentially greater in frequency as additional people will be using the most inaccessible portions of the river. As a result there could be direct effects of trampling or scraping individuals of additional rare species as displayed in Table 3.2-9. The most noteworthy effect of this alternative is the need for portaging, particularly in the uppermost corridor where Eastern hemlocks are denser and trees are already dead. Increased portaging could directly affect rare bryophytes and lichens by trampling and crushing small individuals adhering to rocks and boulders primarily on the river's edge or trampling terrestrial herbaceous species. If portaging is possible in the middle of the river, potential direct effects would be greatly reduced. These impacts to rare bryophytes and lichens are difficult to adequately assess in terms of timing and intensity since it is uncertain how quickly and where the dead trees will fall and how large individual bryophyte populations are present within potential portage areas.

The season and flow restrictions in this alternative will reduce the frequency of potential impacts to rare plant species in comparison to the other boating alternatives. Five sensitive species and four locally rare species are of particular concern, since all of these species have few populations (less than five) known across the individual forest, are limited within the Chattooga River watershed and typically have very small individual population sizes. The sensitive species of concern are *Lophocolea appalachiana* and *Lejeunea bloomquistii* on the CONF and *Cephalozia macrostachya ssp. australis*, *Plagiomnium carolinianum*, *Lophocolea appalachiana*, and *Plagiochila sullivantii var. sullivantii* on the NNF. The locally rare species of concern are *Chiloscyphus muricatus*, *Homalia trichomanoides*, and *Bryoxiphium norvegicum* for NNF and *Listera smallii* for CONF. Increased trampling from user-created portage trails could potentially eliminate these small populations. However, full implementation of the monitoring guidelines (see Appendix B), including designating portages if necessary, should alleviate any viability concerns for these species.

Cumulative effects from existing past and future actions to the rare species affected by this alternative do not differ from any of the other alternatives except for the more widespread species *Hydrothyria venosa* which may have been affected across many more small watersheds with increased sedimentation from developments, road construction, and reconstruction. The cumulative effects from these past and future effects on rare plant species affected by Alternative 4 are not anticipated to result in the loss of any existing species in the corridor.

**Alternative 5 – Direct, Indirect and Cumulative Effects**

Direct, indirect and cumulative effects are similar to alternatives 4, 8, 9 and 10; however, the number of rare species potentially affected by this alternative is lower since the species-rich area north of Bull Pen Road is excluded from boating. Five sensitive plant species and two locally rare species are unlikely to be affected by this alternative in comparison to alternatives 8, 9 and 10 (see Table 3.2-9). In addition, the frequency of effects would be reduced for those species

(*Bryoxiphium norvegicum*, *Chiloscyphus muricatus*, and *Trichomanes petersii*) that only occur adjacent to the river within the Chattooga Cliffs reach, as compared to other alternatives that add boating. In this alternative, two sensitive species and one locally rare species are of particular concern: *Lophocolea appalachiana* in the NNF and the CONF, *Lejeunea bloomquistii* for CONF, and *Listera smallii* for CONF. These species only have a single or a few documented small populations across each individual forest. However, full implementation of the monitoring guidelines (see Appendix B), including designating portages if necessary, should alleviate any viability concerns for these species.

**Alternative 8 – Direct, Indirect and Cumulative Effects**

The same types of direct, indirect and cumulative effects under alternatives 4, 5, 9 and 10 would occur to rare species under Alternative 8. However, Alternative 8 poses the greatest potential for negative impacts to rare plant species since it allows boating year-round, at all flow levels, over the entire length of the upper Chattooga River.

The same five sensitive species and four locally rare species are of particular concern as in Alternative 4. However, full implementation of the monitoring guidelines (see Appendix B), including designating portages if necessary, should alleviate any viability concerns for these species.

**Alternative 9 – Direct, Indirect and Cumulative Effects**

The same direct, indirect and cumulative effects would occur to all the same rare species for this alternative as Alternative 8 although the frequency of effects would be less. The same five sensitive and four locally rare plant species as identified for Alternative 8 are of particular concern from potential trampling and scraping of river bank and river rocks. However full implementation of the monitoring guidelines (see Appendix B), including designating portages if necessary, should alleviate any viability concerns for these species.

**Alternative 10 – Direct, Indirect and Cumulative Effects**

The same direct, indirect and cumulative effects would occur to all the same rare species for this alternative as alternatives 8 and 9 although the frequency of effects would be less than 9 since fewer days are permitted for boating. As previously stated for Alternative 9, the same five sensitive and four locally rare plant species are of particular concern with implementation of this alternative. However full implementation of the monitoring guidelines (see Appendix B), including designating portages if necessary, should alleviate any viability concerns for these species.

Table 3.2-10 summarizes the findings of effects for rare plants.

Section 3.2.1 VEGETATION

Table 3.2-10. Summary of Determination of Effect for each rare plant species potentially affected by any of the 8 alternatives. E=Endangered; S=Sensitive; LR=Locally Rare; # =May impact

Scientific Name	Forest Status	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5	Alt 8	Alt 9	Alt 10
<i>Gymnoderma lineare</i>	E	No Effect	No Effect	No Effect	Not likely to adversely affect				
<i>Acrobolbus ciliatus</i>	S	#	#	#	#	#	#	#	#
<i>Cephalozia macrostachya</i> ssp. <i>australis</i>	S	No impacts	No impacts	No impacts	May impact *	No impacts	May impact *	May impact *	May impact *
<i>Hydrothyria venosa</i>	S	No impacts	No impacts	No impacts	#	No impacts	#	#	#
<i>Lejeunea blomquistii</i>	S	#	#	#	May impact *				
<i>Lophocolea appalachiana</i>	S	No impacts	No impacts	No impacts	May impact *				
<i>Lysimachia fraseri</i>	S	#	#	#	#	#	#	#	#
<i>Marsupella emarginata</i> var. <i>latiloba</i>	S	No impacts	No impacts	No impacts	#	No impacts	#	#	#
<i>Plagiochila austinii</i>	S	No impacts	No impacts	No impacts	#	No impacts	#	#	#
<i>Plagiochila caduciloba</i>	S	#	#	#	#	#	#	#	#
<i>Plagiochila sharpii</i>	S	#	#	#	#	#	#	#	#
<i>Plagiochila sullivantii</i> var. <i>sullivantii</i>	S	#	#	#	May impact *	#	May impact *	May impact *	May impact *
<i>Plagiomnium carolinianum</i>	S	No impacts	No impacts	No impacts	May impact *	No impacts	May impact *	May impact *	May impact *
<i>Radula sullivantii</i>	S	#	#	#	#	#	#	#	#
<i>Bryoxiphium norvegicum</i>	LR	#	#	#	May impact *	#	May impact *	May impact *	May impact *
<i>Calystegia catesbiana</i> var. <i>sericata</i>	LR	#	#	#	#	#	#	#	#
<i>Carex manhartii</i>	LR	#	No impacts	No impacts	#	#	#	#	#
<i>Chiloscyphus muricatus</i>	LR	#	#	#	May impact *	#	May impact *	May impact *	May impact *
<i>Ephebe solida</i>	LR	No impacts	No impacts	No impacts	#	#	#	#	#
<i>Homalia trichomanoides</i>	LR	#	#	#	May impact *	No impacts	May impact *	May impact *	May impact *
<i>Juncus gymnocarpus</i>	LR	#	#	#	#	#	#	#	#
<i>Listera smallii</i>	LR	No impacts	No impacts	No impacts	May impact *				
<i>Lygodium palmatum</i>	LR	#	No impacts	No impacts	#	#	#	#	#
<i>Pohlia lescuriana</i>	LR	#	#	#	#	No impacts	#	#	#
<i>Stellaria alsine</i>	LR	#	#	#	#	#	#	#	#
<i>Stewartia ovata</i>	LR	#	#	#	#	#	#	#	#
<i>Trichomanes boschianum</i>	LR	#	#	#	#	#	#	#	#
<i>Trichomanes petersii</i>	LR	#	#	#	#	#	#	#	#

# May impact individuals of the individual species but not likely to cause a viability concern on the individual forest unit.

\* With full implementation of the monitoring guidelines pertinent to rare plant species, may impact individuals of the species but not likely to cause a viability concern on the individual forest unit.

## 3.2.2 Terrestrial Wildlife

### SUMMARY OF FINDINGS

The terrestrial wildlife analysis evaluated potential effects from the eight alternatives on 1) management indicator species and 2) proposed, endangered, threatened, sensitive, or locally rare wildlife species in the upper Chattooga Corridor. Potential effects on wildlife include human-related disturbances, loss of habitat remoteness, and trampling of vegetation and sensitive habitat. Alternative 2 would provide the greatest conservation of habitat and species since it has the greatest restrictions on visitor numbers and use. Current management is providing sufficient conservation of wildlife, but continued increases in visitors may diminish this in the future. There are relative differences among the boating alternatives; however, in general, those that have the greatest restrictions on the number of users (Alternative 4) and avoid extensive use of the upper reaches of the corridor where most of the rare species are located (Alternative 5) would likely result in fewer impacts on wildlife. Cumulative effects may lead to impacts on wildlife individuals, but none of the alternatives are expected to cause the loss of any existing species.

### AFFECTED ENVIRONMENT

See sections 3.1.1 and 3.2.1 for a description of the physical and biological environment.

### Proposed, Endangered, Threatened, Sensitive and Locally Rare Terrestrial Wildlife

The Chattooga River watershed has a geology and climate which is unique in the Southern Appalachians, and therefore provides suitable habitats for several wildlife species which are listed as “state rare” or altogether “globally rare.” Some of the most important and unique habitat components for rare wildlife species within the watershed include: exposed rock outcrops; deep, narrow gorges and associated vertical rock walls; steep, exposed, rocky forested slopes; and sheltered riparian corridors. These unique geologic features and habitats, combined with an average annual rainfall which can exceed 100 inches in some areas, provide a full spectrum of important and unique wildlife habitats. These distinctive features are mostly associated with the upper portion of the watershed and for this reason, approximately 70% of all rare species known or with potential to occur in the Chattooga River watershed are restricted to the upper portion of the watershed (“upper portion of the watershed” defined at footnote #1 at Table 3.2-11).

Fifteen rare species are known to occur in the Chattooga River watershed (see Table 3.2-11). Two of them, the Eastern Small Footed Bat and Green Salamander, have also been documented within the upper Chattooga River Corridor. An additional 19 species that are not documented have the potential to occur within the Chattooga River watershed, the Chattooga Wild and Scenic River Corridor, or both (see Table 3.2-12).

Section 3.2.2 Terrestrial Wildlife

Table 3.2-11. CONF, NNF and SNF rare wildlife species known to occur within the Chattooga River watershed.

Type	Scientific Name	Common Name	Element Occurrence Location <sup>1</sup>	Number of Separate Element Occurrences	Forest	Rank <sup>2</sup>
Amphibian	<i>Aneides aenus</i>	Green Salamander	Upper and Lower Watershed	28 (27 Upper, 1 Lower)	NNF CONF	LR
Amphibian	<i>Plethodon teyahalee</i>	Southern Appalachian Salamander	Upper Watershed	10	NNF CONF	S
Bird	<i>Aegolius acadicus pop. 1</i>	Northern Saw-whet Owl	Upper Watershed	1	NNF	LR
Bird	<i>Falco peregrinus</i>	Peregrine Falcon	Upper Watershed	1	NNF	S
Bird	<i>Contopus cooperi</i>	Olive-sided Flycatcher	Upper Watershed	1	NNF	LR
Butterfly	<i>Erora laeta</i>	Early Hairstreak	Upper Watershed	1	NNF	LR
Mammal	<i>Myotis leibii</i>	Eastern Small-footed Bat	Upper Watershed	5	NNF SNF CONF	S
Mammal	<i>Corynorhinus rafinesquii</i>	Rafinesque's Big-eared Bat	Upper Watershed	1	NNF	S
Mammal	<i>Neotoma floridana haematoreia</i>	Southern Appalachian Woodrat	Upper and Lower Watershed	2	CONF	LR
Mammal	<i>Sorex palustris punctulatus</i>	Southern Water Shrew	Upper Watershed	2	NNF	S
Mammal	<i>Sorex dispar</i>	Long-tailed Shrew	Upper Watershed	1	CONF	LR
Mammal	<i>Tamiasciurus hudsonicus</i>	Red Squirrel	Lower Watershed	3	CONF	LR
Reptile	<i>Eumeces anthracinus</i>	Coal Skink	Upper Watershed	2	NNF	LR
Reptile	<i>Clemmys muhlenbergii</i>	Bog Turtle	Upper Watershed	2	NNF CONF	T SA (NNF) S (CONF)
Reptile	<i>Pituophis m. melanoleucus</i>	Northern Pine Snake	Lower Watershed	1	CONF	LR

1 = Upper watershed includes all tributaries of the North Fork of the Chattooga above the West Fork – North Fork confluence as well as all the tributaries of the West Fork of the Chattooga. Lower watershed includes all tributaries which drain into the North Fork of the Chattooga below the West Fork – North Fork confluence.

2 = LR = Locally Rare; S = Sensitive; TSA = Threatened – Similarity of Appearance.

Table 3.2-12. CONF, NNF and SNF rare wildlife species with potential to occur within the Chattooga River watershed.

Type	Scientific Name	Common Name	Potential Location <sup>1</sup>	Forest	Rank <sup>2</sup>
Butterfly	<i>Speyeria Diana</i>	Diana Fritillary	Upper and Lower Watershed	CONF NNF SNF	S
Moth	<i>Euchlaena milnei</i>	Milne's Euchlaena	Upper Watershed	NNF	S
Spider	<i>Nesticus silvanus</i>	a nesticid spider	Upper Watershed	NNF	S
Amphibian	<i>Ambystoma talpoideum</i>	Mole Salamander	Upper Watershed	NNF	LR
Bird	<i>Dendroica cerulea</i>	Cerulean Warbler	Upper and Lower Watershed	NNF CONF	LR
Bird	<i>Empidonax minimus</i>	Least Flycatcher	Upper and Lower Watershed	CONF	LR
Bird	<i>Empidonax traillii</i>	Willow Flycatcher	Upper and Lower Watershed	CONF	LR
Bird	<i>Shyrapicus varius Appalachensis</i>	Appalachian Yellow-bellied Sapsucker	Upper Watershed	NNF	LR
Bird	<i>Sitta canadensis</i>	Red-breasted Nuthatch	Upper and Lower Watershed	CONF	LR
Butterfly	<i>Autochton cellus</i>	Golden-banded Skipper	Upper Watershed	NNF	LR
Butterfly	<i>Celastrina niger</i>	Dusky Azure	Upper Watershed	NNF	LR
Spider	<i>Nesticus species nova</i> 2	A nesticid spider	Upper Watershed	NNF	LR
Terrestrial Gastropod	<i>Glyphyalinia junaluskana</i>	Dark Glyph	Upper Watershed	NNF	LR
Terrestrial Gastropod	<i>Glyphyalinia pentadelphia</i>	Pink Glyph	Upper Watershed	NNF	LR
Terrestrial Gastropod	<i>Haplotrema kendeighi</i>	Blue-footed Lancetooth	Upper Watershed	NNF	LR
Terrestrial Gastropod	<i>Patera clarki</i>	Dwarf Proud Globe	Upper Watershed	NNF	LR
Terrestrial Gastropod	<i>Paravitrea lamellidens</i>	Lamellate Supercoil	Upper Watershed	NNF	LR
Terrestrial Gastropod	<i>Paravitrea umbilicarus</i>	Open Supercoil	Upper Watershed	NNF	LR
Terrestrial Gastropod	<i>Zonitoides patuloides</i>	Appalachian Gloss	Upper Watershed	NNF	LR

1 = Upper watershed includes all tributaries of the North Fork of the Chattooga above the West Fork – North Fork confluence as well as all the tributaries of the West Fork of the Chattooga. Lower watershed includes all tributaries which drain into the North Fork of the Chattooga below the West Fork – North Fork confluence.

2 = LR = Locally Rare; S = Sensitive; TSA = Threatened – Similarity of Appearance.

### **Locally Rare Wildlife Species**

All rare species lists and information were compiled by: (1) consulting 14 years of U.S. Forest Service (FS) plant and animal inventory records; (2) consulting Georgia, North Carolina and South Carolina Natural Heritage Program (NHP) element occurrence (EO) records; (3) consultation with other Federal, State and non-government organizational (NGO) biologists; (4) reviewing U.S. Fish and Wildlife Service (USFWS) lists for potential species in Jackson, Macon, Oconee and Rabun Counties; and (6) the references at the end of this document.

Initially, all rare wildlife species which are listed on the CONF, NNF and the SNF were considered in this analysis. This list did not include some Piedmont species and Ridge and

Valley species which are included on the CONF list and SNF list but do not occur in the Southern Blue Ridge Subsection. This initial list included 104 PETS and Locally Rare wildlife species (see Appendix E). From this list, 77 species were dropped from further consideration due to the following criteria: unsuitable habitat for the species occurring in the analysis area; the analysis area being outside the known or suspected range of the species; or the species being considered extirpated. Twenty-seven PETS and Locally Rare wildlife species were identified as having potential to occur in the analysis area, i.e., suitable habitat or as being known to occur in the analysis area (see Table 3.2-13).

Table 3.2-13. CONF, NNF and SNF threatened, endangered, sensitive and locally rare wildlife species which are known to occur or having potential to occur in the analysis area.

TYPE	SCIENTIFIC NAME COMMON NAME	HABITAT/RANGE	FOREST	LISTING
Amphibian	<i>Plethodon teyahalee</i> Southern Appalachian Salamander	Moist forests in southwestern mountains at all elevations	CONF NNF SNF	S
Butterfly	<i>Speyeria diana</i> Diana Fritillary	Rich woods and adjacent edges and openings; host plants violets ( <i>Viola</i> ), Pine Forests	CONF NNF SNF	S
Mammal	<i>Myotis leibii</i> Eastern Small-footed Bat	Roosts in hollow trees, rock outcrops, bridges (warmer months), in caves and mines (winter)	CONF NNF SNF	S
Mammal	<i>Corynorhinus rafinesquii</i> Rafinesque's Big-eared Bat	Roosts in old buildings, hollow trees, caves, mines, and beneath bridges, usually near water	CONF NNF SNF	S
Moth	<i>Euchlaena milnei</i> Milne's Euchlaena	Hardwood forest and riparian areas in mountains	NNF	S
Spider	<i>Nesticus silvanus</i> a nesticid spider	Habitat not indicated (apparently endemic to southern mountains of NC)	NNF	S
Amphibian	<i>Ambystoma talpoideum</i> Mole Salamander	Breeds in fish-free semipermanent woodland ponds; forages in adjacent woods	NNF	LR
Amphibian	<i>Aneides aeneus</i> Green Salamander	Damp, shaded crevices of cliffs or rock outcrops in deciduous forests (southern forests)	CONF NNF	LR
Bird	<i>Dendroica cerulea</i> Cerulean Warbler	Mature hardwood forests; steep slopes and coves in mountains [breeding season only]	NNF CONF	LR
Bird	<i>Empidonax minimus</i> Least Flycatcher	Open hardwood forests, groves, streamside trees (breeding season only)	CONF	LR
Bird	<i>Empidonax traillii</i> Willow Flycatcher	Wet thickets, streamsides, riparian areas (breeding season only)	CONF	LR
Bird	<i>Shyrpicus varius</i> <i>appalachiensis</i> Appalachian Yellow-bellied Sapsucker	Mature, open hardwoods with scattered dead trees [breeding season only]	NNF	LR
Bird	<i>Sitta canadensis</i> Red-breasted Nuthatch	Mixed conifer and hardwood forest and woodland (breeding season only)	CONF	LR
Butterfly	<i>Autocthon cellus</i> Golden-banded Skipper	Moist woods near streams; host plant-hog peanut ( <i>Amphicarpa bracteata</i> )	NNF	LR
Butterfly	<i>Celastrina niger</i> Dusky Azure	Rich, moist deciduous forests; host plant-goat's beard ( <i>Aruncus dioicus</i> )	NNF	LR

Section 3.2.2 Terrestrial Wildlife

TYPE	SCIENTIFIC NAME COMMON NAME	HABITAT/RANGE	FOREST	LISTING
Mammal	<i>Neotoma floridana haematoreia</i> Eastern Woodrat – Southern Appalachian Pop.	Rocky places in deciduous or mixed forests	CONF	LR
Mammal	<i>Tamiasciurus hudsonicus</i> Red Squirrel	Mixed conifer and hardwood forest and riparian areas	CONF	LR
Reptile	<i>Eumeces anthracinus</i> Coal Skink	Rocky slopes, wooded hillsides and roadbanks	CONF	LR
Reptile	<i>Pituophis m. melanoleucus</i> Northern Pine Snake	Dry and/or sandy pine/oak uplands	CONF	LR
Spider	<i>Nesticus species nova 2</i> A nesticid spider	Rocky talus fields along the Chattooga River and rock crevices of Whiteside Mountain	NNF	LR
Terrestrial Gastropod	<i>Glyphyalinia junaluskana</i> Dark Glyph	Moist leaf litter in deciduous woods on mountainsides	NNF	LR
Terrestrial Gastropod	<i>Glyphyalinia pentadelphia</i> Pink Glyph	Pockets of moist leaves in upland woods	NNF	LR
Terrestrial Gastropod	<i>Haplotrema kendeighi</i> Blue-footed Lancetooth	Mountainsides in leaf litter, usually above 2000 feet elevation	NNF	LR
Terrestrial Gastropod	<i>Patera clarki</i> Dwarf Proud Globe	Under leaf litter on wooded mountainsides	NNF	LR
Terrestrial Gastropod	<i>Paravitrea lamellidens</i> Lamellate Supercoil	Pockets of deep, moist leaf litter on wooded hillsides or in ravines	NNF	LR
Terrestrial Gastropod	<i>Paravitrea umbilicarus</i> Open Supercoil	Pockets of deep, moist leaf litter on wooded hillsides or in ravines	NNF	LR
Terrestrial Gastropod	<i>Zonitoides patuloides</i> Appalachian Gloss	Pockets of deep, moist leaves on mountainsides and in ravines	NNF	LR

Since these alternatives primarily relate to human-user disturbances, an additional 18 species were dropped from this list because it was determined that the alternatives analyzed in this proposal would have no direct, indirect or cumulative effect on these species. The 18 “dropped” species represented six major classes of animals, which include: birds, butterflies, mammals, moths, reptiles and spiders. The birds and mammals were dropped from the list because they are very mobile and easily able to adjust to human-related disturbances by fleeing. The mere presence of humans within their habitats is not thought to be particularly disturbing to these species. The butterflies and moths were dropped from the list because they are readily able to flee from disturbances and their host plants and habitats are rather common and would not be affected by these alternatives. The reptiles and spiders were dropped from the list because they occur in rock outcrops, rocky talus slopes, and other areas within the corridor which are not likely to be affected by one or more of the proposed alternatives.

The major animal classes which are analyzed in detail are those species which meet one or more of the following criteria: little is known about the species or its habitat; the species is generally slow-moving and unable to avoid human-related disturbances; and/or the species habitat is sensitive and easily disturbed from human-related disturbances. The species that meet one or more of these criteria are within the amphibian group and the terrestrial gastropod group (see Table 3.2-13). All rare wildlife species included in Table 3.2-14 are assumed present within the analysis area because either documented occurrence records of the species within the analysis area exist or suitable habitat occurs in the analysis area and site specific surveys were not

conducted which could rule out the possibility of occurrence. Table 3.2-15 provides additional information on the sensitive and rare species analyzed for each alternative.

Table 3.2-14. CONF, NNF and SNF threatened, endangered, sensitive and locally rare wildlife species assumed to occur in the analysis area and could be potentially impacted by one or more of the alternatives.

TYPE	COMMON NAME	SCIENTIFIC NAME	FOREST	LISTING
Amphibian	Southern Appalachian Salamander	<i>Plethodon teyahalee</i>	CONF NNF SNF	S
Amphibian	Green Salamander	<i>Aneides aeneus</i>	CONF NNF	LR
Terrestrial Gastropod	Dark Glyph	<i>Glyphyalinia junaluskana</i>	NNF	LR
Terrestrial Gastropod	Pink Glyph	<i>Glyphyalinia pentadelpia</i>	NNF	LR
Terrestrial Gastropod	Blue-footed Lancetooth	<i>Haplotrema kendeighi</i>	NNF	LR
Terrestrial Gastropod	Dwarf Proud Globe	<i>Patera clarki</i>	NNF	LR
Terrestrial Gastropod	Lamellate Supercoil	<i>Paravitrea lamellidens</i>	NNF	LR
Terrestrial Gastropod	Open Supercoil	<i>Paravitrea umbilicarus</i>	NNF	LR
Terrestrial Gastropod	Appalachian Gloss	<i>Zonitoides patuloides</i>	NNF	LR

Table 3.2-15. Information on sensitive and rare wildlife species analyzed in detail for all alternatives.

Name	Species Ranking		Forest List (Occurrennces)	Range and Habitat
	Global	State		
Southern Appalachian Salamander	G3	S2 (GA) S3? (NC) SNR (SC)	NNF (8) CONF (2) SNF	Blue ridge physiographic province of southwestern NC and adjacent TN, GA, and SC. Moist forests at all elevations; includes birch-beech-hemlock forests. Also burrows in soil, fallen logs, debris.
Green Salamander	G3G4	S2 (GA) S2 (NC) S1 (SC) S1	NNF (2)	Southeastern PA to northern AL. Damp crevices in shaded rock outcrops and ledges. Also occurs beneath loose bark and in cracks in standing or fallen trees and sometimes in or under logs on the ground.
Dark Glyph	G2	S2 (NC) S2 (TN) SNR (GA)	NNF (2)	Blue Ridge Mountains in GA, NC, and TN. Inhabits moist pockets of leaves in cove hardwood forests and upland woods.
Pink Glyph	G2	S2 (NC) S2 (TN) SNR (GA)	NNF (4)	Southern Blue Ridge Mountains in GA, NC, and TN. Inhabits moist pockets of leaves in upland woods.
Blue-footed Lancetooth	G2	S1S2(NC) S3 (TN)	NNF (0)	Southern Blue Ridge Mountains in NC and TN. Inhabits leaf litter on mountainsides usually above 2000 feet.

	Species Ranking			
Dwarf Proud Globe	G3		NNF (1)	Southern Blue Ridge Mountains in NC. Inhabits leaf litter in cove hardwood forests.
Lamellate Supercoil	G2	G2 (NC) S2(TN) SNR (ME)	NNF (13)	Southern Blue Ridge Mountains in NC and TN. Inhabits leaf litter and under rocks in cove hardwood forests.
Open Supercoil	G2	SNR (AL) SNR (GA) S2 (NC) S3 (TN)	NNF (2)	Portions of AL, GA, NC, and TN. Inhabits cove hardwood forests with rock slopes.
Appalachian Gloss	G3	SNR (GA) S2 (NC) SNR (SC) S2S3 (TN)	NNF (0)	Portions of AL, GA, NC, and TN. Inhabits cove hardwood forests.

**Management Indicator Species**

The CONF, NNF and SNF have a total of 20 MIS (see Table 3.2-16). Only those MIS which are indicators of the following important habitat components which might be directly or indirectly affected by one or more of the alternatives will be analyzed further in this analysis: large contiguous forest interior, hardmast forest, pine/pine-oak forest, mid-late successional riparian forests and mid-late successional mesic forests. Some species will not be analyzed further in this analysis because their important habitat components do not occur in amounts or arrangements suitable for supporting a viable population of the species and/or simply because their important habitat components will not be affected by one or more of the proposed alternatives.

Table 3.2-16. CONF, NNF, and SNF MIS list and project-level analysis information.

COMMON NAME	IMPORTANT HABITAT COMPONENT	FOREST	PROJECT LEVEL ANALYSIS / REASON <sup>1</sup>
Black Bear	Hardmast Forest, Early Successional Forest, Large Contiguous Forest Interior with Low Disturbance	CONF NNF SNF	Yes / 1
White-tailed Deer	Hardmast Forest, Early Successional Forest	CONF NNF	Yes / 1
Ovenbird	Large Contiguous Deciduous Forest Interior	CONF NNF	Yes / 1
Pine Warbler	Pine / Pine – Oak Forest	CONF NNF SNF	Yes / 1
Acadian Flycatcher	Mid – Late Successional Riparian Forests	CONF NNF SNF	Yes / 1
Hooded Warbler	Mid – Late Successional Mesic Forests	CONF SNF	Yes / 1
Scarlet Tanager	Hardmast Forest	CONF SNF	Yes / 1
Eastern Wild Turkey	General Forest Habitat	SNF	Yes / 1

COMMON NAME	IMPORTANT HABITAT COMPONENT	FOREST	PROJECT LEVEL ANALYSIS / REASON <sup>1</sup>
Pileated Woodpecker	Standing Dead Trees (Snags)	CONF NNF SNF	No / 2
Eastern Towhee	Early Successional Forest	NNF	No / 2
Ruffed Grouse	Early Successional Forest	NNF	No / 2
Brown-headed Nuthatch	Pine Woodlands	SNF	No / 2
Prairie Warbler	Early Successional Forest	CONF SNF	No / 2
Swainson's Warbler	Early Successional Riparian Forest	CONF SNF	No / 3
Field Sparrow	Woodland, Savanna and Grassland Habitat	CONF SNF	No / 2
American Woodcock	Early Successional Riparian Forest	SNF	No / 2
Bobwhite Quail	Early Successional Forest, Woodland, Savanna and Grassland Habitat	SNF	No / 2
Red-cockaded Woodpecker	Longleaf Pine Woodland / Savanna	CONF	No / 3
Wood Thrush	Forest Interior	CONF	No / 3
Chestnut-sided Warbler	High Elevation Early Successional Forest	CONF	No / 2

1-1 = Species has important habitat components in the project area which may be affected by one or more of the proposed alternatives; 2 = Species does not have important habitat components in the project area which may be affected by one or more of the proposed alternatives; 3 = Species was selected as an MIS for habitats which occur on the CONF in middle GA.

## ENVIRONMENTAL CONSEQUENCES

The following effects discussion applies to all of the rare species mentioned above (analyzed in detail). In respect to analyzing the effects of each alternative on rare wildlife species, Alternative 1 will be used as the baseline or existing condition to establish a means of comparison and analysis between all alternatives. Only those aspects of each alternative which may have an effect on rare wildlife (group size/user density, boating management, trail management and camping management) will be analyzed in this proposal. For the purpose of this analysis, the effects of each alternative on rare wildlife species will be qualitatively analyzed and compared, since these alternatives, for the most part, do not have quantitative figures associated with them, such as miles and location of portage trails, etc. It is assumed that specific management actions, such as trail construction, which may result from the selected alternative, will be further analyzed at the project level. Conversely, it is also assumed that some user-created actions and potential rare wildlife effects may result from some of the alternatives without the ability or foresight to conduct site specific analysis. An example of this type of scenario would include portaging around newly established obstacles, such as log jams, since it would be impossible to determine when and where these might occur and thus when and where the immediate need will arise.

For the purposes of this analysis, the upper Chattooga Wild and Scenic River Corridor will be the analysis boundary used to analyze the potential direct and indirect effects each alternative may have on rare species because any potential wildlife effects associated with the alternatives would likely occur in this area. Currently, there are two known occurrences of rare wildlife species within the upper corridor.

The cumulative effects analysis area will be based on individual rare species biology and the known or suspected range of the species. Therefore, the size of the cumulative effects analysis area will vary based on a species by species basis.

### **Effects of the Alternatives on Wildlife Management Indicator Species**

#### **1) Black Bear**

“Remoteness” and lack of human disturbance is the most important element of the black bear’s habitat which might be affected by the proposed alternatives. Currently, this habitat element is adequately protected under Alternative 1, although the growing number of visitors may diminish this effectiveness in the future. While black bears are occasionally disturbed by the occasional existing user, generally this area and the surrounding watershed provide optimal “remoteness” for this species, especially when compared to other areas across the three national forests. None of the alternatives are expected to directly affect the population trend of the black bear (through direct mortality). Alternative 2 could potentially enhance “habitat remoteness” for this species. Alternatives that allow the most visitors to access the corridor, particularly the remote upstream reaches, would likely diminish the habitat remoteness element. However, it is not likely increased human traffic would affect the overall population trends for this species (stable to slightly increasing) across the three national forests.

#### **2) White-tailed Deer**

The key habitat element which limits deer population growth on the Southern Appalachian national forests is early successional habitat, not habitat remoteness. Deer appear to do well in urban environments whenever suitable habitat is available. Therefore, all alternatives in this proposal will maintain the white-tailed deer’s population stable trend across the forests.

#### **3) Ovenbird**

The ovenbird is used as an MIS on the NNF and CONF. This species is used as a MIS to help indicate the effects of management on species associated with mature interior forest habitats. This species requires large, contiguous, mature forests for successful breeding. Since the alternatives in this analysis will not increase or decrease the desired habitat attributes for this species, the stable to slightly increasing population trend for this species will not be affected by any these alternatives.

#### **4) Pine Warbler**

This species uses a variety of upland pine and pine-hardwood forest types throughout its range, and will nest in deciduous forest with scattered individual or small groves of pines (La Sorte et al. 2007). Since the alternatives in this analysis will not increase or decrease the desired habitat attributes for this species, the stable to slightly increasing population trend for this species will not be affected by any these alternatives.

#### **5) Acadian Flycatcher**

Breeding habitat for this species is mature mesic deciduous forests, often near streams (La Sorte et al. 2007). Since the alternatives in this analysis will not increase or decrease the desired habitat attributes for this species, the stable to increasing population trend for this species will not be affected by any these alternatives.

**6) Hooded Warbler**

This species favors moist deciduous forests with a fairly dense understory. Nesting locations are restricted to large forest patches. It typically inhabits mature forests where large trees fall to create canopy gaps (La Sorte et al. 2007). Since the alternatives in this analysis will not increase or decrease the desired habitat attributes for this species, the stable to slightly increasing population trend for this species will not be affected by any these alternatives.

**7) Scarlet Tanager**

This species prefers large blocks of mature forest, especially where oaks are common, but also may occur in young successional woodlands (La Sorte, et al. 2007). Since the alternatives in this analysis will not increase or decrease the desired habitat attributes for this species, the stable to increasing population trend for this species will not be affected by any these alternatives.

**8) Eastern Wild Turkey**

In the south, wild turkey uses upland forests of oaks, hickories and pines as well as bottomland forest habitats, which include beech, gum, bald cypress, tupelo and water ash (La Sorte, et al. 2007). Since the alternatives in this analysis will not increase or decrease the desired habitat attributes for this species, the stable population trend for this species will not be affected by any these alternatives.

**Effects of the Alternatives on Proposed, Endangered, Threatened, Sensitive and Locally Rare Terrestrial Wildlife****Alternative 1 – Direct, Indirect and Cumulative Effects**

Currently, rare wildlife species are being adequately protected under Alternative 1 due to the limitation on group size within the wilderness areas. Under this alternative, it can be assumed that trail management in the upper corridor will remain static or the current trail system may increase in the future, as may campsite creation. Although new trails and campsite construction/relocation, if not carefully planned, could affect rare species, this is not assumed to be the case since any new actions must adhere to project level NEPA analysis. Overall, there will be no direct, indirect or cumulative effects to rare species from this alternative.

**Alternative 2 – Direct, Indirect and Cumulative Effects**

This alternative best conserves rare wildlife species. Because of its restrictive nature, Alternative 2 will inevitably reduce human-related disturbances and impacts in the upper corridor, thus protecting this species and its habitat. There will be no direct, indirect, or cumulative effects to rare species from this alternative.

**Alternative 3 – Direct, Indirect and Cumulative Effects**

Alternative 3 will, over time, reduce human-related disturbances and impacts in the upper corridor, thus conserving rare species and habitat. Overall conservation of rare species is more than Alternative 1 and less than Alternative 2. There will be no direct, indirect, or cumulative effects to rare species from this alternative.

**Alternative 4 – Direct, Indirect and Cumulative Effects**

In this analysis, the most important aspects of the boating alternatives which may have impacts on rare wildlife include: 1) the section of upper corridor which is proposed for boating, 2) total length of upper corridor which is proposed for boating, and 3) the anticipated level of use.

Potential direct and indirect effects to rare species from this and other boating alternatives include: increased user densities and associated disturbance within the upper corridor, trampling of vegetation and sensitive habitat through creation of portage trails and new access trails, and increased vegetation disturbance through creation of new “play” (swimming, resting, lunch) sites. Based on the uncertainty (in amount, time and location) associated with some of the effects resulting from this alternative, such as portage trails, it is unreasonable to assume this alternative will have “no effect” on rare species. It is therefore assumed that some individuals may be directly or indirectly affected by this alternative. However, because rare species, by definition, are rare and are not encountered often, it is unlikely the effects of this alternative would occur at a frequency which would impact the population viability of this species – if present (in the case of the terrestrial gastropods.) Therefore, although individuals may be directly or indirectly impacted under this alternative, it is not likely that this alternative, when combined with other past, present and future management actions on both public and private land, would have a cumulative effect on the population viability of rare species.

**Alternative 5 – Direct, Indirect and Cumulative Effects**

This alternative best conserves rare species from among those alternatives that add boating since the majority of the North Carolina section of the upper Chattooga would be excluded. This exclusion reduces impacts for approximately 70% of all rare wildlife species included in this detailed analysis. As with previous alternatives, although some individuals may be directly or indirectly impacted, it is not likely that this alternative, when combined with other past, present and future management actions on both public and private land, would have a cumulative effect on the population viability of rare species.

**Alternative 8 – Direct, Indirect and Cumulative Effects**

Potential direct and indirect effects to rare species from this alternative would be similar to alternatives 4, 5, 9 and 10 but is more likely to have greater impacts since visitor levels would be higher and could occur throughout the year and throughout the corridor. As with other alternatives, although some individuals may be directly or indirectly impacted, it is not likely that this alternative, when combined with other past, present and future management actions on both public and private land, would have a cumulative effect on the population viability of rare species.

**Alternative 9 – Direct, Indirect and Cumulative Effects**

Although this alternative has a seasonal restriction on boating, it does allow for more user access into the most sensitive rare wildlife habitat in the upper part of Chattooga Cliffs reach (just below private lands). Therefore, this alternative is considered to have more potential impacts on rare species than alternatives 4 or 5 but less than alternatives 8 or 10. As with other alternatives, although some individuals may be directly or indirectly impacted, it is not likely that this alternative, when combined with other past, present and future management actions on both

public and private land, would have a cumulative effect on the population viability of rare species.

**Alternative 10 – Direct, Indirect and Cumulative Effects**

Impacts on rare species are expected to be slightly greater for this alternative than Alternative 9 since more of the river would be open to boating; however, Alternative 10 would have fewer effects than Alternative 8 due to seasonal and flow restrictions. As with other alternatives, although some individuals may be directly or indirectly impacted, it is not likely that this alternative, when combined with other past, present and future management actions on both public and private land, would have a cumulative effect on the population viability of rare species.

### 3.2.3 Aquatic Species and Habitats

#### SUMMARY OF FINDING

This analysis addresses potential effects of the alternatives on sensitive aquatic species, locally rare aquatic species and MIS and communities in the Chattooga River watershed. Potential impacts on aquatic species in this analysis are mainly associated with sedimentation from trails and campsites and with the potential loss of LWD. Currently, campsites and trails are contributing sediment to the river and its tributaries; and some unauthorized removal of LWD is taking place. All of the alternatives address LWD retainment and the designation of campsites and trails to minimize aquatic resource impacts.

No federally listed or proposed aquatic species exist within the analysis area. For all alternatives there would be no adverse direct, indirect or cumulative impacts to Forest Listed Sensitive aquatic species or Locally Rare aquatic species and no risk to aquatic population viability across the Forests for MIS and Communities.

#### AFFECTED ENVIRONMENT

This analysis encompasses the Chattooga River watershed from a point on the main stem of the Chattooga River headwaters below private property (Whiteside Cove area) downstream to Tugaloo Lake, including tributaries to the river. Direct and indirect effects will be addressed from the private property boundary downstream to the Highway 28 Bridge. Cumulative effects will be addressed for the entire watershed.

#### Aquatic Federally Threatened, Endangered and Proposed Aquatic Species and Region 8 Forest Sensitive Aquatic Species (PETS)

No federally listed aquatic species exist in the Chattooga River or its tributaries. Five Region 8 Forest Sensitive aquatic species may occur in the watershed (see Table 3.2-17). Of these five species, there are State Natural Heritage Program element occurrence records for *Cambarus chaugaensis* and *Alasmidonta varicosa* in the Chattooga River. Also, English (1990) sampled *Beloneuria georgiana* in the Chattooga River and two tributaries.

Table 3.2-17. PETS aquatic species for the SNF, CONF and NNF.

Species	Species Ranking				Forest List	Habitat
	Global	State	AFS	Forest		
Oconee stream crayfish <i>Cambarus chaugaensis</i>	G2	GA-S1 NC-S2 SC-S2S3	T	Sensitive	CONF NNF SNF	Fast-moving, rocky tributaries of the upper Savannah River.
Brook floater <i>Alasmidonta varicosa</i>	G3	GA-S2 NC-S1 SC-S?	T	Sensitive	CONF SNF	High gradient streams and moderate gradient rivers among rocks and gravel substrates in sandy shoals, riffles and moderate rapids.
Georgia beloneurian stonefly <i>Beloneuria georgiana</i>	G2	GA-S2 NC-S1S3		Sensitive	CONF	High elevation waterfalls, spray cliffs and spring brooks.

	Species Ranking					
A dragonfly <i>Macromia margarita</i>	G3	GA-S1 NC-S2S3 SC-SNR		Sensitive	NNF	Mountain, sometime Piedmont streams and rivers with high water quality, forested watersheds and silt deposits among rocks.
Edmund's snaketail <i>Ophiogomphus incurvatus</i>	G2G3	GA-S1S2 NC-S3 SC-SNR		Sensitive	CONF	Clear streams with sand or gravel riffles.

The American Fisheries Society (AFS) has assigned status ranks to crayfish species (Taylor et. al. 2007) and freshwater mussel species (Williams et. al. 1992). AFS status rank include CS (currently stable), V (vulnerable), SC (Special Concern), T (threatened) and E (endangered). The T status rank indicates that the species is likely to become endangered throughout all or a significant portion of its range.

The 2004 Final Environmental Impact Statement for the Sumter National Forest LRMP addresses Aquatic Viability by watershed. The Chattooga River watershed was represented by two Forest Sensitive species, *Cambarus chaugaensis* and *Alasmidonta varicosa*. The Aquatic Viability Outcome for these species is that they are potentially at risk in the watershed; however, the Forest Service may influence conditions in the watershed to keep the species well distributed. Therefore likelihood of maintaining viability is moderate. Sediment was determined to be a risk factor for aquatic species viability in the Chattooga River watershed.

Alderman (2004) noted that the population of *Alasmidonta varicosa* in the Chattooga River was the best in the Southeast and therefore special conservation should be emphasized for this population.

#### **Forest Locally Rare Aquatic Species**

The CONF and the NNF both maintain a Locally Rare Species list. Those species that may occur in the watershed are listed in Table 3.2-18. For these species, there are State Natural Heritage Program element occurrence records of *Cryptobranchus alleganiensis*, *Micrasema burksi* and *Notropis lutipinnis* in the watershed. Also, *Notropis lutipinnis*, *Etheostoma inscriptum*, *Notropis leuciodus* and *Micropterus coosae* have been sampled in the Chattooga River by the US Forest Service, South Carolina Department of Natural Resources (SCDNR) and Georgia Department of Natural Resources (GADNR). *Stylurus scudder* was sampled from the Chattooga River between 2001 and 2003 (Smock et. al. 2004). *Micrasema burksi* was sampled from the Chattooga River and one tributary by English (1990).

Section 3.2.3 Aquatic Species and Habitat

**Table 3.2-18. Forest listed Locally Rare aquatic species for the CONF and NNF.**

Species	Species Ranking				Forest List	Habitat
	Global	State	AFS	Forest		
Hellbender <i>Cryptobranchus alleganiensis</i>	G3G4	GA-S2 NC-S3 SC-SNR		LR	NNF	Rocky, clear creeks and rivers, usually where there are large shelter rocks.
A caddisfly <i>Rhyacophila amicus</i>	G2	NC-S2 SC-SNR		LR	NNF	Mountain rivers and creeks.
A caddisfly <i>Matrioptila jeanae</i>	G4	GA-SNR NC-S3 SC-S3		LR	NNF	Streams and rivers.
A caddisfly <i>Micrasema burksi</i>	G4G5	GA-SNR NC-S3 SC-SNR		LR	NNF	Mountain streams.
A caddisfly <i>Micrasema sprulesi</i>	G5	NC-S3 SC-SNR		LR	NNF	Streams and rivers.
Oconee crayfish ostracod <i>Cymocythere clavata</i>	GNR	NC-S2?		LR	NNF	Symbiotic on crayfish in mountain streams and rivers in the Savannah River system.
Whitewater crayfish ostracod <i>Dactylocythere prinsi</i>	GNR	NC-S1		LR	NNF	Symbiotic on crayfish in mountain streams and rivers in the Savannah River system.
Ski-tipped emerald <i>Somatochlora elongata</i>	G5	GA-S1 NC-S2S3		LR	NNF	Slow to moderate streams
Zebra clubtail <i>Stylurus scudderii</i>	G4	GA-S1 NC-S3? SC-SNR		LR	NNF	Creeks and rivers of moderate gradient in gravel or sandy substrates.
Yellowfin shiner <i>Notropis lutipinnis</i>	G4Q	GA-S4 NC-S2 SC-SNR	CS	LR	NNF	Clear rocky pools of headwaters, creeks and rivers.
Turquoise darter <i>Etheostoma inscriptum</i>	G4	GA-S4 NC-S1 SC-SNR	CS	LR	NNF	Rocky riffles of large creeks and small to medium rivers
Redeye bass <i>Micropterus coosae</i>	G5	GA-S5 NC-S1	CS	LR	NNF	Clear upland creeks and small to medium rivers in rocky pools and runs. May move to small tributary streams for spawning.
Habrophleidiodes mayfly <i>Habrophleidiodes spp.</i>	GNR	NC-S2		LR	NNF	Very small streams.
Williams' rare winter stonefly <i>Megaleuctra williamsae</i>	G2	NC-S1 SC-SNR		LR	NNF	Streams and rivers.
Whitetail shiner <i>Cyprinella galactura</i>	G5	GA-S3S4 NC-S4 SC-SNR	CS	LR	CONF	Cool, usually clear, high gradient headwaters, creeks and small rivers with clean gravel and rubble.
Tennessee shiner <i>Notropis leuciodus</i>	G5	GA-S3 NC-S5 SC-SNR	CS	LR	CONF	Pools and runs of cool, usually clear creeks and small to medium rivers with gravel-rubble substrate.

Additional AFS status rank (Warren et al. 2000) in this table: CS (currently stable) denotes a species whose distribution is widespread and stable or a species that may have declined in portions of its range but is not in need of immediate conservation management actions.

### Aquatic MIS and Management Indicator Communities

Table 3.2-19. Aquatic MIS and Communities for the NNF and SNF.

Aquatic Management Indicator Species and Communities	Forest	Habitat
<b>Management Indicator Species</b>		
Brook trout <i>Salvelinus fontinalis</i>	NNF	Coldwater streams.
Rainbow trout <i>Oncorhynchus mykiss</i>	NNF	Coldwater streams.
Brown trout <i>Salmo trutta</i>	NNF	Coldwater streams.
Blacknose dace <i>Rhinichthys atratulus</i>	NNF	Coldwater streams.
<b>Management Indicator Communities</b>		
Cold Water Communities	SNF	Chattooga River and tributaries; Brook trout, rainbow trout, brown trout, blacknose dace, aquatic insects, crayfish and mollusks.
Cool Water Communities	SNF	Chattooga River and tributaries; Trout and other fish species, aquatic insects, crayfish and mollusks.

Continued monitoring indicates that while individual populations exhibit high annual variability in age class structure and biomass, overall trends in brook trout, rainbow trout, brown trout and blacknose dace populations across the Nantahala and Pisgah National Forests have remained stable during the last ten years (National Forests in North Carolina FY 2006 Monitoring and Evaluation report).

The Chattooga River and its tributaries contain cool to cold water aquatic communities from the headwaters to the downstream reaches. The aquatic community serves as a management indicator that is monitored to indicate the effects of management on riparian resources. Fish, crayfish, aquatic insects and mollusks are all components of the community. Tables 3.2-20, 3.2-21 and 3.2-22 address the aquatic community and provide list of fish species from surveys conducted in the Chattooga River watershed by the USFS, SCDNR and GADNR

Table 3.2-20. Fish species sampled in the Chattooga River watershed.

Scientific Name	Common Name
<b>Catostomidae</b>	<b>Suckers</b>
<i>Catostomus commersoni</i>	White sucker
<i>Hypentelium nigricans</i>	Northern hogsucker
<i>Scartomyzon rupiscartes</i>	Striped jumprock
<b>Centrarchidae</b>	<b>Sunfishes</b>
<i>Lepomis auritus</i>	Redbreast sunfish
<i>Lepomis macrochirus</i>	Bluegill
<i>Micropterus coosae</i>	Redeye bass
<b>Cottidae</b>	<b>Sculpins</b>
<i>Cottus bairdi</i>	Mottled sculpin
<b>Cyprinidae</b>	<b>Carps and Minnows</b>
<i>Campostoma anomalum</i>	Central stoneroller

Section 3.2.3 Aquatic Species and Habitat

Scientific Name	Common Name
<i>Clinostomus funduloides funduloides</i>	Rosyside dace
<i>Cyprinella nivea</i>	Whitefin shiner
<i>Hybopsis rubrifrons</i>	Rosyface chub
<i>Luxilus coccogenis</i>	Warpaint shiner
<i>Nocomis leptocephalus leptocephalus</i>	Bluehead chub
<i>Notropis leuciodus</i>	Tennessee shiner
<i>Notropis lutipinnis</i>	Yellowfin shiner
<i>Notropis spectrunculus</i>	Mirror shiner
<i>Rhinichthys atratulus</i>	Blacknose dace
<i>Rhinichthys cataractae</i>	Longnose dace
<i>Semotilus atromaculatus</i>	Creek chub
<b>Ictaluridae</b>	<b>Bullhead Catfishes</b>
<i>Ameiurus brunneus</i>	Snail bullhead
<i>Noturus leptacanthus</i>	Speckled madtom
<b>Percidae</b>	<b>Perches</b>
<i>Etheostoma inscriptum</i>	Turquoise darter
<b>Salmonidae</b>	<b>Trouts</b>
<i>Oncorhynchus mykiss</i>	Rainbow trout
<i>Salmo trutta</i>	Brown trout
<i>Salvelinus fontinalis</i>	Brook trout

The aquatic community includes four forest-listed Locally Rare fish species: *Micropterus coosae*, *Notropis leuciodus*, *Notropis lutipinnis* and *Etheostoma inscriptum*. The fish species diversity of the Management Indicator Community in the Chattooga River watershed has not changed in more than 20 years of sampling the main stem of the river. All of the fish species in the community have been assigned a Global Rank of either G4 or G5 by NatureServe.

*Salvelinus fontinalis* is ranked by the SC Natural Heritage Program as S2. Management efforts throughout the watershed have increased over the last decade to identify existing Southern brook trout populations, increase the species distribution, and enhance habitat in brook trout streams. Most populations are now isolated in headwater tributaries. Brook trout restoration has occurred in one tributary to the Chattooga River and is planned in two additional tributaries.

*Ameiurus brunneus* has been assigned a V (vulnerable) status rank by the AFS. The status rank denotes a species that may become endangered or threatened by relatively minor disturbances to its habitat or that deserves careful monitoring of its distribution and abundance in continental waters of the US to determine its status. The remaining fish species in the community are ranked as CS (currently stable) by the AFS.

Eversole et al. (2002) conducted crayfish surveys in the Chattooga River watershed. Crayfish species known to occur are listed in Table 3.2-21.

Table 3.2-21. Crayfish species that are known to occur in the Chattooga River watershed.

Scientific Name	Common Name
<i>Cambarus asperimanus</i>	Mitten crayfish
<i>Cambarus bartonii bartonii</i>	Common crayfish
<i>Cambarus chaugaensis</i>	Oconee stream crayfish
<i>Procambarus spiculifer</i>	White tubercled crayfish

The aquatic community includes one Forest Sensitive crayfish: *Cambarus chaugaensis*. All other crayfish are rated as G4 or G5 by NatureServe and Currently Stable by AFS. In addition, *Cambarus asperimanus* is ranked as S1 by the SC Natural Heritage Program.

Alderman (2004) found three species of mussels during surveys in the Chattooga River: *Alasmidonta varicosa*, *Elliptio angustata* and *Elliptio producta*. In addition to the species reported by Alderman, Roghair et al. (2005) reported finding a relic shell of *Elliptio complanata* in the Chattooga River (see Table 3.2-22).

Table 3.2-22. Mussel species that are known to occur in the Chattooga River watershed.

Scientific Name	Common Name
<i>Alasmidonta varicosa</i>	Brook floater
<i>Elliptio angustata</i>	Carolina lance
<i>Elliptio complanata</i>	Eastern elliptio
<i>Elliptio producta</i>	Atlantic spike

The aquatic community includes one Forest Sensitive mussel species: *Alasmidonta varicosa*. *Elliptio producta* has a global rank of G3 and is ranked as Special Concern by the AFS. *Elliptio angustata* has a global rank of G4 and is ranked as Special Concern by the AFS. *Elliptio complanata* has a global rank of G5 and is ranked as Currently Stable by the AFS.

Alderman (2004) reported that *Alasmidonta varicosa*, *Elliptio angustata* and *Elliptio producta* were reproducing and have viable populations in the Chattooga River. Until recently, surveys indicated that mussel populations were restricted to the section of the river from the vicinity of Highway 28 and downstream. Relic shells of *Elliptio* sp. were found during recent surveys 6.5 miles upstream the Highway 28 Bridge.

Aquatic insect surveys were conducted in the Chattooga River from 1986-89 by English (1990) and in 1994 by Weber and Isely (1995). Analysis of macroinvertebrate data in the 1990 report indicated the water quality in the Chattooga River watershed was good. The average density over the entire Chattooga River watershed suggested that the river was neither over nor under productive compared to streams in the Great Smoky Mountains National Park. Sites from this survey were resampled in Fall, 2007 and encompass sample sites from the headwaters downstream to just above Tugaloo Lake, including some tributaries. Weber and Isely (1995) concluded that water quality in the Chattooga River basin was good to excellent using macroinvertebrates as biological indicators of water quality.

### **Aquatic Habitat**

Stream habitat surveys using Basinwide Visual Estimation Technique (Dollof et al. 1993) were conducted in six South Carolina tributaries to the Chattooga River in 2001 and 2002. The total area of riffle habitat in these streams was 1.5 to 3.8 times greater than the total pool area. The lack of instream habitat complexity is in part associated with a low percentage of LWD within the streams. Presence of LWD classes considered large enough to be stable and create fish habitat ranged from one to fifteen per cent of the total wood surveyed within the streams. The

larger, most stable, woody debris class (greater than 5 m in length and 55 cm in diameter) ranged from one to seven per cent of the total wood.

Aquatic habitat enhancement through the addition of LWD has recently been implemented in one tributary to the Chattooga River. The project was designed to increase habitat complexity for brook trout, though other aquatic species will also benefit from the addition of wood to the stream.

No complete habitat assessment has been conducted in the main channel of the Chattooga River. During the week of November 12, 2007 personnel from the U.S. Forest Service Southern Research Station's Center for Aquatic Technology Transfer (CATT), Francis Marion Sumter National Forest and CONF conducted an inventory of dead and down LWD on 32.2 miles of streams in the upper Chattooga River, West Fork Chattooga River and two tributaries of the West Fork Chattooga River. Crews counted all wood larger than 1 m long and 10 cm in diameter that had the potential to influence stream channel shape and function (Table 3.2-23); in practice this meant all wood that impinged on the bankfull channel. Total LWD loads ranged from a low of 193 pieces per mile in Overflow Creek to a high of 529 pieces per mile in Holcomb Creek (Table 3.2-24). Although overall LWD loads were near to or greater than the desired condition of 200 pieces per mile (Sumter NF LRMP), several reaches contained lower amounts of LWD (Figure 3.2-1). Also, the largest size class of LWD (size 4) was less than 2% of total LWD in each stream (Figure 3.2-2).

**Table 3.2-23. Size categories used for LWD inventories in the Chattooga River watershed, November 2007. All LWD within the bankfull channel were recorded. Table modified from Dolloff et al. (2008).**

Size Class	Length (m)	Diameter (cm)
1	1 - 5	10 - 55
2	1 - 5	> 55
3	> 5	10 - 55
4	> 5	> 55

**Table 3.2-24. Total LWD counts from streams inventoried in November 2007. Table modified from Dolloff et al. (2008).**

River	Start Location	Length (miles)	Total LWD	LWD per mile
Chattooga	confluence with West Fork Chattooga	20.4	4171	205
West Fork Chattooga	confluence with mainstem Chattooga	6.0	2154	357
Holcomb Creek	Three Forks	2.7	1446	529
Overflow Creek	Three Forks	2.9	551	193

Figure 3.2-1. Total LWD counts from 500 m reaches in the Chattooga River watershed, November 2007. Figure modified from Roghair et al. (2008). Reaches with less than 60 total pieces are below the FMSNF desired future condition for LWD.

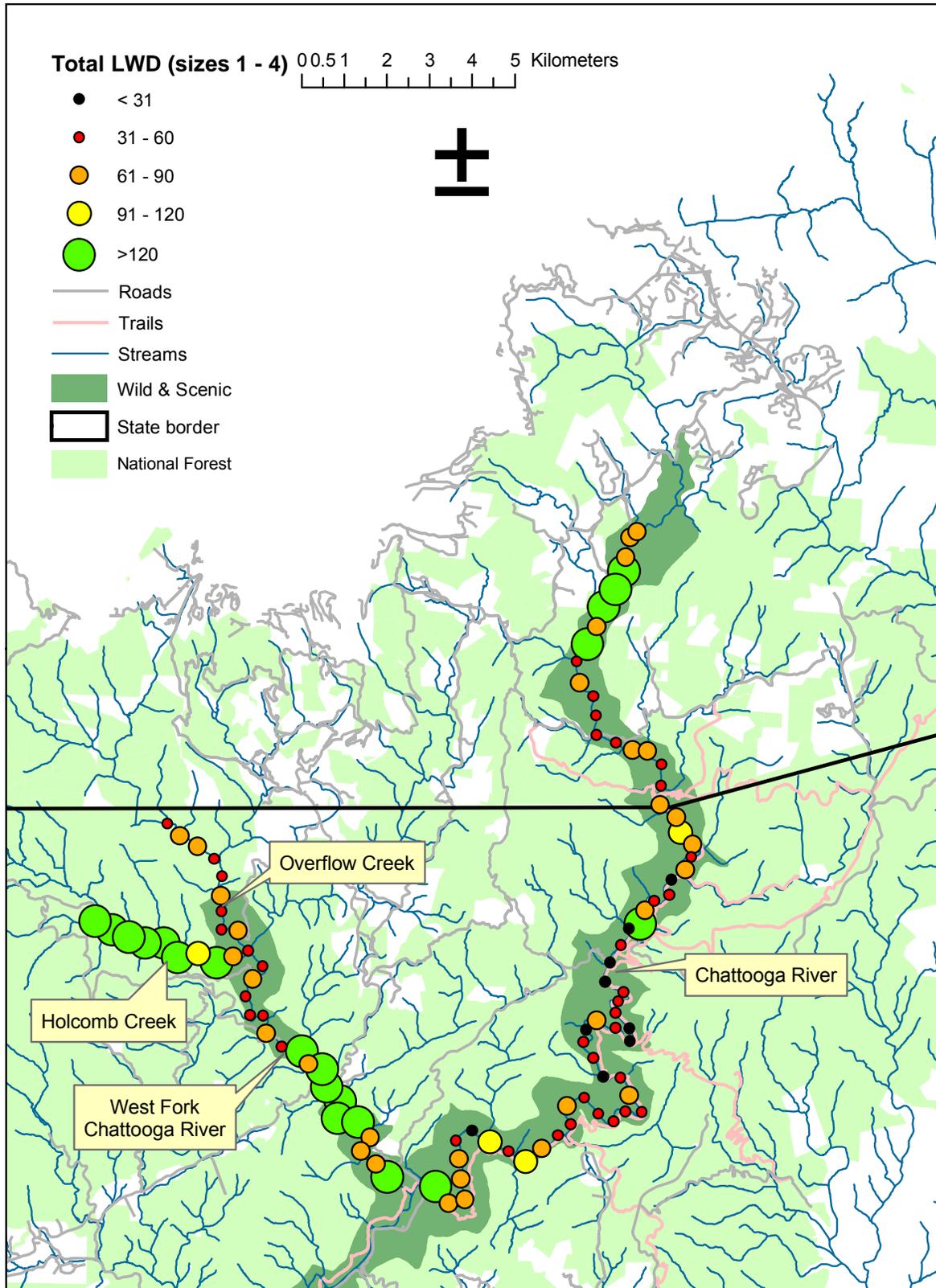
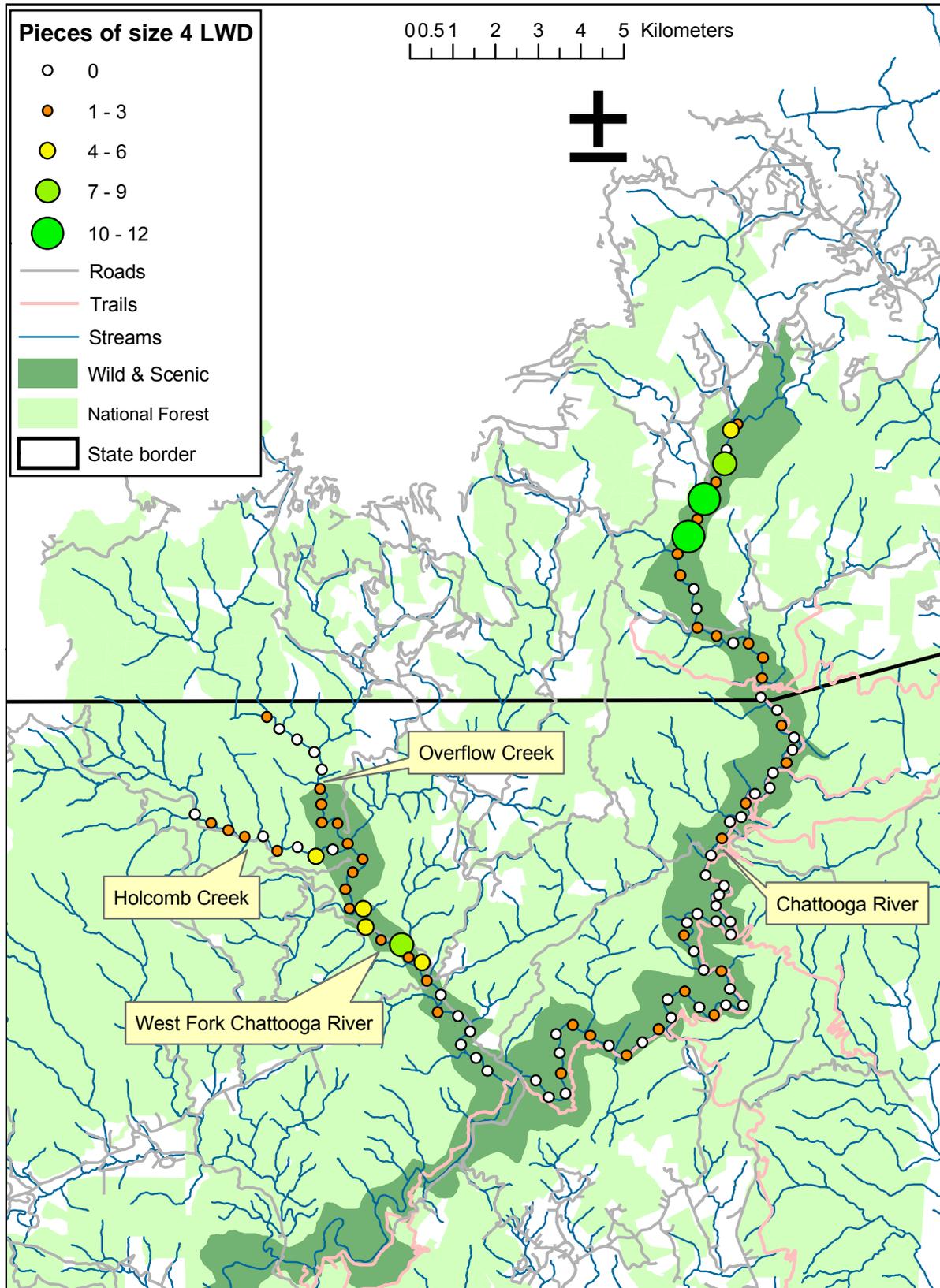


Figure 3.2-2. Size 4 LWD (longer than 5 m, greater than 50 cm diameter) counts from 500 m reaches in the Chattooga River watershed, November 2007. Figure modified from Roghair et al. (2008).



### **Effects of the Alternatives on Aquatic Species and Habitat**

This analysis addresses proposed activities that may contribute sediments or otherwise impact aquatic habitat. Fine sediments can alter and degrade aquatic habitats and eliminate benthic macroinvertebrates or reduce their density and diversity. This in turn decreases a food source for some fish species. Sedimentation can cause mortality in egg and larval stages of aquatic species reproduction. Sediments can fill in and destroy habitat niches within a stream. Van Lear et al. (1995) found that 80% of observable sediment sources in the Chattooga River watershed were associated with open graveled and unsurfaced roads. The users of these roads contribute to their degradation through heavy trafficking and by increasing the need for maintenance, both of which aggravate sedimentation. Van Lear (1995) also found that the wild and scenic corridor of the main stem of the Chattooga River contributes relatively little new sediment. Recreational trails and facilities accounted for 2.6% of the total number of sediment sources in the Chattooga River watershed during the study 12 years ago. The scope of this plan amendment does not include road impacts; therefore this analysis does not address the road sedimentation issue. Reducing recreational impacts in the watershed will be the focus of this aquatic analysis. Whittaker and Shelby (2007) suggest recreation use in the Chattooga Corridor is likely to increase approximately 20% over the next decade, increasing the use of roads, trails and campsites. Given these factors, it is likely that sediment input to the watershed will increase, with sediment from roads still being the greatest contributor.

Species conservation status and known population trends and aquatic habitat conditions are discussed above in Affected Environment. The 2004 Final Environmental Impact Statement (FEIS) for the Sumter LRMP acknowledges that effects to aquatic ecosystems do occur on a watershed scale and sediment has been determined to be a risk factor for aquatic species viability in the Chattooga River watershed. Trail erosion and sediment input and turbidity were identified as an existing impact issue on the river by Whittaker and Shelby (2007). Whittaker also noted that campsites within 20 feet of the river pose great erosion risks. Current management (Alternative 1) in the Sumter LRMP requires camping more than 50 feet from streams and those campsites contributing sediments in the Chattahoochee and Nantahala National Forests would be closed and rehabilitated. Alternative 2 allows no more than one campsite per 0.25 miles of river. For Alternatives 2, 3, 4, 5, 8, 9 and 10, campsites are allowed within 50 feet of the river and no new user-created campsites are allowed.

Where resource damage can be mitigated and campsites maintained, some existing user-created campsites would be designated as official campsites. Unstable sites would be rehabilitated and closed. Fire ring locations would be designated and campsite size (total bare ground per campsite) would be limited to space for three tents. Current management for trails in all three Forests provides standards to improve existing conditions and reduce impacts to aquatic resources. For Alternatives 2, 3, 4, 5, 8, 9 and 10, trail closure and new trail construction would be implemented to mitigate resource damage and minimize erosion to the river. Mitigation refers to no visible movement of sediment into waters and that trails and campsites are located off the stream bank.

LWD is an important component of the aquatic ecosystem. It provides habitat diversity for aquatic species by increasing pool habitats and providing cover and refuge. It also provides a

substrate for macroinvertebrates and nutrients to the stream system. Removal of LWD may result in the loss of pool habitat and complexity and lower fish density, average size and biomass (Dolloff 1994). Substantial mortality of the Eastern hemlock is expected to provide increased amounts of LWD in the Chattooga River in the future. The Eastern hemlock is of great value as LWD due to slow decay and large size which promotes aquatic habitat stability and organic matter retention over a longer period of time. For all the alternatives LWD removal is permissible only in limited cases and is evaluated on a case-by-case basis by Forest Service personnel. For alternatives 4, 5, 8, 9 and 10, no LWD would be removed to accommodate boating.

During the 2007 LWD survey, it was noted that LWD has been actively removed in the Chattooga River in SC. This removal was primarily associated with dispersed campsites. LWD removal was also evident in Overflow Creek, which is a popular boating destination. LWD is removed from river sections downstream Highway 28 for boating passage (Joe Robles personal communication September 2007) and from Overflow Creek by boaters ([www.boatertalk.com/forum/BoaterTalk/1381138](http://www.boatertalk.com/forum/BoaterTalk/1381138)). Boater message board comments ([www.boatertalk.com/forum/BoaterTalk](http://www.boatertalk.com/forum/BoaterTalk)) indicate that LWD has been removed by boaters from rivers to clear passage for boating. In addition, an article on the American Whitewater website (Colburn 2001) describes circumstances where it is proper or improper to remove logs for boating passage. Evidence from the current inventory and other sources show that LWD removal is likely where camping and boating are allowed.

Direct, indirect and cumulative impacts to aquatic resources in this analysis are based on the standards in the proposed alternatives and the future monitoring of those standards.

For all alternatives, there are no federally listed or proposed aquatic species within the analysis area. Under all alternatives, there would be no direct or indirect impacts to Forest Listed Sensitive aquatic species or Locally Rare aquatic species and no risk to aquatic population viability across the Forests for Management Indicator Species and Communities.

#### **Alternative 1 – Direct and Indirect Effects**

In all three Forests, current management for trails provides standards to improve existing conditions and reduce impacts to aquatic resources. Campsites are not allowed within 50 feet of streams within the SNF and should be located outside the ephemeral stream zone in the CONF. The CONF and NNF standards address the permanent closure and rehabilitation of campsites affecting the aquatic resource.

Under Alternative 1, trail and campsite conditions contributing sediments would be improved and potential aquatic impacts minimized. Campsites within 50 feet of streams in the SNF and those contributing sediments in the CONF and NNF would be closed and rehabilitated. During a recent survey of the Chattooga River (Whittaker and Shelby 2007), it was determined that the majority of campsites were located in the SNF. LWD recruitment would be maintained with current LRMP direction for each Forest.

**Alternative 2 - Direct and Indirect Effects**

Under Alternative 2, trail and campsite conditions contributing sediments would be improved and potential aquatic impacts minimized. Campsites would be allowed within 50 feet of the river and designated throughout the watershed. The intent of designated campsites is to minimize resource impacts. There would be four designated campsites per mile along the Chattooga River under this alternative which is slightly less than the number of existing campsites. LWD recruitment would be maintained with current LRMP direction for each Forest. The closure of roadside parking at Burrells Ford Bridge may decrease some sediment input, but it would be negligible compared to the sediment input from Burrells Ford Road.

**Alternative 3 - Direct and Indirect Effects**

Under Alternative 3, trail and campsite conditions that are contributing sediments would be improved and potential aquatic impacts minimized. Campsites would be allowed within 50 feet of the river and designated throughout the watershed. The intent of designated campsites is to minimize resource impacts. LWD recruitment would be maintained with current LRMP direction for each Forest. Impacts of new parking restrictions are the same as Alternative 2.

**Alternative 4 - Direct and Indirect Effects**

Under Alternative 4, trail and campsite conditions that are contributing sediments would be improved and potential aquatic impacts minimized. Impacts from parking are the same as Alternative 3. Campsites would be allowed within 50 feet of the river and designated throughout the watershed. The intent of designated campsites is to minimize resource impacts. LWD recruitment would be maintained with current LRMP direction for each Forest and no LWD removal would occur to accommodate boating. Impacts of new parking restrictions are the same as Alternative 2.

Alternative 4 proposes boating on the main stem of the Chattooga River for approximately 7 miles from County Line Road in North Carolina to Burrells Ford Bridge in South Carolina. It is in these sections of the river where new access and portage trails may be created and the potential for the loss of LWD increased. The Chattooga River tributaries are not included for boating under this alternative; therefore, portage trails would not be created along these streams. Protection of stream banks and recruitment of LWD is crucial in these tributaries that are managed for brook trout and the restoration of brook trout populations.

**Alternative 5 - Direct and Indirect Effects**

Under Alternative 5, impacts and standards for trails, camping, parking and LWD remain the same as Alternative 4. However, the number of access and portage trails may increase more than in Alternative 4 because Alternative 5 provides six additional miles of boating.

Alternative 5 proposes boating on the main stem of the Chattooga River for approximately 13 miles from Bull Pen Road in North Carolina to Lick Log Creek in South Carolina. It is in this section of the river where new access trails and portage trails may be created and the potential for the loss of LWD increased. Impacts to the Chattooga River tributaries are protected as in Alternative 4.

**Alternative 8 - Direct and Indirect Effects**

Under Alternative 8, impacts and standards for trails, camping, parking and LWD remain the same as Alternatives 4 and 5. However, the number of access and portage trails may increase from those in Alternatives 4 and 5 because Alternative 8 provides the most boating.

Alternative 8 proposes boating on the main stem of the Chattooga River for approximately 20 miles from below the private property in North Carolina to the Highway 28 Bridge. It is in this section of the river where new access trails and portage trails may be created and the potential for the loss of LWD increased.

Impacts to the Chattooga River tributaries are protected as in Alternative 4.

**Alternative 9 - Direct and Indirect Effects**

Under Alternative 9, impacts and standards for trails, camping, parking and LWD remain the same as Alternatives 4, 5 and 8. However, the number of access and portage trails may decrease as compared to those in alternatives 4, 5 and 8.

Alternative 9 proposes boating on the main stem of the Chattooga River for approximately 6 miles from below the private property in North Carolina to the East Fork Trail in South Carolina. It is in this section of the river where new access trails and portage trails may be created and the potential for the loss of LWD increased.

Impacts to the Chattooga River tributaries are protected as in Alternative 4.

**Alternative 10 - Direct and Indirect Effects**

Under Alternative 10, impacts and standards for trails, camping, parking and LWD remain the same as Alternatives 4, 5, 8 and 9. However, the number of access and portage trails may increase in numbers over Alternatives 4, 5 and 9 and compare to those in Alternative 8.

Alternative 10 proposes boating on the main stem of the Chattooga River for approximately 20 miles from below the private property in North Carolina to the Highway 28 Bridge. It is in this section of the river where new access trails and portage trails may be created and the potential for the loss of LWD increased.

Impacts to the Chattooga River tributaries are protected as in Alternative 4.

**Cumulative Effects for All Alternatives**

Under the 2004 Plan Revision for the Sumter National Forest, a Watershed Condition Rank (WCR) was assigned to 5<sup>th</sup> level watersheds across the Forest. The Chattooga River watershed received a rank of Below Average in comparison to other watersheds on the Forest, which denotes that the potential to adversely affect aquatic resources is high on a scale of low, moderate and high. Forest objectives in high ranked watersheds include maintaining and improving aquatic health through the implementation of the Riparian Corridor Prescription, conducting watershed assessments at the project level, pre-project monitoring efforts to determine biota health, and maintaining and restoring watershed health and aquatic systems on a

project level. Sediment was determined to be a risk factor for aquatic species viability in the Chattooga River watershed.

The 2004 FEIS for the Sumter National Forest LRMP also addresses Watersheds and Aquatic Habitats. This section of the FEIS recognizes that while direct and indirect adverse effects to aquatic communities are minimized by the Riparian Corridor Prescription and the Forest Wide Direction standards, these effects are not eliminated from the entire watershed. Campsite areas, trails and roads all contribute sediment to the Chattooga River watershed. The LRMP FEIS analysis of Aquatic Viability is based on present LRMP standards. As noted under the Aquatic PETS discussion, the Aquatic Viability Outcome for the aquatic Forest listed Sensitive species is that they are potentially at risk from sediment in the Chattooga River watershed; however, the Forest Service may influence conditions in the watershed to keep the species well distributed. Therefore likelihood of maintaining viability is moderate. Forest objectives associated with the Chattooga River WCR were designed to eliminate this risk.

Cumulative impacts pertain to the entire Chattooga River watershed from Tugaloo Reservoir upstream into the headwaters. The trails, campsites and erosion points within 100 feet of the river and its tributaries are most likely contributing sediments and degrading the integrity of the stream bank. However, graveled and unsurfaced roads and their use are the major sediment source to the Chattooga River. Since the 1995 Van Lear report, sections of two roads have been paved in the upper watershed.

Other recent past activities in the watershed include prescribed burning, road reconstruction and timber management. Present ongoing activities include brook trout restoration and habitat enhancement, wildlife opening maintenance, road maintenance and recreational activities. LWD is removed from river sections downstream Highway 28 for boating passage (Joe Robles personal communication September 2007) and from Overflow Creek by boaters ([www.boatertalk.com/forum/BoaterTalk/1381138](http://www.boatertalk.com/forum/BoaterTalk/1381138)). LWD is also actively removed from river sections upstream Highway 28 in association with dispersed campsites. LWD monitoring is included in Chapter 2.1 of this EA. Possible future activities include prescribed burning, timber management, invasive plant management, road reconstruction in addition to the present ongoing activities. LRMP directions and standards are designed to minimize adverse impacts from any of these activities. Brook trout restoration and habitat enhancement have a positive impact on aquatic populations.

There are no federally listed or proposed aquatic species within the analysis area. Under all alternatives, there would be no adverse cumulative impacts to Forest Listed Sensitive aquatic species or Locally Rare aquatic species and no risk to aquatic population viability across the Forests for Management Indicator Species and Communities under any of the alternatives.

## 3.3 SOCIAL RESOURCES

### 3.3.1 Recreation

#### AFFECTED ENVIRONMENT

##### History of Recreation Management on the Chattooga River

In the late 1960s, recreation use on the Chattooga was generally light and largely “local,” with most use associated with fishing and camping at several road-accessible locations. The river was identified as a study river in the 1968 Wild and Scenic Rivers Act; the study began in 1969 and was completed in 1971 following public meetings in 1969 and 1970 before substantial boating use had occurred. Trout fishing on the Chattooga has historically been better upstream of Highway 28. Trout stocking was generally heavier on the upper compared to the lower river, although stocking occurred from the headwaters down to Highway 76 into the early 1970s. (Whittaker and Shelby 2007).

Use on the river began to increase dramatically after the study was completed, but it was also catalyzed by the 1972 movie “Deliverance” which was partially filmed on the Chattooga. The highest use increases came from boaters; levels increased from an estimated 800 floaters per year in 1971 to more than 20,000 by 1975 (Whittaker and Shelby 2007). Most of the boating use increases occurred on the lower Chattooga which had more reliable boatable flows and less challenging rapids than reaches above Highway 28. Some higher skilled kayakers and canoeists apparently ran the upper Chattooga reaches on occasional days when flows were favorable, but this use was very low (Whittaker and Shelby 2007). The floaters largely were not from immediate communities and their use affected locals who used the river for fishing, swimming and picnicking. By 1974, some lower river anglers were probably displaced due to the lack of solitude. Anecdotal evidence shows that responses from anglers to boaters in the 1970s included aggressive displays of frustration over change, shouting, raft-slashing, rock throwing, fistfights and gunplay (TetraTech, Inc., 2006). During public meetings in 2005 and 2006 and a public hearing in 2007, some of those same anglers and local users expressed frustration about what happened in the 1970s and their continued fear that history would repeat itself should the Forest Service allow boating on the upper Chattooga.

By 1974, the Chattooga River’s outstandingly remarkable fish, wildlife, recreation, scenic and historic values were recognized by Congress through designation as a Wild and Scenic River. Within one year, the Forest Service was mandated to establish boundaries, classify sections for the river and prepare an administrative management plan. This led to more proactive recreation management yet, with a particular focus on removing or minimizing development in the corridor.

When developing the 1976 river management plan for the Chattooga, Forest Service staff report considering a spectrum of recreation settings and opportunities that included prohibiting boating above Highway 28. By this time, staff were apparently discouraging inexperienced boaters from using the more challenging upper river as part of a broad safety initiative; they believed the number of boaters capable of safely running the upper segments was small. In addition, road closures made stocking the lower river difficult, and warmer water temperatures were marginal

for developing a wild fishery there, while the upper river was better suited for stocking and fishing. New trails were being planned to open additional land-based access to the upper river, and managers were concerned that increased boater use and conflicts might “migrate” upstream with them. Taken together, this led them to an overarching management concept that encouraged boating (among other uses) on the lower river and encouraged angling and hiking (among other uses) on the upper river (Whittaker and Shelby 2007).

In the initial management plan (printed in the Federal Register in 1976, p. 11819), the river was divided into geographic zones with different use patterns and characteristics; zoning by type of recreation setting (using the Recreation Opportunity Spectrum) was the dominant recreation planning framework in use at that time and language in the 1976 Plan clearly indicates interest in “providing a range of recreation opportunities characteristic of, and in harmony with, the nature of individual river segments.” As part of the zoning effort, the segment above Highway 28 was closed to boating (TetraTech, Inc., 2006). Limited written documentation of the specific reasons for the ban exist, but the “Classification, Boundaries, and Development Plan” provided in the March 22, 1976 Federal Register includes statements that suggest three possible reasons: boating safety, lack of reliable boating flows and the following language regarding conflict:

“Very little fishing is done from floatable craft. Most fishing is done either from the bank or by wading in the stream. The recent increase in floaters using the river has had a detrimental effect on the fishing experience. Conflicts have developed on certain sections of the river where floaters and fishermen use the same waters... This area [Nicholson Fields] remains a favorite spot for trout fishing. This location is the source of some of the best trout fishing in both South Carolina and Georgia. Floating will be prohibited above Highway 28 which includes the Nicholson Fields area.”

Federal Register, March 22, 1976

The implicit notion underlying the prohibiting boating above Highway 28 was to ensure that these conflicts did not migrate to the upper river, which had less use, a more primitive setting and few boaters because of lower water levels, incompatible equipment and more difficult whitewater. The idea was to ensure that local anglers had a segment to fish where encounters with floaters would not take place.

On conflict/experience issues, protecting fishing experiences was an important rationale and interviews with Forest Service personnel indicate that the boater and angler conflict as the driving force behind the 1976 prohibition; the Forest Service took the conflict into consideration and the decision to limit boating to below Highway 28 a joint decision between the Forest Service and DNRs in Georgia, South Carolina, and North Carolina (TetraTech, Inc., 2006).

Even after the boating ban in 1976, the boater-angler or local/non-local conflicts may still have lingered to some degree. The Handbook for River Guides (Wildwater 1980) included a section on “community relations” described the issue in terms of locals vs. outsiders, and warned of past “acts of destruction and harassment.” The substantial changes in use and access due to the movie and wild and scenic status clearly made some local people feel that “their” river had been taken

away, and these frustrations may have played a role in the conflict incidents that apparently occurred (TetraTech, Inc., 2006). Public meetings between 2005 and 2007 and a public hearing in 2007 have shown that locals are concerned that similar frustrations and the resulting conflict may reoccur if boaters are allowed to float the upper Chattooga.

A later study of floating on the Chattooga concurs with these reasons asserting that the first twenty-six miles of the river was closed to boating because that portion of the river is “generally too small for floating during most water levels,” which is distinct from the pure safety concern. This document also suggested the ban provided an area where people could “fish and hike without encountering boating traffic.” (Craig et al. 1979)

Reducing the impact of boats on anglers was further discussed in the 1985 forest plan revision, which stated “The Chattooga is considered to be the best trout stream in South Carolina and is one of the best in Georgia. It has the size and volume to permit quality fly fishing in a very attractive setting. This is especially true on the undeveloped section north of the Highway 28 Bridge where floating use is not permitted to provide quality trout fishing. The upper portion has colder water that is more conducive to natural regeneration.”

For the last 30 years, some recreationists in the upper Chattooga Corridor have come to expect a boat-free recreation experience and a place where they may be able to find a sense of solitude. In addition, the state natural resource agencies have pursued active fisheries management above Highway 28 by annually stocking the river with trout to enhance the angling experience. Below Highway 28, the river has become a destination for self- and commercially-guided world-class whitewater boating experiences, including creek boating outside the main stem on Overflow Creek.

### **Existing and Potential Recreation Opportunities**

Individuals who currently visit the upper Chattooga and those who wish to float the river above Highway 28 appreciate different characteristics of the wild, scenic and recreational areas on the upper river. When citing reasons for wanting to visit the upper Chattooga, depending on the location, the public’s desired experience consists of remoteness and solitude in a spectacularly scenic setting with little evidence of other humans. Table 3.3-1 summarizes existing recreation uses on the upper Chattooga, where and when they occur and the characteristics of the public’s desired experience.

**Table 3.3-1. Existing Recreation Opportunities in the Upper Chattooga River Corridor**

Type	Location	Opportunities/Important Features	Season	Characteristics
Frontcountry Recreation  (occurs within ¼ mile of access roads and bridges)	Grimshawes Bridge	Swimming. Water quality, scenery, a functioning "sliding rock," small beaches	Mostly spring, summer, fall	"Social recreation" setting where solitude is less important.
	Bull Pen Bridge	Vehicle-based sightseeing, short walks, swimming, picnicking, sunning/relaxing.	Mostly spring, summer, fall	More remote than other bridges so solitude is probably more important.
	Burrells Ford Bridge	Picnicking, sunning/relaxing, swimming, short walks, camping. Water quality, scenery an availability of uplands sites near wading/swimming or angling locations	Mostly spring, summer, fall	"Social recreation" setting where solitude is less important.
	Hwy 28 Bridge	More popular for frontcountry angling and camping or as the starting point for backcountry angling and hiking. Scenic views and some swimming holes.	Mostly spring, summer, fall	"Social recreation" setting where solitude is less important.
Frontcountry Angling  (within ¼ mile of access roads and bridges)	Grimshawes Bridge	Limited fishing opportunity. Fly, spin or bait anglers fish for rainbow and brown trout.	Mostly cooler months/ dawn/dusk in the summer	Frontcountry anglers focus on harvest while the scenery and social setting may be less important.
	Bull Pen Bridge	Limited fishing opportunity. Fly, spin or bait anglers fish for rainbow and brown trout.	Year-round	
	Burrells Ford Bridge	Stocked May to October. Provides best frontcountry angling opportunity. Bait and spin anglers are more common here; some anglers wade, while others fish from the bank.	Year-round	
	Hwy 28 Bridge	Stocked May to October. This area is regulated by delayed-harvest (DH) Nov. 1 – May 15 (artificial lure, catch and release only). Bait, spin and fly fishing occur here the rest of the year.	Year-round	
Backcountry Angling  (more than ¼ mile away from access roads and bridges)	Chattooga Cliffs reach/Ellicott Rock reach	"Wild" trout fishery. Higher proportions wade rather than fish from the bank and use flies rather than spinning gear or bait. Relatively fewer anglers compared to downstream reaches. Ellicott Rock is a congressionally designated wilderness area.	Year-round; best in spring, early summer and fall	Fish in small groups (1 to 4 anglers). Generally interested in solitude, sense of remoteness and an environment with few signs of human use.
	Burrells Ford to Reed Creek	Stocked May to October including helicopter stocking in the fall. More anglers here than in Chattooga Cliffs/Ellicott Rock reaches but less than in DH reach.	Year-round; best in spring, early summer and fall	Value water quality and clarity, scenery, insect hatches, "wild" or "naturalized" fishery.

Type	Location	Opportunities/Important Features	Season	Characteristics
Backcountry angling (continued)	Reed Creek to Hwy. 28	Stocked May – October. This area is regulated by DH Nov. 1 – May 15 (artificial lure, catch and release only). Bait, spin and fly fishing occur here the rest of the year.	Year-round	
Day Hiking	Throughout the corridor	Major recreation use. Most heavily used trails are from Burrells Ford to Ellicott Rock, the East Fork Trail (all within the Ellicott Rock Wilderness) and the Foothills Trail. In the upper Chattooga, about 26% of designated trails and 51% of user created trails are within 100 feet of the river.	Year-round; more popular in spring, summer and fall	Sense of remoteness/solitude, spectacular scenery, few signs of human use and lack of motorized, mountain bike and horse use. Views and enjoyment of the river
Backpacking/ Camping	Throughout the corridor	Distinguished from day hiking by overnight use but uses the same trail system. Of the 97 sites on the Upper River, about 26 (27%) are within 20 feet of the river	Same as day hikers w/ lower winter use	Similar to dayhikers but more interested in solitude/ sense of remoteness, particularly at destinations. Prefer to camp out of sight and sound of others. Major component is camping along the river.
Hunting	Along user-created trails	Light use. Bear, deer, hog and turkey are available game species but none are thought to be abundant.	Defined fall season.	Solitude, remote and scenic setting, game availability. Unlikely to interact with other users.

Table 3.3-2 summarizes potential recreation uses (currently prohibited) on the upper Chattooga, where and when they might occur and the characteristics of the public’s desired experience.

**Table 3.3-2 Potential Recreation Opportunities in the Upper Chattooga River Corridor**

Type	Location	Opportunities/Important Features	Season	Characteristics
Whitewater Oriented Boating  (Class IV-V whitewater kayaking, canoeing or rafting on the upper Chattooga’s steeper segments by highly skilled boaters)	Chattooga Cliffs reach	Most creek-like whitewater boating opportunity (steeper gradient, more technical rapids)	Mostly winter and spring; sometimes summer during higher flows.	Sense of remoteness, spectacular scenery and few traces of human use. Focused on the challenge of running whitewater.  For some whitewater-oriented boaters, solitude is likely to be important; for others, high-quality boating can occur in a more “social” higher density setting.  Boaters are generally likely to travel in small groups of two to five (based on use data from the Lower Chattooga).
	Ellicott Rock reach	Offers the most whitewater for its length.		
	Rock Gorge reach	Longer trip with several good Class IV-V rapids; longer stretches of flat water. Many Rock Gorge trips would include travel through the Class I Nicholson Fields reach too.		

Type	Location	Opportunities/Important Features	Season	Characteristics
Scenic Oriented Boating (Class I-II opportunities on the lower gradient reaches that may be used for access to the area, boat- or tube-based fishing or during "water play")	Nicholson Fields reach	This reach is accessible by trail with a take-out at Hwy. 28 or the Section II boat launch, about a mile and a half downstream. Some people might be interested in tubing short sections of this reach in the summer.	Available more frequently through the year because lower flows are required.	A sense of remoteness, scenery, lack of signs of human use. Running challenging whitewater is probably less important to these boaters while solitude might be important to some. Social component is more important to this group.
Horse Riding Mountain Biking Commercial Boating	Throughout the UC corridor	These activities are mentioned for completeness but are not a focus of additional analysis and have not been contested during the recent Sumter Forest Plan revision.	Year-round	

### Background Information for the Recreation Analysis

When the Chattooga River was designated as wild and scenic, recreation was determined to be one of the river's ORVs. Specifically, the recreation ORV was described as follows:

The recreation values of the river and corridor are outstanding along its 57-mile course. The river offers a wide variety of activities in a high-quality setting. Activities range from swimming to hiking and horseback riding with spectacular scenery to excellent trout fishing and nationally recognized white-water rafting opportunities. Other activities include backpacking, photography and nature study. Most of these activities take place in largely unmodified natural surroundings with many opportunities for remoteness and solitude.

When recreation is an ORV (as on the Chattooga), the Interagency Wild and Scenic Rivers Coordinating Council (IWSRCC) recommends protecting regionally or nationally significant recreational attributes while avoiding adverse effects on non-recreation ORVs (IWSRCC 2007 draft p. 5). This recognizes the need to balance recreation with other values through the Comprehensive River Management Plan (currently incorporated into the revised Sumter LRMP). Similar to balancing between ORVs, the river-administering agency is required to "address...user capacities" consistent with protecting the desired experience and other non-recreation values (Whittaker and Shelby 2007).

The Wild and Scenic Rivers Act does not indicate which types of recreation should be emphasized in any specific location. Searching for balance among potentially conflicting/competing groups is difficult at best. The Forest Service has been tasked with finding the right balance for the Chattooga River Corridor so that the overall recreation ORV is protected and enhanced. As the agency cannot optimize for every type of recreation opportunity at every time and place, the goal of the proposed alternatives is to

find an appropriate mix of recreation uses in the corridor given information about demand and river characteristics.

One issue that may affect social impacts in the future is trends among existing and potential uses. For many recreation activities, past use may be a relatively good predictor of future use. However, some activities may be in developing or declining trends, in which case factors such as population growth, economy, availability of nearby alternatives, free time, weather etc. should be considered (Whittaker and Shelby 2007). Whittaker and Shelby (2007) provide some insight into trends for existing and potential recreation uses on the Chattooga:

- *Frontcountry and backcountry angling*: Nationally, projections show fishing participation is likely to grow, but not keep pace with population growth. However, individual segments of the Chattooga, particularly the delayed-harvest section, established in 2000, have probably seen increased use and are candidates for more growth in the future. Angling trends on the Chattooga also depend on stocking and regulation stability. Major changes in current stocking levels or regulation changes that favor one type of fishing over another would probably affect future use (Whittaker and Shelby 2007).
- *Backpacking*: Nationally, backpacking use appears to be flat or declining. However, participation projections estimate that backpacking in the South will increase about 23% by 2020, which would be less than the population increase (Whittaker and Shelby 2007). As a result, backpacking use may not grow as fast as other uses in the future.
- *Day Hiking*: Nationally, day hiking appears to be increasing at or slightly faster than the population rate. Participation projections estimate that hiking in the South will increase by about 48% by 2020 (Whittaker and Shelby 2007). Day hiking is most likely to see substantial increases relative to other uses.
- *Whitewater Boating*: According to a recent survey, whitewater kayaking saw growth in the mid- to late-1990s, but that growth has flattened in recent years. Use data from the lower Chattooga indicates considerably higher use in the late 1990s, with a drop-off in the first part of this decade (possibly explained by several recent low-water years) (Whittaker and Shelby 2007). Growth in whitewater boating is not as certain when compared to the likely increase in day hiking.
- *Scenic boating*: Scenic floating has grown considerably since 1998; however, use of Sections I and II on the lower Chattooga (which features scenic floating) has generally declined from peaks in the mid-1990s (Whittaker and Shelby 2007). As with whitewater boating, growth in scenic boating is not as certain when compared to the likely increase in day hiking.

Another issue that affects social impacts from different recreation uses focuses on flow levels. Studies from many rivers show that different activities may be optimal and much more likely to occur at certain flows than others. In many cases, for example, whitewater boating occurs at

higher flows (when the waves are larger and the hydraulics are more powerful) than wading-based angling (because it is easier to wade and cross the river at lower flows). Whittaker and Shelby (2007) describes acceptable and optimal flows for different kinds of boating and angling opportunities, documenting when flows are better for one activity (and not the other), as well as when flow ranges for these activities overlap. The report provides greater detail about these flow ranges for different opportunities and segments, but overall suggests that the highest quality fishing and boating generally occur in different parts of the hydrograph (the exception is bait fishing, which remains optimal through higher flows). The best fishing flows are not the best boating flows and vice versa.

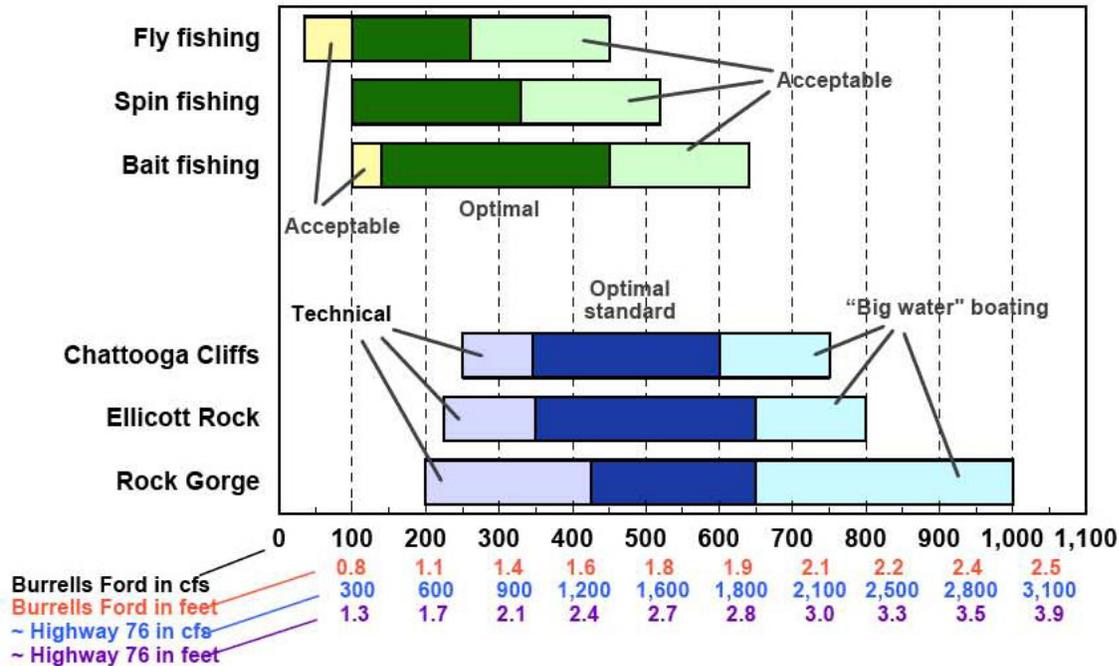
However, Whittaker and Shelby (2007) also documents that acceptable but lower quality fishing opportunities would overlap with optimal boating and acceptable but lower quality technical boating would overlap with optimal fishing. At these overlap flows some users of each group could be present (if boating were allowed) and encounters could create impacts and conflict.

The only overlap between optimal boating and optimal fishing is for bait fishing, which is more likely to occur at higher flows than wading based fly or spin fishing. However, Whittaker and Shelby (2007) also suggests that bait anglers are more likely to be frontcountry users, may be more focused on harvesting fish than a social setting and may have higher use levels during front country stocking season (generally focused on summer). Higher flows are more likely in winter and spring.

Table 3.3-3 shows “flow range bars” for fishing and boating opportunities on the upper Chattooga. This analysis of flow levels and recreation opportunities forms the basis for estimates of the number of days with potential interaction between boaters and other users in the alternatives that allow additional boating in the Chattooga corridor. However, such analyses also apply additional estimates about the number of days that boaters are likely to actually use such flows (because they may be of short duration, are difficult to predict, may occur on weekdays when boaters are working, on days with poor weather or at night).

Analyses of interaction between boaters and other users also consider the timing of use. Because anglers spend most of their time near the river and usually fish in a small segment of the stream, they are likely to be passed by nearly all the boaters using the segment on that day. However, the timing of both activities on the river can impact the number of encounters. Angler-boater encounters are more likely to occur in the winter months (December thru February) when both groups are on the river in the middle of the day. As the weather warms by mid-March and April, boating concentrated in the middle of the day would likely produce relatively fewer boater-angler encounters as anglers are more likely to fish in the early morning before temperatures rise (Whittaker and Shelby 2007).

Table 3.3-3 shows “flow range bars” for fishing and boating opportunities on the upper Chattooga (Whittaker and Shelby 2007)



This section of the EA examines the impacts of the proposed alternatives on three social issues:

- o Carrying capacity/solitude which is chiefly focused on overall encounter rates, particularly on-trail and on-river encounters, but also includes competition for resources;
- o Conflict, which has two components—face-to-face conflict as represented by specific types of encounters; and goal interference impacts as represented by the presence or absence of boat-free segments; and
- o Recreation opportunities foregone.

Major sources for this section include Whittaker and Shelby (2007) and information gathered at public meetings, at a public hearing and during the scoping process.

**Carrying Capacity/Solitude Definitions and Background:**

*Carrying capacity* refers to the quantity of recreation use which an area can sustain without adverse impact on the ORVs and...the quality of recreation experience (Wild and Scenic River guidelines).

*Solitude* refers to 1) the state of being or living alone; seclusion; 2) remoteness from habitations, as of a place; absence of human activity; and 3) a lonely, unfrequented place (*Dictionary.com Unabridged (v 1.1)*). Solitude is one component of the Chattooga River’s recreation ORV. Information from the public indicates that solitude is one of the most valued, if not *the* most valued, qualities of the recreation experience in the upper Chattooga Corridor.

*Encounters* refer to contact (sight or sound) between groups or individuals and can be distinguished by user types (e.g., anglers-boaters, hikers-anglers, swimmer -boaters), timing (e.g., season, weekend/weekdays) and location (e.g., on river, on trails, in camps or at attraction sites).

*Backcountry encounters* specifically refer to those that occur more than ¼ mile from roads or bridges. Encounters are a common social impact indicator for backcountry settings and have received considerable attention in recreation literature (Whittaker and Shelby 2007). They are one of the most important indicators of solitude in backcountry areas like the upper Chattooga River Corridor.

*Trail Encounters* are experienced along the trail (e.g. hikers-hikers, hikers-anglers, hikers-boaters) and are particularly relevant in backcountry areas. These encounters can include trail users that see or hear a group that is on the river if the trail has a view or is in close proximity of the river (e.g.: a group of boaters or swimmers seen or heard from the trail). Trail encounters do not include encounters trail users may experience while fishing, swimming or participating in other on- or in-river activities (this analysis defines those as “on-river encounters”).

*Camp Encounters* refer to the percent of nights spent in sight or sound of another group and are only relevant for groups that camp (generally backpackers, but some backcountry anglers may camp as well). In general, individuals or groups that camp prefer to camp out of sight and sound of others and value few signs of human use or development (Whittaker and Shelby 2007). A 1995 study of the Ellicott Rock (Rutlin 1995) discovered that many wilderness users are more sensitive to camp encounters than trail encounters.

*On-river encounters* occur while users are on or in the river itself. As with on-trail encounters, on-river encounters (e.g., angler-angler, angler-swimmer, boater-boater, boater-swimmer) are an issue in backcountry areas.

*Competition* involves contention for potentially scarce resources. Competition for campsites or fishable water is a common example. Three potential competition indicators on the upper Chattooga include percent of fishing areas passed because they are occupied; percent of campsites passed because they are occupied; and percent of camps occupied per segment (Whittaker and Shelby 2007).

One way of evaluating the capacity of the area to sustain use, while still protecting desirable characteristics, is to measure the number of encounters occurring among users and compare that to the desired number. For this proposal, encounter goals (maximum upper limits) are established for each alternative (see Chapter 2). How well these encounter goals are likely to be met can reveal the likelihood of 1) protecting the desirable characteristics such as solitude; and 2) maintaining recreation use within the carrying capacity.

Studies in wilderness and backcountry settings show that users agree encounter levels should be low. In wilderness areas, preferences (a more stringent standard) are fewer than two or three encounters per day, while tolerances (a less stringent standard) are slightly higher, about four or five per day. For less primitive backcountry experiences encounter tolerances are higher still, but

usually less than ten per day. The effect of encounters varies for different users. Some are more solitude-seeking and therefore sensitive to encounters, while others are more gregarious, even in wilderness-like settings (Whittaker and Shelby 2007).

The impact of encounters between trail users and boaters (if boating were allowed) is likely to vary, depending upon when and where the encounter occurs and the individual tolerances of the parties involved. Many of these encounters may have similar effects as trail encounters with other land-based users although they could be more adverse for some individual boaters or hikers (Whittaker and Shelby 2007).

Public comments and Forest Service studies have shown that angler-boater encounters are among the most important impacts associated with allowing boating on the upper Chattooga (Whittaker and Shelby 2007). Studies indicate that anglers can be very sensitive to this impact, more so than boaters. When one group (anglers) is sensitive to the impacts of the others (boaters), but not the reverse, the impact is described as “asymmetric.” Some of the alternatives in this proposal provide additional boating opportunities in the Chattooga River Corridor use but also “zone” boating use by flow level, season or segment to reduce encounters between anglers/historical users who desire a “boat free” experience and boaters.

Precise information on the existing condition of backcountry encounters for all sections of the river was not available for this analysis. The Use Estimation Workshop (Berger and CRC 2007) was used to roughly describe the average and peak use levels in the upper corridor. In addition, averages from Rutlin (1995) and assumptions about existing rates and use-encounter relationships were applied to the Use Estimation Workshop results to develop some very rough encounter relationships among existing users (see Appendix D).

For the alternatives which provide additional boating opportunities on the Chattooga River, estimates of backcountry use and on-trail and on-river encounters attributed to boating were developed by using the assumptions in the “Estimating Potential Whitewater Boating Use” section of Whittaker and Shelby (2007), as well as assumptions in the Encounter Calculation working papers in the project files (see Appendix D). Although encounters with boaters or groups of boaters may fluctuate throughout the year depending on geography, weather conditions, timing, season and flow levels, etc., this analysis assumes that a hiker, angler, camper, etc. will see an average of 75% of all boaters floating a specific stretch on any particular day. In addition, a percentage of boating groups based on the percentage of trails within 100 feet of the river will be seen or heard from on-trail users.

Currently, anecdotal evidence indicates that some boaters may “poach” illegal runs on the upper Chattooga although this use has not been studied or documented. Accordingly, this analysis does not estimate encounter rates from existing or potential illegal use (which may occur with any alternative).

In addition to encounters, the condition of user-created/portage trails can impact user perceptions of solitude and remoteness by their width, clearing limits, condition, location, abundance, density, etc. The condition of campsites can similarly affect user perceptions of solitude and remoteness by their size, amount of bare ground, condition, location, etc. New portage trails may

form from boating because of “attraction” sites, increased hemlock mortality and the agency’s policy of not removing LWD to accommodate boating. However, boating-induced portage trails may minimally influence the perception of remoteness and solitude when compared to existing user-created trails and campsites. The increase in LWD, however, particularly in the Chattooga Cliffs and Ellicott Rock reaches where the most hemlock mortality is expected to occur, could impact the boating experience and make it less desirable.

**Existing Condition of Carrying Capacity/Solitude:** Based on existing use estimates and the above assumptions, the number of encounters currently occurring in the upper Chattooga on some days, especially in the wilderness, exceeds the threshold that typically defines solitude in wilderness and primitive backcountry settings. This is especially the case on weekends in the spring, summer and fall in most sections. In addition, the public has indicated that the condition and location of some user-created trails and user-created campsites is unsightly. All of these issues are affecting the sense of solitude on the upper Chattooga.

Tables 3.3-4 and 3.3-5 depict the estimated number of current backcountry encounters by reach on the upper river.

**Table 3.3-4. Existing Trail Encounter Levels per Day in Backcountry Areas by Reach**

Reach	Season	Encounters Per Day			
		1-3	4 - 7	8 - 10	> 10
Chattooga Cliffs (wild and recreational area)	Dec-Feb	Most days			
	Mar-May	Most days			
	June-Aug	Most days	Some weekends		
	Sept-Nov	Most days	Some weekends		
Ellicott Rock (wild area)	Dec-Feb	Most days			
	Mar-May	Most weekdays	Most weekends	Some weekends	
	June-Aug	Some weekdays	Most weekdays	Most weekends	Some weekends
	Sept-Nov	Most weekdays	Most weekends	Some weekends	
Rock Gorge (wild area)	Dec-Feb	Most days			
	Mar-May	Some weekdays	Most days		
	June-Aug	Some days	Some weekdays	Some weekdays	Most weekends
	Sept-Nov	Some weekdays	Most days		
Nicholson Fields (recreational and wild area)	Dec-Feb	Most weekdays	Most weekends		
	Mar-May	Some days	Most weekdays	Some weekends	Most weekends
	June-Aug	Some days	Some weekdays	Some weekdays	Most weekends
	Sept-Nov	Some days	Most weekdays	Most weekends	Some weekends

**Table 3.3-5. Existing On-River Encounters per Day in Backcountry Areas by Reach**

Reach	Season	Encounters Per Day			
		1-3	4 - 7	8 - 10	> 10
Chattooga Cliffs	Dec-Feb	Most days			
	Mar-May	Most days			
	June-Aug	Most days			
	Sept-Nov	Most days			
Ellicott Rock	Dec-Feb	Most days			
	Mar-May	Most days			
	June-Aug	Most days			
	Sept-Nov	Most days			
Rock Gorge	Dec-Feb	Most days			
	Mar-May	Most days			
	June-Aug	Most days			
	Sept-Nov	Most days			
		1-3	4-7	8-10	>10
Nicholson Fields	Dec-Feb	Most weekdays	Some weekends		
	Mar-May	Some days	Most weekends	Some weekends	
	June-Aug	Some days			
	Sept-Nov	Some days	Most weekends	Some weekends	

Use levels can also impact competition for resources. Currently, fishing competition is probably an issue at the frontcountry fisheries at Burrells Ford and Highway 28 during stocking season and for the Nicholson Fields reach during delayed-harvest season. Probably less than 20% of fishing areas in the backcountry are passed because they were occupied.

Evidence suggests that current competition for parking spaces may occur in busy summer and fall color season at parking areas for Sliding Rock, Nicholson Fields (the delayed-harvest reach) and at Burrells Ford (Whittaker and Shelby 2007).

Approximately 70 backcountry camps exist in the upper Chattooga, excluding the 30 camps at Burrells Ford. Total overnight use probably does not exceed 25 groups at one time on peak weekends, producing an approximate 35% occupancy rate. However, this campsite occupancy rate does not necessarily correlate with low campsite competition, because the number of “desirable sites” is less than the total number of sites. On the upper Chattooga, some higher quality sites exist near good swimming/relaxing beaches or at a “popular” distance from trailheads. At least one large camping area with multiple sites exists at the confluence of East Fork. Trade-offs probably exist between having a good site and camp encounters but no study has specifically addressed these impacts for the Chattooga.

### **Conflict Definitions and Background:**

*Conflict* implies an incompatibility between two recreation activities. Some conflicts are “zero tolerance” for another group’s activity or behavior while others are multi-faceted and may allow some level of contact or impact.

*Asymmetrical conflict* occurs when group A reports adverse impacts from group B, but not the converse. As conflicts escalate, however, it is common for group B to develop antipathy toward group A. “Asymmetrical antipathy” explains why the “non-sensitive” group may be willing to “share” while the sensitive group may not; “sharing” does not have the same price for each group (Whittaker and Shelby 2007).

*Social values conflict* does not require contact in the resource setting. The sensitive group simply does not agree an activity is appropriate in certain settings (e.g., motorized use in a wilderness area) and opposes it even if they never encounter such use (e.g., when it occurs in the off season). Social values conflicts often are more challenging to address by separating uses by space or time or educating users on how to minimize conflict behavior.

*Face-to-face conflict* occurs when two incompatible users encounter one another in the resource setting itself; this conflict can often be mitigated by separating strategies.

Separating strategies can help reduce *goal interference*, when the behavior of one group blocks another from achieving its goals. It does not require conflicting groups to have different goals (Whittaker and Shelby 2007). Goal interference is one commonly cited explanation for recreation use conflicts (Jacob and Schreyer 1980)

As documented previously, boating has been absent on the upper Chattooga for 30 years and has created an expectation and experience unique to the upper Chattooga (no boating, outstanding trout fishing) and an experience and expectation unique to the lower Chattooga (world class boating, challenge). Boating was rare on the river even before 1976, so the “current baseline” setting lacks boating. It is not surprising that some believe that is how the place “should be” and resist any change. For these users, any boating represents a “problem” even if they have no face-to-face encounters; the 1976 boating closure...is considered a “compromise solution,” and any additional boating erodes it (Whittaker and Shelby 2007).

Research on conflicts has looked at a variety of issues that may be at the root of the conflict, but they tend to obscure the more central issue, which is the nature of contrasting experiences in conflicts. If a sensitive group feels that another use decreases the quality of their experience, it is important to understand whether a primary impact is to blame, or a more global objection. If two activities are incompatible and both are to be provided, zoning options that equitably share the resource (perhaps capitalizing on natural use patterns) are usually the best solution (Whittaker and Shelby 2007).

For example, anglers may experience goal interference from boaters when they are forced to move out of the boater’s path (themselves or their lines). “Making anglers move” is a social impact which is related to several variables: characteristics of the location (e.g., river width, where anglers are fishing, space for boaters to pass); tackle (e.g., spinning gear, which has a longer “range”); behavior of anglers (e.g., wading into the channel vs. fishing from the bank); and behavior of boaters (whether they know and take the “path of least disturbance” or whether the line of descent dictates their path). Boaters may also interfere with anglers’ goals when the number, behavior or frequency of boaters disturbs fish which, in turn, may affect fishing success (Whittaker and Shelby 2007).

Depending on the physical characteristics of each individual reach, flow levels at which boating is allowed and the location of trails along the river, interference with angling from boaters may be mitigated. For example, the Chattooga Cliffs reach is a narrower stretch of stream; therefore, interactions between boaters and anglers may be more likely to cause interference. However, this could be mitigated during higher flows since traveling within the stream channel to fish is difficult at best during these times. Access from the trail to the river is difficult and, to fish more than one location, it is necessary to hike up the bank to the trail, walk up or down the trail and then drop back down to the river.

In the Ellicott Rock reach, the stretch from Bull Pen Bridge down to the Ellicott Rock marker is a narrow stretch, but is not heavily fished, probably because there are no trails on either side of the river, stocking does not occur here and the river gradient and surrounding terrain is steep. The stretch from the Ellicott Rock marker down to Burrells Ford has a trail along the eastern side of the river. The river is also wider and the gradient is not so steep. This section is more heavily fished than the Chattooga Cliffs reach, especially below the confluence with the East Fork.

The Rock Gorge stretch down to the Big Bend area is similar to the Ellicott Rock reach below the Ellicott Rock marker in terms of gradient, width and access. It is easily accessible by the Chattooga Trail on the east bank and a user-created trail on a portion of the west bank. Because this reach is stocked, the fishing pressure is relatively high here and higher than in both the Chattooga Cliffs and Ellicott Rock reaches. The steeper gradients starting at Big Bend Falls to about half way down the Rock Gorge reach and extending through the Rock Gorge tend to be difficult to fish during higher flows.

Information from the public indicates that some swimmers anticipate goal interference from boaters if they are forced to move for safety reasons. However, this interference is likely to be rare and at low flows that whitewater boaters cannot use and can be eliminated completely at popular swimming areas through education efforts or site specific boating restrictions. This interference may be more likely should scenic boating occur on the upper Chattooga although Whittaker and Shelby (2007) suggests that scenic boating is likely to be very rare due to access problems.

Public comments also indicate that some existing users believe an encounter with a boater or group of boaters would interfere with their solitude or “boat-free” experience. At the same time, many boaters have indicated their goal of floating the upper Chattooga has been interfered with because they are not allowed to float the river (e.g. if a boater stands on the Highway 28 Bridge, watching others recreate on the river, he feels his goal of floating has been interfered with because he cannot legally participate in his activity).

When examining the river in its entirety, it is clear that the areas above and below Highway 28 have evolved somewhat differently over the years. User dynamics are different in the “sense of place” they generate among visitors, biological constraints (e.g. water temperatures for trout sustainability, etc.). Therefore, it is often difficult to compare the two considering their differing characteristics and the experiences recreationists seek above or below Highway 28. In spite of those differences, the evaluation of the alternatives for goal interference will include a qualitative

discussion of the existing or potential level of goal interference for each alternative and will be discussed in the context of the entire river corridor, not just the upper Chattooga.

**Existing Condition of Conflict:**

As documented by Whittaker and Shelby (2007); during public meetings, public scoping and a public hearing; and in Web articles and on message boards, there are use conflict issues on the upper Chattooga among existing and potential user groups.

For some individuals, the conflict appears to be fundamentally “values-based” – they believe that boating is an inappropriate use on the upper Chattooga whether or not they encounter boaters; they have a zero tolerance for boating and feel that some part of their “sanctuary” would be lost by the addition of boating.

For others, the conflict focuses on expected impacts from face-to-face interaction if boating were allowed. These individuals might be willing to accommodate some boating but they want that use to occur when they are not using the river (or to be very low).

The face-to-face conflict is largely asymmetrical in nature; hikers or anglers are probably more sensitive to seeing boaters than boaters are to seeing other users. This is common with user conflicts. However, as the perceived conflict has escalated, boaters have also developed antipathy toward those who oppose boating, thus creating conflict for the boaters as well. One group opposes providing additional boating opportunities while the other feels it is being unfairly excluded from the upper reaches of the river. The conflict from existing users as well as potential users is real and does not exist to this extent on other rivers

Currently, goal interference, and the resulting face to face conflict between existing users and boaters, is mostly "perceived" as there is no on-the-ground mixing of these uses.

**Recreation Opportunities Foregone Definition and Background:**

*Recreation opportunities foregone* are those opportunities that could be provided in a resource setting but, for one reason or another, are not. Similar to the evaluation of the alternatives for goal interference, the analysis of recreation opportunities foregone will include a qualitative discussion of the existing or potential level of recreation opportunities foregone for each alternative and will be discussed in the context of the entire river corridor, not just the upper Chattooga.

**Existing Condition of Recreation Opportunities Foregone:**

When discussed in the context of the entire river corridor, some users are experiencing recreation opportunities foregone. Currently, boaters are experiencing recreation opportunities foregone in that they are not allowed to legally float the upper Chattooga. On the other hand, some hikers, backpackers, and anglers are experiencing recreation opportunities foregone since they are not guaranteed a boat-free experience year-round on the lower river segments even though, a boat-

free experience may be available on the lower river on Sections I and II on some days during most of the year and on Sections III and IV on some days during the winter months.

## ENVIRONMENTAL CONSEQUENCES

### ALTERNATIVE 1

#### Direct and Indirect Effects

**Carrying Capacity/Solitude:** Current management on all three national forests in the upper Chattooga has no encounter standards except those established for the North Carolina portion of the Ellicott Rock Wilderness in the Nantahala National Forest Plan. However, since North Carolina has the lowest use areas in the Ellicott Rock Wilderness, it is not likely that the encounter standards are currently being reached or exceeded.

Backcountry encounters in this alternative are the same as under the Existing Condition. The solitude experience of existing backcountry users is already being diminished during certain times of the year and in certain locations which may have caused some users to change the timing of their activities to lower use times of the week/season/year or has entirely displaced some users from the river. Given the information on future trends among existing and potential uses, encounters in this alternative are likely to increase over time since no limits or encounter levels have been prescribed.

Figure 3.3-1 displays the number of days per year on-trail encounters from existing users and boaters are likely to exceed goals by reach and by alternative.

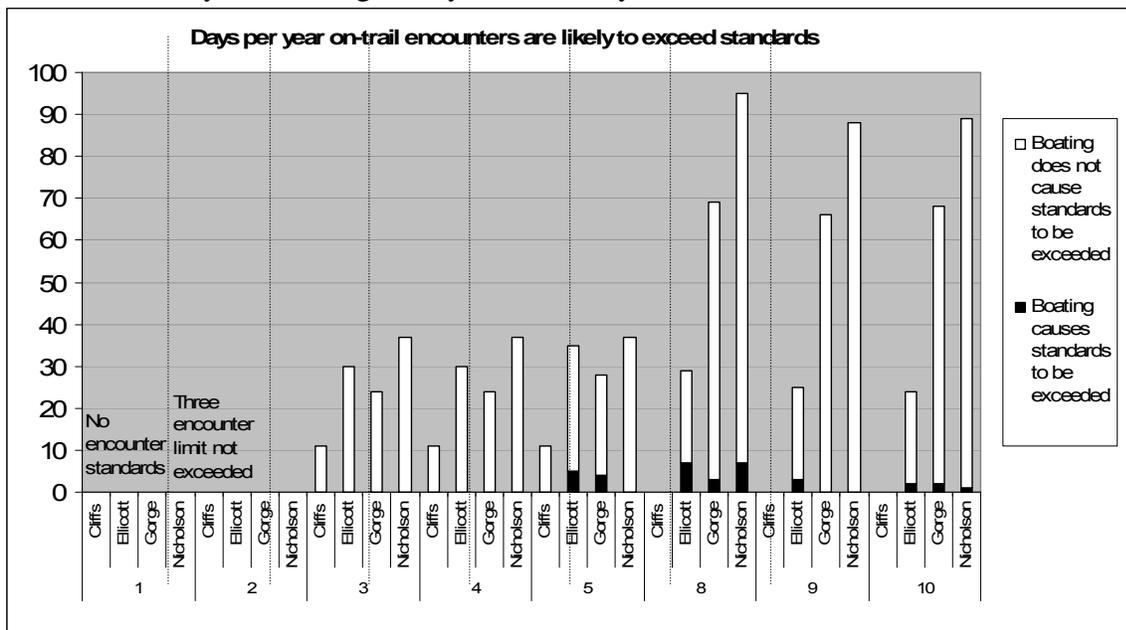
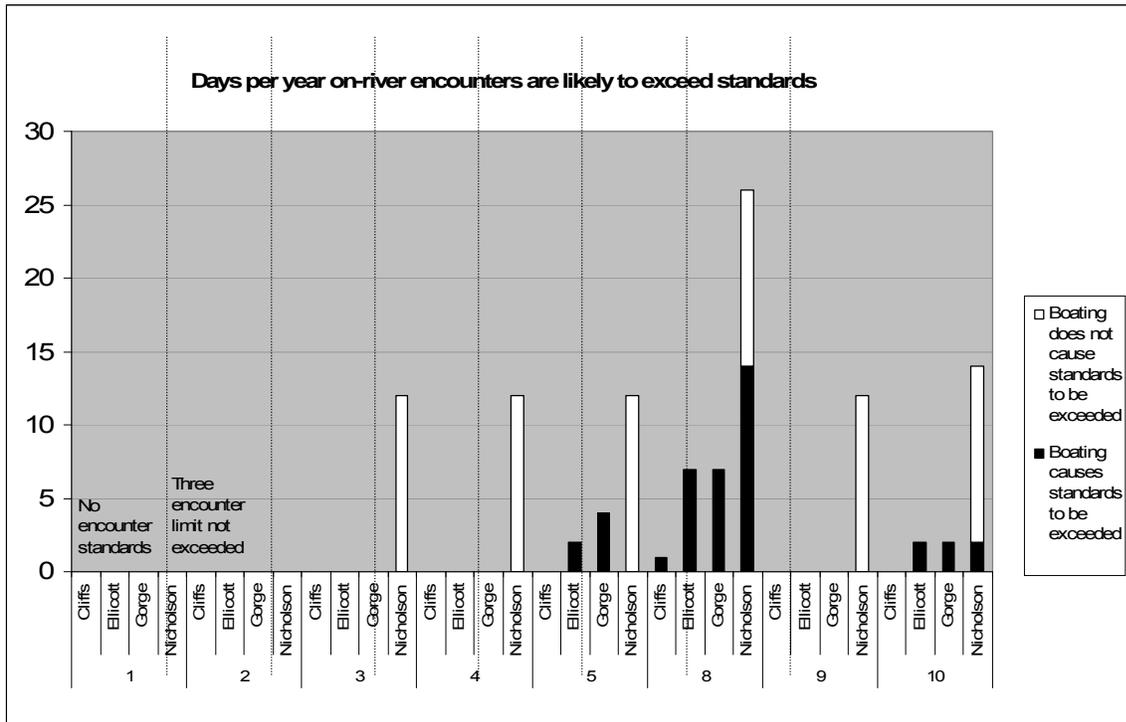


Figure 3.3-2 displays the number of days per year on-river encounters from existing users and boaters are likely to exceed goals by reach and by alternative.



The number of campsite encounters is likely to decrease from existing levels under this alternative because existing management includes implementation of Forestwide Standard 81 in the Sumter LRMP. When implemented, it will rehabilitate and close all backcountry dispersed campsites within 50 feet of the Chattooga River and its tributaries in South Carolina. Replacement campsites will likely be constructed outside the 50-foot zone and not as many campsites would be constructed as close to one another. Under this alternative, competition for campsites may increase if user demand is not met due to the agency closing campsites and decreasing the overall number of campsites throughout the upper river corridor.

Trails are managed in accordance with direction in the three Forest Plans; none of the plans emphasize a trail system that is designed to enhance solitude. In addition, user-created trails exist and may expand which could be incompatible with sections of the river classified as wild.

Competition for fishable water and parking in this alternative is the same as under the Existing Condition. Given future use trend information, competition for fishable water is likely to increase under this alternative, particularly in the Nicholson Fields reach.

**Conflict:** If the Forest Service chooses to continue current management the boaters’ antipathy toward those who oppose boating would likely escalate. Goal interference and the resulting face-to-face conflict under this alternative is the same as the Existing Condition. The social values conflict for those who believe that boating is an inappropriate use on the upper Chattooga would be resolved.

**Recreation Opportunities Foregone:** Recreation opportunities foregone are the same as under the Existing Condition. Closing campsites within 50 feet of the river and decreasing the overall number of campsites throughout the corridor may result in recreation opportunities foregone for users wishing to camp if campsites reach capacity before all users are accommodated.

**Cumulative Effects:** The vast majority of the recreational effects are direct/indirect as described above. There will be no cumulative adverse effects on boaters nor cumulative beneficial effects on historical users from a year-round exclusion above Highway 28 because no other rivers exist in the region where boating is prohibited in this manner.

## **ALTERNATIVE 2**

### **Direct and Indirect Effects**

Under Alternative 2, the permit system limiting encounters to three in the upper three reaches and six in the Nicholson Fields reach (along with the reduction in trail and campsite density) would serve to more closely align these areas to wilderness and remote backcountry preferences described in literature. To meet these encounter levels, however, use limits (a permit system) would be necessary. Use limit systems require administrative effort, require users to plan ahead and compete for limited permits, and would displace some proportion of existing use on high use days. The alternative fundamentally trades-off increased bureaucracy for users (and some loss of access at high use times) in order to provide higher quality (lower density) experiences.

**Carrying Capacity/Solitude:** Opportunities for solitude experiences in this alternative are protected and enhanced for existing users more than in Alternative 1 because of reduced encounter levels. Solitude for existing backcountry users who are able to obtain a permit would be enhanced during the highest use times of the year; the wilderness character and solitude would be enhanced in the wilderness and in the wild river segment.

In Alternative 2, a limited number of existing users would have access to the trails and river year-round. Use may shift into lower use times more quickly than under Alternative 1. In the upper three reaches, the permit system would probably displace some users on most weekends March - October and on most summer weekdays (fewer days in the Chattooga Cliffs reach where use is lower; more days in the Rock Gorge where use is slightly higher). In the Nicholson Fields reach, users will probably be displaced on weekend days March - December and most weekdays April - August (Berger and CRC 2007).

### **Encounter Levels by Reach:**

***Chattooga Cliffs Reach:*** Encounters may be slightly reduced by this alternative but the decrease is likely to be small. The agency likely will need to limit the number of permits on weekends June - August and October and on some weekdays in July, August and October, where encounter levels are already estimated to be higher than three (Berger and CRC 2007). Requiring designated campsites to be at least ¼ mile apart is not expected to alter encounter levels

significantly because the three existing dispersed campsites here are already well-spaced and backpacking use is very low (Berger and CRC 2007).

*Ellicott Rock Reach:* Existing encounters appear to be higher than three-per-day on most weekends March - October and most weekdays June - August (Berger and CRC 2007). Campsite restrictions would lower campsite encounters in this stretch and would enhance the wilderness character of the Ellicott Rock Wilderness as well as enhance solitude in the wild segment of the river.

Elimination of roadside parking at Burrells Ford (between the Ellicott Rock and Rock Gorge reaches), coupled with enforcement, would have minimal impacts on encounters in the backcountry.

*Rock Gorge Reach:* Current encounter levels here are estimated to be higher than three; therefore, some users will be displaced immediately on most weekends March - October and most weekdays April - October (Berger and CRC 2007). In addition, use may start to shift into the lower-use seasons. Campsite restrictions would lower campsite encounters in this reach and would enhance solitude of the wild segment of the river by limiting additional development and access.

*Nicholson Fields Reach:* Implementation of this alternative would immediately result in displaced users on weekends March – December and on most weekdays April - August (Berger and CRC 2007). New campsite restrictions in this alternative would lower campsite encounters in this reach.

Reduction in campsite density; the requirement to camp at designated sites by reservation only; and rehabilitation of remaining campsites so that they are in better condition, conform to the landscape and are environmentally sustainable will help to enhance perceptions of solitude and to protect the wilderness character and recreation ORV. Competition for campsites may decrease due to lower numbers of users, although the latter could be nullified by fewer campsites (one per ¼ mile of river).

This alternative emphasizes a designated trail system designed to mitigate encounters and enhance solitude. Fewer trails which are in better condition, conform better to the landscape and are environmentally sustainable will help enhance perceptions of solitude.

Because of the stringent encounter levels and limited permits in this alternative, competition for fishable water in the Nicholson Fields reach during the delayed-harvest season should be reduced, although opportunities to fish also would be reduced. Similarly, lower numbers of users should reduce competition for parking as well as campsites. Competition for the limited number of backcountry permits during the high-use times of the year where encounters already exceed the goals in Alternative 2 would increase; given recreation trends, this competition is likely to increase over time.

**Conflict:** Goal interference for boaters/existing users and the resulting conflict are the same as Alternative 1.

**Recreation Opportunities Foregone:** Recreation opportunities foregone are the same for boaters and existing users as Alternative 1; however, the permit system is likely to increase foregone recreation opportunities for some existing users. Also, recreation use trend information suggests that demand for these permits would increase over time, either resulting in more recreation opportunities foregone or use/demand shifting into the shoulder seasons spreading use/demand more evenly over the course of the year.

**Cumulative Effects:** Same as Alternative 1.

### **ALTERNATIVE 3**

#### **Direct and Indirect Effects**

**Carrying Capacity/Solitude:** In the three lower reaches, most average daily encounters are not expected to exceed the goals except on some weekends April - September and on some weekdays May - August. The Chattooga Cliffs reach should have fewer days where average daily encounters exceed goals (some weekends May - August and October). On-river encounters in the upper three reaches are low and are not expected to exceed the encounter goals in the foreseeable future. However, on-river encounters in the Nicholson Fields reach are the highest of all the reaches; encounter goal levels will likely be exceeded on some weekends March - May and November - December (Berger and CRC 2007).

#### **Encounter Levels by Reach:**

*Chattooga Cliffs Reach:* Average daily encounters will exceed the four-encounter goal on 11 days on some weekend days May - August and in October. On-river encounters in the backcountry are not expected to reach the four-encounter goal in the foreseeable future (Berger and CRC 2007).

*Ellicott Rock Reach:* Average daily encounters will exceed the encounter goal on 30 days on some weekend days April - September and on some weekdays June - August. On-river encounters are very low and are not expected to reach the encounter goal in the foreseeable future (Berger and CRC 2007).

Impacts of eliminating roadside parking at Burrells Ford (between the Ellicott Rock and Rock Gorge reaches), coupled with enforcement, is the same as Alternative 2.

*Rock Gorge Reach:* Average daily encounters will exceed the goal on 24 days per year on some weekend days and possibly on some weekdays June - August. On-river encounters are very low and are not expected to reach the encounter goal in the foreseeable future (Berger and CRC 2007).

*Nicholson Fields Reach:* Average daily encounters will exceed the goal on 37 days per year on some weekend days April - September and November and possibly on some weekdays May - August. On-river encounter goals will likely be exceeded some weekends March - May and November - December (Berger and CRC 2007).

Opportunities for solitude, remote experiences and the wilderness character are enhanced more than in Alternative 1, but less than Alternative 2. As in Alternative 1, the solitude experiences of existing backcountry users are already being diminished during certain times of the year and in certain locations. In addition, the encounter goals in the wilderness are slightly higher than the desired level. Both factors may lead to some slight erosion of solitude, may cause more use to shift to the shoulder season or may displace some users from the river.

Closing unsustainable campsites and rehabilitating remaining campsites would enhance perceptions of solitude and remoteness more than Alternative 1 but not as much as Alternative 2. In addition, the amount of campsite use from backpackers may be reduced due to the requirement to camp at designated sites by reservation only.

In addition to the direct encounter goals, this alternative emphasizes a designated trail system, not to the degree of Alternative 2, but better than Alternative 1. As in Alternative 2, closing and rehabilitating trails would help enhance perceptions of solitude and remoteness. The recreation ORV will be protected and enhanced in this alternative as well, even though some new trail construction may take place.

Given the information on future trends among existing and potential uses provided earlier in this section, over time use/demand will start to impinge on the encounter goals during the higher use times of the year and some use/demand will begin to shift into the shoulder seasons (traditionally lower use times of the year) spreading use/demand more evenly over the course of the year. However, this will not occur as quickly and immediately as in Alternative 2 and, unlike Alternative 1, use and encounters in Alternative 3 are limited at existing levels to maintain existing experiences.

Competition for fishable water would be the same as Alternative 1. New campsite restrictions likely would increase competition for campsites more than alternatives 1 and 2 (encounter levels in Alternative 2 are lower than Alternative 3; lower encounter levels leads to less users which, in turn, equates to less competition for resources). New parking restrictions in Alternative 3 likely would increase competition for parking. Given recreation trend information, competition for resources is likely to increase.

**Conflict:** Goal interference for boaters/existing users and the resulting conflict are the same as Alternative 1.

**Recreation Opportunities Foregone:** Same as Alternative 1.

**Cumulative Effects:** Same as alternatives 1 and 2.

#### **ALTERNATIVE 4**

##### **Direct and Indirect Effects**

In this alternative, a mean daily flow of 450 cfs or higher at Burrells Ford between December 1 and March 1 occurs on an average of six days per year (Hansen 2007). These days are referred to

as “boatable” days. Using data from the last 67 years and a standard deviation approach, the number of boatable days in this alternative would range from a low of zero to a high of 11.

**Carrying Capacity/Solitude:** In general, Alternative 4 enhances solitude less than Alternative 2 because of its less stringent encounter limits. Existing backcountry users (on-trail and on-river) would exceed the “encounters per day” goals to the same extent as in Alternative 3. Given the restrictions on the number of boater groups per day and minimum flows for boating, the encounters attributed to boaters are not expected to go up in the future. The effects of adding boating are summarized in Table 3.3-6.

**Table 3.3-6 Effects of adding whitewater boating on the number of backcountry encounters in Alternative 4**

<u>Reach</u>	<u>Average # of add'l on-trail encounters on 6 days/year</u>	<u>Average # of days on-trail encounter goals will be exceeded due to boating</u>	<u>Average # of add'l on-river encounters on 6 days/year</u>	<u>Average # of days on-river encounter goals will be exceeded due to boating</u>
<u>Chattooga Cliffs</u>	<u>1 (some may occur on County Line Trail)</u>	<u>0</u>	<u>2</u>	<u>0</u>
<u>Ellicott Rock</u>	<u>1</u>	<u>0</u>	<u>3</u>	<u>0</u>
<u>Rock Gorge</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>
<u>Nicholson Fields</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>

To see the encounters generated by existing backcountry users and boaters, refer to the on-river and on-trail encounter charts in Figures 3.3-1 and 3.3-2.

Impacts of parking restrictions are the same as Alternative 2.

Over time, use/demand will start to impinge on the encounter limits during the higher use times of the year and some use/demand will begin to shift into the shoulder seasons (traditionally lower use times of the year) spreading use/demand more evenly over the course of the year. However, this will not occur as quickly and immediately as in Alternative 2.

Competition for fishable water would be the same as Alternative 1. Competition for parking may increase slightly at boater put-ins and take-outs although evidence suggests that when boating is allowed, overall use in the upper river corridor is low. In addition, the limited number of boater groups per day may increase competition between boaters should more than four groups per day per reach want to float the upper river. Finally, given recreation trend information, competition for resources is likely to continue to increase in the future.

As in Alternative 3, more trails and campsites would be in better condition than current, would better conform to the landscape, and would be environmentally sustainable thereby helping to enhance perceptions of solitude and remoteness.

Under Alternative 4, boating has the potential of creating new portage trails and user-created trails to attraction sites which may slightly influence the perception of remoteness and solitude, but this would be minimal when compared to existing user-created trails and campsites.

**Conflict:** Compared to the other alternatives that provide boating opportunities, Alternative 4 has the potential to introduce the least amount of goal interference and the resulting face-to-face conflict. However, it has the potential to introduce more conflict than alternatives 1-3.

In this alternative, boaters may experience goal interference and the resulting antipathy toward those opposed to boating on the upper Chattooga because they are not allowed to legally float the upper river year-round. In addition, some existing users could experience goal interference on an average of six days per year which could lead to a slight increase in face-to-face conflict.

Specifically, boaters may interfere with angling on days when boating is allowed although, at flows of 450 cfs or higher, the interference may be mitigated, particularly with those anglers who wade fish. Additionally, Table 3.3-3 shows that flow levels of 450 cfs and above provide “optimal” boating (up to approximately 650 cfs) and are “acceptable” primarily for bait anglers, some of whom may not be as concerned about solitude experiences as much as fly and spin anglers.

Face-to-face conflict may also occur between boaters and recreationists who have a zero tolerance for boating at boater put-ins and take-outs during the low-use time of the year (winter months). At the same time, existing users, including anglers, would know they may encounter boaters at 450 cfs and higher from December 1 – March 1 and could adjust their expectations accordingly, thereby potentially mitigating a negative reaction if they encounter a group or groups of boaters. Also, the take-out at Burrells Ford avoids on-river encounters with anglers in the Rock Gorge and in the delayed-harvest area.

Taking the entire river into consideration and the different characteristics of both the upper and lower river discussed earlier, both boaters and some existing users may experience goal interference in this alternative. Boaters who want to float the upper Chattooga year-round may experience goal interference because they are only allowed to float the upper Chattooga on an average of six days per year. Also, some hikers, backpackers, and anglers may experience goal interference since they are not guaranteed a boat-free experience year-round on the lower river segments even though a boat-free experience may be available on the lower river on Sections I and II on some days during most of the year and on Sections III and IV on some days during the winter months. Finally, existing users and backcountry anglers (primarily bait anglers) are not guaranteed a boat-free experience on the upper river on boatable days.

This alternative would not address the concerns of those who have a social values based conflict with boating being allowed on the upper Chattooga. In addition, conflict will remain for boaters who want to float all reaches above Highway 28 at all flow levels. Boating in this alternative could result in the displacement of some users who specifically recreate on the upper Chattooga because of the historically no-boating experience although, given the low number of boatable days, this is unlikely. Like alternatives 5, 8, 9 and 10, this alternative will create a new “norm” and users with a “zero tolerance” for boating will either adjust or be displaced on an average of six boatable days.

**Recreation Opportunities Foregone:** When compared to Alternatives 1-3, Alternative 4 has more recreation opportunities foregone for existing users and less opportunities foregone for

boaters; at the same time, less recreation opportunities are foregone for existing users and more are foregone for boaters than under alternatives 5, 8, 9 and 10.

Taking the entire river into consideration and the different characteristics of both the upper and lower river discussed earlier, both boaters and some existing users may experience recreation opportunities foregone in this alternative. Boaters who want to float the upper Chattooga year-round may experience recreation opportunities foregone because they are only allowed to float the upper Chattooga on an average of six days per year. Also, some hikers, backpackers, and anglers may experience recreation opportunities foregone since they are not guaranteed a boat-free experience year-round on the lower river segments: however, a boat-free experience may be available on the lower river on Sections I and II on some days during most of the year and on Sections III and IV on some days during the winter months. Finally, existing users and backcountry anglers (primarily bait anglers) are not guaranteed a boat-free experience on the upper river on an average of six days per year.

### **Cumulative Effects**

The vast majority of the recreational effects are direct/indirect as described above. There will be no cumulative adverse effects on boaters from restricting boating to mean daily flow of 450 cfs and higher from December through February since there are no other rivers in the region where boating is limited in this manner. There will be a very small cumulative negative effect on historical users from allowing some boating use (even as it is highly restricted). Several similarly-sized river segments in the region have some boating use at higher flow levels, and this alternative would add one more river to that list (and thus decrease the number that have no boating at any flow level).

## **Alternative 5**

### **Direct and Indirect Effects**

In Alternative 5, a mean daily flow of 350 cfs or higher occurs on an average of 37 days per year (Hansen 2007). Using data from the last 67 years and a standard deviation approach, the number of “boatable” days in this alternative would range from 12 to 64 days per year.

**Carrying Capacity/Solitude:** Existing backcountry users (on-trail and on-river) would exceed the “encounters per day” goals to the same extent as in Alternative 3. Given the restrictions on the number of boating groups per day and minimum flows for boating, the encounters attributed to boaters are not expected to go up in the future. The effects of adding boating are summarized in Table 3.3-7.

**Table 3.3-7 Effects of adding whitewater boating on the number of backcountry encounters in Alternative 5**

<u>Reach</u>	<u>Average # of add'l on-trail encounters on 37 days/year</u>	<u>Average # of days on-trail encounter goals will be exceeded due to boating</u>	<u>Average # of add'l on-river encounters on 37 days/year</u>	<u>Average # of days on-river encounter goals will be exceeded due to boating</u>
Chattooga Cliffs	0	0	0	0
Ellicott Rock	1	5	3	2
Rock Gorge	1	4 (some may occur on Lick Log Trail)	3	4
Nicholson Fields	0	0	0	0

To see the encounters generated by existing backcountry users and boaters, refer to the on-river and on-trail encounter charts in Figures 3.3-1 and 3.3-2.

Impacts of parking restrictions are the same as Alternative 2.

As discussed previously, overall recreation use is expected to increase in the future. Over time, use/demand will start to impinge on the encounter limits during the higher use times of the year, and some use/demand will begin to shift into the shoulder seasons (traditionally lower use times of the year) spreading use/demand more evenly over the course of the year. However, this will not occur as quickly and immediately as in Alternative 2, but sooner than in alternatives 3 and 4.

Competition for fishable water would be the same as Alternative 1. Competition for parking and resources in the future is the same as Alternative 4. The limited number of boater groups may increase competition between boaters should more than six groups per day want to float the river between Bull Pen and Burrells Ford and more than eight groups per day want to float the river between Burrells Ford and Lick Log Creek.

Effects to solitude from trail and campsite management would be the same as alternatives 3 and 4. The impacts of potential portage and user-created trails to attraction sites may be slightly increased over Alternative 4 but will minimally influence the perception of remoteness and solitude when compared to existing user-created trails and campsites.

Under this alternative, boating will be concentrated in the wilderness area. Limits on numbers of boater groups per day will help protect the wilderness character better than alternatives 8, 9 and 10 but less than Alternative 4. On the other hand, limits on the number of encounters per day from trails are more stringent in alternatives 8, 9 and 10 than alternatives 3, 4 and 5. Therefore, in the long run, alternatives 8, 9 and 10 may provide more solitude than Alternative 5 given the potential increases in encounters from historically trail-based users.

**Conflict:** Compared to the other alternatives that provide boating opportunities, Alternative 5 has the potential to introduce more goal interference and the resulting face-to-face conflict than alternatives 1, 2, 3, 4, 9 and 10 but less than Alternative 8.

Goal interference for boaters in this alternative and the resulting antipathy is slightly less than Alternative 4 because it allows more boatable days. For existing users, goal interference and the potential resulting face-to-face conflict with boaters is higher than under Alternative 4.

Specifically, boaters may interfere with angling on days when boating is allowed although, at mean daily flows of 350 cfs or higher, the interference may be mitigated, particularly with those anglers who wade fish. Additionally, Table 3.3-3 shows that flow levels of 350 cfs or higher provide “optimal” boating (up to approximately 650 cfs) and are “acceptable” for fly and spin fishing (up to approximately 450 cfs and 525 cfs respectively) and “optimal” (up to 450 cfs) and “acceptable” (up to 650 cfs) for bait fishing. Additionally, the characteristics of each reach outlined in the affected environment, turbidity and proximity of the angler to the shore may also mitigate direct interference to angling from boating.

Face-to-face conflict may occur between boaters and recreationists who have a zero tolerance for boating at boater put-ins and take-outs during the low-use time of the year (winter months). At the same time, existing users, including anglers, would know they may encounter boaters at 350 cfs and higher and could adjust their expectations accordingly, thereby potentially mitigating a negative reaction if they encounter a group or groups of boaters. Also, the take-out at Lick Log Creek may mitigate interference with anglers in the delayed-harvest area.

Goal interference for boaters in this alternative is more than Alternative 8 but less than in the other alternatives. The opposite is true for historical users seeking a boat-free experience.

Like alternatives 4, 8, 9 and 10, this alternative would not address the concerns of those who have a social values based conflict with boating being allowed on the upper Chattooga. In addition, conflict will remain for boaters who want to float all reaches above Highway 28 at all flow levels. Boating in this alternative could also result in the displacement of some users who specifically recreate on the upper Chattooga because of the historically no-boating experience. Like alternatives 4, 8, 9 and 10, this alternative will create a new “norm” and users with a “zero tolerance” for boating will either adjust or be displaced on an average of 37 boatable days.

**Recreation Opportunities Foregone:** Recreation opportunities foregone for boaters in this alternative are more than Alternative 8 but less than in the other alternatives. The opposite is true for historical users seeking a boat-free experience.

### **Alternative 5 – Cumulative Effects**

Cumulative adverse effects on boaters are more than Alternative 8 but less than alternatives 4, 9 and 10. Cumulative negative effects on historical users are less than Alternative 8 but more than the other alternatives.

## **Alternative 8**

### **Direct and Indirect Effects**

Since there are no flow restrictions for boating under this alternative, the boatable flow ranges derived from the expert panel were used to estimate boatable days in an average year. These 114 boatable days include the “big water boating” days and the “high overlap” and “low overlap” ranges. However, Whittaker and Shelby (2007) predict that only half of the 77 “low overlap”

days would be used. Additionally, this is the only alternative in which scenic boating is anticipated on the upper Chattooga; Whittaker and Shelby (2007), “guesstimate” this activity would likely occur on 50 days or less per year. This translates into an average of 125 boatable days per year. Using data from the last 67 years and a standard deviation approach, the number of boatable days would range from 85 to 168.

Some additional use may also be attributed to scenic boaters on low-flow summer days when fishing flows are optimal. Scenic boaters tend to be less skilled boaters that might run some segments of the upper Chattooga that lack more challenging rapids. Scenic boaters may also float the segment from the East Fork confluence down to Burrells Ford but use here is less likely because of the approximately 2.5 mile portage. Scenic boating is most likely to occur during the warmer months during lower flows. Highest use would likely occur in the Nicholson Fields reach and would increase encounters by one per day on 50 days. This section may also be of interest to boating-based anglers. In the other three reaches, encounters may increase by one on ten days.

**Carrying Capacity/Solitude:** Existing backcountry trail users would exceed the “encounters per day” goals in the Chattooga Cliffs, Ellicott Rock, Rock Gorge and Nicholson Fields reaches on 0, 22, 66 and 88 days, respectively. Existing on-river users would not exceed the encounter goals for the Chattooga Cliffs, Ellicott Rock and Rock Gorge reaches, but would exceed the goals for the Nicholson Fields reach on 12 days.

Since there are no restrictions on maximum number of user groups per day, on-river encounter goals may be exceeded fairly quickly in the Chattooga Cliffs, Ellicott Rock and Rock Gorge reaches due to the introduction of boating. However, on-river goals are already exceeded by existing users in the Nicholson Fields reach, while on-trail goals are exceeded by existing users in the Ellicott Rock, Rock Gorge and Nicholson Fields reaches (see Figures 3.3-1 and 3.3-2). Whether those higher encounter levels are sustained could depend on whether boater interest in floating the upper river wanes after the first few years. In addition, the adaptive management approach in this alternative could allow up to five years of exceeded encounter goals prior to implementing direct controls. This approach has the potential to further erode solitude in the Ellicott Rock wilderness and the rest of the river corridor, particularly on-river. On the other hand, the maximum encounter limits in this alternative are lower than in alternatives 3, 4 and 5; therefore, in the long-run, Alternative 8 may have lower use overall than alternatives 1, 3, 4 and 5.

The effects of adding whitewater boating on backcountry encounters for each of the four reaches in the upper Chattooga River are described in more detail in Table 3.3-8.

**Table 3.3-8 Effects of adding whitewater boating on the number of backcountry encounters in Alternative 8**

<u>Reach</u>	<u>Average # of add'l on-trail encounters on 75 days/year</u>	<u>Average # of days on-trail encounter goals will be exceeded due to boating</u>	<u>Average # of add'l on-river encounters on 75 days/year</u>	<u>Average # of days on-river encounter goals will be exceeded due to boating</u>
Chattooga Cliffs	<u>1/2</u>	<u>0</u>	<u>1</u>	<u>0</u>
Ellicott Rock	<u>1</u>	<u>7</u>	<u>3</u>	<u>7</u>
Rock Gorge	<u>1</u>	<u>3</u>	<u>3</u>	<u>7</u>
Nicholson Fields	<u>2</u>	<u>7</u>	<u>3</u>	<u>14</u>

To see the encounters generated by existing backcountry users and boaters, refer to the on-river and on-trail encounter charts in Figures 3.3-1 and 3.3-2.

Impacts of parking restrictions are the same as Alternative 2.

As discussed previously, overall recreation use is expected to increase in the future. Over time use/demand will start to impinge on the encounter limits during the higher use times of the year, and some use/demand will begin to shift into the shoulder seasons (traditionally lower use times of the year) spreading use/demand more evenly over the course of the year. However, this will not occur as quickly and immediately as in Alternative 2, but sooner than in alternatives 3, 4 and 5.

Competition for fishable water may be higher in this alternative than all others because of the direct interference boaters may cause anglers at various flow levels. Competition for camping may increase if scenic boaters want to take advantage of low flows in the high-use times. Competition for parking may increase at boater put-ins and take-outs, particularly if storm events occur during the high-use seasons. The number of boater groups per days is unlimited so competition for those slots should be eliminated. Finally, impacts of competition for resources in the future are the same as Alternative 4.

Because boating can occur at any flow level, the feeling of solitude that some existing backcountry users get during a boat-free recreation experience may be eroded on up to 125 days per year. This may be especially true for anglers on boatable days in this alternative when flow levels are optimal for angling. In addition, solitude, generally more pure in the winter months, may be more difficult to achieve as boating could increase encounters during that time because there are no boater group limits.

Effects to solitude from trail and campsite management would be similar to alternatives 3, 4 and 5. The impacts of potential portage trails and user-created trails to attraction sites may be increased more than in all other alternatives but will minimally influence the perception of remoteness and solitude when compared to existing user-created trails and campsites.

Alternative 8 sets more stringent on-trail encounter goals than alternatives 3, 4, and 5 thereby aiming to protect solitude on-trails in the long run. In general, Alternative 2 enhances the solitude and remoteness more than the other alternatives. As in Alternative 2 (but not as drastic), the encounter goals for alternatives 8, 9 and 10 will serve to more closely align the upper Chattooga to the wilderness and remote backcountry settings described in the literature.

**Conflict:** Compared to the other alternatives that provide boating opportunities, Alternative 8 has the potential to introduce more goal interference and the resulting face-to-face conflict for existing users than any other alternative. However, it satisfies the boaters' desire to float the upper Chattooga on any boatable day so their goal interference and the resulting antipathy are eliminated.

Goal interference with anglers and other users, including swimmers, is more likely under this alternative, particularly since boating is allowed in all reaches, during all seasons and at all water levels. The characteristics of each reach outlined in the affected environment, turbidity and proximity of the angler to the shore (based on water levels) may also mitigate interference to angling from boating.

Under Alternative 8, face-to-face conflict may occur between boaters and recreationists who have a zero tolerance for boating at higher levels at boater put-ins and take-outs, in the Rock Gorge and delayed-harvest area where angling is most popular. At the same time, existing users, including anglers, would know they may encounter boaters on an average of 125 days per year and could adjust their expectations accordingly, thereby potentially mitigating a negative reaction if they encounter a group or groups of boaters. This alternative may also increase face-to-face conflict with campers as boaters will be floating past campsites near the river during high-use times.

Boaters would not experience goal interference in this alternative. Historical users seeking a boat-free experience would have more goal interference in this alternative than in any of the others.

Like alternative 4, 5, 9 and 10, this alternative would not address the concerns of those who have a social values based conflict with boating being allowed on the upper Chattooga. Conflict for boaters who want to float all reaches above Highway 28 at all flow levels would be solved. Boating in this alternative could also result in the displacement of some users who specifically recreate on the upper Chattooga because of the historically no-boating experience. Like alternatives 4, 5, 9 and 10, this alternative will create a new "norm;" users with a "zero tolerance" for boating will either adjust or be displaced on an average of 125 boatable days.

**Recreation Opportunities Foregone:** Boaters would not experience recreation opportunities foregone in this alternative. Historical users seeking a boat-free experience would have more goal interference in this alternative than in any of the others.

### **Cumulative Effects**

Cumulative adverse effects on boaters are less than the other alternatives that provide boating opportunities. Cumulative negative effects on historical users are more than the other boating alternatives.

## Alternative 9

### Direct and Indirect Effects

In Alternative 9, a mean daily flow of 350 cfs or higher occurs between November 1 and March 31 on an average of 21 days per year (Hansen 2007). Using data from the last 67 years and a standard deviation approach, the number of “boatable” days in this alternative would range from four to 38.

**Carrying Capacity/Solitude:** Existing backcountry users (on-trail and on-river) would exceed the “encounters per day” goals to the same extent as in Alternative 8. The effects of adding boating are summarized in Table 3.3-9.

**Table 3.3-9 Effects of adding whitewater boating on the number of backcountry encounters in Alternative 9**

<u>Reach</u>	<u>Average # of add'l on-trail encounters on 21 days/year</u>	<u>Average # of days on-trail encounter goals will be exceeded due to boating</u>	<u>Average # of add'l on-river encounters on 21 days/year</u>	<u>Average # of days on-river encounter goals will be exceeded due to boating</u>
Chattooga Cliffs	1	0	2	0
Ellicott Rock	3	3	1	0
Rock Gorge	0	0	0	0
Nicholson Fields	0	0	0	0

To see the encounters generated by existing backcountry users and boaters, refer to the on-river and on-trail encounter charts in Figures 3.3-1 and 3.3-2.

Impacts of parking restrictions are the same as Alternative 2.

As discussed previously, overall recreation use is expected to increase in the future. Over time use/demand will start to impinge on the encounter limits during the higher use times of the year, and some use/demand will begin to shift into the shoulder seasons (traditionally lower use times of the year) spreading use/demand more evenly over the course of the year. However, this will not occur as quickly and immediately as in Alternative 2, but sooner than in alternatives 3, 4 and 5. Impacts of increased use in the future are less than Alternative 8 because boating occurs only from November 1 to March 31 at 350 cfs or higher. On-trail encounter goals are exceeded less than Alternative 8 and about the same as Alternative 10, while on-river encounter goals are exceeded less than Alternatives 5, 8 and 10, and similar to Alternative 4 (see Figures 3.3-1 and 3.3-2).

Requiring boaters to take out at the East Fork confluence will increase trail encounters on the East Fork Trail inside the Ellicott Rock Wilderness. Conversely, it will reduce on-river encounters with anglers through the heaviest fished portion the Ellicott Rock reach. Alternative 9 has no restrictions on the maximum number of boating groups per day; therefore, encounters attributed to boaters could go up in the future.

Competition for fishable water would be the same as Alternative 1. Competition for parking is the same as Alternative 4, as is predicted increased competition for resources in the future. Competition for boating slots is the same as Alternative 8.

Effects to solitude from trail and campsite management will be similar to alternatives 3, 4, 5, 8 and 10. The impacts of potential portage trails and user-created trails to attraction sites will minimally influence the perception of remoteness and solitude, particularly when compared to existing user-created trails and campsites.

**Conflict:** Compared to the other alternatives that provide boating opportunities, Alternative 9 has the potential to introduce more goal interference and the resulting face-to-face conflict than alternatives 1, 2, 3, 4 and 10 but less than alternatives 5 and 8.

Goal interference for boaters in this alternative and the resulting antipathy is slightly less than alternatives 4 and 10 but more than alternatives 5 and 8. For existing users, goal interference and the potential resulting face-to-face conflict with boaters is higher than under alternatives 1, 2, 3, 4, and 10.

Specifically, boaters may interfere with angling on days when boating is allowed although, at flows of 350 cfs or higher, the interference may be mitigated, particularly with those anglers who wade fish. Additionally, Table 3.3-3 shows that flow levels of 350 cfs or higher provide “optimal” boating (up to approximately 650 cfs) and are “acceptable” for fly and spin fishing (up to approximately 450 cfs and 525 cfs respectively) and “optimal” (up to 450 cfs) and “acceptable” (up to 650 cfs) for bait fishing. Additionally, the characteristics of each reach outlined in the affected environment, turbidity and proximity of the angler to the shore (due to high flows) may also mitigate interference to angling from boating.

Face-to-face conflict may occur between boaters and recreationists who have a zero tolerance for boating at boater put-ins and take-outs; however, this would occur only during lower-use times of the year (winter months). At the same time, existing users, including anglers, would know they may encounter boaters at 350 cfs and higher November 1 – March 31 each year and could adjust their expectations accordingly, thereby potentially mitigating a negative reaction if they encounter a group or groups of boaters. Also, the take-out at the East Fork Trail may mitigate interference with anglers in the delayed-harvest area.

Goal interference for boaters in this alternative is more than alternatives 5 and 8, but less than all the other alternatives. Goal interference for historical users seeking a boat-free experience is less than alternatives 5 and 8, but more than the all the other alternatives.

Like alternatives 4, 5, 8 and 10, this alternative would not address the concerns of those who have a social values based conflict with boating being allowed on the upper Chattooga. In addition, conflict will remain for boaters who want to float all reaches above Highway 28 at all flow levels. Boating in this alternative could also result in the displacement of some users who specifically recreate on the upper Chattooga because of the historically no-boating experience although, given the low number of boatable days, this is unlikely. Like alternatives 4, 8 and 10,

this alternative will create a new “norm” and users with a “zero tolerance” for boating will either adjust or be displaced on an average of 21 days per year.

**Recreation Opportunities Foregone:** In Alternative 9, more recreation opportunities for existing users and less opportunities for boaters are foregone than in alternatives 1, 2, 3, 4 and 10; at the same time, less recreation opportunities for existing users and more opportunities for boaters are foregone than in alternatives 5 and 8.

**Cumulative Effects**

Cumulative adverse effects on boaters are more than alternatives 5 and 8 but less than alternatives 4 and 10. Cumulative negative effects on historical users are less than alternatives 5 and 8 but more than alternatives 4 and 10.

**Alternative 10**

**Direct and Indirect Effects**

In Alternative 10, a mean daily flow of 350 cfs or higher between November 1 and March 1 occurs on an average of 14 days per year (Hansen 2007). Using data from the last 67 years and a standard deviation approach, the number of “boatable” days would range from zero to 28 days per year.

**Carrying Capacity/Solitude:** Existing backcountry users (on-trail and on-river) would exceed the “encounters per day” goal to the same extent as in Alternative 8. The effects of adding boating are summarized in Table 3.3-10.

**Table 3.3-10 Effects of adding whitewater boating on the amount of backcountry encounters in Alternative 10**

Reach	Average # of add'l on-trail encounters on 14 days/year	Average # of days on-trail encounter goals will be exceeded due to boating	Average # of add'l on-river encounters on 14 days/year	Average # of days on-river encounter goals will be exceeded due to boating
Chattooga Cliffs	1	0	2	0
Ellicott Rock	2	2	4	2
Rock Gorge	1	2	3	2
Nicholson Fields	2	1	3	2

Impacts of increased use in the future are less than Alternative 8, and apply only to the period of November 1 to March 1. On-trail encounter goals are exceeded less than Alternative 8 and about the same as Alternative 9, while on-river encounter goals are exceeded more than Alternatives 4 and 9, but less than Alternatives 5 and 8 (see Figures 3.3-1 and 3.3-2).

Impacts of parking restrictions are the same as Alternative 2.

As in Alternative 2 (but not as drastic), the encounter goals for alternatives 8, 9 and 10 will serve to more closely align the upper Chattooga to the wilderness and remote backcountry settings described in the literature.

Competition for fishable water would be the same as Alternative 1. Competition for parking, boating slots and resources in the future is the same as in Alternative 9.

Effects to solitude from trail and campsite management will be similar to alternatives 3, 4, 5, 8 and 9. The impacts of potential portage trails and user-created trails to attraction sites will minimally influence the perception of remoteness and solitude, particularly when compared to existing user-created trails and campsites. Additionally, the impacts to the Wild and Scenic River classifications would be the same as alternative 8.

**Conflict:** Compared to the other alternatives that provide boating opportunities, Alternative 10 has the potential to introduce more goal interference and the resulting face-to-face conflict than alternatives 1, 2, 3, 4 and 9 but less than alternatives 5 and 8.

Goal interference for boaters and the resulting antipathy is less than alternatives 1, 2, 3 and 4 but more than alternatives 5, 8 and 9. For existing users, goal interference and the potential resulting face-to-face conflict with boaters is higher than under alternatives 1, 2, 3 and 4 but less than alternatives 5, 8 and 9.

Specifically, boaters may interfere with angling on days when boating is allowed although, at flows of 350 cfs or higher, the interference may be mitigated, particularly with those anglers who wade fish. Additionally, Table 3.3-3 shows that flow levels of 350 cfs or higher provide “optimal” boating (up to approximately 650 cfs) and are “acceptable” for fly and spin fishing (up to approximately 450 cfs and 525 cfs respectively) and “optimal” (up to 450 cfs) and “acceptable” (up to 650 cfs) for bait fishing. Additionally, the characteristics of each reach outlined in the affected environment, turbidity and proximity of the angler to the shore may also mitigate interference to angling from boating.

Under Alternative 10, face-to-face conflict may increase between boaters and recreationists who have a zero tolerance for boating at boater put-ins and take-outs; however, this would occur only during the lower use times of the year (winter months). At the same time, existing users, including anglers, would know they may encounter boaters at mean daily flows of 350 cfs and higher November 1 – March 1 each year and could adjust their expectations accordingly, thereby potentially mitigating a negative reaction if they encounter a group or groups of boaters

Goal interference for boaters in this alternative is more than alternative 5, 8 and 9 but less than alternatives 1, 2, 3 and 4. The opposite is true for historical users seeking a boat-free experience.

Like alternatives 4, 5, 8 and 9, this alternative would not address the concerns of those who have a social values based conflict with boating being allowed on the upper Chattooga. In addition, conflict will remain for boaters who want to float all reaches above Highway 28 at all flow levels. Boating in this alternative could also result in the displacement of some users who specifically recreate on the upper Chattooga because of the historically no-boating experience although, given the low number of boatable days, this is unlikely. Like alternatives 4, 5, 8 and 9, this alternative will create a new “norm” and users with a “zero tolerance” for boating will either adjust or be displaced on an average of 14 days per year.

**Recreation Opportunities Foregone:** Recreation opportunities foregone for boaters in this alternative are more than alternatives 5, 8 and 9 but less than alternatives 1, 2, 3 and 4. The opposite is true for historical users seeking a boat-free experience.

**Cumulative Effects**

Cumulative adverse effects on boaters are more than alternative 5, 8 and 9 but less than Alternative 4. Cumulative negative effects on historical users are less than alternative 5, 8 and 9 but more than Alternative 4.

### 3.3.2 Scenery

#### SUMMARY OF FINDINGS

Currently in the upper Chattooga, scenery impacts within the river corridor are from soil compaction, erosion and vegetation damage associated with: dispersed camping and user-created trails; human waste and trash accumulation; and, erosion associated with undesignated roadside parking. With all alternatives, recreation users passing through the corridor may see multiple incidents of these scenery impacts. However, all action alternatives propose a reduction in parking and elimination of unsustainable campsites and trails which serve to reduce cumulative impacts to scenery resources.

Alternative 1 may result in the greatest degree of cumulative scenery impact, since there is no regulation of camping and user-created trails beyond how the corridor is currently managed. With its limits on campsite density and user permit system, cumulative effects to scenery would be minimized with Alternative 2. All other alternatives would have varying degrees of cumulative scenery impacts depending on allowed use-levels, and river miles open to boating: more use will result in greater impacts.

#### AFFECTED ENVIRONMENT

Generally, Wild segments on the upper Chattooga are inaccessible by road, have a natural-appearing character and dramatic natural beauty. Scenic segments include road crossings, bridges and developed recreation sites; though these segments have high quality scenery, they contain obvious signs of human modification. Recreational segments may have major road crossings, large bridges, roads paralleling the river within the corridor, more intense recreation development, or tracts of private land with development. The scenic character of these segments may include frequently seen human modifications and, although still visually distinctive, represent the lowest level of scenic quality among the three designations.

The Sumter and Chattahoochee National Forest management plans incorporate the Scenery Management System (SMS) while the Nantahala National Forest management plan uses the Visual Management System (VMS). Though these systems differ in the way inventories are conducted, the resulting scenery management objectives differ primarily in terminology. Both systems base inventories and management objectives on viewer concern level, viewing distance and scenic characteristics of the visible landscape.

Currently scenery impacts within the river corridor are from soil compaction, erosion and vegetation damage associated with: dispersed camping and user-created trails; human waste and trash accumulation; and erosion associated with undesignated roadside parking.

#### Direct and Indirect Effects

##### **Alternative 1**

Negative impacts to scenery would continue under this alternative as existing campsites are closed and new sites appear to replace them. Each new site would have its share of connecting

user trails, vegetation damage, fire rings, soil compaction, erosion, human waste and trash accumulation—all of which detract greatly from the area’s scenic quality. Some existing roadside parking has become eroded and unattractive, and may continue under this proposal.

### **Alternative 2**

This alternative would have the least impact to scenic quality and would actually enhance scenic conditions to a greater extent than other alternatives by reducing visible areas of bare ground/erosion and trash/vegetation damage and restoring a natural-appearing landscape. Though management of human waste or trash accumulation is not specifically addressed in this alternative, it will minimize aesthetic degradation associated with these impacts by reducing overall use.

### **Alternative 3**

Like all action alternatives, this alternative reduces scenery impacts through proposed campsite and trail management; but, use in the Chattooga WSR Corridor is expected to increase in the future. By not restricting use, the inevitable increase in use will continue to create scenery impacts from soil compaction, erosion, vegetation damage and human waste/trash accumulation.

### **Alternatives 4, 5, 8, 9 and 10**

Like alternatives 2 and 3, some management actions will improve scenic quality within the corridor. However, boating would provide additional means of accessing remote sections of river such as those designated as Wild segments. This new use would increase overall use in the corridor, and increase scenery impacts from portage and access trails. Though some portage trails would be identified and constructed to standard, other user-created portage trails will appear with no authorization or review by managers. These user-created portage trails will almost certainly occur within the riparian zone, on highly erodible soils and across steep slopes. Resulting soil compaction and/or erosion will negatively impact scenery. In addition, use and associated scenery impacts at boater put-in and take-out locations will increase.

Boating also will introduce another new impact to scenery: boat markings on rocks. As a hard-shell kayak hits river rocks, a mark the same color as the boat will be left behind. Often whitewater kayakers are brightly colored, which makes the rock markings stand-out in the natural landscape. Boating at different flows would result in markings at various levels on the rocks. At normal flows, these residual boat markings may appear several feet above the water-level. Certain rocks would be struck repeatedly because of their location in the river channel, so higher use levels may result in more heavily scoured rocks with multi-colored streaks. These impacts will degrade the aesthetics of the natural appearing landscape; however, the amount of marking and the degree to which it will impact scenery is difficult to predict.

The addition of boating in the upper Chattooga also increases the potential for unauthorized LWD removal in sections of the upper Chattooga opened to boating. Cut marks will degrade the aesthetics of the natural appearing landscape; however, the amount of cutting and the degree to which it will impact scenery is difficult to predict.

Alternatives that open longer reaches of river to boating will have greater scenery impacts; those with higher use levels will also create greater impacts. This is true for the boating-specific

scenery impacts stated above, soil compaction and vegetation damage resulting from an overall increase in use and aesthetic impacts of additional human waste and trash accumulation.

However, Alternative 4 proposes an “adaptive management” component that could use registration, monitoring or surveys to determine the need for implementation of additional use restrictions. This approach could help reduce scenery impacts associated with introduction of a new use and an overall increase in use.

### **Cumulative Effects**

With all alternatives, recreation users may see multiple incidents of soil compaction, erosion, vegetation damage, boat marking on rocks, human waste or trash accumulation. However, all action alternatives propose new parking, campsite and trail standards which will serve to reduce cumulative impacts to scenery resources.

Alternative 1 may result in the greatest degree of cumulative scenery impact, since there is no regulation of camping and user-created trails beyond how the corridor is currently managed. With its limits on campsite density and user permit system, cumulative effects to scenery would be minimized with Alternative 2. All other alternatives would have varying degrees of cumulative scenery impacts depending on allowed use-levels and river miles open to boating: more use will result in greater impacts.

Beyond proposed actions in the current range of alternatives, no other past, present or foreseeable future actions would measurably contribute cumulative impacts to scenic resources in the Chattooga Wild and Scenic River Corridor.

### 3.3.3 Human Health and Safety (Search and Rescue)

Recreating on NFS lands is not without risk, especially recreating close to or in rapidly flowing rivers such as the Chattooga River. The Chattooga drops approximately 1,500 feet in elevation within the 20 mile section from Grimshaws 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. The addition of LWD from dying Hemlock is likely to add to these risks. Removal of LWD by the public would not be compatible with the Wilderness designation nor with aquatic habitat goals and objectives. Whereas combining these attributes with recreational use results in inherent risks to the user, some users consider it part of the experience defined by the challenge, adventure and satisfaction from knowing that natural dangers have been successfully negotiated.

Since 1970, 39 fatalities have occurred on the Chattooga River – all below Highway 28. Thirty-one of these were directly or indirectly associated with floating. All but one of these floating fatalities were self-guided boaters; the other was 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: requiring recreationists to use protective equipment in certain sections; prohibiting certain craft types in some sections; restricting paddling alone in some sections; and by posting pertinent safety information on maps, brochures, websites, permits and signs.

South Carolina, North Carolina and Georgia 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 (SAR) organizations, the state natural resource agencies, outfitter/guide companies, and others.

According to staff on the Andrew Pickens Ranger District, a range of five to ten SAR 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 1993, seven fatalities were associated with boating; four were associated with hiking or swimming.

The following information on SAR impacts associated with potential boating on the upper Chattooga is based on Whittaker and Shelby (2007).

- Specific characteristics of a river can substantially influence fatality rates. Fatality rates maybe as high as 1 in 4,000 user days (Class V Russell Fork KY) because of sieve and undercut hazards, or as low as 1 in 1,000,000 (Class IV New River Gorge, WV) where powerful hydraulics may flip boats but rarely cause fatalities. Walbridge thought the Class IV-V Upper Youghigheny, PA might be a good point of comparison for the upper Chattooga

in terms of difficulty; the first fatality occurred in the past year after about 30 years of higher use than is expected on the upper Chattooga.

- On Tennessee's Class IV Big South Fork National River, there has been one fatality in about 25 years of regular boating (150 day season, peaks about 100 private boaters per day), but SAR responses are generally required about two times a year. The eight-mile gorge segment of this river is similar to the upper Chattooga with limited road access, which presents some SAR response challenges but impacts from these responses have not been a substantial issue for management.
- The frequency of similar hazards on the upper Chattooga is not known. Despite consistent hiking, swimming and angling use on the upper Chattooga for at least two decades, there do not appear to have been any fatalities above Highway 28 and SAR responses are rare.
- About half of the lower Chattooga fatalities apparently required larger-scale SAR responses or body extractions. SAR squads apparently respond to the river about six to eight times per year (not always for a fatality), although the Forest Service does not track these incidents.
- The American Whitewater accident database identifies two accidents on Overflow Creek (generally considered more difficult than the upper Chattooga by the expert panel), but apparently neither was a fatality. Walbridge reports that several other boaters have been injured on Overflow, but they have generally walked out or self-rescued. Several sources agree that many non-fatal accidents during whitewater boating are "handled" and never reported; a major factor is the skill and experience in the group (or passing groups). In general, Class IV-V boaters have first aid and swiftwater rescue experience, but some wonder if this is declining among younger boaters.
- Hendricks estimated varying rates of SAR incidents on several NC rivers. At the high end of the spectrum, the new flow releases on the Cheoah appear to be relatively more dangerous because of live trees in the channel due to low base flows for several decades; the river has already had one fatality and appears to require a SAR response about every other release. On the other end of the spectrum, the Class II-III Nantahala has only one to two SAR incidents a season despite very high use (although this is expected to increase as new relicensing flow releases are provided in the more challenging gorge).
- If SAR or body extraction efforts are required on the upper Chattooga, there may be impacts related to access to the scene for staff and equipment. Wilderness designation complicates the use of some equipment and access, although "minimum tool" analyses and a pre-accident plan with "equipment approval levels" have been developed for other rivers in NC with similar constraints.

Estimating the number and type of incidents (or the associated SAR impacts) that may occur if boating were allowed is challenging. However, if boating were allowed on the upper Chattooga, it is anticipated that there would be some accidents, injuries and eventually a fatality. Based on likely use levels and information from other rivers of similar difficulty, these numbers would likely be low and few would require SAR responses.

### 3.3.4 Heritage Resources

#### SUMMARY OF FINDINGS

This analysis reviewed known heritage resources information for the upper Chattooga, including nine heritage resource sites that have been identified in the corridor. Activities resulting in ground disturbance (hiking and camping) have the most potential to cause impacts to heritage resources. Areas where disturbance was identified around camp sites and trails near major river access points were examined for heritage resources by a Forest Service archaeologist to determine if any heritage resources were being affected by current users or would be affected by new users groups. This analysis determined that Alternative 1 would have limited or no effect on heritage resources and all of the other alternatives would avoid impacts to known heritage resources.

#### AFFECTED ENVIRONMENT

Very little heritage resource inventory has been completed for the upper Chattooga River. Inventories of areas in the national forests outside of the river corridor have identified use beginning in the prehistoric PaleoIndian Period (10,000 B.C.) and continuing to the present (Benson 2006). Table 3.3-5 describes the known heritage resources.

Table 3.3-5. Known Heritage Resources on the upper Chattooga

Resource	State	Type	Culture Period	N. Register Historic Places
Bull Pen Bridge	NC	CCC steel truss bridge	early 20 <sup>th</sup> century	eligible
Bull Pen Gold Mine	NC	historic period mine	19 <sup>th</sup> /early 20 <sup>th</sup> century	not evaluated
Ellicott Rock	NC,SC,GA	boundary monument	early 19 <sup>th</sup> century	on register
Winchester Cemetery	SC	cemetery	early 19 <sup>th</sup> century	not eligible
Chattooga Town 38OC18	SC	Cherokee village earlier occupations, Euro-American farm	17 <sup>th</sup> , 18 <sup>th</sup> , 19 <sup>th</sup> , 20 <sup>th</sup> century, Late Archaic, Woodland, Mississippian Periods	eligible
9RA125	GA	prehistoric lithic scatter, historic period house site	Early Archaic, early 20 <sup>th</sup> century	not evaluated
9RA126	GA	prehistoric artifact scatter	Woodland Period	not evaluated
9RA127	GA	Cherokee village	17 <sup>th</sup> , 18 <sup>th</sup> century, part of Chattooga Town on GA side of the river.	not evaluated
Lick Log House	SC	historic period house site	19 <sup>th</sup> /20 <sup>th</sup> century	not evaluated

Heritage resource information from inventories of surrounding areas and the Southern Appalachian Region suggest that additional undiscovered heritage resource sites are present on the upper Chattooga (Benson 2006). Level areas such as raised benches and near-level ridge noses near the river or tributary streams have a high potential for containing prehistoric archeological sites including short term camps and small farmsteads. Rock shelters used in

prehistoric or historic periods may be located in steep slopes. Historic period house sites also may be found in areas near the river or creeks where several acres of cultivable bottoms exist. Additional remains of historic period mining and logging activities near the river, as well as traditional cultural properties, also may exist.

Proposed management alternatives were examined for potential effects to heritage resources. The magnitude and nature of activities related to the alternatives, the nature and extent of potential effects to heritage resources, and the likely nature and location of heritage resources within the upper Chattooga River Corridor were taken into account. Biophysical impacts likely to disturb archeological sites were located, mapped and measured by the Forest Service (USDA Forest Service 2007). Activities resulting in ground disturbance (hiking and camping) have the most potential to cause impacts to heritage resources. Most biophysical impacts have been found at river access points, camp sites and on trails. Disturbances directly related to boating will be largely restricted to the river and areas immediately adjacent to the river. These areas have been disturbed by the river and are not likely to contain significant archaeological sites.

Areas where disturbance was identified around camp sites and trails near major river access points (Burrells Ford, Lick Log Creek and the Highway 28 Bridge) were examined for heritage resources by a Forest Service archaeologist to identify the extent of current ground disturbances and determine if any heritage resources were affected by current users. The Eastern Band of Cherokee Indians was consulted to identify heritage resources of importance to the tribe.

**Direct, Indirect and Cumulative Effects of Alternative 1**

This alternative would have limited or no effect on heritage resources. Examination of camp sites, trails and heavily used areas at several points along the river found no heritage resources disturbed by current uses. Most camps near the river were covered by recent alluvium which would bury any older heritage resources. Ground disturbance at camp sites was minimal and limited to small areas. Many trails were in low probability areas for archeological sites. Under this alternative, enforcement of current standards would close and rehabilitate many user-created campsites. These sites may be replaced with new user-created campsites that would add to overall ground disturbance and possibly affect unknown heritage resources.

**Direct, Indirect and Cumulative Effects of all other alternatives**

All other alternatives would avoid impacts to known heritage resources. Use of designated camp sites and designated trails only would avoid potential effects to heritage resources from user created camp sites and trails. Any new trail construction or designated camp sites would be reviewed for effects to heritage resources. Direct disturbances related to boating would be restricted to the river and areas immediately adjacent to the river; these areas have been scoured and disturbed by the river and are expected to contain few heritage resources.

## **List of Preparers and Agencies/Persons Consulted**

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Greg Barnes – Social Scientist (LBL)  
Jim Bates, Bob Morgan – Heritage (FMS)  
Ruth Berner – Writer/Editor, Forest Planner (NC)

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Doug Whittaker, Bo Shelby – Confluence Research Consulting (Social Analysis)  
Karen Klosowski – The Louis Berger Group (Literature Review)  
Ben Ellis – The Louis Berger Group (Boater Expert Panel runs)  
Gestric Coulson – Tetra Tech, Inc. (History)  
Jeff Durniak – Georgia Department of Natural Resources  
Dan Rankin – South Carolina Department of Natural Resources  
Laura Callendrella – USDA Forest Service (Public Involvement)

## **APPENDIX A – Outstandingly Remarkable Values of the Chattooga Wild and Scenic River**

In 1974, when the river was designated by Congress as a part of the National Wild and Scenic Rivers System, the river possessed several outstandingly remarkable values including geology, biology, scenery, recreation and history. The following is a description of the ORVs developed for the revision of the Sumter Land Management Plan.

### Geology

The geologic and geomorphologic values of the Chattooga, as described in the 1971 Wild and Scenic River Study Report for the Chattooga River, included the deeply dissected escarpment and the steep, rocky, forested sloped that plunge into deep, narrow gorges.

There are a series of outstanding monolithic treeless domes and slopes of exposed resistant granite, which occur at the upper headwaters of the river. Another feature of the river is that it flows into the Atlantic Ocean whereas most other rivers in the Southern Appalachian flow into the Gulf of Mexico. It is likely that the Tugaloo River (formed by the confluence of Chattooga and the Tallulah) captured these rivers from the Chattahoochee River. A stream capture of this magnitude is unusual in the region.

### Biology

There is a variety and richness of plant life within the Chattooga watershed, including the Chattooga Wild and Scenic River Corridor. The unique geography and climate characteristics provide habitats for uncommon assemblages of endemic, disjunct, and relic plant species. The rarest species within the Chattooga River Gorge landtype are Southern Appalachian endemics: liverworts, rock gnome lichen, Blue Ridge bindweed, Fraser's loosestrife, Manhart's sedge, Biltmore's sedge, pink shell azalea, and divided leaf ragwort. Old growth communities comprise almost 10% of the corridor. Federal and state agencies consider several non-game wildlife species within the watershed sensitive species.

### Scenery

The scenery along the Chattooga River is exceptional. The scenery plays an important part in the Wild and Scenic River experience. The river is deeply entrenched between high ridges for large stretches of its length. Steep forested slopes on either side of the river give a feeling of seclusion. The river constantly meanders and curves and there are excellent views along these bends. The seasons change the landscape from the varying soft greens of spring and summer to a patchwork of red, yellow and orange. Winter finds the leaves stripped away and the patches of green from the white pines stand out against the gray-brown hillsides and exposed rock formations. The river itself provides a varying scene from a smooth flowing stream to a river with thundering falls and cascades, raging rapids, enormous boulders and cliff-enclosed deep pools.

### Recreation

The recreation values of the river and corridor are outstanding along its 57-mile course. The river offers a wide variety of activities in a high-quality setting. Activities range from swimming to hiking and horseback riding with spectacular scenery to excellent trout fishing and nationally recognized white-water rafting opportunities. Other activities include backpacking, photography and nature study. Most of these activities take place in largely unmodified natural surroundings with many opportunities for remoteness and solitude.

### History

Very little systematic survey has been completed in the river corridor. A total of 38 archeological sites have been recorded within the corridor. These include 15 prehistoric sites, 15 historic house and farmstead sites, a railroad embankment, 2 historic cemeteries, a 19th century mineral prospecting pit, and a rock shelter. Approximately half of these sites are considered potentially eligible for the National Register of Historic Places. The Cherokees village of Chattooga Town was occupied from the early 1600's until the 1730's when it was abandoned. The site is near the present day Highway 28 Bridge. This site is eligible for the National Register of Historic Places.

## APPENDIX B – Implementation Strategy and Monitoring Questions

### Implementation

Estimates of probable projects, activities, additional personnel, and agency costs are provided below. These items are considered estimates since the number, location, and the rates in which projects are implemented are driven by available funding and additional decisions informed by site specific analysis in accordance with agency rules and regulations. Additional personnel and associated costs are estimated in table B-1.

#### Reduce campsite density

- Inventory and map (GPS) all campsites
- Develop criteria for recommending which campsites would be designated
- Scoping and NEPA
- Close, rehabilitate and sign closed sites
- Monitoring and enforcement

#### Reduce trail density

- Inventory and map (GPS) all user-created trails
- Develop criteria for recommending which trails would be designated
- Scoping and NEPA
- Close, rehabilitate and sign closed trails
- Monitoring and enforcement

#### Close parking within ¼ mile of Burrells Ford

- Install signage
- Monitoring and enforcement

#### Camping Reservations

- Develop internet-based reservation system
- Monitoring and enforcement
- Fees and the use of <http://www.recreation.gov> may become necessary if misused

#### Boater Registration

- Develop permit
- Install permit boxes and signage
- Develop/modify database
- Monitor, data input, enforcement
- Some alternatives will need internet-based reservation system that would require development, monitoring and enforcement, and possible fees

#### User Registration

- Develop permit
- Install permit boxes and signage
- Develop database
- Monitor, data input, enforcement

- Development, implementation, enforcement, and monitoring of direct and indirect adaptive management strategies

Table B-1

Estimated Implementation, Monitoring, and Enforcement Needs by Alternative. Staffing Positions and Thousands of Dollars per year (Minimal / Optimal)										
Alt	Georgia		NC		SC		Shared		Totals	
	Staffing	\$	Staffing	\$	Staffing	\$	Staffing	\$	Staffing	\$
2	0.5 / 1	24 / 48	0.5 / 1	24 / 48	1 / 2	47 / 94	1 / 2	85 / 132	3 / 6	180 / 322
3	0.25 / 0.5	12 / 24	0 / 0.25	0 / 12	0.5 / 1	24 / 47	1 / 2	85 / 132	1.75 / 3.75	121 / 215
4	0.25 / 0.5	12 / 24	0.25 / 0.5	12 / 24	0.5 / 1	24 / 47	1 / 2	85 / 132	2 / 4	133 / 227
5	0.25 / 0.5	12 / 24	0.25 / 0.5	12 / 24	0.5 / 1	24 / 47	1 / 2	85 / 132	2 / 4	133 / 227
8	0.5 / 1	24 / 48	0.5 / 1	24 / 48	1 / 2	47 / 94	1 / 2	85 / 132	3 / 6	180 / 322
9	0.25 / 0.5	12 / 24	0.25 / 0.5	12 / 24	0.5 / 1	24 / 47	1 / 2	85 / 132	2 / 4	133 / 227
10	0.25 / 0.5	12 / 24	0.25 / 0.5	12 / 24	0.5 / 1	24 / 47	1 / 2	85 / 132	2 / 4	133 / 227

## Monitoring

In addition to the current Land Management Plan Monitoring requirements for the Chattooga Wild and Scenic River Corridor and Ellicott Rock Wilderness Area, two additional monitoring questions have been developed to guide the collection of information necessary to ensure that goals, objectives, trends, and estimated affects are occurring as anticipated for this analysis. If a boating alternative is selected, adaptive management principles are key considerations in identifying what elements to measure and the techniques to be utilized to measure the elements. The monitoring questions below constitute the LMP monitoring decision. Below each question is the probable monitoring item and general technique that may be used to collect information. Again, based on findings and new information the monitoring element and the techniques used may be changed and will not be considered a plan level decision.

- 1. Are site impacts from the introduction of boating above Highway 28, additional LWD from hemlock mortality and removal of LWD by users affecting rare plant species and aquatic habitats?**

Item: Rare Species, Aquatic Habitats, LWD  
 Technique: Direct Survey

**2. Is the solitude component of the recreation ORV being maintained? Are the encounter levels within established desires and estimates? Has the experience of historical recreation users been diminished due to introduction of boating above Highway 28?**

Item: Recreation Use by activity  
On-Water and Off-Water Encounters  
Technique: User Survey

**Specific Requirements for Implementing Monitoring Question #1:**

For alternatives 4, 5, 8, 9 and 10

1. LWD would be monitored annually for the first two years after these alternatives are implemented and periodically thereafter depending on need.
2. The following two lengths of the Chattooga River would be searched for any downed trees spanning the river and requiring portage:
  - Confluence with Norton Mill Creek downstream to Bull Pen Road Bridge (alternatives 4, 8, 9 and 10)
  - 0.6 mile length downstream of point where Fowler Creek Trail (# 431) intersects Chattooga River Trail. The upstream portion is in NC; however the primary search area is along the NC and SC boundary (alternatives. 4, 5, 8, 9 and 10)

For alternatives 4, 9 and 10 reconnaissance should take place prior to the start of the boating season. For alternatives 5 and 8 reconnaissance should take place approximately three times during the year.

If portage is deemed necessary, a site-specific decision under the appropriate NEPA process will be made. The analysis will include a survey of the site to determine the presence of the following rare species:

- *Lejeunea bloomquistii* or *Listera smallii* on the CONF;
- *Chiloscyphus muricatus*, *Homalia trichomanoides*, *Bryoxiphium norvegicum*, *Cephalozia macrostachya* ssp. *australis*, *Plagiomnium carolinianum*, or *Plagiochilla sullivantii* var. *sullivantii* on the NNF;
- *Lophocolea appalachiana* for either the NNF or the CONF.

If any of these rare species are located, the decision would ensure boaters traversing that stretch of the river would avoid impacts.

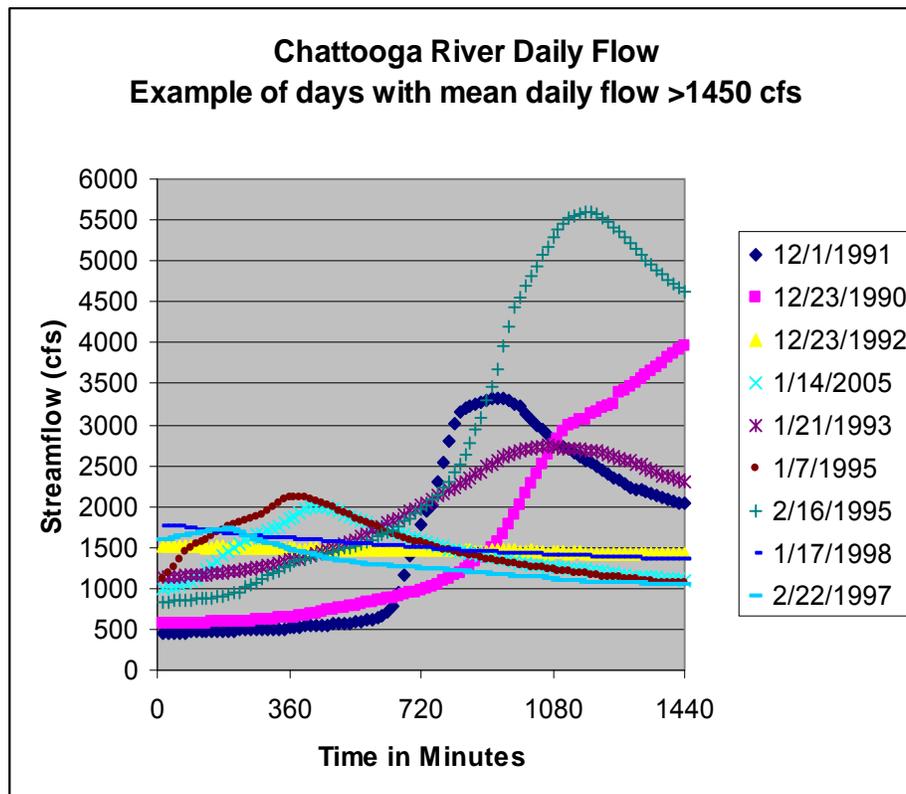
## APPENDIX C – Mean Daily Flow and Boatable Days

The term mean daily flow (MDF) used in the description of the boating alternatives (i.e. Alternatives 4 – 10) is the average flow that occurs over a 24-hour day and is typically reported as cubic feet per second. The determination of MDF is made after numerous estimates of flow during a day are compiled and averaged. For example, USGS gauging station stage readings are normally made at 15 minute intervals during the day (total of 96), and each stage is converted to a flow value by applying an equation that relates the stream stage to flow for that station. The 96 values of stage converted to flow readings during that day are summed and divided by 96 to get an average daily flow rate (MDF).

The term "boatable day" is based on a predictable 24-hour flow average rather than on a prediction that the river may reach a certain flow level for a limited amount of time on a given day. For example, in Alternative 4, the corresponding number of "boatable days" is the estimated number of days when the water level would be predicted to average 450 cfs over the course of a 24-hour period, not simply when the flow level is expected to hit 450 cfs for a limited time.

For this analysis, the MDF flow records from 1939 to 2006 were used to approximate the number of days by month that would be boatable under alternatives 4 – 10 (Alternative 4 – 450 cfs, alternatives 5-10 – 350 cfs, and Alternative 8 – no required level). For example, Alternative 4 has an MDF of 450 cfs at the Burrells Ford gauge (upper Chattooga) with a corresponding average estimate of 6 boatable days between Dec. 1 and March 1. This compares with a MDF of 1450 cfs at the HWY 76 gauge (lower Chattooga). The upper Chattooga commonly peaks 3-6 hours or more before the lower Chattooga does. There is a lot of variability in flow for days that equal or exceed an MDF of 1450 cfs (figure 1). The flow response is largely rainfall driven, but recent events may elevate the soil, ground water and stream base flow levels within the watershed, making some days with little flow variance (12/23/92, 1/17/98). Higher base flows suggest that there is going to be continued stored water released for an extended period of time as well as faster response to rainfall events. These periods are going to be easier to predict what is likely to happen the next day. Lower base flow periods require more rainfall intensity (inches per hour) and/or total amount for the stream to respond to have a MDF of 1450 cfs (12/23/90, 12/1/91, 2/16/95). Therefore, it will be easier to predict some days with boatable flows than others, depending on the expected rainfall and base flow conditions.

Figure 1



The variables of expected rainfall and base flow conditions will be used to initially predict an approximation of MDF and boatable days during implementation of the boating alternatives. As new information becomes available during monitoring, adjustments will be made to improve the linkage of a declared boatable day and MDF.

## APPENDIX D

### Encounter Calculation Assumptions and Working Paper

#### Assumptions about Existing User Encounters

1. Precise information about trail encounter levels is not available for most parts of the river.
  - Average encounter estimates for Ellicott Rock Wilderness (Rutlin, 1995) are available, but researchers only reported averages over three seasons from users contacted at major trailheads.
  - The assumption is that encounters have increased slightly since then (it has been over a decade and population levels have increased) – based on Use Estimation Workshop judgments.
2. Precise use information is not available for most parts of the river, particularly trail users.
  - Some accurate front country angling use information is available (Rankin 2007).
  - Some recent vehicle counts at trailheads are available (Berger 2007a).
  - The above information was employed in the *Use Estimation Workshop* (Berger and CRC 2007) to roughly describe the level of use that is likely to be occurring now.
  - In general, Use Estimation Workshop estimates appear to be maximums (it is likely that actual use is lower and unlikely that it is higher).
3. Precise information about use-encounter relationships is not available. The Rutlin study (Rutlin, 1995) did not try to estimate use or correlate it with encounters, although it is possible to combine that study's averages with estimates of use to develop some very rough relationships.

Taken together, limitations exist on the ability to estimate encounters and how use levels and alternatives will affect them. To make estimates, assumptions must be made about existing rates, use-encounter relationships and estimates about how those might grow in the planning period.

To simplify and suggest the appropriate level of precision, this analysis is focusing on four three-month seasons: Winter (December – February); Spring (March – May); Summer (June – August); Fall (September – November); four general categories of encounter levels: Low (less than or equal to 3); moderate (4 to 7); high (8 to 10); and very high (more than 10); and four generalized frequencies of encounter levels: Some weekdays (it happens on a minority of these types of days); most weekdays (it happens a majority of these types of days); some weekends (a minority of these days); and most weekends (a majority of these days).

***Assumptions and basis for estimates of existing impacts:***

Encounters per day were derived from the results of the Use Estimation Workshop (Berger and CRC 2007) by applying the following assumptions:

- 50% of day hiking groups at one time (GAOT)
- + 50% of backpacking groups at one time (GAOT)
- + 25% of angling people at one time (PAOT)
- The 50% estimate for day hiking and backpacking use on trails assumes average encounters to be about half of all groups using a trail system. This assumption is based on consideration of the findings from Rutlin 1995, Berger 2007a – Limited Use Monitoring Summary, and Berger and CRC 2007 – Use Estimation Workshop Summary. The workshop use estimates were made as GAOT, so no other conversions are necessary.
- Angling estimates during the workshop (Berger and CRC 2007) were provided in PAOTs because that is the more important indicator for fishing quality and because it fits with the available creel data (which was organized by people, not groups). Since average group size for anglers is one (1) (Berger and CRC 2007), PAOT's for anglers equals GAOTs. For trail encounters, however, assume anglers spend about half their time on trails (since they are headed to their favorite fishing spot) when compared to hikers/backpackers. Therefore, assume encounters for anglers on trails equates to 50% of 50% of PAOTs or 25% of PAOT. Finally, also assume that on average on-river encounters between anglers will be 25% of PAOT. This is because the amount of ground covered while fishing is less than that covered while walking on trails, and also because backcountry anglers tend to space themselves out along the river to minimize encounters with each other. The one exception to this would be in the Delayed Harvest reach (Lick Log to Highway 28) where average encounters between anglers would be 50% of PAOT (Durniak 2007). This is because in-river-corridor movement is much easier in this reach due to the low gradient channel and because of the user created trails immediately adjacent the river on both banks.

**Encounter Calculations by Reach and Alternative**

Assumptions on boating group sizes: 4 boaters per group when the number of groups per day is unlimited (based on Vagias 2006 analysis of Section 4 private boating use); 5 boaters per group when the number of groups per day is capped (boaters will try to maximize their use but will not likely achieve an average of 6 (maximum number in a group)).

**Chattooga Cliffs Reach**

**Alternative 1:** Trail and on-river encounters were derived by applying the above assumptions to the results of the Use Estimation Workshop (Berger and CRC 2007).

**Alternative 2:** Trail and on-river encounter numbers were derived by applying the alternative's standard of no more than three encounters per day.

**Alternative 3:** The same assumptions for trail and on-river encounter levels as Alternative 1.

**Alternative 4:** Under this alternative, mean daily flow levels of 450 cfs or higher translates to six boatable days between December 1 and March 1.

Trail and on-river encounters were derived by combining the boating encounters estimated below with the encounters among existing users in Alternative 1. Total encounters were then compared with the encounter limits set for each alternative and river segment.

Given earlier assumptions, boaters may venture onto the Chattooga Cliffs reach on at most six days out of 90. The following assumptions about boatable days are based on Whittaker and Shelby (2007) and assume ideal conditions for boating are present.

1. 1/2 of the six days would have predictable flows that can be used by regional boaters; 1/3 (1) of these days would occur on weekends and reach peak weekend maximum use, around 4 groups of 6 per day; the remaining 2 days reach weekday maximum use around 4 groups of 5 per day;
2. 1/2 of the six days would have less predictable flows and might have about half the use of ideal weekdays, around 2 groups per day;
3. The average number of trail users on the above days as described in the Use Estimation Workshop is not reduced due to increasing water levels, inclement weather conditions and/or adverse temperatures; given that 25% of the total trail miles in this reach are within 100 feet of the river, assume that existing trail users will encounter about 25% of boating groups. Also reference Whittaker and Shelby (2007, p.61-62) for additional reasons for this assumption.

Table D-1 shows the number of boatable days December 1 – March 1 (predictable/less predictable days), estimated groups per day and # of trail encounters produced per day under Alternative 4. Requiring boaters to put-in at County Line Trail will increase encounters with trail users and campers along this route by 1-2.

Boatable Days (6)	# of weekend days/ weekdays	Groups/day	# of trail encounters	# of days encounter limits are exceeded
3 high overlap days with predictable flows	1 weekend days 2 weekdays	4 2	1 (25% of groups/day) 0.5	0 0
3 high overlap days with less predictable flows	1 weekend days 2 weekdays	1 1	0.5 0.5	0 0
Don't have low overlap days in Alt 4				

**On-River Encounters**

In addition to the above assumptions, the expectation is that anglers will not encounter every boating group while on the river because higher flows make the reach more challenging in terms of access and wading, while some stretches are made totally inaccessible; more care is required to wade at the higher flows; and greater energy is necessary to stand in the river which may ultimately result in anglers spending less time

fishing over the course of the day (Berger 2007c). Geography and timing can also interact to affect the likelihood of encounters (Whittaker and Shelby 2007).

Therefore, assume: an average backcountry on-river user will encounter 75% of boating groups on the river. Assume also the presence of at least one on-river user (average number of backcountry anglers present is 1 or less November – April, 2 or less May - October in the Chattooga Cliffs reach (Berger and CRC 2007)).

Table D-2 shows the number of boatable days December 1 – March 1 (predictable/less predictable/useable low overlap days), estimated groups per day and # of on-river encounters produced per day under Alternative 4

Boatable Days (6)	# of weekend days/ weekdays	Groups/day	# of on-river encounters	# of days encounter limits are exceeded
3 high overlap days with predictable flows	1 weekend days	4	3 (75% of groups/day)	0
	2 weekdays	2	2	0
3 high overlap days with less predictable flows	1 weekend days	1	1	0
	2 weekdays	1	1	0

**Alternative 5:** Boating is not allowed in the Chattooga Cliffs reach.

**Alternative 8:** Under this alternative, 125 boatable days exist of which 75 are “whitewater” days and 50 are “guesstimated” scenic boating days (and therefore are not used to calculate encounters).

Given earlier assumptions, whitewater boaters may venture onto the Chattooga Cliffs on 75 days per year. Additionally, the following assumptions about boatable days and trail encounters are based on Whittaker and Shelby (2007) and assume ideal conditions for boating are present:

1. ½ of the 37 days with predictable flows (18) can be used by regional boaters, of which 1/3 (6) would occur on weekends and reach peak weekend maximums; the remaining 12 days reach weekday maximum use levels;
2. ½ of the 37 days (18) would have less predictable flows and might have about half the use of ideal weekdays;
3. ½ of the 77 days in the acceptable but not optimal range would have no use, while the other half would average about 5 boaters per day;
4. The average number of trail users on the above days (Berger and CRC 2007) is not reduced due to increasing water levels, inclement weather conditions and/or adverse temperatures); assume that existing trail users will encounter about 25% of boating groups based on the 25% of the total trail miles in the Chattooga Cliffs reach that are within 100 feet of the river (USDA Forest Service 2007b). Also reference Whittaker and Shelby (2007, p.61-62) for additional reasons for this assumption.
5. Requiring boaters to put in at County Line Trail will increase encounters with trail users and campers along this route by 1-2.

For on-river encounter calculations, the same boatable days and trail encounter assumptions apply. In addition, assume an average backcountry angler will encounter 75% of boating groups on the river and assume the presence of at least one angler (Berger and CRC 2007).

Table D-3 shows the number of boatable days in the Winter (predictable/less predictable/useable low overlap days), estimated groups per day and # of trail encounters produced per day under Alternative 8.

Boatable Days (38)	# of weekend days/ weekdays	Groups/day	# of trail encounters	# of days encounter limits are exceeded
6 high overlap days with predictable flows	2 weekend days 4 weekdays	5 2	1 (25% of groups/day) 0.5	0 0
7 high overlap days with less predictable flows	2 weekend days 5 weekdays	1 1	0.5 0.5	0 0
25 low overlap days (12 of which are useable)	3 weekend days 9 weekdays	2 2	0.5 0.5	0 0

Table D-4 shows the number of boatable days in the Spring (predictable/less predictable/useable low overlap days), estimated groups per day and # of trail encounters produced per day under Alternative 8.

Boatable Days (48)	# of weekend days/ weekdays	Groups/day	# of trail encounters	# of days encounter limits are exceeded
8 high overlap days with predictable flows	3 weekend days 5 weekdays	5 2	1 (25% of groups/day) 0.5	0 0
7 high overlap days with less predictable flows	2 weekend days 5 weekdays	1 1	0.5 0.5	0 0
33 low overlap days (16 of which are useable)	5 weekend days 11 weekdays	2 2	0.5 0.5	0 0

Table D-5 shows the number of boatable days in the Summer (predictable/less predictable/useable low overlap days), estimated groups per day and # of trail encounters produced per day under Alternative 8.

Boatable Days (48)	# of weekend days/ weekdays	Groups/day	# of trail encounters	# of days encounter limits are exceeded
2 high overlap days with predictable flows	1 weekend days 1 weekdays	5 2	1 (25% of groups/day) 0.5	0 0
3 high overlap days with less predictable flows	1 weekend days 2 weekdays	1 1	0.5 0.5	0 0
10 low overlap days (5 of which are useable)	1 weekend days 4 weekdays	2 2	0.5 0.5	0 0

Table D-6 shows the number of boatable days in the Fall (predictable/less predictable/useable low overlap days), estimated groups per day and # of trail encounters produced per day under Alternative 8.

Boatable Days (13)	# of weekend days/ weekdays	Groups/day	# of trail encounters	# of days encounter limits are exceeded
2 high overlap days with predictable flows	1 weekend days 1 weekdays	5 2	1 (25% of groups/day) 0.5	0 0
2 high overlap days with less predictable flows	1 weekend days 1 weekday	1 1	0.5 0.5	0 0
9 low overlap days (5 of which are useable)	1 weekend days 4 weekdays	2 2	0.5 0.5	0 0

Table D-7 shows the number of boatable days in the Winter (predictable/less predictable/useable low overlap days), estimated groups per day and # of on-river encounters produced per day under Alternative 8.

Boatable Days (38)	# of weekend days/ weekdays	Groups/ day	# of on-river encounters	# of days encounter limits are exceeded
6 high overlap days with predictable flows	2 weekend days 4 weekdays	5 2	4 2	0 0
7 high overlap days with less predictable flows	2 weekend days 5 weekdays	1 1	1 1	0 0
25 low overlap days (12 of which are useable)	4 weekend days 8 weekdays	2 2	2 2	0 0

Table D-8 shows the number of boatable days in the Spring (predictable/less predictable/useable low overlap days), estimated groups per day and # of on-river encounters produced per day under Alternative 8.

Boatable Days (48)	# of weekend days/ weekdays	Groups/day	# of on-river encounters	# of days encounter limits are exceeded
8 high overlap days with predictable flows	3 weekend days 5 weekdays	5 2	4 2	0 0
7 high overlap days with less predictable flows	2 weekend days 5 weekdays	1 1	1 1	0 0
33 low overlap days (16 of which are useable)	5 weekend days 11 weekdays	2 2	2 2	0 0

Table D-9 shows the number of boatable days in the Summer (predictable/less predictable/useable low overlap days), estimated groups per day and # of trail encounters produced per day under Alternative 8.

Boatable Days (48)	# of weekend days/ weekdays	Groups/day	# of on-river encounters	# of days encounter limits are exceeded
2 high overlap days with predictable flows	1 weekend days 1 weekdays	5 2	4 2	Possibly 1 in July/August 0
3 high overlap days with less predictable flows	1 weekend days 2 weekdays	1 1	1 1	0 0
10 low overlap days (5 of which are useable)	2 weekend days 3 weekdays	2 2	2 2	0 0

Table D-10 shows the number of boatable days in the Fall (predictable/less predictable/useable low overlap days), estimated groups per day and # of on-river encounters produced per day under Alternative 8.

Boatable Days (13)	# of weekend days/ weekdays	Groups/day	# of trail encounters	# of days encounter limits are exceeded
2 high overlap days with predictable flows	1 weekend days 1 weekdays	5 2	4 2	0 0
2 high overlap days with less predictable flows	1 weekend days 1 weekday	1 1	1 1	0 0
9 low overlap days (5 of which are useable)	2 weekend days 3 weekdays	2 2	2 2	0 0

## Appendix E – All Rare Wildlife Species Listed on the CONF, NNF and SNF

TYPE	SCIENTIFIC NAME	COMMON NAME	HABITAT/RANGE	FOREST	LISTING	ANALYZED / REASON <sup>1</sup>
Mammal	<i>Glaucomys sabrinus coloratus</i>	Carolina Northern Flying Squirrel	High elevation forests, mainly spruce-fir	NNF	E	No / 4
Mammal	<i>Myotis sodalis</i>	Indiana Bat	Roots in hollow trees or under loose bark (warmer months), in caves (winter).	NNF	E	No / 3
Mammal	<i>Puma concolor cougar</i>	Eastern Cougar	Extensive forests, remote areas	NNF CONF SNF	E	No / 5
Reptile	<i>Clemmys muhlenbergii</i>	Bog Turtle	Bogs, wet pastures, wet thickets	NNF	T (S/A)	No / 4
Spider	<i>Microhexura montivaga</i>	Spruce-fir Moss Spider	In moss of spruce-fir forests (endemic to North Carolina and adjacent Tennessee)	NNF	E	No / 4
Terrestrial Gastropod	<i>Patera clarki nantahala</i>	Noonday Globe	Nantahala Gorge (endemic to this site)	NNF	T	No / 3
Amphibian	<i>Desmognathus santeetlah</i>	Santeetlah Dusky Salamander	stream headwaters and seepage areas; southwestern mountains	NNF	S	No / 4
Amphibian	<i>Eurycea junaluska</i>	Junaluska Salamander	Forests near seeps and streams in the southwestern mountains	NNF	S	No / 3
Amphibian	<i>Plethodon aureolus</i>	Tellico Salamander	Forests in the Unicoi Mountains	NNF	S	No / 3
Amphibian	<i>Plethodon teyahalee</i>	Southern Appalachian Salamander	moist forests, in southwestern mountains at all elevations	CONF NNF SNF	S	Yes / 1
Beetle	<i>Cicindela ancocisconensis</i>	Appalachian Tiger Beetle	Habitat specialist preferring sand and cobble along permanent streams or grassy openings , above 4000 feet	CONF NNF	S	No / 4
Beetle	<i>Cicindela patruela</i>	A Tiger Beetle	Sandy soil in open pine or pine-oak woods	CONF	S	No / 4
Beetle	<i>Trechus luculentus unicoi</i>	A ground beetle	Beneath rocks and moss in wet ravines and near seeps and springs	NNF	S	No / 3
Beetle	<i>Trechus rosenbergi</i>	A ground beetle	Deep in mat of spruce and fir needles piled up against wet, vertical rock faces, Plott Balsam and Great Balsam Mountains	NNF	S	No / 4
Bird	<i>Aimophila aestivalis</i>	Bachman's Sparrow	Dry, open, pine or oak woods with well developed herb layer	CONF	S	No / 4
Bird	<i>Falco peregrinus</i>	Peregrine Falcon	Cliffs (for nesting)	CONF NNF	S	No / 4
Bird	<i>Haliaeetus leucocephalus</i>	Bald Eagle	Mature forests near large bodies of water (for nesting)	CONF NNF SNF	S	No / 4
Bird	<i>Lanius ludovicia migrans</i>	Migrant Loggerhead Shrike	Fields and pastures (breeding season only)	CONF NNF	S	No / 4
Bird	<i>Thryomanes bewickii altus</i>	Appalachian Bewick's Wren	Woodland borders or openings, farmlands or brushy fields, at high Elevations (breeding season only)	NNF	S	No / 4
Butterfly	<i>Callophrys irus</i>	Frosted Elfin	Open woods and borders, usually in dry situations; host plant-lupines ( <i>Lupinus</i> ) and wild indigos ( <i>Baptisia</i> )	NNF	S	No / 4
Butterfly	<i>Speyeria diana</i>	Diana Fritillary	Rich woods and adjacent edges and openings; host plants violets ( <i>Viola</i> ), Pine Forests	CONF NNF SNF	S	No / 2
Grass-hopper	<i>Melanoplus divergens</i>	Divergent Melanoplus	Glades and balds, 1800-4717 feet	NNF	S	No / 4
Grass-hopper	<i>Melanoplus serrulatus</i>	Serrulate Melanoplus	Valleys and lower slopes, Nantahala Mountains	NNF	S	No / 3

APPENDIX E

TYPE	SCIENTIFIC NAME	COMMON NAME	HABITAT/RANGE	FOREST	LISTING	ANALYZED / REASON <sup>1</sup>
Grass-hopper	<i>Scudderia septentrionalis</i>	Northern Bush Katydid	Woodlands	NNF	S	No / 4
Grass-hopper	<i>Trimerotropis saxatilis</i>	Rock-loving Grasshopper	Boulderfields	NNF	S	No / 4
Mammal	<i>Microtus chrotorrhinus carolinensis</i>	Southern Rock Vole	Rocky areas at high elevations, forests, or fields	NNF	S	No / 4
Mammal	<i>Myotis austroriparius</i>	Southeastern Bat	Standing snags, hollow trees and buildings	CONF	S	No / 4
Mammal	<i>Myotis leibii</i>	Eastern Small-footed Bat	Roosts in hollow trees, rock outcrops, bridges (warmer months), in caves and mines (winter)	CONF NNF SNF	S	No / 2
Mammal	<i>Sorex palustris punctulatus</i>	Southern Water Shrew	Stream banks in montane forests or northern hardwood forests above 3000 ft.	CONF NNF	S	No / 4
Mammal	<i>Corynorhinus rafinesquii</i>	Rafinesque's Big-eared Bat	Roosts in old buildings, hollow trees, caves, mines, and beneath bridges, usually near water	CONF NNF SNF	S	No / 2
Moth	<i>Euchlaena milnei</i>	Milne's Euchlaena	Hardwood forest and riparian areas in mountains	NNF	S	No / 2
Moth	<i>Semiothisa fraserata</i>	Fraser Fir Angle	spruce/fir forests with fraser fir	NNF	S	No / 4
Reptile	<i>Clemmys muhlenbergii</i>	Bog Turtle	Bogs, wet pastures, wet thickets	CONF	S	No / 4
Spider	<i>Nesticus cooperi</i>	Lost Nantahala Cave Spider	Caves and along Nantahala River (apparently endemic to Swain County, NC)	NNF	S	No / 3
Spider	<i>Nesticus sheari</i>	a nesticid spider	on the ground in moist or rich forests (apparently endemic to Graham County, NC)	NNF	S	No / 4
Spider	<i>Nesticus silvanus</i>	a nesticid spider	Habitat not indicated (apparently endemic to southern mountains of NC)	NNF	S	Yes / 1
Terrestrial Gastropod	<i>Pallifera hemphilli</i>	Black Mantleslug	High elevation forest, mainly spruce-fir	NNF	S	No / 4
Terrestrial Gastropod	<i>Paravitrea placentula</i>	Glossy Supercoil	Leaf litter on wooded hillsides	NNF	S	No / 3
Amphibian	<i>Ambystoma talpoideum</i>	Mole Salamander	Breeds in fish-free semipermanent woodland ponds; forages in adjacent woods	NNF	LR	Yes / 1
Amphibian	<i>Aneides aeneus</i>	Green Salamander	Damp, shaded crevices of cliffs or rock outcrops in deciduous forests (southern forests)	CONF NNF	LR	Yes / 1
Amphibian	<i>Eurycea longicauda longicauda</i>	Longtail Salamander	Moist woods and floodplains; small ponds for breeding	NNF	LR	No / 3
Amphibian	<i>Hemidactylium scutatum</i>	4-toed Salamander	Pools, bogs and other wetlands in hardwood forests	CONF	LR	No / 4
Bird	<i>Accipiter striatus</i>	Sharp-shinned hawk	Forests and Woodlands	NNF	LR	No / 3
Bird	<i>Aegolius acadicus pop. 1</i>	Northern Saw-whet Owl	Spruce-fir forests or mixed hardwood/spruce forests (for nesting) [breeding season only]	NNF	LR	No / 4
Bird	<i>Bombycilla cedrorum</i>	Cedar Waxwing	Hardwood, pine forest / woodland (breeding season only)	CONF	LR	No / 4
Bird	<i>Catharus guttatus</i>	Hermit Thrush	Spruce-fir forests (for nesting) [breeding season only]	NNF	LR	No / 4
Bird	<i>Coccyzus erythrophthalmus</i>	Black-billed Cuckoo	Deciduous forests, mainly at higher elevations [breeding season and habitat only]	NNF	LR	No / 4

APPENDIX E

TYPE	SCIENTIFIC NAME	COMMON NAME	HABITAT/RANGE	FOREST	LISTING	ANALYZED / REASON <sup>1</sup>
Bird	<i>Contopus cooperi</i>	Olive-sided Flycatcher	Montane conifer forests ( mainly spruce-fir) with openings or dead trees [breeding season only]	NNF	LR	No / 4
Bird	<i>Corvus corax</i>	Common Raven	High elevation, remote cliffs and rock outcrops	CONF	LR	No / 4
Bird	<i>Dendroica cerulea</i>	Cerulean Warbler	Mature hardwood forests; steep slopes and coves in mountains [breeding season only]	NNF CONF	LR	No/ 2
Bird	<i>Dendroica magnolia</i>	Magnolia Warbler	Spruce-fir forests, especially in immature stands [breeding season only]	NNF	LR	No / 4
Bird	<i>Empidonax alnorum</i>	Alder flycatcher	High elevation, shrub/sapling thicket	NNF	LR	No / 4
Bird	<i>Empidonax minimus</i>	Least Flycatcher	Open hardwood forests, groves, streamside trees (breeding season only)	CONF	LR	No/ 2
Bird	<i>Empidonax traillii</i>	Willow Flycatcher	Wet thickets, streamside, riparian areas (breeding season only)	CONF	LR	No/ 2
Bird	<i>Loxia curvirostra</i>	Red Crossbill	Pine and pine / oak forests and woodlands (breeding season only)	CONF	LR	No / 4
Bird	<i>Pheucticus ludovicianus</i>	Rose-breasted Grosbeak	Hardwood forests at mid-to high elevations (breeding season only)	CONF	LR	No / 4
Bird	<i>Regulus satrapa</i>	Golden-crowned Kinglet	Mixed pine / hardwood forests at mid-to high elevations (breeding season only)	CONF	LR	No / 4
Bird	<i>Shyrapicus varius appalachiensis</i>	Appalachian Yellow-bellied Sapsucker	Mature, open hardwoods with scattered dead trees [breeding season only]	NNF	LR	No/ 2
Bird	<i>Sitta canadensis</i>	Red-breasted Nuthatch	Mixed conifer and hardwood forest and woodland (breeding season only)	CONF	LR	No/ 2
Bird	<i>Troglodytes troglodytes</i>	Winter Wren	Mixed conifer and hardwood forest and woodland at mid to high elevations (breeding season only)	CONF	LR	No / 4
Bird	<i>Vermivora chrysoptera</i>	Golden-winged Warbler	Old fields, woodlands and hardwood successional forests (breeding season only)	CONF	LR	No / 4
Bird	<i>Vermivora pinus</i>	Blue-winged Warbler	Low elevation brushy fields and thickets	NNF	LR	No / 4
Bird	<i>Vireo gilvus</i>	Warbling Vireo	Scattered hardwoods in open country [breeding season only]	NNF	LR	No / 4
Bird	<i>Wilsonia canadensis</i>	Canada Warbler	Shrub thickets in riparian areas, second growth deciduous hardwoods (breeding season only)	CONF	LR	No / 4
Butterfly	<i>Autochton cellus</i>	Golden-banded Skipper	Moist woods near streams; host plant-hog peanut ( <i>Amphicarpa bracteata</i> )	NNF	LR	No/ 2
Butterfly	<i>Chlosyne gorgone</i>	Gorgone Checkerspot	Woodland Openings and borders	NNF	LR	No / 4
Butterfly	<i>Celastrina niger</i>	Dusky Azure	Rich, moist deciduous forests; host plant-goat's beard ( <i>Aruncus dioicus</i> )	NNF	LR	No/ 2
Butterfly	<i>Euphydryas phaeton</i>	Baltimore Checkerspot	Bogs, marshes, wet meadows, rarely upland habitat, host plants turtle hrad (Chelone) and false foxglove (Aureolaria)	NNF	LR	No / 4
Butterfly	<i>Papilio cresphontes</i>	Giant Swallowtail	Primarily coastal in maritime forests or thickets	NNF	LR	No / 4
Butterfly	<i>Phyciodes batesii maconensis</i>	Tawny Crescent	Rocky ridges, woodland openings, at higher elevations; host plants- Asters, mainly <i>Aster undulatus</i>	NNF	LR	No / 4
Butterfly	<i>Polygonia progne</i>	Gray comma	Rich deciduous woods	NNF	LR	No / 3
Butterfly	<i>Satryium edwardsii</i>	Edward's Hairstreak	Xeric oak woods , host plants oaks	NNF	LR	No / 4
Butterfly	<i>Erora laeta</i>	Early Hairstreak	Deciduous forests, especially along roads or edges at high elevations	NNF	LR	No / 4

APPENDIX E

TYPE	SCIENTIFIC NAME	COMMON NAME	HABITAT/RANGE	FOREST	LISTING	ANALYZED / REASON <sup>1</sup>
Fly	<i>Eulonchus marialiciae</i>	Mary Alice's Small-headed Fly	High-elevation hardwood – hemlock forests	NNF	LR	No / 4
Grasshopper	<i>Melanoplus cherokee</i>	Cherokee Melanoplus	Woodlands, 1800-5100 feet	NNF	LR	No / 4
Grasshopper	<i>Melanoplus viridipes eurycerus</i>	Green-legged Melanoplus	Woodlands and forest edges	NNF	LR	No / 4
Grasshopper	<i>Melanoplus acrophilus acrophilus</i>	A short-winged Melanoplus	Shrubby areas, 3600-5000 feet elevation	NNF	LR	No / 4
Mammal	<i>Condylura cristata</i>	Star – nosed mole	Forested wetlands, bogs/fens and swamps	CONF	LR	No / 4
Mammal	<i>Mustela nivalis</i>	Least Weasel	Mixed hardwood pine grassy upland and riparian woodland, grassland	CONF	LR	No / 4
Mammal	<i>Neotoma floridana haematoresia</i>	Eastern Woodrat – Southern Appalachian Pop.	Rocky places in deciduous or mixed forests	CONF	LR	Yes / 1
Mammal	<i>Neotoma magister</i>	Allegheny woodrat	Rocky places and abandoned buildings in deciduous or mixed forests in the northern mountains and adjacent Piedmont.	NNF	LR	No / 3
Mammal	<i>Sorex dispar</i>	Long-tailed Shrew	High elevation forests with talus or rocky slopes	CONF NNF	LR	No / 4
Mammal	<i>Sylvilagus obscurus</i>	Appalachian cottontail	High elevation balds and shrub thickets	CONF	LR	No / 4
Mammal	<i>Tamiasciurus hudsonicus</i>	Red Squirrel	Mixed conifer and hardwood forest and riparian areas	CONF	LR	No / 2
Moth	<i>Hepialus sciophanes</i>	a ghost moth	Spruce-fir forests	NNF	LR	No / 4
Moth	<i>Itame subcessaria</i>	Barred Itame	High elevation forests with gooseberries	NNF	LR	No / 4
Reptile	<i>Eumeces anthracinus</i>	Coal Skink	Rocky slopes, wooded hillsides and roadbanks	CONF	LR	Yes / 1
Reptile	<i>Pituophis m. melanoleucus</i>	Northern Pine Snake	Dry and/or sandy pine/oak uplands	CONF	LR	Yes / 1
Reptile	<i>Sternotherus minor</i>	Loggerhead Musk Turtle	Streams and rivers in Mississippi drainage	NNF	LR	No / 3
Spider	<i>Nesticus species nova 1</i>	A nesticid spider	Talus fields, known only from a five mile radius on the northern end of Chunky Gal Mountain	NNF	LR	No / 3
Spider	<i>Nesticus species nova 2</i>	A nesticid spider	Rocky talus fields along the Chattooga River and rock crevices of Whiteside Mountain	NNF	LR	Yes / 1
Terrestrial Gastropod	<i>Glyphyalinia junaluskana</i>	Dark Glyph	Moist leaf litter in deciduous woods on mountainsides	NNF	LR	Yes / 1
Terrestrial Gastropod	<i>Glyphyalinia pentadelphia</i>	Pink Glyph	Pockets of moist leaves in upland woods	NNF	LR	Yes / 1
Terrestrial Gastropod	<i>Haplotrema kendeighi</i>	Blue-footed Lancetooth	Mountainsides in leaf litter, usually above 2000 feet elevation	NNF	LR	Yes / 1
Terrestrial Gastropod	<i>Helicodiscus bonamicus</i>	Spiral Coil	Leaf litter on wooded hillsides	NNF	LR	No / 3
Terrestrial Gastropod	<i>Helicodiscus fimbriatus</i>	Fringed Coil	Leaf litter and under rocks on wooded hillsides	NNF	LR	No / 3
Terrestrial Gastropod	<i>Appalachina chillhoweensis</i>	Queen Crater	Under leaf litter or in rock piles	NNF	LR	No / 3
Terrestrial Gastropod	<i>Patera clarki</i>	Dwarf Proud Globe	Under leaf litter on wooded mountainsides	NNF	LR	Yes / 1
Terrestrial Gastropod	<i>Inflectarius ferrissi</i>	Smoky Mountain Covert	Under rock ledges, in rock piles, under downed logs at elevations above 2000 feet; Great Smokey Mountains and Plott Balsams	NNF	LR	No / 3
Terrestrial Gastropod	<i>Fumonilex orestes</i>	Engraved Covert	In crevices in rock ledges; high elevations in the Plott Balsam Mountains	NNF	LR	No / 3

## APPENDIX E

TYPE	SCIENTIFIC NAME	COMMON NAME	HABITAT/RANGE	FOREST	LISTING	ANALYZED / REASON <sup>1</sup>
Terrestrial Gastropod	<i>Paravitrea lacteodens</i>	Ramp Cove Supercoil	Habitat unknown-probably leaf litter on mountainsides	NNF	LR	No / 3
Terrestrial Gastropod	<i>Paravitrea lamellidens</i>	Lamellate Supercoil	Pockets of deep, moist leaf litter on wooded hillsides or in ravines	NNF	LR	Yes / 1
Terrestrial Gastropod	<i>Paravitrea umbilicarus</i>	Open Supercoil	Pockets of deep, moist leaf litter on wooded hillsides or in ravines	NNF	LR	Yes / 1
Terrestrial Gastropod	<i>Zonitoides patuloides</i>	Appalachian Gloss	Pockets of deep, moist leaves on mountainsides and in ravines	NNF	LR	Yes / 1

1- 1 = suitable habitat for the species occurs in the analysis area and this species could potentially be impacted by one or more alternatives in this analysis; therefore, species is analyzed in project - level effects analysis; 2 = Dropped - = suitable habitat for the species occurs in the analysis area, but this proposal does not include management actions which would affect this species; 3 = Dropped - the analysis area is outside of the Known or Suspected Range of the Species (only includes nesting range for birds); therefore, species is dropped from further analysis; 4 = Dropped - Within Range, but no suitable habitat in the analysis area; therefore, species is dropped from further analysis; 5 = Dropped - the best available science indicates this species is extirpated.

**References Cited**

- Alderman, J.M., 2004. Freshwater mussel survey Chattahoochee-Oconee National Forests. Contract Number 43-435H-3-0145. 4 p.
- Benson, R.W., 2006. Sumter National Forest Cultural Resources Overview. Francis Marion and Sumter National Forests CRM Report 06-07. On file USFS, Columbia.
- Berger Group, 2007. Upper Chattooga River Phase I Data Collection Expert Panel Field Assessment Report. 43 pp.
- Berger Group and Confluence Research & Consulting, 2007. Chattooga River Use Estimation Workshop Summary. Tables, graphs, and notes prepared for the USDA Forest Service. 21pp.
- Bilby, R.E., Bisson P.A., 1998. Function and distribution of large woody debris. In: Naiman, R.J., Bilby, R.E. (Eds.), *River ecology and management: Lessons from the Pacific coastal ecoregion*. New York: Springer-Verlag. Pages 324-346.
- Bilby, R.E. & Ward, J.W., 1991. Characteristics and function of large woody debris in streams draining old-growth, clear-cut, and second-growth forests in Southwestern Washington. *Canadian Journal of Fisheries and Aquatic Sciences* 48, 2499-2508.
- Brown, R. L., Peet, R. K., 2003. Diversity and invisibility of southern Appalachian plant communities. *Ecology* 84(1), 32-39.
- Burrell, K. H., Isley J. J., Bunnell, D. B. Jr., Van Lear, D, H., Dolloff, C. A., 2000. Seasonal movement of brown trout in a Southern Appalachian river. *Transactions of the American Fisheries Society* 129, 1373–1379.
- Chattooga-river.net. Chattooga River area. Undated. <<http://www.chattooga-river.net/>>. Accessed October 30, 2007.
- Clinton, B.D., Vose, J.M., 2003. Differences in surface water quality draining four road surface types in the southern Appalachians. *South. J. Appl. For.* 27(2), 100-106.
- Coats, R.N., Miller, T.O., 1981. Cumulative silvicultural impacts on watershed: A hydrologic and regulatory dilemma. *Environmental Management*. 5, 147-160.
- Colburn, K., 2001. Large woody debris removal ecology and ethics. <<http://www.americanwhitewater.org.>>.
- Craig, Bill et al. 1979. *A Study of Floating Use on the Chattooga Wild and Scenic River*.
- Davison, P.G., Hicks, M. L., Amoroso, J. L., 1996. Bryophyte status survey: *Cheilolejeunea evansii* (M. A. Tayler). R. M. Schuster: NC Natural Heritage

## REFERENCES

- Program and Endangered Species Field Office, US Fish and Wildlife Service. Raleigh and Asheville, North Carolina. Revised 1997. 18 p.
- Dolloff, C.A. Pages 93-107. In: Implementing integrated environmental management. Cairns, J. Jr., Crawford, T.V., Salwasser, H. (Eds), 1994. Virginia Polytechnic Institute and state University. University Center for Environmental and Hazardous Material Studies, Blacksburg, Virginia 24061.
- Dolloff, C.A., Hankins, D.G. and Reeves, G.H. 1993. Basinwide estimation of habitat and fish populations in streams. General Technical Report SE-83. Asheville, North Carolina: USDA, Southeastern Forest Experimental Station.
- Dolloff, C. A., C. Roghair, C. Krause, and J. Steele. 2008. Executive Summary: Large wood in the upper Chattooga River Watershed, November 2007. Unpublished Report. Blacksburg, Virginia: U.S. Department of Agriculture, Forest Service, Center for Aquatic Technology Transfer.
- English, W.R., 1990. An assessment of water quality in the Chattooga River and tributaries through analysis of the benthic macroinvertebrate community structure. Clemson University, Clemson, South Carolina. 14 p.
- Eversole, A.G, Jones, D.R., Welch, S.M., 2002. Crayfish of the Sumter National Forest: Chauga and Chattooga watersheds. Clemson University, Clemson, South Carolina. 16 p.
- Frampton, J.E., 2007. Letter in response to Forest Service's request for comments on preliminary alternatives. South Carolina Department of Natural Resources. September 7, 2007.
- Hansen, W.F., 2007. North Fork Chattooga River: Streamflow character based on gauged sites. Unpublished report.
- Hatcher, R. D. 1978. Tectonics of the western Piedmont and Blue Ridge, Southern Appalachians; review and speculation. *American Journal of Science*, Vol. 278, 276-304.
- Jacob, G. R., & Schreyer R. (1980). Conflict in outdoor recreation: A theoretical perspective. *Journal of Leisure Research*, 12, 368-380.
- Johnson, T. et al. (Eds.), 1999. Protected animals of Georgia. Georgia Dept. of Natural Resources, State of Georgia. 247 p.
- La Sorte, F.A., Thompson, F.R.III, Trani, M.K., Mersmann, T. J., 2007. Population trends and habitat occurrences of forest birds on southern national forests, 1992-2004. Gen. Tech. Rep. NRS-9. Newtown Square, PA: U.S. Department of Agriculture, Forest Service, Northern Research Station. 260 p.

- Multi-Resolution Land Characteristics (MRLC) Consortium, 2001.  
<<http://www.mrlc.gov>>.
- NatureServe. 2007. NatureServe Explorer: An online encyclopedia of life (web application). Version 6.1. NatureServe, Arlington, Virginia.  
<<http://www.natureserve.org/explorer>>. Accessed September 17, 2007.
- NatureServe. 2007. NatureServe Explorer: An online encyclopedia of life (web application). Version 6.2. NatureServe, Arlington, Virginia.  
<<http://www.natureserve.org/explorer>>. Accessed: October 31, 2007.
- Random House, 2008. *Dictionary.com Unabridged (v 1.1)*. <Dictionary.com  
<http://dictionary.reference.com/browse/solitude>>. Accessed: February 9, 2008.
- Robertson, J., 1999. A proposal for allowing limited whitewater access to: sections 00, 0, and 1 in the headwaters of the Chattooga River. American Whitewater, Nov/Dec 1999.
- Roghair, C., C. A. Dolloff, C. Krause, and J. Steele. 2008. Inventory of large wood in the upper Chattooga River Watershed, November 2007. Unpublished Report. Blacksburg, Virginia: U.S. Department of Agriculture, Forest Service, Center for Aquatic Technology Transfer.
- Roghair, C.N., D.R. Nuckols and W.R. Haag. 2005. Establishment of a monitoring for freshwater mussels in the Chattooga river, SC and GA. USDA Forest Service, Southern Research Center, Center for Aquatic Technology Transfer, Blacksburg, VA. 30 pp.
- Ross, John. 1999. America's 100 Best Trout Streams. Falcon Publishing, Inc., Helena, MT. 353 p.
- Rutlin, W.M., 1995. Wilderness Visitors, Use Patterns and Wilderness Privacy in the Ellicott Rock Wilderness. Clemson University Thesis. 141 pp.
- Samsel, Jeff. The new =deal – our delayed harvest trout. South Carolina Game and Fish. 2007. Undated. <[http://www.scgameandfish.com/fishing/trout-fishing/sc\\_aa044803a/](http://www.scgameandfish.com/fishing/trout-fishing/sc_aa044803a/)> Accessed October 30, 2007.
- Taylor, C.A., Schuster, G.E., Cooper, J.E., DiStefanao, R.J., Eversole, A.G, Hamr, P., Hobbs, H.H. III, Robison, H.W., Skelton, C.E., Thomas, R.F., 2007. A reassessment of the conservation status of crayfishes of the United States and Canada after 10 years on increased awareness. *Fisheries* 32(8), 372-389.
- Tetra Tech EC, Inc., 2006. Chattooga River History Project Literature Review and Interview Summary. 31pp.

## REFERENCES

- U.S. Fish and Wildlife Service, 1995. Endangered and Threatened Wildlife and Plants; determination of *Gymnoderma lineare* (rock gnome lichen) to be an endangered species. Federal Register 60(11), 3557-3562.
- U.S. Fish and Wildlife Service, 1997. Recovery Plan for Rock Gnome Lichen (*Gymnoderma lineare*) (Evans) Yoshimura and Sharp. Atlanta, Ga. 30 p.
- US EPA, 1999. Assessment of water quality conditions, Chattooga River watershed, Rabun County, GA, Macon County, NC, and Oconee County, SC. Unpublished Report.
- USDA Forest Service, 2007. Biophysical monitoring information on the Chattooga River. <<http://www.fs.fed.us/r8/fms>>.
- USDA Forest Service, 2007. Forest Service Manual 2300 – Recreation, Wilderness and Related Resource Management; Chapter 2320 – Wilderness Management; Amendment No. 2300-2007-1. USDA Forest Service, Washington Office, Washington, DC.
- USDA Forest Service, 1994. Land and Resource Management Plan Amendment Five, Nantahala and Pisgah National Forest, Southern Region, Atlanta, GA.
- USDA Forest Service, 2004a. Chattahoochee-Oconee National Forests Land and Resource Management Plan. R8-MB 113 A. USDA Forest Service, Southern Region, Atlanta, GA.
- USDA Forest Service, 2004b. Final Environmental Impact Statement for the Land and Resource Management Plan Chattahoochee-Oconee National Forests, Management Bulletin R8-MB 113 B. USDA Forest Service, Southern Region, Atlanta, GA.
- USDA Forest Service, 2004c. Sumter National Forest Land and Resource Management Plan. R8-MB 116A. USDA Forest Service, Southern Region, Atlanta, GA.
- USDA Forest Service, 2005. The conservation of native Eastern hemlock by suppression of hemlock woolly adelgid infestations on the Chattahoochee National Forest. Unpublished Report.
- USDA Forest Service, 2007. Biophysical impact survey upper Chattooga River visitor capacity analysis data collection reports. Unpublished report.
- USDA, NRCS, 2007. The PLANTS Database, Version 3.5 , <<http://plants.usda.gov>>. National Plant Data Center, Baton Rouge, LA 70844-4490 USA.
- USDA Forest Service, 1995. Ecosystem classification, mapping, and inventory of the Chattooga River watershed. National Forests in North Carolina, Asheville, NC. Draft manuscript, 500+ p.

## REFERENCES

- USGS Surface-water monthly statistics surface water data for the USA. (n.d.).  
<<http://waterdata.usgs.gov/nwis/monthly>>. Retrieved September 12, 2007.
- Van Lear, D.H., Taylor, G.B., Hansen, W.F., 1995. Sedimentation in the Chattooga River watershed. Department of Forest Resources Technical Paper No. 19, Clemson University, Clemson, South Carolina. 61 p.
- Warren, M.L, Brooks, M.B., Walsh, S.J., Bart, H.L., Cashner, R.C., Etnier, D.A., Freeman, B.J., Kuhajda, B.R., Mayden, R.L., Robison, H.W., Ross, S.T., Starnes, W.C., 2000. Diversity, distribution, and conservation status of the native freshwater fisheries of the Southern United States. *Fisheries* 25(10), 7-29.
- Weakley, A.S., 2007. Flora of the Carolinas, Virginia, Georgia, and surrounding areas (Working Draft of January 11, 2007). University of North Carolina Herbarium, UNC Chapel Hill, Chapel Hill, North Carolina. 1015 pp.
- Weber, L.M, Isely, J.J., 1995. Water quality assessment using a macroinvertebrate biotic index. Clemson University, Clemson, South Carolina. 5 p.
- Whittaker, D., Shelby, B., 2007. Capacity and conflict on the upper Chattooga River. USDA National Forest Service, Columbia, SC. 113 pp.
- Wildwater. 1980. Handbook for River Guides.
- Wild and Scenic River Guidelines. <<http://www.rivers.gov/guidelines.html>>.
- Williams, J.D., Warren, M.L. Jr., Cummings, K.S, Harris, J.L., Neves, R.J., 1992. Conservation status of the freshwater mussels of the United States and Canada. *Fisheries* 18(9), 6-22.