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Environmental Assessment

Managing Recreation Uses on the Upper Chattooga River

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Chattahoochee National Forest: Rabun County, Georgia

Nantahala National Forest: Jackson County and Macon County, North Carolina

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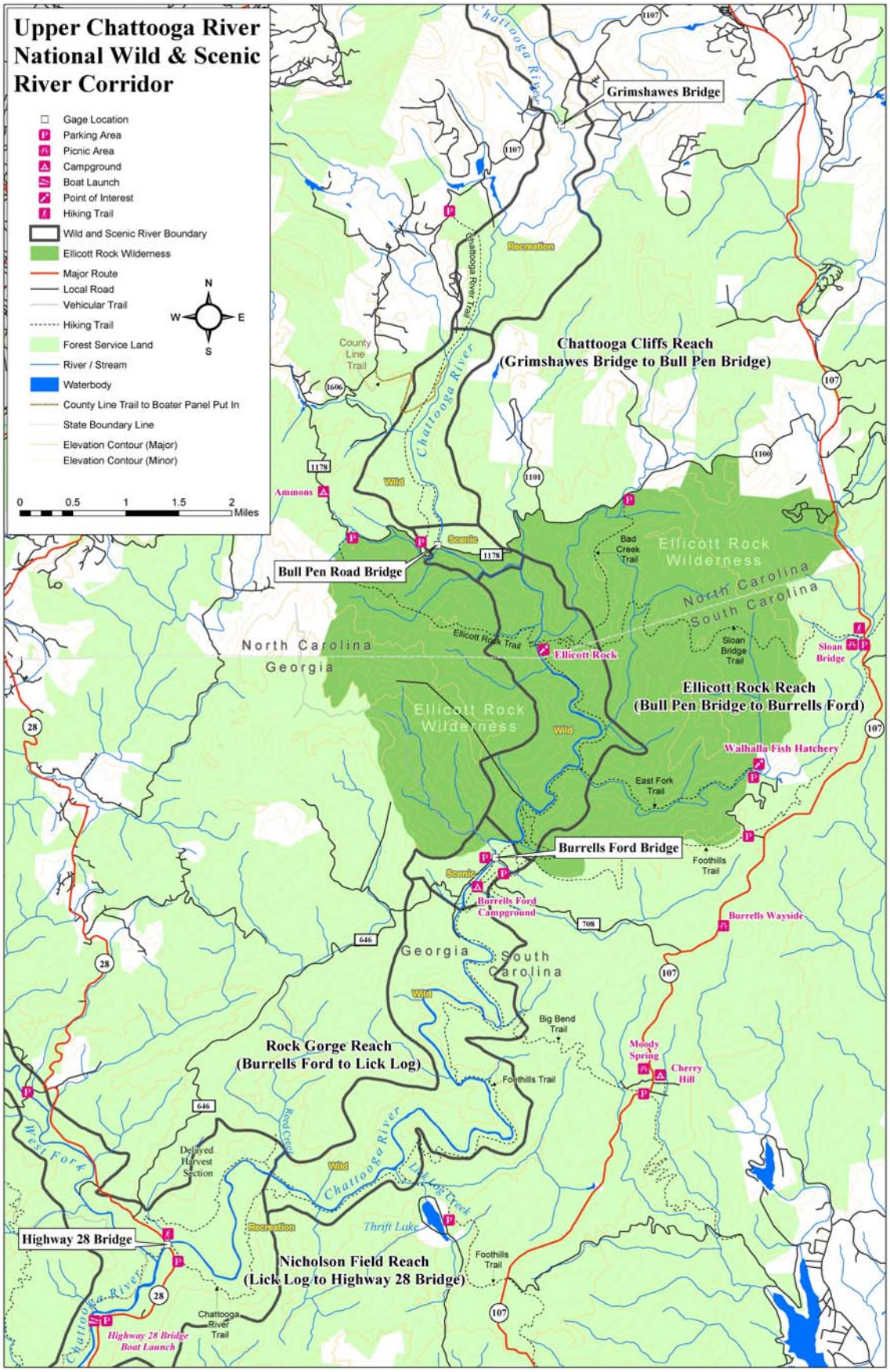

Upper Chattooga River National Wild & Scenic River Corridor
Gage Location
Parking Area
Picnic Area
Campground
Boat Launch
Point of Interest
Hiking Trail
Wild and Scenic River Boundary
Ellicott Rock Wilderness
Major Route
Local Road
Vehicular Trail
Hiking Trail
Forest Service Land
River / Stream
Waterbody
County Line Trail to Boater Panel Put In
State Boundary Line
Elevation Contour (Major)
Elevation Contour (Minor)
N
W
E
S
0
0.5
1
1.5
2
Miles
Grimshawes Bridge
Chattooga River
Recreation
Chattooga River Trail
County Line Trail
Chattooga Cliffs Reach
(Grimshawes Bridge to Bull Pen Bridge)
Wild
Ammons
Scenic
Bull Pen Road Bridge
Bad Creek Trail
Ellicott Rock Wilderness
North Carolina
South Carolina
Ellicott Rock Trail
Ellicott Rock
Sloan Bridge Trail
Sloan Bridge
Ellicott Rock Reach
(Bull Pen Bridge to Burrells Ford)
Walhalla Fish Hatchery
East Fork Trail
Burrells Ford Bridge
Foothills Trail
Burrells Ford Campground
Burrells Wayside
Georgia
Big Bend Trail
Moody Spring
Cherry Hill
Rock Gorge Reach
(Burrells Ford to Lick Log)
West Fork
Delayed Harvest Section
Red Creek
Lick Log Creek
Thrift Lake
Highway 28 Bridge
Nicholson Field Reach
(Lick Log to Highway 28 Bridge)
Chattooga River Trail
Highway 28 Bridge Boat Launch

Chapter 1. PURPOSE AND NEED FOR ACTION

Three national forests—the Sumter in South Carolina, the Chattahoochee in Georgia and the Nantahala in North Carolina—are proposing to establish new management direction for the 21-mile section of the wild and scenic Chattooga River corridor above the Highway 28 bridge known as the upper Chattooga (Figure 1.1). A map of the wild and scenic Chattooga River corridor is included in Appendix F.

New management direction will be established by amending the land and resource management plans for the three national forests. The purpose of the new management direction is to ensure continued enjoyment of the upper Chattooga by a variety of recreationists consistent with protecting and enhancing the river's free flowing condition, water quality and Outstandingly Remarkable Values (ORVs) (see Appendix A) as required under the Wild and Scenic Rivers Act. This new direction also will preserve the natural conditions, wilderness character, "outstanding opportunities for solitude" and a "primitive and unconfined type of recreation" within the Ellicott Rock Wilderness as required by the Wilderness Act.

1.1 Need for the Proposed Actions

The 57-mile wild and scenic Chattooga River includes lands in three national forests: the Nantahala, the Chattahoochee and the Sumter and passes through approximately five miles of the 8,724-acre Ellicott Rock Wilderness (see Appendix F). It provides important recreation opportunities for visitors to the area such as high-quality fishing, nationally-recognized 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.

When the Chattooga River was designated 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 whitewater 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.

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

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 the institution of a delayed-harvest section in the Nicholson Fields reach have recently made the fishing experience even more attractive (Samsel 2007). There is a need to protect the unique angling experience above highway 28. Limited trout fishing occurs below Highway 28 because 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) 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 boating 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 National Forest 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/sumter/resources/Chattooga.php).

The visitor use capacity study and analysis was conducted in the latter half of 2006 and first half of 2007 and included the collection and analysis of biophysical data, social impact information, hydrology (flow) data and information from user trials. The report, *Capacity and Conflict on the Upper Chattooga River* (Whittaker and Shelby 2007), integrates much of this information and is used to inform the analysis in this Environmental Assessment (EA). The report also 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 ensure that the ORVs for which the Chattooga River was designated as wild and scenic are protected and enhanced, and that the natural conditions and wilderness character of the Ellicott Rock Wilderness are preserved, along with its "outstanding opportunities for solitude" and a "primitive and unconfined type of recreation."

A. Wild and Scenic River Act

The National Wild and Scenic Rivers System was created by Congress in 1968 (Public Law 90-542; 16 U.S.C. 1271 et seq.) to preserve certain rivers with outstanding natural, cultural and recreational values in a free-flowing condition for the enjoyment of present and future generations. The act is notable for safeguarding the special character of these rivers, while also recognizing the potential for their appropriate use and development. The Wild and Scenic Rivers Act requires that the managing agency "protect and enhance" the free flowing condition, the water quality and the ORVs of designated rivers.

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.

B. Wilderness Act

The Wilderness Act of 1964 specifies preservation of natural conditions and the wilderness character with "outstanding opportunities for solitude" and a "primitive and unconfined type of recreation" that is administered for the use and enjoyment of the American people.

C. Potential Impacts

The relationships among uses and potential impacts on affected resources are 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 such as trampling plants or disturbing wildlife.

- Multiple encounters and certain types of encounters with others can detract from the recreation experience for many visitors.

Allowing whitewater boating on some or the entire upper Chattooga River has the potential to increase biophysical impacts and affect the high-quality backcountry angling experience. However, non-commercial boating is also consistent with the recreation ORV of the wild and scenic Chattooga River and the wilderness. Adaptive management strategies may be incorporated into the alternatives based on identified intended outcomes, and on monitoring to determine if management actions are meeting those outcomes. For 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 to prevent adverse impacts to ORVs from increasing use levels and ensure the protection and enhancement of each ORV and to protect the wilderness characteristics.

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.

- Manage biophysical impacts on natural resources by limiting trails, campsites, group size, number of groups per day, parking and types of use and by establishing actions for large woody debris recruitment and retention.

- Manage encounters among existing users by limiting trails, campsites, group size 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 for the upper Chattooga:

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, encounter levels 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 actions for large woody debris recruitment and retention?

1.4 Significant Issues Related to the Proposed Actions

Issues raised by the public during scoping were often related to the purpose and need of ensuring the protection and enhancement of the Chattooga River's ORVs. The Forest Service

has addressed the public's concerns in a variety of ways: "significant issues" (those issues that have extensive geographic distribution, a duration of effects or are of intense interest or resource conflict) were addressed by developing and modifying the alternatives; other issues were addressed in the effects analysis in Chapter 3; still others were identified as being outside the scope of this proposal. Alternatives referred to in this section are those outlined in Chapter 2. It should be noted that all of the alternatives respond to the purpose and need and address at least one significant issue. The discussion below highlights the major differences in how each alternative responds to the various issues.

Significant Issues:

1. Concern that the current distribution and concentration of campsites, trails and parking is excessive and, in some cases, their condition is causing erosion, compaction of soils and unsightliness.

Response: All user-created trails and campsites will be designated or eliminated under alternatives 2-10. Over time, this action will reduce the number of campsites, including those within 50 feet of the river. Alternatives 2, 3, 5, 8, 9 and 10 also prohibit roadside parking within ¼ mile of Burrells Ford Bridge.

2. Concern that adding boating above Highway 28 could negatively affect the unique opportunity to find solitude on the upper river and the high quality of wilderness hiking, nature watching, fly fishing and other recreation pursuits above Highway 28. Concern that boating is currently permitted on the majority of the river and that boating has negatively impacted the quality of many other recreational experiences on the lower river for other users; it would be fair to protect the solitude and boat-free recreation experience in the upper section.

Response: Alternatives 1-3 do not provide additional boating opportunities in the Chattooga River corridor (above Highway 28). Alternatives 4, 5 and 8-10 allow varying levels of boating use. All alternatives meet the purpose and need described in Chapter 1.

3. Concern that the upper Chattooga River corridor cannot support increased numbers of users in the future without affecting the feeling of solitude – remoteness from the modern world – that is a commonly desired component of the recreation experience for many users.

Response: A range of alternatives has been developed to establish varying encounter and group-size limits, as well as types of use, all within a framework that protects and enhances the ORVs. Through meetings with the public in a variety of venues, solitude has been determined to be a component of the ORV.

4. Concern that boating should be considered a compatible use on the upper Chattooga and should be treated equitably. Concern that boating should not be limited until and unless it can be demonstrated that the desired level of encounters is exceeded. Then, all uses should be limited equitably.

Response: Alternatives 4-10 include boating as one of the uses above the Highway 28 bridge. Alternative 8 provides the most boating opportunities and takes an adaptive management approach based on monitoring encounters. Limits are not imposed at the outset.

5. If boating is included above the Highway 28 bridge, concern that potential conflicts between boaters and other users, including day hikers, swimmers and particularly anglers, must be mitigated.

Response: Various mechanisms to manage encounters and potential conflicts are incorporated in alternatives 4-10 including limiting boating by season, flow, zone and group size.

6. Concern that the changes in recreation management could impact water quality. The Wild and Scenic Rivers Act requires protection and enhancement of water quality.

Response: The potential impacts to water quality are described in Chapter 3, Section 3.1.1 Water and Riparian Corridor.

1.5 Other Issues

1. Concern that boating should not be allowed in the upper Chattooga tributaries.

Response: No alternatives permit boating in the tributaries.

2. Concern about the potential impacts if commercially guided boating is allowed.

Response: No alternatives permit commercial boating.

3. Concern about the potential impacts of new access points being established along the upper Chattooga.

Response: All alternatives except Alternative 1 establish a designated trail system that would minimize user-created trails. In alternatives 4-10, long-term portage trail needs would be addressed on a site-specific basis to ensure trail sustainability and protection of resources. In addition, alternatives 4-10 have designated put-ins and take-outs for boating that also would discourage the development of new access points.

4. Concern about safety issues if boating were allowed in upper Chattooga and the increased cost and difficulty of search and rescue (SAR) in this more remote section of the river.

Response: This topic is addressed in Chapter 3.

5. Concern about maintaining adequate large woody debris (LWD).

Response: Alternatives 4-10 include the provision that no LWD removal would occur to accommodate recreation within the river or stream banks on the upper Chattooga River. This topic is also discussed in Chapter 3.

6. Concern about the potential for boaters to trespass on private land; concern that boaters should be allowed to float through private land.

Response: This issue is outside the scope of this proposal. The Forest Service does not encourage trespass on private lands.

7. Concern that implementation of any new management proposal would tax the resources of the Forest Service. An increase in personnel would be required for full implementation of any alternative, including current management.

Response: The agency's estimated resource needs to implement each alternative are included in Appendix B.

8. Concern that the proposed changes in recreation management could impact the free-flowing conditions of the Chattooga River. The Wild and Scenic River Act requires protection and enhancement of the free conditions of the Chattooga River.

Response: The proposed changes in recreation management do not include any construction of dams so the free flowing conditions of the Chattooga River should not be affected by any alternative.

Chapter 2. ALTERNATIVES

All proposed action alternatives meet the goal of protect and enhance of the Wild and Scenic Rivers Act and protecting the enduring resource of wilderness in Ellicott Rock. In addition, the purpose of these proposed changes is to ensure continued enjoyment of the upper Chattooga by a variety of recreationists consistent with protecting and enhancing the river's free-flowing condition, water quality and ORVs. To protect and enhance the ORVs, a suite of different management actions were designed to ensure a high quality recreation experience while protecting other values in the corridor. The solitude component has been set by interactions with the public in a variety of venues.

Through a series of meetings, the public was asked to provide input to help define the desired recreational experience in the upper Chattooga that are in keeping with the intent of the Wild & Scenic Rivers Act and the Wilderness Act.

Based on public input, management actions vary between alternatives. Nevertheless, all alternatives are designed to protect and enhance ORVs, free-flowing conditions and water quality in their different ways. They provide a range of recreational experiences, for example, by varying opportunities for solitude. For some user groups solitude may be an emphasis for a higher quality recreation experience. Other user groups may not consider it an emphasis at all.

The alternatives establish a varying mix and level of elements such as seasonal constraints, flow levels, campsite restrictions, group sizes and encounter levels which would result in development of a variety of national forest plan standards, guidelines, goals, objectives and desired conditions. All action alternatives include monitoring, which could lead to additional management actions to ensure that desired conditions are met.

2.1 Alternatives Considered in Detail

2.1.1 Alternative 1

Alternative 1 is the no-action alternative and, therefore, maintains current management on all three national forests.

Table 2.1.1. Alternative 1

#1	Maintain Current Management (includes all three forest standards)
	Actions
Boating	• Does not provide additional boating opportunities within the Chattooga wild and scenic river corridor. Boating allowed in the corridor only from the Highway 28 bridge downstream.
Encounters	SUMTER NATIONAL FOREST – No current standard CHATTAHOOCHEE NATIONAL FOREST – No current standard NANTAHALA NATIONAL FOREST– Applies only to wilderness: • Manage use within the specified limits for the following indicators and zones:

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
Reduce use when it exceeds the limits on more than 10 days during the peak-use season.		

Group Size	SUMTER NATIONAL FOREST • Group size is limited to 12 people within existing wilderness areas; the commercial and organized group size is limited to 12. CHATTAHOOCHEE NATIONAL FOREST • For the Ellicott Rock Wilderness, group camping size is limited to 12 people. NANTAHALA NATIONAL FOREST • For the Ellicott Rock Wilderness, limit the size of commercial and organized groups to 10.
Trails	SUMTER NATIONAL FOREST • 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. • Motorized and non-motorized trail reconstruction and relocation within the riparian corridor are allowed to reduce impacts to riparian and aquatic resources. CHATTAHOOCHEE NATIONAL FOREST • 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. • 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. NANTAHALA NATIONAL FOREST • Design and manage the trail system consistent with wilderness objectives for solitude, physical and mental challenge, spirit of adventure and self-reliance. • Manage the long distance hiking trails, such as Mountain to Sea Trail, which pass through Wilderness consistent with wilderness management objectives. • 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.
Woody Debris	SUMTER NATIONAL FOREST • 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. • 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 (*by the Forest Service*) on a case-by-case basis. Except in unusual circumstances, woody debris embedded within the channel materials will not be removed. CHATTAHOOCHEE NATIONAL FOREST • 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. NANTAHALA NATIONAL FOREST • 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. • Base decisions regarding retention, addition or removal of large woody debris on site specific analysis. Coordinate with scenery and recreation objectives.
Campsites	SUMTER NATIONAL FOREST • 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. • Mitigate resource damage at existing campsites. CHATTAHOOCHEE NATIONAL FOREST • 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. • 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. NANTAHALA NATIONAL FOREST • 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.

2.1.2 Alternative 2

This alternative emphasizes increased solitude by managing encounters through a permit system and by reducing user-created features. All users are required to register. User-created trails and campsite densities are reduced and camping is allowed only in designated sites. Roadside parking within ¼ mile of the Burrells Ford Bridge is prohibited. Boating is not permitted in the Chattooga River above Highway 28 bridge.

Table 2.1.2. Alternative 2

#2	This alternative emphasizes increased solitude by managing encounters through a permit system and by reducing user-created features (ie. campsites and trails).
	Actions
Boating	▪ Does not provide additional boating opportunities within the Chattooga wild and scenic river corridor. Boating allowed in the corridor only from the Highway 28 bridge downstream.
Encounters	▪ 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.
Group Size	▪ Maximum of 12 per group on trails; six at campsites except at group campsites; four for anglers.
Trails	▪ Designated trails only. Close redundant trails; trails where resource damage cannot be mitigated; and trails where closure is needed to limit encounters. ▪ Rerouting may be necessary to correct existing problems on designated trails. ▪ No new trail construction except where needed to enhance solitude.
Woody Debris	▪ Maintain current management.
Dispersed Camping	▪ Camping only in designated sites; reservations required. ▪ No more than approximately one campsite per ¼ mile of river. ▪ Campsites limited to no more than three tents, except for group designated campsites. ▪ Designated fire ring locations. ▪ Permanently close and rehabilitate excessive and unsustainable campsites.
Parking	▪ Close roadside parking within ¼ mile of Burrells Ford Bridge. ▪ Lost parking spaces would not be replaced. ▪ No net gain in parking capacity.
User Registration	▪ Self-registration for all users/visitors. A permit system that manages use will be implemented for all users to maintain appropriate level of encounters.
Monitoring	▪ Periodically assess amount of use/encounters occurring more than ¼ mile from roads and bridges.

2.1.3 Alternative 3

This alternative emphasizes year-round, high-quality trout fishing and maintaining current encounter levels. User-created trails and campsite densities are reduced and camping is allowed only in designated sites. Roadside parking within ¼ mile of the Burrells Ford Bridge is prohibited. Boating is not permitted in the Chattooga River above Highway 28 bridge.

Table 2.1.3. Alternative 3

#3	This alternative emphasizes year-round, high-quality trout fishing and maintaining current encounter levels.
	Actions
Boating	▪ Does not provide additional boating opportunities within the Chattooga wild and scenic river corridor. Boating allowed in the corridor only from the Highway 28 bridge downstream.
Encounters	▪ Trails: maximum 4 encounters above Bull Pen; maximum 9 on weekends, 4 on weekdays Bull Pen 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. ▪ In River: maximum 4 above Bull Pen; maximum 6 Bull Pen 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.
Group Size	▪ Maximum of 12 per group on trails; six at campsites except at group campsites; four for anglers.
Trails	▪ Designated trails only. Close redundant trails; trails where resource damage cannot be mitigated; and trails where closure is needed to limit encounters. ▪ Rerouting may be necessary to correct existing problems on designated trails.
Woody Debris	▪ Maintain current management.
Dispersed Camping	▪ Camping only in designated sites. ▪ Campsites limited to no more than three tents, except for group-designated campsites. ▪ Designated fire ring locations. ▪ Permanently close and rehabilitate excessive and unsustainable campsites.
Parking	▪ Close roadside parking within ¼ mile of Burrells Ford Bridge. ▪ No net gain in parking capacity. ▪ Lost parking spaces would not be replaced.
User Registration	▪ Manage encounters using adaptive management strategy that may include user registration, monitoring, surveys, etc., followed by indirect and direct measures.
Monitoring	▪ Periodically assess amount of use/encounters occurring more than ¼ mile from roads and bridges. ▪ If encounters are exceeded on more than 20% of days per year for two consecutive years, the agency would implement indirect measures 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 encounters are exceeded in the third year, a permit system would be implemented for all users to manage level of encounters.

2.1.4 Alternative 4

This alternative emphasizes year-round, high-quality trout fishing and boating opportunities on the main stem upper Chattooga. This alternative maintains current encounter levels into the future while still allowing boating. User-created trails and campsite densities are reduced and camping is allowed only in designated sites. Parking is not changed from current direction.

Table 2.1.4. Alternative 4

#4	This alternative emphasizes year-round, high-quality trout fishing and at the same time provides boating opportunities on the main stem upper Chattooga. It maintains current encounter levels.
	Actions
Boating from the confluence of Norton Mill Creek in NC south to Burrells Ford Bridge	▪ Craft type: tandem/single-capacity hard boats and inflatable kayaks. ▪ Boating at flow levels of approximately 450 cfs or higher (Burrells Ford gauge) or approximately 2.5 feet or higher at the HWY 76 gauge. ▪ From the confluence of Norton Mill Creek in North Carolina south to Burrells Ford Bridge December 1 - March 1. ▪ Self-registration. ▪ Put-ins: confluence of Norton Mill Creek (NC); Bull Pen Bridge (NC). ▪ Take-outs: Bull Pen Bridge (NC); Burrells Ford Bridge (SC). ▪ No commercially guided floating or shuttles. ▪ Boating not allowed in the tributaries.
Encounters	▪ Trails: maximum 4 encounters above Bull Pen; maximum 9 on weekends, 4 on weekdays Bull Pen 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. ▪ In river: maximum 4 above Bull Pen; maximum 6 Bull Pen 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.
Group Size	▪ Existing users: Maximum of 12 per group on trails; six at campsites except at group campsites; four for anglers. ▪ Boaters: maximum six per group; minimum two craft per group.
Trails	▪ Designated trails only. Close redundant trails; trails where resource damage cannot be mitigated; and trails where closure is needed to limit encounters. ▪ Rerouting may be necessary to correct existing problems on designated trails. ▪ Designated portage trails may be necessary to protect/avoid unacceptable impacts to resources.
Woody Debris	▪ No large woody debris removal without agency approval. No large woody debris removal to accommodate recreation within the river or stream banks on the upper Chattooga River.
Dispersed camping	▪ Camping only in designated sites. ▪ Campsites limited to no more than three tents, except for group-designated campsites. ▪ Designated fire ring locations. ▪ Permanently close and rehabilitate excessive and unsustainable campsites.
Parking	▪ There is no change in parking from current forest plan direction.
User Registration	▪ Manage encounters using adaptive management strategy that may include user registration, monitoring, surveys, etc., followed by indirect and direct measures. ▪ Safety equipment for boaters would be determined at the district level and would be a condition of the self-registration permit.
Monitoring	▪ Periodically assess amount of use/encounters occurring more than ¼ mile from roads and bridges. ▪ Periodically assess the condition of LWD. ▪ Periodically assess need for designation of portage areas/trails to ensure rare plants are not adversely impacted (see Appendix B). ▪ If encounters are exceeded on more than 20% of days per year for two consecutive years, the agency would implement indirect measures 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 encounters are exceeded in the third year, a permit system would be implemented for all users to manage level of encounters.

2.1.5 Alternative 5

This alternative emphasizes year-round, high-quality trout fishing and at the same time provides more boating opportunities on the main stem upper Chattooga. Boating would be excluded from the Chattooga Cliffs reach and the delayed-harvest area in order to address a combination of biological and social concerns. This alternative maintains current encounter levels into the future while still allowing boating. User-created trails and campsite densities are reduced and camping is allowed only in designated sites. Roadside parking within ¼ mile of the Burrells Ford Bridge is prohibited.

Table 2.1.5. Alternative 5

#5	This alternative emphasizes year-round, high-quality trout fishing and at the same time provides more boating opportunities on the main stem upper Chattooga. Boating would be excluded from the Chattooga Cliffs reach and the delayed-harvest area in order to address a combination of biological and social concerns.
	Actions
Boating from Bull Pen Bridge south to Lick Log Creek	▪ No seasonal restriction on boating ▪ Boating allowed at flow levels of approximately 350 cfs (at Burrells Ford gauge) or approximately 2.3 feet (HWY 76 gauge). ▪ Boating limited to tandem/single-capacity hard boats and tandem/single-capacity inflatable kayaks. ▪ Put-ins: Bull Pen Bridge (NC): Burrells Ford Parking Lot (GA). ▪ Take-outs: Burrells Ford Bridge (SC); Lick Log Creek (SC); Fisherman's Trail/Big Bend Road (SC). ▪ No commercially guided floating or shuttles. ▪ Boating not allowed in the tributaries.
Encounters	▪ Trails: maximum 4 encounters above Bull Pen; maximum 9 on weekends, 4 on weekdays Bull Pen 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. ▪ In river: maximum 4 above Bull Pen; maximum 6 Bull Pen 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.
Group Size	▪ Existing users: Maximum of 12 per group on trails; six at campsites except at group campsites; four for anglers. ▪ Boaters: maximum six per group; minimum two craft per group.
Trails	▪ Designated trails only. Close redundant trails; trails where resource damage cannot be mitigated; and trails where closure is needed to limit encounters. ▪ Rerouting may be necessary to correct existing problems on designated trails. ▪ Designated portage trails may be necessary to protect/avoid unacceptable impacts to resources.
Woody Debris	▪ No large woody debris removal without agency approval. No large woody debris removal to accommodate recreation within the river or stream banks on the upper Chattooga River.
Dispersed Camping	▪ Camping only in designated sites. ▪ Campsites limited to no more than three tents, except for group-designated campsites. ▪ Designated fire ring locations. ▪ Permanently close and rehabilitate excessive and unsustainable campsites.
Parking	▪ Close roadside parking within ¼ mile of Burrells Ford Bridge. ▪ Lost parking spaces would not be replaced. ▪ No net gain in parking capacity.
User Registration	▪ Safety equipment for boaters would be determined at the district level and would be a condition of the self-registration permit. ▪ Manage encounters using adaptive management strategy that may include user registration, monitoring, surveys, etc., followed by indirect and direct measures.

Monitoring	▪ Periodically assess amount of use/encounters occurring more than ¼ mile from roads and bridges. ▪ Periodically assess the condition of LWD. ▪ Periodically assess need for designation of portage areas/trails to ensure rare plants are not adversely impacted (see Appendix B). ▪ If encounters are exceeded on more than 20% of days per year for two consecutive years, the agency would implement indirect measures 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 encounters are exceeded in the third year, a permit system would be implemented for all users to manage level of encounters.

[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 emphasizes boating opportunities with no zone, season or flow restrictions on the upper stem of the Chattooga River while still providing quality trout fishing. It allows boating including the use of rafts on the main stem Chattooga from just below private property to the Highway 28 bridge. User-created trails and campsite densities are reduced and camping is allowed only in designated sites. Roadside parking within ¼ mile of the Burrells Ford Bridge is prohibited.

Table 2.1.6. Alternative 8

#8	This alternative emphasizes boating opportunities with no zone, season or flow restrictions on the upper stem of the Chattooga River while still providing quality trout fishing.
	Actions
Boating from below private land to Highway 28 bridge	▪ 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. Therefore, boating allowed on the entire main stem of Chattooga. ▪ Craft type: Tandem/single-capacity hard boats, tandem/single-capacity inflatable kayaks and up to four-person rafts. ▪ Minimum group size of two craft. ▪ Put-ins: Chattooga River Trail west bank (NC); confluence of Norton Mill Creek (NC); Bull Pen Bridge (NC); Burrells Ford Parking Lot (GA); Fisherman's Trail/Big Bend Road (SC); Lick Log Creek (SC). ▪ Take-outs: confluence of Norton Mill Creek (NC); Bull Pen Bridge (NC); Burrells Ford Bridge (SC); Fisherman's Trail/Big Bend Road (SC); Lick Log Creek (SC); Highway 28 bridge (SC). ▪ No commercially guided floating or shuttles. ▪ Boating not allowed in the tributaries.
Encounters	▪ 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.
Group Size	▪ Maximum of 6 for all users; minimum of two craft for boaters.
Trails	▪ Designated trails only. Close redundant trails; trails where resource damage cannot be mitigated; and trails where closure is needed to limit encounters. ▪ Rerouting may be necessary to correct existing problems on designated trails. ▪ Designated portage trails may be necessary to protect/avoid unacceptable impacts to resources.
Woody Debris	▪ No large woody debris removal without agency approval. No large woody debris removal to accommodate recreation within the river or stream banks on the upper Chattooga River.
Dispersed Camping	▪ Camping only in designated sites. ▪ Campsites limited to no more than three tents, except for group-designated campsites. ▪ Designated fire ring locations. ▪ Permanently close and rehabilitate excessive and unsustainable campsites.

Parking	▪ Close roadside parking within ¼ mile of Burrells Ford Bridge. ▪ Lost parking spaces would not be replaced. ▪ No net gain in parking capacity.
User Registration	▪ Safety equipment for boaters would be determined at the district level and would be a condition of the self-registration permit. ▪ Manage encounters using adaptive management strategy that may include user registration, monitoring, surveys, etc., followed by indirect and direct measures.
Monitoring	▪ Periodically assess amount of use/encounters occurring more than ¼ mile from roads and bridges. ▪ Periodically assess the condition of LWD. ▪ Periodically assess need for designation of portage areas/trails to ensure rare plants are not adversely impacted (see Appendix B). ▪ If encounters are exceeded on more than 20% of days per year for two consecutive years, the agency would implement indirect measures 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 encounters are exceeded in the third year, a permit system would be implemented for all users to manage level of encounters.

2.1.7 Alternative 9

This alternative emphasizes boating with season and flow restrictions in the stretch of the main stem upper Chattooga most highly rated for creek boating while still providing high-quality trout fishing. Boating is excluded from areas with the highest volume of existing users. User-created trails and campsite densities are reduced and camping is allowed only in designated sites. Roadside parking within ¼ mile of the Burrells Ford Bridge is prohibited.

Table 2.1.7. Alternative 9

#9	This alternative emphasizes boating with season and flow restrictions in the stretch of the main stem upper Chattooga most highly rated for creek boating while still providing high-quality trout fishing.
	Actions
Boating from below private land south to East Fork Trail	▪ 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. ▪ Boating allowed November 1 – March 31. ▪ Flow levels of approximately 350 cfs (at Burrells Ford gauge) or approximately 2.3 feet (HWY 76 gauge). ▪ Craft type: Tandem/single-capacity hard/inflatable boats. ▪ Put-ins: Chattooga River Trail west bank (NC); confluence of Norton Mill Creek (NC); Bull Pen Bridge (NC). ▪ Take-outs: Confluence of Norton Mill Creek (NC); Bull Pen Bridge (NC); East Fork Trail (SC). ▪ No commercially guided floating or shuttles. ▪ Boating not allowed in the tributaries.
Encounters	▪ 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.
Group Size	▪ Existing users: Maximum of 12 per group on trails; six at campsites except at group campsites; four for anglers. ▪ Boaters: maximum six per group; minimum two craft per group.
Trails	▪ Designated trails only. Close redundant trails; trails where resource damage cannot be mitigated; and trails where closure is needed to limit encounters. ▪ Rerouting may be necessary to correct existing problems on designated trails. ▪ Designated portage trails may be necessary to protect/avoid unacceptable impacts to resources.

Woody Debris	▪ No large woody debris removal without agency approval. No large woody debris removal to accommodate recreation within the river or stream banks on the upper Chattooga River.
Dispersed Camping	▪ Camping only in designated sites. ▪ Campsites limited to no more than three tents, except for group-designated campsites. ▪ Designated fire ring locations. ▪ Permanently close and rehabilitate excessive and unsustainable campsites.
Parking	▪ Close roadside parking within ¼ mile of Burrells Ford Bridge. ▪ Lost parking spaces would not be replaced. ▪ No net gain in parking capacity.
User Registration	▪ Safety equipment for boaters would be determined at the district level and would be a condition of the self-registration permit. ▪ Manage encounters using adaptive management strategy that may include user registration, monitoring, surveys, etc., followed by indirect and direct measures.
Monitoring	▪ Periodically assess amount of use/encounters occurring more than ¼ mile from roads and bridges. ▪ Periodically assess the condition of LWD. ▪ Periodically assess need for designation of portage areas/trails to ensure rare plants are not adversely impacted (see Appendix B). ▪ If encounters are exceeded on more than 20% of days per year for two consecutive years, the agency would implement indirect measures 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 encounters are exceeded in the third year, a permit system would be implemented for all users to manage level of encounters.

2.1.8 Alternative 10

This alternative emphasizes boating with season and flow restrictions on the main stem of the upper Chattooga River while providing high-quality trout fishing. User-created trails and campsite densities are reduced and camping is allowed only in designated sites. Roadside parking within ¼ mile of the Burrells Ford Bridge is prohibited.

Table 2.1.8 Alternative 10

#10	This alternative emphasizes boating with season and flow restrictions on the main stem of the upper Chattooga River while providing high-quality trout fishing.
	Actions
Boating below private land south to Highway 28 bridge	▪ 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 the Highway 28 bridge. ▪ Boating allowed November 1 - March 1. ▪ Flow levels of approximately 350 cfs at Burrells Ford gauge or approximately 2.3 feet (HWY 76 gauge). ▪ Craft type: Tandem/single-capacity hard boats/inflatable kayaks from below private to Lick Log Creek. ▪ Tandem/single-capacity hard boats and inflatables from Lick Log Creek to Highway 28 bridge. ▪ Put-ins: Chattooga River Trail west bank (NC); confluence of Norton Mill Creek (NC); Bull Pen Bridge (NC); Burrells Ford Parking Lot (GA); Fisherman's Trail/Big Bend Road (SC); Lick Log Creek (SC). ▪ Take-outs: Confluence of Norton Mill Creek (NC); Bull Pen Bridge (NC); Burrells Ford Bridge (SC); Fisherman's Trail/Big Bend Road (SC); Lick Log Creek (SC); Highway 28 bridge (SC). ▪ No commercially guided floating or shuttles. ▪ Boating not allowed in the tributaries.
Encounters	▪ 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.
Group Size	▪ Existing users: Maximum of 12 per group on trails; six at campsites except at group campsites; four for anglers. ▪ Boaters: maximum six per group; minimum two craft per group.

Trails	▪ Designated trails only. Close redundant trails; trails where resource damage cannot be mitigated; and trails where closure is needed to limit encounters. ▪ Rerouting may be necessary to correct existing problems on designated trails. ▪ Designated portage trails may be necessary to protect/avoid unacceptable impacts to resources.
Woody Debris	▪ No large woody debris removal without agency approval. No large woody debris removal to accommodate recreation within the river or stream banks on the upper Chattooga River.
Dispersed Camping	▪ Camping only in designated sites. ▪ Campsites limited to no more than three tents, except for group-designated campsites. ▪ Designated fire ring locations. ▪ Permanently close and rehabilitate excessive and unsustainable campsites.
Parking	▪ Close roadside parking within ¼ mile of Burrells Ford Bridge. ▪ Lost parking spaces would not be replaced. ▪ No net gain in parking capacity.
User Registration	▪ Safety equipment for boaters would be determined at the district level and would be a condition of the self-registration permit. ▪ Manage encounters using adaptive management strategy that may include user registration, monitoring, surveys, etc., followed by indirect and direct measures.
Monitoring	▪ Periodically assess amount of use/encounters occurring more than ¼ mile from roads and bridges. ▪ Periodically assess the condition of LWD. ▪ Periodically assess need for designation of portage areas/trails to ensure rare plants are not adversely impacted (see Appendix B). ▪ If encounters are exceeded on more than 20% of days per year for two consecutive years, the agency would implement indirect measures 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 encounters are exceeded in the third year, a permit system would be implemented for all users to manage level of encounters.

2.2 Alternatives Considered But Not Evaluated In Detail

Boating in the Tributaries above Highway 28

Under current management, boating is not allowed on the main stem or in the tributaries of the Chattooga River above the Highway 28 bridge. Per the Wild and Scenic Rivers Act, both the main stem of the river and the corridor (1/4 mile on each side of the main stem) are designated as “wild and scenic.” As a result, because boating is not currently permitted on the main stem, it also is not permitted on the tributaries. While developing alternatives that permit boating above Highway 28, the agency considered extending boating opportunities to the tributaries. However, because of concerns regarding large woody debris, native brook trout restoration, vegetation removal, increased encounter levels, user-created trails, as well as enforcement and management issues, the agency determined that the analysis of boating in the tributaries in further detail was unnecessary.

Of particular concern is the brook trout, the only salmonid native to the Southern Appalachian Mountains. The South Carolina Department of Natural Resources (SCDNR) has documented the complete loss of some brook trout populations and significant loss of range in recent years. Recent survey data and historical records indicate that in South Carolina, brook trout range has also declined at least 70 percent. Remnant populations are found in only six streams on the Andrew Pickens Ranger District. To improve habitat conditions favorable for the preservation and perpetuation of native brook trout, the Forest Service and SCDNR are actively restoring stream habitat in the Chattooga River watershed through the addition of LWD. 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. In the area above Burrells Ford, emphasis is being placed on maintaining or enhancing existing populations of brook trout.

Preliminary Alternatives 2, 3, 4 and 5:
Some components of these preliminary alternatives were modified in direct response to comments received during scoping. The actions 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; Alternative 7, therefore, became redundant and 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.

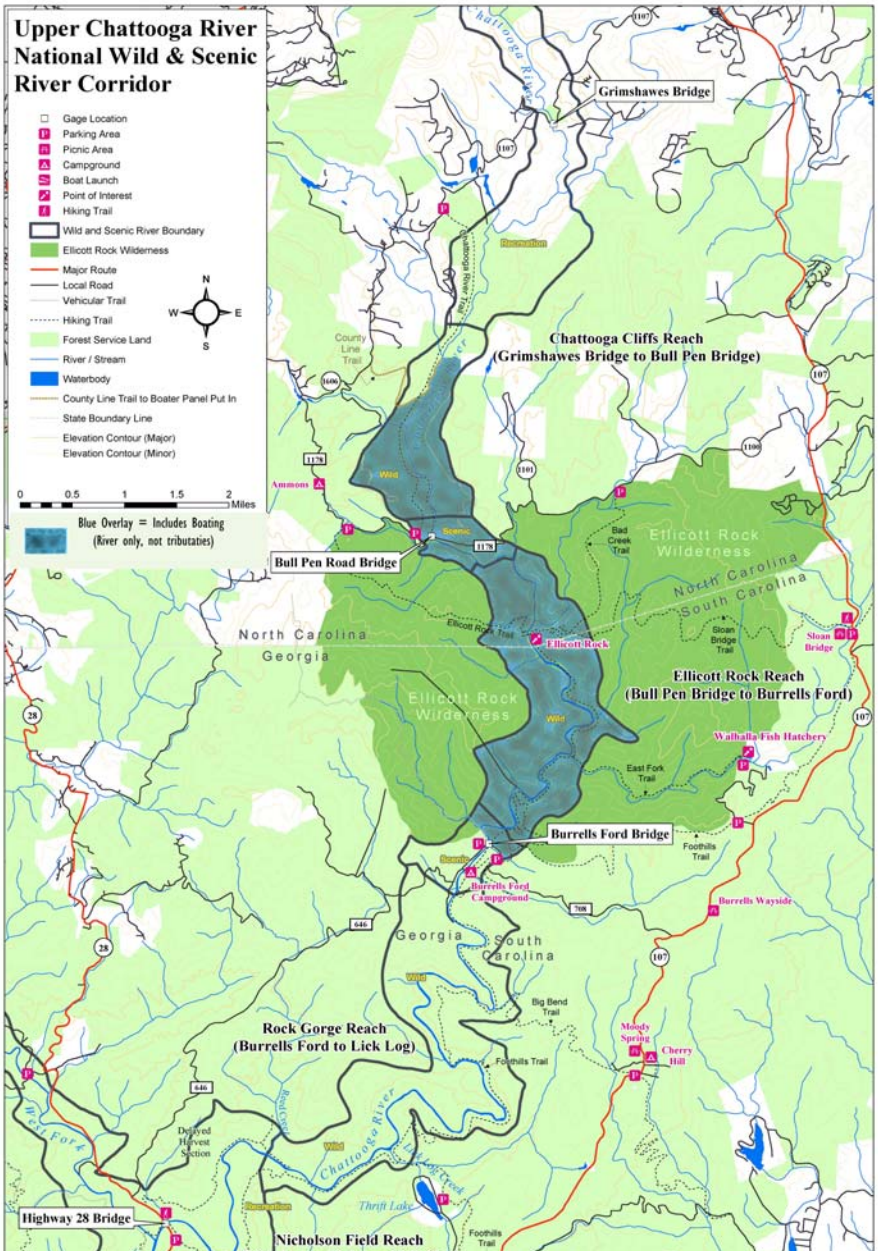


Figure 2.3-1 Alternative 4

ZONES: Confluence of Norton Mill Creek south to Bull Pen Bridge; Bull Pen Bridge south to Burrells Ford Bridge [+/-7 miles].
SEASON: December 1-March 1.
FLOW: Flow levels of approximately 450 cfs at Burrells Ford gauge.
TYPE OF CRAFT: Single/tandem hardboats and inflatable kayaks.
[Boatable Days in an Average Year: 6; range 0 to 11 (Hansen 2007)]

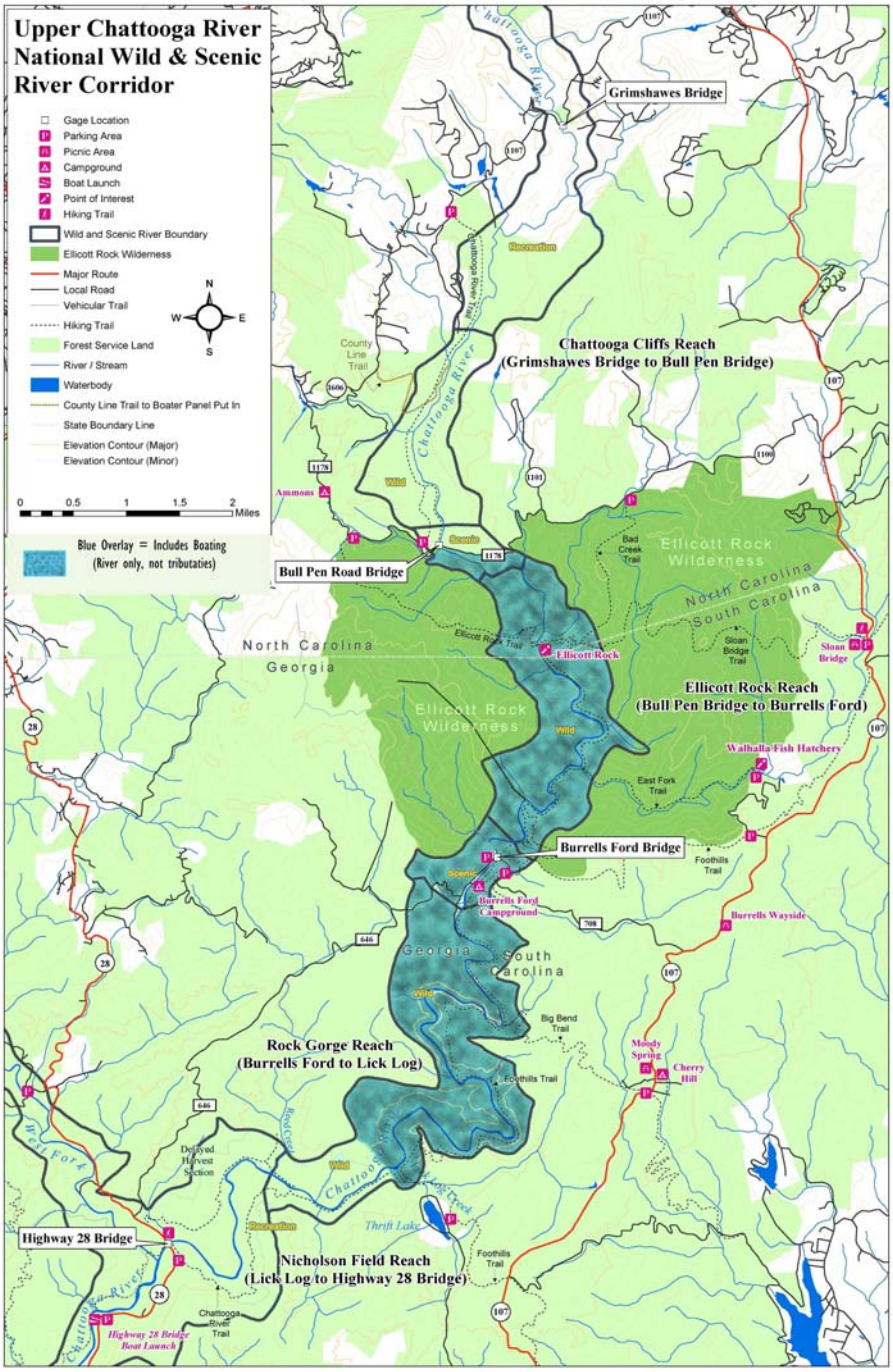


Figure 2.3-2 Alternative 5

ZONES: Bull Pen Bridge to Burrells Ford; Burrells Ford to Lick Log Creek [+/- 13 miles].
SEASON: All year.
FLOW: Flow levels of approximately 350 cfs Burrells Ford gauge.
TYPE OF CRAFT: Single/tandem hardboats and inflatable kayaks.
[Boatable Days in an Average Year: 37; range 12 to 64 (Hansen 2007)]

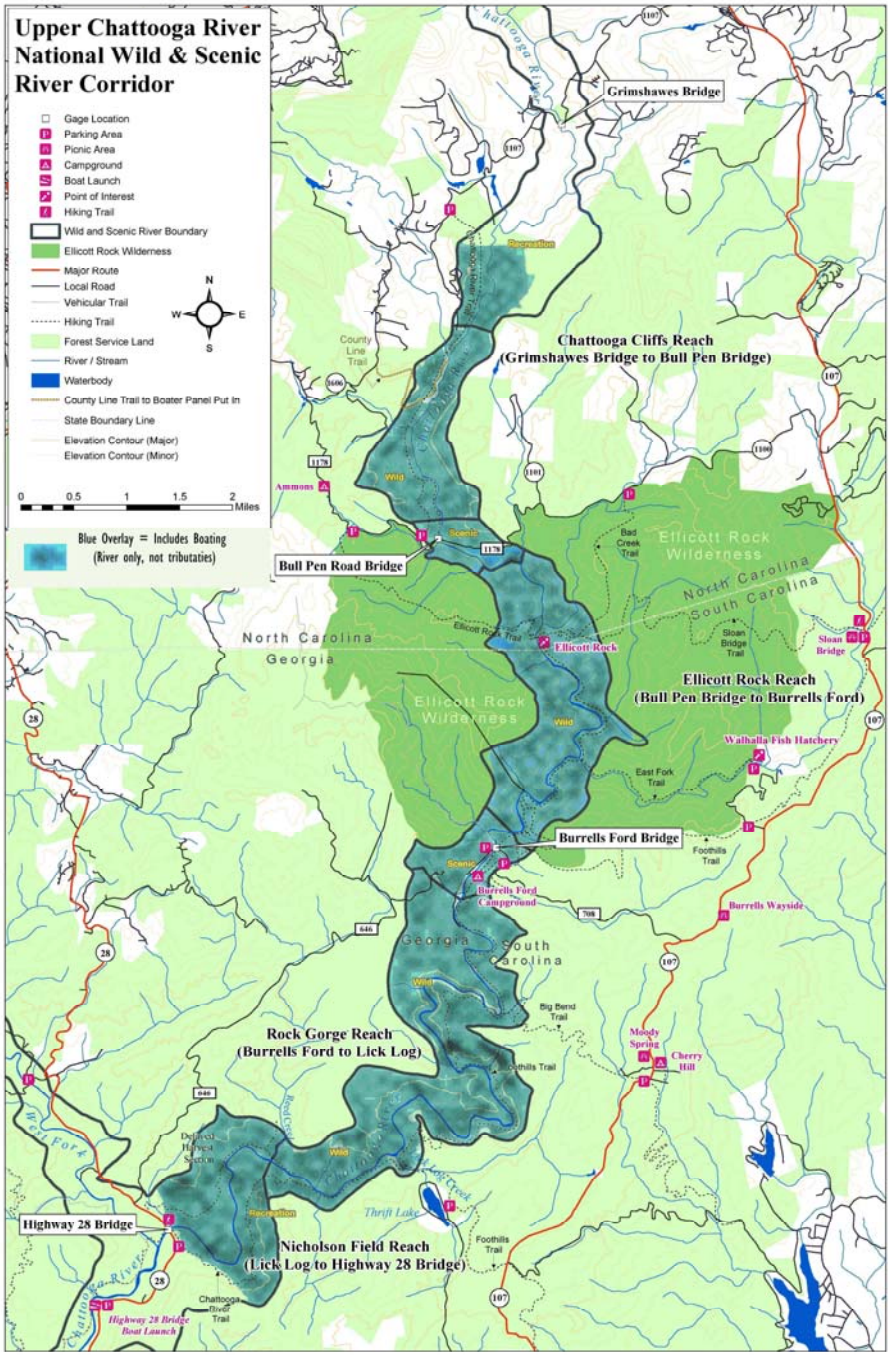


Figure 2.3-3 Alternative 8

ZONE: 4/10 mile below private property to Highway 28 bridge [+/- 20 miles].
SEASON: All year.
FLOW: All flow levels.
TYPE OF CRAFT: Single/tandem hardboats and inflatable kayaks, up to four-person rafts
[Boatable Days in an Average Year: 125; range 85 to 168 (Hansen 2007)]

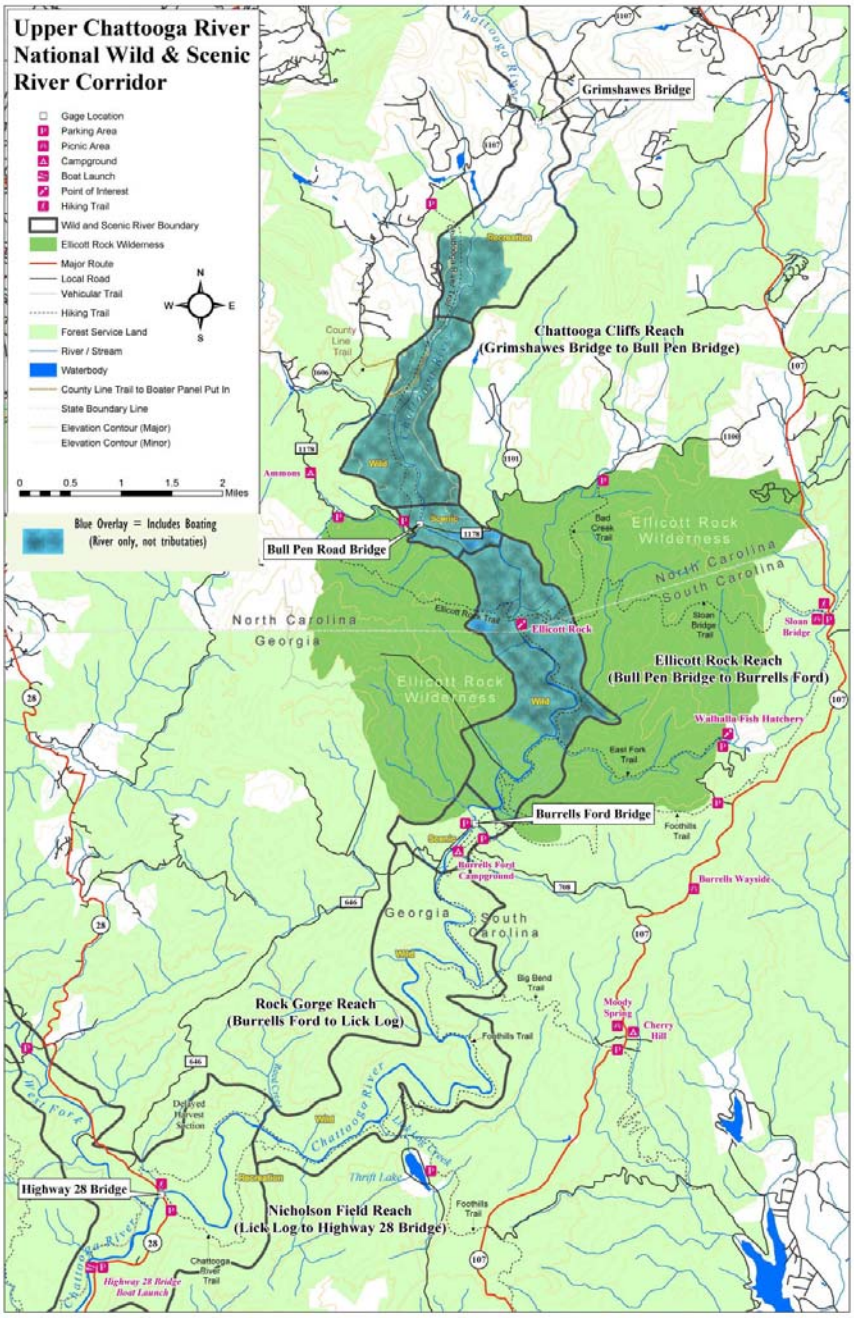


Figure 2.3-4 Alternative 9

ZONE: 4/10 mile below private property to East Fork Trail [+/- 6 miles].
SEASON: November 1 - March 31.
FLOW: Flow levels of approximately 350 cfs at Burrells Ford gauge.
TYPE OF CRAFT: Single/tandem hardboats.
[Boatable Days in an Average Year: 21; range 4 to 38 (Hansen 2007)]

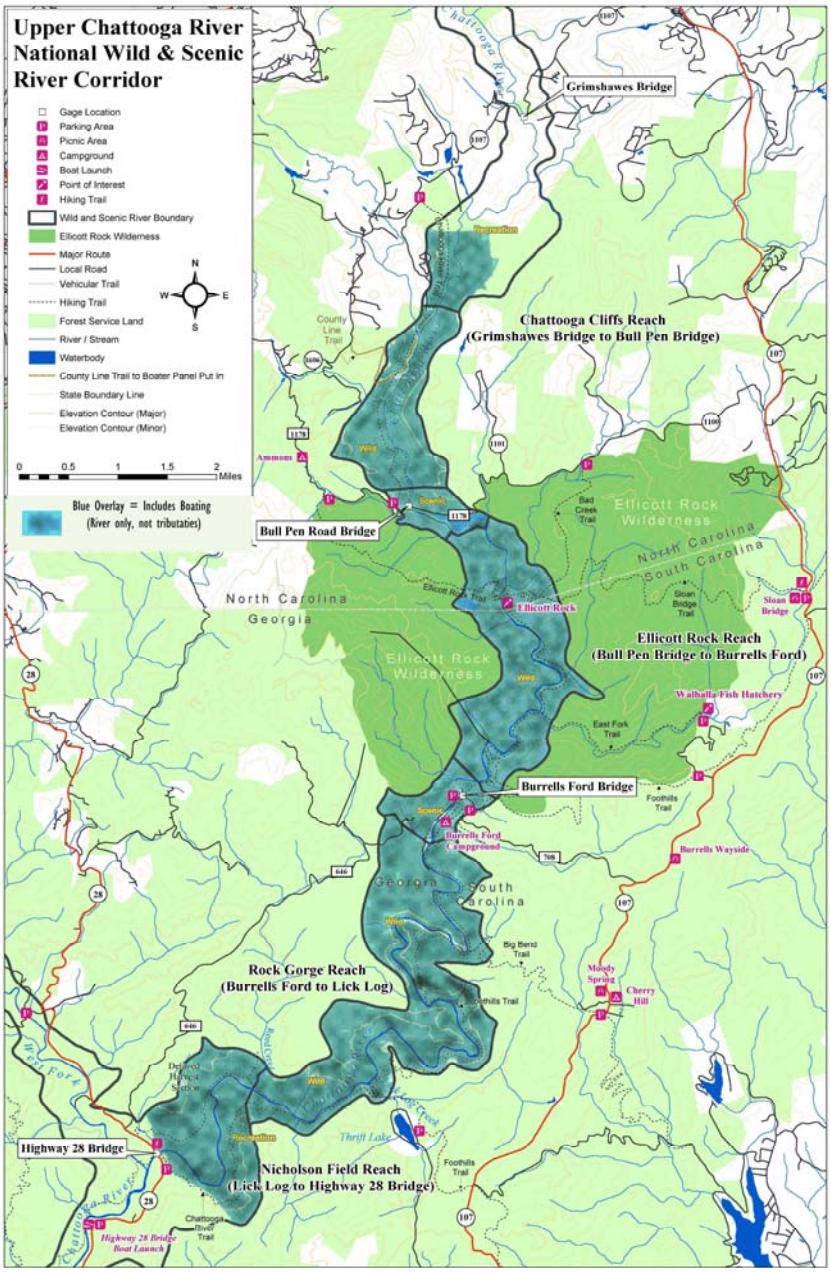


Figure 2.3-5 Alternative 10

ZONE: 4/10 mile below private property to Highway 28 bridge [+/- 20 miles].
SEASON: November 1 - March 1.
FLOW: Flow levels of approximately 350 cfs at Burrells Ford gauge.
TYPE OF CRAFT: Tandem/single-capacity hard boats/inflatable kayaks from below private land to Lick Log Creek; single/tandem hardboats and inflatables Lick Log Creek to Highway 28 bridge.
[Boatable Days in an Average Year: 14; range 0 to 28 (Hansen 2007)]

Table 2.3-1 Comparison Of Alternative Components

BP = Bull Pen Bridge; BF = Burrells Ford Bridge; RC= Reed Creek; 28 = Highway 28 bridge; NMC = confluence of Norton Mill Creek; CRT = Chattooga River Trail; EF = East Fork; BFPL = Burrells Ford Parking Lot; FT = Fisherman's Trail/Big Bend Road; LLC = Lick Log Creek

<table>
<tr><th></th><th>Alternative 1</th><th>Alternative 2</th><th>Alternative 3</th><th>Alternative 4</th></tr>
<tr><td>Description</td><td>Current Management</td><td>This alternative emphasizes increased solitude by managing encounters through a permit system and by reducing user-created features (ie. campsites and trails).</td><td>This alternative emphasizes year-round, high-quality trout fishing and maintaining current encounter levels.</td><td>This alternative emphasizes year-round, high-quality trout fishing and at the same time provides boating opportunities on the main stem upper Chattooga. It maintains current encounter levels.</td></tr>
<tr><td>BOATING</td><td></td><td></td><td></td><td></td></tr>
<tr><td>Zone</td><td></td><td></td><td></td><td>NMC – BF</td></tr>
<tr><td>Single/Tandem-capacity hardboats & inflatable kayaks</td><td></td><td></td><td></td><td>Yes</td></tr>
<tr><td>Up-to-four person rafts</td><td></td><td></td><td></td><td></td></tr>
<tr><td>Season</td><td></td><td></td><td></td><td>Dec. 1 – March 1</td></tr>
<tr><td>Flow level</td><td></td><td></td><td></td><td>Flows of approx. 450 cfs</td></tr>
<tr><td>Designated put-ins</td><td></td><td></td><td></td><td>NMC; BP</td></tr>
<tr><td>Designated take-outs</td><td></td><td></td><td></td><td>BP; BF</td></tr>
<tr><td>Days/year</td><td></td><td></td><td></td><td>Avg. 6; low 0; high 11</td></tr>
<tr><td>ENCOUNTERS</td><td></td><td>≤ 3 BP - RC

≤ 6 RC - 28</td><td>Trails
<table>
<tr><th>Area</th><th>Weekends</th><th>Weekdays</th></tr>
<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>
</table>
In River
<table>
<tr><th>Area</th><th>Weekends</th><th>Weekdays</th></tr>
<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>
</table>
[exceptions w/in ¼ mile of all roads bridges and BF Campground]</td><td>Same as 3.</td></tr>
<tr><td>GROUP SIZE</td><td></td><td>12 trails
6 camping
4 anglers</td><td>Same as Alternative 2</td><td>Existing users same as Alternative 2; six boaters (min. 2 craft per group)</td></tr>
<tr><td>WOODY DEBRIS</td><td></td><td>Maintain current management.</td><td>Same as Alternative 2</td><td>No LWD removal without agency approval. No LWD removal to accommodate recreation within the river or stream banks on the upper Chattooga River</td></tr>
<tr><td>TRAILS</td><td></td><td>No new except for solitude. Reroute ok.</td><td>Expect reroutes & possible closures</td><td>Expect reroutes, portage, and possible closures</td></tr>
<tr><td>DISPERSED CAMPING</td><td></td><td>Designated sites/fire rings; 1 site per 1/4 mile. No more than 3 tents except in group-designated sites. Close/rehab excessive/ unsustainable sites. Reservation required</td><td>Designated sites/fire rings; No more than 3 tents except in group-designated sites. Close/rehabilitate excessive/unsustainable campsites.</td><td>Same as Alternative 3</td></tr>
<tr><td>PARKING</td><td></td><td>No roadside parking within ¼ mile of BF; Lost parking not replaced; No net gain.</td><td>Same as Alternative 2</td><td>No change from current forest plan directions.</td></tr>
<tr><td>REGISTRATION /PERMITS</td><td></td><td>Self-registration /permits</td><td>Adaptive management</td><td>Adaptive management/ boaters register/boaters safety equipment</td></tr>
</table>

Table 2.3-1 Continued

	Alternative 5	Alternative 8	Alternative 9	Alternative 10
Description	This alternative emphasizes year-round, high-quality trout fishing and at the same time provides more boating opportunities on the main stem upper Chattooga. Boating would be excluded from the Chattooga Cliffs reach and the delayed-harvest area in order to address a combination of biological and social concerns.	This alternative emphasizes boating opportunities with no zone, season or flow restrictions on the upper stem of the Chattooga River while still providing quality trout fishing.	This alternative emphasizes boating with season and flow restrictions in the stretch of the main stem upper Chattooga most highly rated for creek boating while still providing high-quality trout fishing.	This alternative emphasizes boating with season and flow restrictions on the main stem of the upper Chattooga River while providing high-quality trout fishing.
BOATING				
Zone	BP to LL	CRT to 28	CRT to EFT	CRT to 28
Single/Tandem-capacity hardboats & inflatable kayaks	Yes	Yes	Yes	Yes
Up-to-four person rafts		Yes		
Season	Year-round	Year-round	Nov. 1 – March 31	Nov. 1 – March 1
Flow level	Flows approx. 350 cfs		Flows approx. 350 cfs	Flows approx. 350 cfs
Designated put-ins	BP; BFPL	CRT; NMC; BP; BFPL; FT; LLC	CRT; NMC; BP	CRT; NMC; BP; BFPL; FT; LLC
Designated take-outs	BF; LLC; FT	NMC; BP; BFPL; FT; LLC; 28	NMC; BP; EFT	NMC; BP; BFPL; FT; LLC; 28
Days/year	Avg. 37; low 12; high 64	Avg. 125; low 85; high 168	Avg. 21; low 4; high 38	Avg. 14; low 0; high 28
ENCOUNTERS	Same as Alternative 3	Trails: ≤ 6 in upper corridor In-River: ≤ 4 above BP ≤ 6 BP-RC ≤ 8 RC-28 [exceptions w/in ¼ mile of all roads/bridges and BF Campground]	Same as Alternative 8	Same as Alternative 8
GROUP SIZE	Same as Alternative 4	6 all users; minimum of 2 craft per group of boaters	Same as Alternative 4	Same as Alternative 4
WOODY DEBRIS	Same as Alternative 4	Same as Alternative 4	Same as Alternative 4	Same as Alternative 4
TRAILS	Same as Alternative 4	Same as Alternative 4	Same as Alternative 4	Same as Alternative 4
DISPERSED CAMPING	Same as Alternative 3	Same as Alternative 3	Same as Alternative 3	Same as Alternative 3
PARKING	Same as Alternative 2	Same as Alternative 2	Same as Alternative 2	Same as Alternative 2
REGISTRATION/PERMITS	Same as Alternative 4	Same as Alternative 4	Same as Alternative 4	Same as Alternative 4

CHAPTER 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. Unpaved dirt and gravel roads are the main contributors to stream sedimentation in the Chattooga River, however, some trails and campsites may also be sediment sources. While recreation management proposed in the alternatives would likely result in an overall reduction in sedimentation 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 trails. Overall, the impact is not likely to be great from any of the alternatives; however the potential impact does vary by alternative. Alternative 2 would likely result in the greatest reduction in impacts. Alternative 8 has the most potential for increased impacts. None of the alternatives are likely to create unacceptable cumulative increases in sediment 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 table displays total miles of stream, summarized by order, for both the entire Chattooga River watershed and the upper Chattooga corridor area.

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 percent perennial, 17 percent intermittent and 55 percent 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. In North Carolina, the Chattooga River from its source to the state line is classified as a Class B, trout water and outstanding resource water (ORW). In Georgia, the Chattooga River from the Georgia-North Carolina state line to the Tugaloo Reservoir is classified as wild and scenic. The Chattooga River and all its tributaries are also classified as primary trout waters in Georgia. In South Carolina, the Chattooga River from the North Carolina state line to its confluence with Opossum Creek is classified as outstanding resource waters. Beneficial uses for the Chattooga River include primary recreation (swimming on a frequent or organized basis), fishing, aquatic life including natural trout propagation and survival of stocked trout, and wildlife.

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. Another source of sediment comes from recreation sites and user-created recreation areas. Managing recreation impacts can reduce sedimentation and improve

overall water quality. Recreation uses have increased since 1995; therefore, recreation impacts from existing users 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, 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 TMDL (Total Maximum Daily Load) settlement agreement, the U.S. Environmental Protection Agency (EPA) 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
South Carolina			
	East Fork Chattooga River (downstream of fish hatchery)	Partial support	Unknown
North Carolina			
	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.

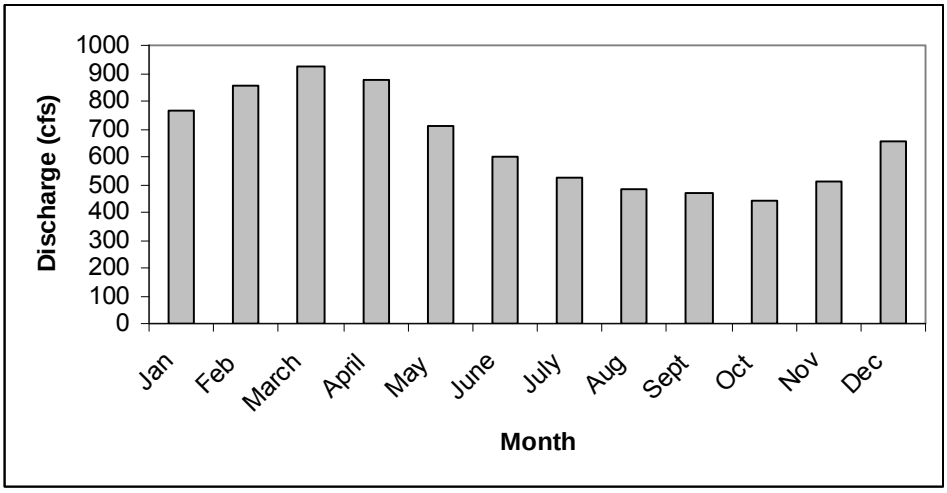
Chattooga River Flows

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 United States 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[1], and the decline from April - October is linked to vegetation growth and its impact on moisture stress and water table depth.

[1] The dormant season is the time in which there are minimal rates of evapotranspiration from vegetation, soils and other surfaces. This is typically the winter season.

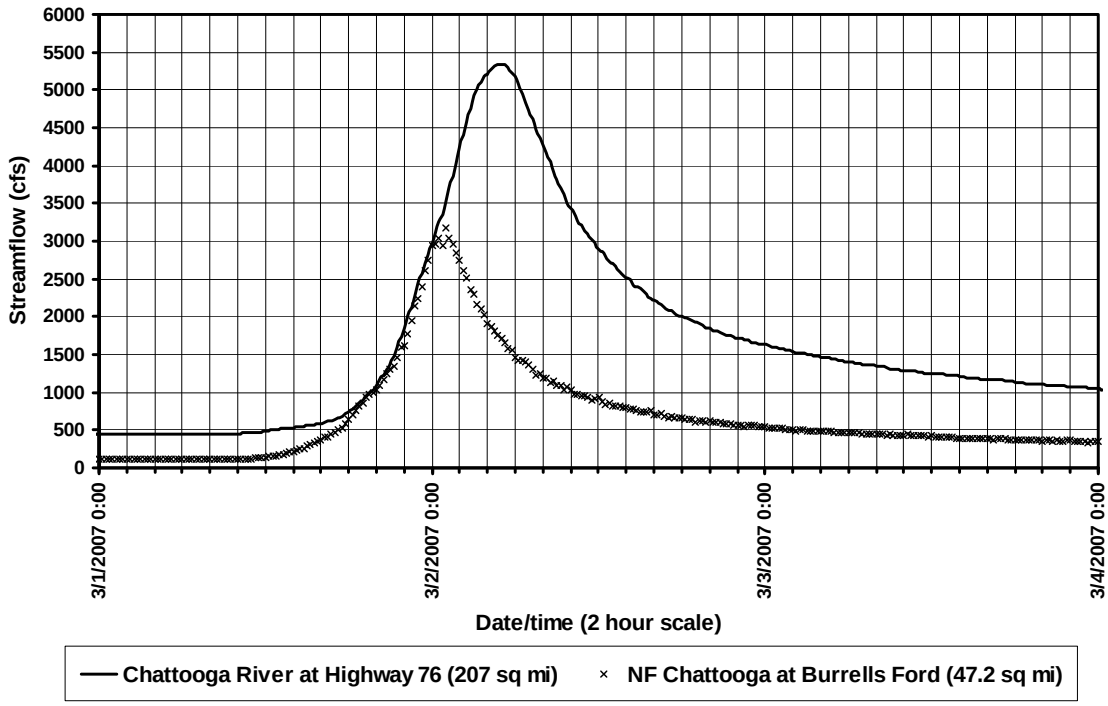
The long-term data at Highway 76 was used as an indicator of boating frequency for planning purposes. The correlation data involve comparisons of flow between two stream stations (Highway 76 and Burrells Ford) within the same watershed. Generally there is a good relationship between the flows except during storms events. The report highlights the limitations of using Highway 76 as a sole predictor for flow in the North Fork. A new gauge at Burrells Ford would be used to help the Forest Service to declare a boatable day (see Appendix C).

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 gauge show that during non-storm periods the two gauges are moderately to highly correlated. The summary report of the differences in flow between the Chattooga at Highway 76 and the North Fork Chattooga at Burrells Ford can be found in the process records. Figure 3.1-2 displays the hydrograph of a bankfull spring storm on the Chattooga River at Burrells Ford and Highway 76. Bankfull events of this magnitude occur on average, about once every year or two, so they occur with enough frequency to affect channel morphology or structure. More typical storms produce much less flow. Unless exceptionally dry, winter dormant periods need two to three inches of rainfall to achieve flows approximating 450 cfs.

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 increase and decrease 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 (HWA)

Eastern hemlock (*Tsuga canadensis)* is the one of the primary riparian tree species in the Southern Blue Ridge. The hemlock woolly adelgid (*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 forecasted 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 to eventually maintain bank stability.

With the loss of hemlock, the species composition and age structure of riparian stands will change. There will be an increased number of canopy gaps and increased light availability to the forest floor. These site changes will influence natural regeneration of the stand over time, as well as LWD stream inputs. Two probable scenarios could occur depending on existing vegetation. In stands where there is a *Rhododrendon* subcanopy, there would be a long-term decrease in transpiration. In stands where black gum and yellow poplar dominate, there would be a short-term increase in transpiration. There may be a greater hydrologic impact in areas currently dominated by hemlock in riparian areas

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 require portage. Over time, a route that is consistently trampled by 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 remain unscouted, 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 one 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 main stem 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 measured at two scales; that portion above Highway 28 and the drainage as measured above Tugaloo Lake. 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 designated and user-created trails, the 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 by existing users 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. Current 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 (stripped) of vegetation and 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 often determined by the amount and kind of dispersed recreation occurring within a specific area. Table 3.1-4 provides information on the number of existing 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 Existing 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 the 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, often during recreational activities such as fishing, camping, hiking or to access certain areas such as boating put-ins or take-outs or other specific points of interest. 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 existing 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 Existing 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 existing 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 Existing 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	Standard FW-70: 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.	Standard FW-1: 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. Standard FW-2: 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.	FW Standard (soil & water): 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)

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 NFS 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	Roach Mill Rx Burn	2004	550 a	X		
	Licklog Rx Burn	2004	790 a	X		
	Sarah's Creek Campground Upgrade	2004	30 a	X		
	Holcomb Creek Campsite Rehab.	2004	3 a	X		
	Westfork Streambank Stabilization	2004	0.5 a	X		
	Walking Stick Road Heavy Maint.	2004	2.5 m	X		
	Lucy Gap Road Reclosure	2004	0.5 m	X		
	Sarah's Creek Road Closure	2004	0.5 m	X		
	Laurel Creek Mine Rehab	2004	2 a	X		
	Bad Creek SPB Regeneration	2004	15 a	X		
	Wildlife Opening Expansion – Warwoman WMA	2004	3 a	X		
	Salvage of SPB Mortality on Rock Cr. Road	2004	5 a	X		
	Deaden Timber Complex Erosion Reduction	2004-2005	2 m	X		
	Watergauge Firewood Area	2004-2005	10 a	X		
	Closure & Soil/Water Rehab of Three Abandoned County Roads	2005	5.5 m	X		
	Hwy 76 Bridge Replacement	2005	1 a	X		
	Wolf Creek Rx Burn	2006	130 a	X		
	Fish Passage & Habitat Enhancement; Brook Trout Restoration/Renovation	2006	3 m	X		
	Ridley Branch Dispersed Site Closure	2006	0.5 a	X		
	Duck's Nest Gap Rx Burn	2006	1050 a	X		X
	Highway 28 Wildfire	2006	180 a	X		
	Burn 2 on Big Ridge	2006	1150 a	X		
	Wolf Creek Church Firewood Area	2006-2007	5 a	X		
	Roach Mill Rx Burn	2008	695 a	X		X
	Chintilly Rx Burn	2008	230 a	X		X
	Rabun Bald Trail Reroute	2008-2010	3.5 m		X	
	Watergauge Yellow Pine-Oak Woodland Restoration (Rx Burn)	2009	232 a			X
	Tri-District Land Exchange	2009	157 a			X
	Bartram Trail Reroute @ Wilson Gap	2009	0.5 m	X		
	Satolah Soil and Water Complex	2009			X	
	Camp Creek Rx Burn	2009	1800	X		X
	Upper Warwoman Vegetation Management	2009-2010	200 a			X
	Invasive Plant Eradication	2009-2011	25 a			X
	Herbicide Release of Young Forest Communities	2009-2012	150 a			X
	Vegetation Management for Forest Health	2009-2014	250 a			X
	Woodall Shoals Rx Burn	2010-2011	1100 a			X
	Buckeye Branch/Licklog Rx Burn	2010-2011	2470 a			X
	Willis Knob Horse Trail Reroutes	2010-2014	5 m			X
	Sarah's Creek Crossing Replacement	2009	0.05 m		X	
SC	Sandy Ford Rx Burn	2002, 2005	400 ac	X		
	Loblolly Thinning/Removal	2010-2014	1000 ac			X
	Crane Mountain RX Burn	2009, 2013	300 ac			X
	Earls to Sandy Rx Burn	2010	1000 ac			X
	Whetstone Thinning	2008-2009	64 ac	X	X	
	Garland Tract Rx Burning and Dove Field Mtc	2004-2014	600 ac	X	X	X

State	Activity	Year(s) Implemented	Acres/Miles Affected	Past	Present	Reasonably Foreseeable
SC	FSR 719 Reconstruction	2009-2010	2.4 mi			X
	Horse trail closures, relocations	2010-2011	10 miles			X
	Horse camp reconstruction	2010	12 acres			X
	Burrells Ford Campground Reconstruction	2009-2010	6 acres			X
	Russell Farmstead Interpretive Living Farm	2010-2014	40 acres			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 existing 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 Existing 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 existing trail mileage and erosion problems for the lower Chattooga River and the West Fork. Table 3.1-12 summarizes additional trail information and the extent of erosion associated with existing trails in close proximity to the lower Chattooga and West Fork.

Table 3.1-11. Summary Of Existing 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 Existing 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[1]	Bare Ground Rehabilitated (sq. ft.)[2]	Cleared Area Rehabilitated (sq. ft.)[2]
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

[1] 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.
[2] 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 actions 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. Impacts from parking would be the same as Alternative 1. 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 to reach the confluence of Norton Mill Creek and the potential increase in user-created trails by boaters could result in slightly more

compaction, erosion and sedimentation than in alternatives 2 or 3. This alternative stipulates that no LWD would be removed to accommodate recreation within the river or stream banks on the upper Chattooga. However, the potential for unauthorized LWD removal increases 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. This alternative stipulates that no LWD would be removed to accommodate recreation within the river or stream banks on the upper Chattooga. However, the potential for unauthorized LWD removal increases 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. Because scenic boating is allowed in this alternative, 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.. This alternative stipulates that no LWD would be removed to accommodate recreation within the river or stream banks on the upper Chattooga. However, the potential for unauthorized LWD removal increases 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 4, 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. This alternative stipulates that no LWD would be removed to accommodate recreation within the river or stream banks on the upper Chattooga. However, the potential for unauthorized LWD removal increases 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. This alternative stipulates that no LWD would be removed to accommodate recreation within the river or stream banks on the upper Chattooga. However, the potential for unauthorized LWD removal increases 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 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 US were first cleared have also contributed to current sediment loads. Splash dams and poorly located skid roads were used to move logs to local mills. Roads and skid trails were often located near streams and they lacked adequate surfacing and drainage features. Sediment deposited in the stream system during these early disturbances 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 upper Chattooga watershed has “legacy sediment” and in-stream sediment present from all these sources.

The current land use/cover for the entire watershed is mostly forested. In 2001, the upper Chattooga watershed (located above the bridge crossing Highway 28) was approximately 94% forested while the entire Chattooga watershed was approximately 90% forested (Table 3.1-14). In 1992, the percentage of forested land cover was higher for both these areas. Table 3.1-8 lists the 2001 land cover classes and their total acreage for private lands in the Chattooga watershed. The majority of private lands have a forested land cover, but some of these lands are developed or used for agriculture. The general trend on private lands is increasing development, but the large percentage of national forest lands in the watershed will help maintain these high percentages of forested land cover. Forested watersheds serve many purposes. Acting as a living filter, forests capture rainfall, regulate stormwater and streamflow, filter nutrients and sediment, and stabilize soils (USDA NA-TP-03-96).

Table 3.1-14. Trend In Forested Conditions In The Upper Chattooga To The Entire Watershed For 1992 And 2001.

Watershed	1992 Acres/Percent	2001 Acres/Percent
Upper Chattooga (above Hwy 28)	41,662 / 98%	39,960 / 94%
Chattooga River (above Tugaloo Lake)	170,620 / 96%	160,980 / 90%

These acres and percentages of forested land cover are approximate.

Studies from the Chattooga River Ecosystem Management Demonstration project indicate that the upper Chattooga watershed is in good condition. The Van Lear et al. (1995) study indicated that sediment concentrations in the upper Chattooga River watershed were lower than other major subwatersheds like Stekoa Creek, Big Creek (West Fork), and Warwoman Creek. Weber and Isely (1995) assessed water quality across the Chattooga watershed using benthic macroinvertebrates. All 27 sampling sites used in this study rated excellent using the North Carolina Biotic Index (NCBI). This study also evaluated multiple habitat types in a qualitative assessment of the same 27 sites. Overall, the qualitative sample results rated Chattooga River sites good while tributaries were rated excellent.

Table 3.1-9 displays past, present, and reasonably foreseeable future actions within the Chattooga River watershed. In the past five years, 7,627 acres have been prescribed burned on the three national forests. The primary ground disturbing activity associated with prescribed burning includes the construction of firelines. Firelines for prescribed burns often utilize existing features such as roads or streams to minimize the amount of line constructed with equipment. When constructed lines are needed, they are implemented using forest plan standards and Best Management Practices (BMPs). Exposed soils are minimized and then treated to reestablish ground cover and vegetation. The recovery period for these burns is approximately two years (Dissmeyer and Stump, 1978).

Recent timber harvests in the NC portion of the watershed on the national forest for a total of approximately 225 acres and 64 acres in SC. No harvests have taken place within the last five years on national forest lands in GA. However, projects are planned in the future on all three national forests. Primary ground disturbing activities associated with timber harvests include Forest Service system road maintenance (as needed for logging access), temporary roads, skid trails and log landings. When possible, decommissioned roads and skid trails are reused for access, unless the impacts would be greater than use of a different route. These activities are typically short in duration with an estimated recovery period of three years (Dissmeyer and Stump, 1978). Bare soils and concentrated flow are aggressively treated to reduce erosion and sedimentation. Erosion and sedimentation are minimized for these activities through BMP implementation and adherence to forest plan standards.

Table 3.1-9 also indicates there have been eight miles of road reconstruction completed within the past five years. The objectives of the projects were to reshape the roadbed and to improve/install proper drainage structures. This reduces sediment laden water from roads flowing directly into streams. Poorly designed or inadequately maintained roads represent the greatest potential source of sediment input to tributaries in undeveloped (largely forested) watersheds. Properly installed drainage structures and maintenance practices substantially reduce sediment movement from forest roads (Clinton and Vose, 2003). Other road projects that have been or will be implemented within the watershed to reduce cumulative sediment sources include road closures and rehabilitation projects. In addition, road reconstruction and road paving have or will be implemented to reduce sediment input to streams.

Table 3.1-15 indicates the total miles and road density for both the entire Chattooga watershed and the upper Chattooga watershed (that portion above the Highway 28 bridge). This summary includes FS, state, county, and local road networks. These roads have a variety of surface types,

including native material, gravel and asphalt. Roads maintained by the FS are on a schedule to receive maintenance, resurfacing and needed improvements. These activities are taking place annually on FS maintained roads within the watershed. County road maintenance activities are also ongoing. Some roads in the watershed receive little or no regular maintenance.

The limited designated parking within the watershed is a relatively minor sediment source compared to sediment from roads. Closing parking near Burrells Ford Bridge with alternatives 2, 3, 5, 8, 9, and 10 would reduce overland water flow as a result of impervious surfaces near this crossing. These former parking areas would become less compacted over time and would result in more water percolating into the ground. 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).

Table 3.1-15. Road Density.

Watershed	Chattooga River Watershed	Upper Chattooga River Watershed
Road Density (mi/mi^2)	2.67	2.14
Road Miles	746	142

Source: USFS GIS data set, 2009.

Other projects that are being implemented or will be implemented in the future to reduce sediment input to streams include closure of dispersed sites and horse trails and trail reroutes.

Today, the watershed continues to be predominantly forested with most of the private lands in the upper watershed concentrated in the Cashiers, NC area. The upper Chattooga watershed is in overall good condition as a result of the high percentage of forested land cover and FS/County efforts to mitigate sediment delivered from the road and trail networks. In addition, the upper Chattooga watershed also includes the 8,274 acre Ellicott Rock Wilderness or about 19.5 percent of the area above Highway 28. This also helps account for the overall good condition of this portion of the watershed.

The Forest Service has undertaken recent projects to address water quality and sedimentation issues within the entire watershed. During the Chattooga River large scale watershed restoration project, the FS implemented major restoration or reconstruction projects to mitigate existing sediment sources identified by Van Lear, agency personnel and others. Table 3.1-16 summarizes the Project improvements through the year 2002. The benefits of this large scale restoration effort continue today. They have improved water quality and enhanced aquatic habitats.

Table 3.1-16. Chattooga River Large Scale Watershed Restoration Project.

Restoration Action	Total (unit)
Trails rehabilitated	150 miles
Roads rehabilitated	81 miles
Heavy road maintenance	319 miles
Illegal ATV trails revegetated	80 acres
Recreation sites rehabilitated (camp sites)	23 sites
County roads rehabilitated using Wyden Amendment	24 miles
Streambank stabilization	1250 feet

Activities or requirements within each alternative would further contribute to reducing cumulative watershed effects from sedimentation. User-created trails and campsites would be eliminated or designated over time, which includes bringing them to current standards. 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 2007 biophysical inventory that documented intensive recreation use within the corridor, including numerous user-created features (trails and campsites) and erosion sites. These user-created features are often adjacent to streams, which can result in chronic sediment sources.

Campsites

Proposed actions for campsites vary across alternatives 2-5 and 8-10. Overall, the alternatives do not include actions that restrict camping near streams, but instead address conditions of unacceptable resource damage. Designated campsites would also be evaluated to determine if any mitigation measures are needed to minimize erosion and sedimentation. These activities would further reduce existing sediment sources throughout the watershed. See USDA (2007), table 3, for a summary of the number of campsites in the Chattooga watershed, the upper Chattooga watershed, and within 20 feet of the Chattooga River.

Access and Trails

Access for boaters would utilize existing trails, old roadbeds, existing bridge crossings or other user-created features for put-in and take-out. Designated put-in/take-out trails would be reconstructed as needed and maintained to current forest plan standards. Additional user-created trails from boating activities would be discouraged, but difficult to control. Portage trail needs would be addressed while trying to minimize potential resource impacts. There is no new road or trail construction proposed for any alternative.

The alternatives that include boating would likely add varying amounts to the increasing number of users, thereby potentially increasing slightly the impacts from sedimentation. There would be ground disturbing activity resulting from access trails, portage trails and additional user-created trails, but the total length of these trails or the amount of ground disturbance associated with these activities would be small compared to the total miles of existing trails and roads in the upper Chattooga watershed (see Table 3.1-15 and Table 3.1-17 for miles of existing roads and trails, respectively). See Table 3.1-18 for an estimate of additional trail needs associated with boating activities. This table identifies different trail types or access needs associated with boating. It also estimates these trail lengths.

Table 3.1-17. Total Miles Of Existing Designated Trails And User-Created Trails For Both The Chattooga Watershed (Above Tugaloo Lake) And Upper Chattooga Watershed (Above Hwy 28).

	Chattooga River Watershed miles (miles / square mile)	Upper Chattooga Watershed miles (miles / square mile)
Designated trail	80.2 (0.29)	35 (0.54)
User-created trail	52.5 (0.19)	19.3 (0.30)

Table 3.1-18. Estimated Length Of Trail Features Reconstructed Or Created In The Upper Chattooga For Alternatives 4, 5, 8, 9, And 10, As A Result Of The Addition Of Boating.

Feature	Estimated Number/Length	Source
Designated put in/take out locations (except for Norton Mill Creek)	Alternatives range from a total of 3-7 put-ins and take-outs; each estimated to be ¼ mile in length for up to a total of 1-2 miles of trail depending on alternative	Existing user-created trails that would be reconstructed to meet current standards
Norton Mill Creek put-in aka County Line Trail (alts 4, 8, 9, 10)	Approximately 1.5 miles	An old road-bed that would be reconstructed as needed and a short section of designated trail
Portage for rapids or woody debris accumulation	Total length for both these features is estimated to be ½ mile	Existing user-created features and creation of new footpaths in some areas
User-created trail	19.3 miles currently in the upper Chattooga watershed	Some existing user-created trails will continue to be used. Existing user-created trails would also be analyzed for further treatment, with some being obliterated. Some new user-created trails are expected for alternatives that include boating, but their use would be discouraged

In addition to the activities in Table 3.1-18 related to boating, there would also be management activity within the entire Chattooga watershed to improve watershed conditions as described above. Boating would result in additional ground disturbance but there would be an overall net reduction in sediment when watershed improvement projects are implemented. Watershed improvements include evaluation and treatment of user-created trails, user-created campsites and erosion sources. Additionally, designated trails, campsites and roads are maintained to minimize sediment sources.

Mitigation measures would be utilized to minimize the direct, indirect and cumulative effects for these alternatives. Mitigation measures include the use of forest plan standards, state erosion/sedimentation control programs, and BMPS for forestry and forestry-related activities. Additional mitigation measures may be applied as needed when site-specific projects are implemented. All water quality regulations or guidelines are expected to be met in each 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 existing 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 and closing or mitigating damaged trails. All alternatives, except 1 and 4, eliminate roadside parking near Burrells Ford Bridge which also would reduce impacts to soils. 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; Alternative 8 is expected to have the highest likelihood of increased erosion and sedimentation from increased portages. However, as noted previously, impacts from introducing boating would be minor.

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 3.1-19 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 3.1-19. 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 sensitivity
M = Medium sensitivity
H = High sensitivity

The Chattooga Cliffs and Rock Gorge reaches are rated high soil sensitivity because of soil texture and steepness of slopes. West Fork reach has low soil sensitivity because of flatter terrain and upland soils which are coarser and percolate water faster resulting in less erosion. The other reaches are medium soil sensitivity because of the amount of limited bare soil exposure based on moderate slopes and soil types.

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. Roads and road maintenance are the chef contributors of erosion and sediment in the Chattooga drainage. Sediment fields from user-created trails, dispersed campsites and parking areas are minor. The addition of boating should not generate measureable amounts of sediment.

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

- *User-created trails* which 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 sediment.
- *Dispersed campsites* which 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* which 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* which 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 the associated erosion points 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 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 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 requirements.

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. 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

Cumulative effects were evaluated at two scales: the upper Chattooga River above Highway 28; and the whole Chattooga above Tugaloo Lake. Cumulative effects analysis discussed in chapter 3.1.1 Water and Riparian Corridor was used to inform the soil cumulative effects analysis and conclusions on likely effects. Natural background erosion levels are typical of that associated with largely forested watersheds.

Past, present and reasonably foreseeable projects are displayed in Table 3.1-9. Cumulative soil erosion and compaction from projects are primarily associated with recreation use (primarily trails and campsites), vegetative management, and maintenance activities associated with roads and trails. The other listed management activities add minor amounts to the total erosion occurring in the watershed. On the other hand, a number of projects have been or will be implemented to specifically target reducing cumulative adverse impacts to soils in the entire watershed and that portion of the watershed above the Highway 28 bridge. These projects are mainly associated with rerouting trails, closing roads, and paving road surfaces aimed at reducing erosion and chronic sediment input to streams. In addition, past projects (Table 3.1-16) associated with trails, roads, campsites and streambank stabilization have been implemented. This has reduced cumulative impacts to soils from erosion and compaction and decreased sediment delivery to tributaries and the Chattooga River itself.

Recreation management activities aimed at reducing impacts associated with erosion and sedimentation have included road, parking lot/trailhead, campsites and trail maintenance in the Chattooga River above Highway 28. This has decreased soil erosion in the watershed. Impacts to soils would be furthered reduced by directing recreationists to sustainable (stable soil areas that can handle repeated use) designated campsites and trails. Soil and water improvements that are planned in the watershed along with those already completed would result in further cumulative reductions in soil erosion and compaction in the upper portion of the watershed.

Vegetation management projects have and will improve forest health throughout the watershed. The activities result in restoration of native plants and reduce impacts from Southern pine

beetles. This also reduces and prevents impacts from wildfire on soils. Projects aimed at reducing non-native invasive plants (NNIS) also favor the development of native species. These activities enhance forest cover including understory grasses and shrubs and maintain/restore healthy ecosystems which help protect soils in the short and long term.

All of the alternatives would result in closed and rehabilitated campsites, trails and soil erosion points, thus reducing adverse affects on soils. The overall impacts that can be expected if the individual impacts are allowed to accumulate from each action alternative would be a reduction in erosion, sedimentation and compaction both in the upper part of the watershed and in the whole Chattooga River drainage. The overall good condition of the upper potion of the watershed will be maintained in the short term and will improve in the long term under any of the alternatives. The entire Chattooga River watershed would also continue to improve in the short and long term.

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.

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 (NNIS) 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 existing users are 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 low 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 3.2-2 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 percent of the watershed is dominated by hardwood

types (primarily oaks), 27 percent by mixed yellow pine-oak types, another 15 percent by hemlocks and hardwoods, and 11 percent by white pine and hardwoods. The remaining types, such as alluvial forest and rock outcrops, are much less common.

Table 3.2-2 Comparison Of Ecological Type Abundance On NFS Lands Within The Chattooga River Watershed And The Upper And Lower Wild And Scenic River 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 LRMP. 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 3.2-3). If the species is a PETS or locally rare plant species, it is described further in the PETS section.

Table 3.2-3. 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 *Rhododendron vaseyi*	G3	S3 (NC)	NNF (15)	NC endemic present in the Chattoogo 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 *Packera millefolium*	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 *Lysimachia fraseri*	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 *Calystegia catesbiana ssp. Sericata*	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 *Carex biltmoreana*	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 *Carex manhartii*	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 *Gymnoderma linerae*	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 3.2-4 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 3.2-4. 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 assess 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 3.2-5 identifies the four plant MIS and the biological communities they represent.

Table 3.2-5. 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. 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.

Some locally rare (forest concern) species habitat types may occur within other portions of the three national forests, but not within the Chattooga River watershed. Even though locally rare species or their habitat types may be quite common in the main portion of their range, they can be rare, even rarer than sensitive species, within individual forests.

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 habitat is marginal. 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 or adjacent to larger river channels and are therefore unlikely to be impacted by portage trails next to the Chattooga River, 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 currently only documented in 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 2,240 feet) located for the species across its range. There is no visible impact to the populations from any current recreational usage. These conclusions are based on the observations of the interdisciplinary team forest botanist at this site, in comparison to other *Gymnoderma* sites (more than 20 sites) across its narrow range. The BA and EA indicate all the action alternatives are unlikely to adversely affect the species.

Regionally Sensitive Plants

Table 3.2-6 describes the 13 regionally sensitive plant species that occur within the Chattooga River corridor and might be affected by the alternatives.

Table 3.2-6. Regionally Sensitive Plant Species Within The Chattooga River Corridor That Could Be Affected By Any Of The Alternatives.

Species	Species Ranking Global	Species Ranking State	Forest List (Occurrences)	Range and Habitat
Acrobolus ciliatus	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.
Cephalalozia macrostachya ssp. *australis*	G4T1	S1 (NC)	NNF (1)	NC within Linville Gorge and Chattooga Gorge. Crevices of streamside rocks.
Hydrothyria venosa	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.
Lejeunea bloomquistii	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.
Lophocolea appalachiana	G1G2Q		NNF (7) CONF (1)	KY, TN, and Carolinas. Typically occurs on shaded wet rocks or seeps.
Fraser's loosestrife *Lysimachia fraseri*	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.
Marsupella emarginata var. latiloba	G5T1T2	S1 (NC)	NNF (2) Includes 1 site in upper Chattooga	NC and VT. Typically occurs within damp shaded rock outcrops.
Plagiochila austinii	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.
Plagiochila caduciloba	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.
Plagiochila sharpii	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.
Plagiochila sullivantii var. sullivantii	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 *Plagiomnium carolinianum*	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.

Species	Species Ranking Global	State	Forest List (Occurrences)	Range and Habitat
Radula sullivantii	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 3.2-7 describes the 14 locally rare species that occur within the Chattooga River corridor and might be affected by the alternatives.

Table 3.2-7. Locally Rare Plant Species Within The Chattooga River Corridor That Could Be Affected By Any Of The Alternatives.

Species	Species Ranking Global	State	Forest List (Occurrences)	Range and Habitat
Sword moss *Bryoxiphium norvegicum*	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 *Calystegia catesbiana ssp. sericata*	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 *Carex manhartii*	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.
Chiloscyphus muricatus	G5	S1 (NC)	NNF (2)	NC and TN. Rock outcrops within humid gorges.
Ephebe solida	G3G4	S1 (NC)	NNF (8)	Quebec south to NC, GA, and AL. Aquatic lichen that adheres to rocks.
Lime homalia *Homalia trichomanoides*	G5	S1 (NC)	NNF (3)	WA, WI, MI, and VT south to TN and NC. Within outcrops in humid gorges or spray cliffs.
Seep rush *Juncus gymnocarpus*	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 *Listeria smallii*	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 *Lygodium palmatum*	G4	S3 (NC) S2 (GA) S1S2 (SC)	CONF (2)	MA west to MI south to KY, MS, and FL. Moist thickets, islands, and bogs.

Species	Species Ranking Global	Species Ranking State	Forest List (Occurrences)	Range and Habitat
Pohlia lescuriana	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 *Stellaria alsine*	G5	S1 (G5)	NNF(3)	Quebec south to OH, TN, and FL. Within riparian zones, seeps, and bogs.
Mountain camellia *Stewartia ovata*	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 *Trichomanes boschianum*	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 *Trichomanes petersii*	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 3.2-8 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 cause recreationists on the river to go over, under or around them. If they go around the obstacles, this action can create user trails and vegetation trampling. The amount of LWD currently on the upper corridor is displayed in Figures 3.2-1 and 3.2-2 (in Section 3.2.3 Aquatic Species and Habitat).

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 (see table 3.3-1 on page 96 for definition of “frontcountry”). 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.

Eastern hemlocks primarily occur within two community types, both of which dominate the main stem of the Chattooga River. Hemlock hardwood forests are dominated (50-75%) by eastern hemlocks while acidic cove forests are typically dominated by hardwoods with thirty percent or less canopy dominance by eastern hemlock. Table 3.2-8 shows the relative density and distribution of these two community types among the primary reaches of the upper Chattooga.

Table 3.2-8. 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, 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. Refer to Table 3.1-9 for a listing of past, present, and reasonably foreseeable actions within the Chattooga River watershed.

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. The communities are defined in the document "Community Descriptions" located in project file. None of the alternatives would result in loss of a plant community. While these plant communities may be directly and indirectly affected by the proposed recreational alternatives, the loss of hemlocks will potentially have a greater effect on both species composition and structural diversity (Ford and Vose 2007). The loss of hemlock will occur regardless of the selected alternative.

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 (see Appendix B for monitoring plan).

Another potential impact on ecological communities would be the continued introduction of additional non-native invasive plant species (NNIS plants) from visiting recreation users. NNIS plant species observed throughout the riparian areas of the river corridor include *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.

NNIS plants tend to be more frequent within riparian areas and increase with greater flood frequency (Brown and Peet 2003). NNIS tend to be associated with disturbance that exposes soils and thereby creates conditions for plants to become established. Any additional recreation users within the upper portions of the Chattooga River have the potential for introducing new outbreaks or new NNIS 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 NNIS 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). Based on an evaluation of existing vegetation conditions, past inventories in similar areas and low levels of disturbance, invasive species are not expected to increase as a result of boating .

Ground-disturbing activities, including timber harvest, road construction and prescribed burning, have the potential to cumulatively introduce non-native invasive plants. The additional introductions of NNIS 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 NNIS plants would occur over time under any of the alternatives. Alternative 2 would result in the fewest new introductions since it is designed to restrict the number of recreationists to a lower level than at present.

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

Seven plant species, and liverworts as a group, were identified as outstanding remarkable values in the description of the biology within the Chattooga River watershed when the wild and scenic river corridor was designated. All the identified species included southern Appalachian endemics that were rare at the time of designation. Updated distribution information has determined a few of the species (*Carex manhartii, Carex biltmoreana,* and *Calystegia catesbiana var. sericata*) are not as seriously threatened now as previously determined at the time of wild and scenic designation. There was no clarification on species within the liverwort group.

The following discussion addresses direct, indirect and cumulative effects on each of the eight plant species associated with the biology ORV for the Chattooga wild and scenic river corridor.

<u>Pinkshell Azalea</u> (*Rhododendron vaseyi*)
Though documented in the Chattooga watershed, pinkshell azalea has never been documented in the wild and scenic river corridor. Therefore, none of the alternatives is likely to 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 is likely to 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 Forest Service 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 the 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 is likely to directly, indirectly or cumulatively affect this species.

Manhart's Sedge (*Carex manhartii*)
Many rare plant species are revisited once or twice every five to seven years and typically only non-quantitative data is collected. As a result impacts are usually inferred from anecdotal information. This species was formally dropped from the regional sensitive list in 2001 with updated information from the NNF where more than 65 populations were documented during the 1990s. As a result both the NNF and the SNF no longer formally tracked this sedge. Manhart's sedge is particularly abundant from west to east of the Chattooga River watershed in the upper Little Tennessee River watershed and the Thompson and Whitewater river watersheds, respectively (Natureserve 2007, G. Kauffman, personal observation).

Current use is most likely not greatly impacting this species. An individual plant could be trampled if it occurs next to a trail. 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. Any future decisions could include mitigation measures to protect these species if any rerouting of existing trails is needed. In addition, slightly more impacts could

occur in Alternative 5 as boaters take out at Lick Log Creek, where a new population was documented in 2007. This species is also addressed in the 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. Adverse cumulative impacts from other activities are unlikely given the remote habitat areas occupied by the species.

Table 3.2-9 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 3.2-9. 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	3rd 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	2nd 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 Chattooga Trail off Whiteside Cove Road when ginseng would be visible. However, even if the few individuals near the Chattooga 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. During the last two years, the NNF has experienced a significant increase in ginseng harvest. In 2008 the NNF permitted harvest of over 50,000 individuals. The potential harvest of individuals along the access trail to the Chattooga Trail off Whiteside Mount Road as a result of increased recreation usage would represent less than 0.01% of the permitted harvested amount.

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 3.2-10 provides a crosswalk of potential impacts on rare species from each of the proposed alternatives.

Table 3.2-10. 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
Gymnoderma lineare	Endangered	Trampling/scraping on rocks on river bank[2]	No	No	No	No	No	No	No	No
Acrobolbus ciliatus	Sensitive	Trampling/scraping on rocks in river and river bank	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cephalozia macrostachya ssp. Australis	Sensitive	Same as above	No	No	No	Yes	No	Yes	Yes	Yes
Hydrothyria venosa	Sensitive	Same as above	No	No	No	Yes	No	Yes	Yes	Yes
Lejeunea blomquistii	Sensitive	Same as above	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Lophocolea appalachiana	Sensitive	Same as above	No	No	No	Yes	Yes	Yes	Yes	Yes
Marsupella emarginata var. latiloba	Sensitive	Same as above	No	No	No	Yes	No	Yes	Yes	Yes
Plagiochila austinii	Sensitive	Same as above	No	No	No	Yes	No	Yes	Yes	Yes
Plagiochila caduciloba	Sensitive	Same as above	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Plagiochila sharpie	Sensitive	Same as above	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Plagiochila sullivantii var. sullivantii	Sensitive	Same as above	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Plagiomnium carolinianum	Sensitive	Same as above	No	No	No	Yes	No	Yes	Yes	Yes
Radula sullivantii	Sensitive	Same as above	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Bryoxiphium norvegicum	Locally Rare	Same as above	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Chiloscyphus muricatus	Locally Rare	Same as above	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Pohlia lescuriana	Locally Rare	Same as above	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes
Homalia trichomanoides	Locally Rare	Same as above	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes
Trichomanes boschianum	Locally Rare	Same as above	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Trichomanes petersii	Locally Rare	Same as above	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Lysimachia fraseri	Sensitive	Trampling on islands	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Juncus gymnocarpus	Locally Rare	Trampling on islands	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Stellaria alsine	Locally Rare	Trampling on islands	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Carex manhartii	Locally Rare	Trampling from portage trails, campsites	Yes	No	No	Yes	Yes	Yes	Yes	Yes
Listera smallii	Locally Rare	Trampling on portage trails	No	No	No	Yes	Yes	Yes	Yes	Yes
Lygodium palmatum	Locally Rare	Trampling at campsites	Yes	No	No	Yes	Yes	Yes	Yes	Yes
Stewartia ovata	Locally Rare	Trampling at campsites	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Calystegia catesbiana var sericata	Locally Rare	Impacted by trail closures (loss of early seral habitat)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Ephebe solida	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

[2] A determination of "Not likely to adversely affect" was made in the BA for *Gymnoderma lineare*.

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. For *Gymnoderma lineare*, it was determined during a site visit with U.S. Fish and Wildlife Service personnel (Asheville, NC and Columbia, SC offices) that the population was in a protected location which would discourage any visitation from boaters; if adjacent eastern hemlocks fell across the river here, requiring portage, the natural area to traverse would be the western bank where the species did not occur. Therefore, project activities associated with any of the five boating alternatives is not likely to adversely affect *Gymnoderma lineare*.

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 NNIS 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 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.*

Recent past activities within the upper Chattooga River watershed that may still be impacting rare plant species include prescribed burning, road reconstruction and timber management. Present ongoing activities that may affect plant species include brook trout restoration and habitat enhancement, wildlife opening maintenance, road maintenance and recreational activities. Possible future activities include prescribed burning, timber management, invasive plant management and road reconstruction in addition to the present ongoing activities.

In the past ten to 20 years, recreational use has increased on the trails and on the river within the wild and scenic corridor. The increased use has affected individual rare plant species. The recreational activities are anticipated to continue in the future in the most accessible portions of the river corridor. Recent home development, road construction and reconstruction have primarily contributed to the loss of suitable habitat for the forest-associated species and to a lesser extent to the gorge river-associated species within private property in the corridor. There have been less frequent and smaller disturbances of this habitat within public ownership areas. These cumulative effects on plants on private property are expected to continue for the foreseeable future given the high land value across the watershed.

Federally Listed Species

Gymnoderma lineare
None of the alternatives that include boating (alternatives 4, 5, 8, 9 and 10) are likely to result in trampling impacts to *Gymnoderma lineare* or to adversely affect this species. Similarly, no project activities associated with the non-boating alternatives are likely to affect *Gymnoderma lineare*. No future projects on the CONF or the NNF are anticipated to affect *Gymnoderma lineare*. Thus there are no cumulative affects anticipated on *Gymnoderma lineare* with implementation of this project for all alternatives.

Sensitive Plant Species

Thirteen sensitive plant species were identified for further analysis based on potential effects from any of the alternatives proposed for the Chattooga River recreational use project. Seven of these sensitive plant species could have individuals impacted by any one of the eight alternatives. These species occur in more accessible corridor areas and could be trampled or crushed with existing and/or increased recreational usage. These seven species are *Acrobolbus ciliatus, Lejeunea blomquistii, Lysimachia fraseri, Plagiochila caduciloba, Plagiochila sharpii, Plagiochila sullivantii var. sullivantii,* and *Radula sullivantii*.

With the exception of *Lysimachia fraseri*, none of the individuals within populations recorded for these seven species are likely to be affected by projects within the upper Chattooga River corridor, other than recreational impacts. Since these species were relocated during the field review it is suspected that existing recreation use provides enough habitat for their continued persistence in the upper Chattooga River. With increased usage, except for *Lejeunea blomquistii* and *Plagiochila sullivantii var. sullivantii,* the remaining species should be able to persist within the upper Chattooga River since they occur in both accessible and inaccessible portions of the gorge and the inaccessible portions will receive fewer impacts from all recreational users. Provided the monitoring plan is implemented for alternatives 4, 8, 9, or 10 for *Lejeunea blomquistii* and *Plagiochila sullivantii var. sullivantii*, there are no anticipated cumulative effects that will lead to further impacts on these two species within the upper Chattooga River.

For *Lysimachia fraseri*, two previous road improvement projects within the NNF have impacted habitat and directly affected individuals along Bull Pen Road and Whiteside Cove Road. Habitat conditions within these two areas are not currently suitable for *Lysimachia fraseri* and probably will not become suitable for another ten years. A long-term project to relocate individuals currently maintained in a common garden at Warren Wilson College will improve the viability of this species within the Chattooga River watershed portion of the NNF. Based on regrowth of the propagated stems, the net loss of stems from these previous projects is less than 200. The goal with the restoration project is to reestablish the species in sites with recurrent disturbance to ensure its long-term persistence. The past negative impacts and the anticipated benefits in the future will result in a slightly greater cumulative loss of individuals of *Lysimachia fraseri* with implementation of any of the Chattooga River recreation alternatives, including the no-action alternative.

Cephalozia macrostachya ssp. australis, *Marsupella emarginata var. lobata*, *Plagiochila austinii*, and *Plagiomnium carolinianum* could be negatively impacted with the action boating alternatives 4, 8, 9 and 10. No other projects in the past or anticipated in the future have impacted, or are likely to impact these four bryophytes.

Hydrothyria venosa, a sensitive aquatic lichen, could also be negatively impacted with the action boating alternatives 4, 8, 9, and 10. For *Hydrothyria venosa*, road construction associated with one previous vegetation management project within the Chattooga River watershed directly impacted occupied habitat and permanently removed a small portion of the population with placement of a culvert. Six other past projects may have affected occupied habitat for this species from increased sediments following disturbance from project activities. However, this effect would have been relatively short in duration and dissipated throughout the stream channel. Except for the permanent loss of a very small amount of stream habitat with the culvert, no remaining direct and indirect effects from previous projects are negatively affecting this lichen. Thus any cumulative impacts on *Hydrothyria venosa* habitat with implementation of alternatives 4, 8, 9 or 10 should be miniscule in comparison to the amount of habitat present within NC in the upper Chattooga River corridor.

Locally Rare Species

Fourteen locally rare plant species were identified for further analysis based on potential effects from any of the alternatives proposed for the Chattooga River recreational use project. Eight of these locally rare plant species could have individuals impacted by any one of the eight alternatives. As previously indicated for impacts to sensitive plant species, these locally rare plant species occur in more accessible corridor areas and could be trampled or crushed with existing and/or increased recreational usage. These eight species are *Bryoxiphium norvegicum*, *Calystegia catesbiana var sericata*, *Chiloscyphus muricatus*, *Juncus gymnocarpus*, *Stellaria alsine*, *Stewartia ovata*, *Trichomanes petersii*, and *Trichomanes boschianum.* Other than *Calystegia catesbiana var sericata* and *Juncus gymnocarpus*, recreational impacts within the Chattooga River are the only negative affects to these species. No other projects known for all these species within the upper Chattooga River are likely to affect any individuals within populations recorded for these species. Since these species were relocated during the field review it is suspected the existing recreation use provides enough habitat for their continued persistence in the upper Chattooga River. With increased usage, except for *Bryoxiphium norvegicum* and *Chiloscyphus muricatus*, the remaining species should be able to persist within the upper Chattooga River since they occur in both accessible and inaccessible portions of the gorge and the inaccessible portions will receive fewer impacts from all recreational users. Provided the monitoring plan is implemented for alternatives 4, 8, 9 and 10 for *Bryoxiphium norvegicum* and *Chiloscyphus muricatus*, there are no anticipated cumulative effects that will lead to further impacts on these two species within the upper Chattooga River.

Previous road improvement projects on the NNF have affected individuals of both *Calystegia catesbiana var. sericata* and *Juncus gymnocarpus*. For *Calystegia catesbiana var. sericata* this was only a short-term impact and no longer affects the species. There is another anticipated impact to a population on a proposed road project on the NNF. This anticipated negative impact is also expected to be short-term in duration, one to two years. For *Juncus gymnocarpus*, which

can occur in roadside seeps or ditch lines, the anticipated negative effect is still ongoing and probably will not result in suitable habitat for another ten years. *Juncus gymnocarpus* is relatively common in the NNF in the upper Chattooga River watershed. As a result it is no longer tracked as a rare species. No known projects in the past have affected this species, nor any anticipated in the future on the Chattahoochee NF.

Homalia trichomanoides and *Pohlia lescuriana* may have individuals impacted with all the alternatives except Alternative 5. *Ephebe solida* and *Listera smallii* could be impacted by any of the five boating alternatives. *Carex manhartii* and *Lygodium palmatum* could have individuals impacted by any of the five boating alternatives as well as the no-action alternative. Other than *Carex manhartii*, no other projects in the past or anticipated in the future have impacted or are likely to impact these two bryophytes and four vascular plants. *Carex manhartii* is relatively common in the NNF in the upper Chattooga River watershed. Various vegetation management and road improvement projects have impacted this species. Most of the negative impacts have been for the short term; a few have been permanent, such as new road construction for vegetation management projects. However the species is still common in the upper Chattooga River watershed in the NNF, and as a result it is no longer tracked as a rare species. No known projects in the past have affected this species, nor are any anticipated in the future on the CONF.

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. They may, however, contribute to a reduction in population size of individual species listed in Table 3.2-10 and result in a “yes” under the column addressing Alternative 1 for those species not already being impacted.

Alternative 2 – Direct, Indirect and Cumulative Effects

Direct and indirect effects to rare species are the same as in Alternative 1 except there would be less potential for 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 3.2-10 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 type of direct and indirect effects as detailed for Alternative 1 will occur to rare species with Alternative 4. The type of direct and indirect effects can occur for both alternatives. However, under Alternative 4, there is potentially a greater frequency of these effects. This increased frequency could result in greater population decline for affected species as more people will be using 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 3.2-10. The most noteworthy effect of this alternative is the potential 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. The majority of the rare species are on rocks at the edge of the river, not the center of the main channel. 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 populations of rare bryophytes that were located along the river are quite miniscule. It would be difficult to determine their distribution and abundance. Based on inventories, the greatest likelihood of occurrence was identified along specific stretches of the river. The greatest potential impact to the rarest species would be from creation of portage trails. To mitigate these potential effects, periodic monitoring of log jams is required with site specific bryophyte surveys conducted when they are located.

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 trichomanoide,* and *Bryoxiphium norvegicum* for NNF and *Listera smallii* for CONF. Sections of the Chattooga River were identified as having high potential for these species. The Monitoring Plan in Appendix B requires reconnaissance of large woody debris prior to the start of the boating season in these sections. If portage is deemed necessary, surveys would be made to determine the presence of these species. A site-specific NEPA decision would be made for portage trails.

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 3.2-11). 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 Alternative 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 3.2-11 summarizes the findings of effects for rare plants.

Table 3.2-11. Summary Of Determination Of Effect For Each Rare Plant Species Potentially Affected By Any Of The Eight 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
Gymnoderma lineare	E	No Effect	No Effect	No Effect	Not likely to adversely affect	Not likely to adversely affect	Not likely to adversely affect	Not likely to adversely affect	Not likely to adversely affect
Acrobolbus ciliatus	S	#	#	#	#	#	#	#	#
Cephalozia macrostachya ssp. australis	S	No impacts	No impacts	No impacts	May impact *	No impacts	May impact *	May impact *	May impact *
Hydrothyria venosa	S	No impacts	No impacts	No impacts	#	No impacts	#	#	#
Lejeunea blomquistii	S	#	#	#	May impact *	May impact *	May impact *	May impact *	May impact *
Lophocolea appalachiana	S	No impacts	No impacts	No impacts	May impact *	May impact *	May impact *	May impact *	May impact *
Lysimachia fraseri	S	#	#	#	#	#	#	#	#
Marsupella emarginata var. latiloba	S	No impacts	No impacts	No impacts	#	No impacts	#	#	#
Plagiochila austinii	S	No impacts	No impacts	No impacts	#	No impacts	#	#	#
Plagiochila caduciloba	S	#	#	#	#	#	#	#	#
Plagiochila sharpii	S	#	#	#	#	#	#	#	#
Plagiochila sullivantii var. sullivantii	S	#	#	#	May impact *	#	May impact *	May impact *	May impact *
Plagiomnium carolinianum	S	No impacts	No impacts	No impacts	May impact *	No impacts	May impact *	May impact *	May impact *
Radula sullivantii	S	#	#	#	#	#	#	#	#
Bryoxiphium norvegicum	LR	#	#	#	May impact *	#	May impact *	May impact *	May impact *
Calystegia catesbiana var sericata	LR	#	#	#	#	#	#	#	#
Carex manhartii	LR	#	No impacts	No impacts	#	#	#	#	#
Chiloscyphus muricatus	LR	#	#	#	May impact *	#	May impact *	May impact *	May impact *
Ephebe solida	LR	No impacts	No impacts	No impacts	#	#	#	#	#
Homalia trichomanoides	LR	#	#	#	May impact *	No impacts	May impact *	May impact *	May impact *
Juncus gymnocarpus	LR	#	#	#	#	#	#	#	#
Listera smallii	LR	No impacts	No impacts	No impacts	May impact *	May impact *	May impact *	May impact *	May impact *
Lygodium palmatum	LR	#	No impacts	No impacts	#	#	#	#	#
Pohlia lescuriana	LR	#	#	#	#	No impacts	#	#	#
Stellaria alsine	LR	#	#	#	#	#	#	#	#
Stewartia ovata	LR	#	#	#	#	#	#	#	#
Trichomanes boschianum	LR	#	#	#	#	#	#	#	#
Trichomanes petersii	LR	#	#	#	#	#	#	#	#

May impact individuals of the individual species but not likely to cause a viability concern on the individual forest unit.
Determinations for endangered and sensitive species are found in the BA and the BE.

3.2.2 Terrestrial Wildlife

SUMMARY OF FINDINGS

The terrestrial wildlife analysis evaluated potential effects from the eight alternatives on MIS, PETS and 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 appears to be providing for conservation of rare wildlife species known to occur in the corridor, as there has been no documentation which links "declines" of rare species to the current management of the upper Chattooga River. There are relative differences among the boating alternatives; however, in general, those that have the greatest restrictions on the number of boatable days (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. Regardless of alternative, there is the potential for the spread of NNIS plants, animals, insects and diseases into the Chattooga River corridor. As the number of forest visitors increases, there is the potential for the increased spread of NNIS.

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; therefore, it 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 percent of all rare species known or with potential to occur in the Chattooga River watershed are restricted to the “upper portion of the watershed” (defined at footnote #1 at Table 3.2-12).

Fifteen rare species are known to occur in the Chattooga River watershed (see Table 3.2-12). 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 but have the potential to occur within the Chattooga River watershed, the Chattooga wild and scenic river corridor, or both (see Table 3.2-13).

Table 3.2-12. CONF, NNF And SNF Rare Wildlife Species Known To Occur Within The Chattooga River Watershed.

Type	Scientific Name	Common Name	Element Occurrence Location[1]	Number of Separate Element Occurrences	Forest	Rank[2]
Amphibian	*Aneides aenus*	Green Salamander	Upper and Lower Watershed	28 (27 Upper, 1 Lower)	NNF CONF	LR
Amphibian	*Plethodon teyahalee*	Southern Appalachian Salamander	Upper Watershed	10	NNF CONF	S
Bird	*Aegolius acadicus pop. 1*	Northern Saw-whet Owl	Upper Watershed	1	NNF	LR
Bird	*Falco peregrinus*	Peregrine Falcon	Upper Watershed	1	NNF	S
Bird	*Contopus cooperi*	Olive-sided Flycatcher	Upper Watershed	1	NNF	LR
Butterfly	*Erora laeta*	Early Hairstreak	Upper Watershed	1	NNF	LR
Mammal	*Myotis leibii*	Eastern Small-footed Bat	Upper Watershed	5	NNF SNF CONF	S
Mammal	*Corynorhinus rafinesquii*	Rafinesque's Big-eared Bat	Upper Watershed	1	NNF	S
Mammal	*Neotoma floridana haematoreia*	Southern Appalachian Woodrat	Upper and Lower Watershed	2	CONF	LR
Mammal	*Sorex palustris Punctulatus*	Southern Water Shrew	Upper Watershed	2	NNF	S
Mammal	*Sorex dispar*	Long-tailed Shrew	Upper Watershed	1	CONF	LR
Mammal	*Tamiasciurus hudsonicus*	Red Squirrel	Lower Watershed	3	CONF	LR
Reptile	*Eumeces anthracinus*	Coal Skink	Upper Watershed	2	NNF	LR
Reptile	*Clemmys muhlenbergii*	Bog Turtle	Upper Watershed	2	NNF CONF	T SA (NNF) S (CONF)
Reptile	*Pituophis m. melanoleucus*	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 3.2-13. CONF, NNF And SNF Rare Wildlife Species With Potential To Occur Within The Chattooga River Watershed.

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

PETS and Locally Rare Wildlife Species

All rare species lists and information were compiled by: (1) consulting 14 years of U.S. Forest Service 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 organization (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 3.2-14).

Table 3.2-14. 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	*Plethodon teyahalee* Southern Appalachian Salamander	Moist forests in southwestern mountains at all elevations	CONF NNF SNF	S
Butterfly	*Speyeria diana* Diana Fritillary	Rich woods and adjacent edges and openings; host plants violets (Viola), Pine Forests	CONF NNF SNF	S
Mammal	*Myotis leibii* Eastern Small-footed Bat	Roosts in hollow trees, rock outcrops, bridges (warmer months), in caves and mines (winter)	CONF NNF SNF	S
Mammal	*Corynorhinus rafinesquii* Rafinesque's Big-eared Bat	Roosts in old buildings, hollow trees, caves, mines, and beneath bridges, usually near water	CONF NNF SNF	S
Moth	*Euchlaena milnei* Milne's Euchlaena	Hardwood forest and riparian areas in mountains	NNF	S
Spider	*Nesticus silvanus* a nesticid spider	Habitat not indicated (apparently endemic to southern mountains of NC)	NNF	S
Amphibian	*Ambystoma talpoideum* Mole Salamander	Breeds in fish-free semipermanent woodland ponds; forages in adjacent woods	NNF	LR
Amphibian	*Aneides aeneus* Green Salamander	Damp, shaded crevices of cliffs or rock outcrops in deciduous forests (southern forests)	CONF NNF	LR
Bird	*Dendroica cerulea* Cerulean Warbler	Mature hardwood forests; steep slopes and coves in mountains (breeding season only)	NNF CONF	LR
Bird	*Empidomax minimus* Least Flycatcher	Open hardwood forests, groves, streamside trees (breeding season only)	CONF	LR
Bird	*Empidomax trailii* Willow Flycatcher	Wet thickets, streamsides, riparian areas (breeding season only)	CONF	LR
Bird	*Shyrapicus varius appalachiensis* Appalachian Yellow-bellied Sapsucker	Mature, open hardwoods with scattered dead trees (breeding season only)	NNF	LR
Bird	*Sitta canadensis* Red-breasted Nuthatch	Mixed conifer and hardwood forest and woodland (breeding season only)	CONF	LR
Butterfly	*Autochton cellus* Golden-banded Skipper	Moist woods near streams; host plant-hog peanut (*Amphicarpa bracteata*)	NNF	LR

Type	Scientific Name Common Name	Habitat/Range	Forest	Listing
Butterfly	*Celastrina niger* Dusky Azure	Rich, moist deciduous forests; host plant-goat's beard (*Aruncus dioicus*)	NNF	LR
Mammal	*Neotoma floridana haematoreia* Eastern Woodrat – Southern Appalachian Pop.	Rocky places in deciduous or mixed forests	CONF	LR
Mammal	*Tamiasciurus hudsonicus* Red Squirrel	Mixed conifer and hardwood forest and riparian areas	CONF	LR
Reptile	*Eumeces anthracinus* Coal Skink	Rocky slopes, wooded hillsides and roadbanks	CONF	LR
Reptile	*Pituophis m. melanoleucus* Northern Pine Snake	Dry and/or sandy pine/oak uplands	CONF	LR
Spider	*Nesticus species nova 2* A nesticid spider	Rocky talus fields along the Chattooga River and rock crevices of Whiteside Mountain	NNF	LR
Terrestrial Gastropod	*Glyphyalinia junaluskana* Dark Glyph	Moist leaf litter in deciduous woods on mountainsides	NNF	LR
Terrestrial Gastropod	*Glyphyalinia pentadelphia* Pink Glyph	Pockets of moist leaves in upland woods	NNF	LR
Terrestrial Gastropod	*Haplotrema kendeighi* Blue-footed Lancetooth	Mountainsides in leaf litter, usually above 2000 feet elevation	NNF	LR
Terrestrial Gastropod	*Patera clarki* Dwarf Proud Globe	Under leaf litter on wooded mountainsides	NNF	LR
Terrestrial Gastropod	*Paravitrea lamellidens* Lamellate Supercoil	Pockets of deep, moist leaf litter on wooded hillsides or in ravines	NNF	LR
Terrestrial Gastropod	*Paravitrea umbilicarus* Open Supercoil	Pockets of deep, moist leaf litter on wooded hillsides or in ravines	NNF	LR
Terrestrial Gastropod	*Zonitoides patuloides* 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: birds, butterflies, mammals, moths, reptiles and spiders. The birds and mammals were dropped from the list because they are very mobile and easily adjust to human-related disturbances. Wildlife can move to other suitable nearby habitat while the disturbance occurs, then return after the disturbance has passed. 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 3.2-14). All rare wildlife species included in Table 3.2-15 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 3.2-16 provides additional information on the sensitive and rare species analyzed for each alternative.

Table 3.2-15. 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	*Plethodon teyahalee*	CONF NNF SNF	S
Amphibian	Green Salamander	*Aneides aeneus*	CONF NNF	LR
Terrestrial Gastropod	Dark Glyph	*Glyphyalinia junaluskana*	NNF	LR
Terrestrial Gastropod	Pink Glyph	*Glyphyalinia pentadelphia*	NNF	LR
Terrestrial Gastropod	Blue-footed Lancetooth	*Haplotrema kendeighi*	NNF	LR
Terrestrial Gastropod	Dwarf Proud Globe	*Patera clarki*	NNF	LR
Terrestrial Gastropod	Lamellate Supercoil	*Paravitrea lamellidens*	NNF	LR
Terrestrial Gastropod	Open Supercoil	*Paravitrea umbilicarus*	NNF	LR
Terrestrial Gastropod	Appalachian Gloss	*Zonitoides patuloides*	NNF	LR

Table 3.2-16. Information On Sensitive And Rare Wildlife Species Analyzed In Detail For All Alternatives.

Name	Species Ranking		Forest List (Occurrences)	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.
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 3.2-17). 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 3.2-17. CONF, NNF, And SNF MIS List And Project-Level Analysis Information.

COMMON NAME	IMPORTANT HABITAT COMPONENT	FOREST	PROJECT LEVEL ANALYSIS / REASON[1]
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
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 Successionl 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 = 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 by existing users or boaters 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 are the most important elements 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, *Chattahoochee-Oconee and Sumter Monitoring and Evaluation Reports, 2008*) 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 population's stable trend across the forests.

3) Ovenbird
The ovenbird is used as an MIS on the NNF and CONF 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 alternative.

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 alternative.

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 alternative.

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 alternative.

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 alternative.

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 alternative.

Effects of the Alternatives on Proposed, Endangered, Threatened, Sensitive and Locally Rare Terrestrial Wildlife

There is the potential for introducing new outbreaks or new NNIS from recreation visitors to the wildlife along the Chattooga River in all alternatives. NNIS can impact wildlife indirectly or by altering habitats, but some NNIS, such as West Nile Virus, can cause direct mortality to wildlife.

The risk of spread of NNIS would increase as the number of forest visitors increases. The potential for spread of NNIS occurs regardless of alternative. While some of the alternatives invite more use, it is anticipated that the chances of NNIS introduction and spread will increase or decrease in proportion to the amount of users in the corridor.

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, the proliferation of user created trails and campsites could affect rare species in the future, but the exact effect is unknown, since the proliferation of user created trails is sporadic and unpredicatable.

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 species and their habitat. There will be no direct, indirect, or cumulative effects to sensitive or 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 sensitive and rare species and their habitat. Overall conservation of sensitive and rare species is more than Alternative 1 and less than Alternative 2. There will be no direct, indirect, or cumulative effects to sensitive and 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 sensitive and (continue making this correction throughout!) 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 sensitive and locally rare species include trampling and disturbance from increased user densities. Impacts to habitat for sensitive and locally rare species include creation of portage trails and new access trails and increased trampling and disturbance to plants. 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 percent 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 boating is allowed year-round, at all flow levels 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.

Migratory Birds

The Chattooga River corridor provides optimal mature forest habitat for a variety of migratory birds which inhabit the Appalachian mountain eco-region during a portion of their life cycle. Table 3.2-18 lists the migratory birds which have potential to occur within the river corridor, as well as any potential effects which might be associated with the various alternatives.

Table 3.2-18. Migratory Birds With Potential To Occur Within The Chattooga River Analysis Area

Species	Habitat	Potential Effect (Y/N)
Swainson's warbler	Mature forest/Early Succession Riparian	Y
Black-throated blue warbler	Mature forest	Y
Louisiana water thrush	Mature forest	Y
Acadian flycatcher	Mature forest	Y
Worm-eating warbler	Mature forest	Y
Wood thrush	Mature forest	Y
Kentucky warbler	Mature forest	Y
Yellow-throated vireo	Mature forest	Y
Black burnian warbler	Mature forest	Y

ENVIRONMENTAL CONSEQUENCES

In general, the least amount of human disturbance possible is the best scenario for the above mentioned migratory birds. Obviously, the fewer the people allowed within the Chattooga corridor, the less the likelihood of disruption to the natural life-cycle or patterns of these species, such as foraging, reproducing and nesting. However, it should be noted that none of the alternatives present a threat to the structure or linkage of habitats for these species. The addition of boating and related increased human use within the analysis area may disturb some migratory birds, but it is highly unlikely that the boating activity would cause any species to abandon the river corridor or cause a decline in individual species population trends. More likely, migratory birds which inhabit the corridor, especially very near the river itself, would likely be flushed to other areas of the corridor which have less human disturbance. Overall, if boating was allowed within the upper corridor, some individual birds may be displaced, but it is unlikely the addition of boating would affect the viability of the populations as a whole.

The following analysis compares the effects of each alternative on migratory bird species. Currently, these species are being adequately protected within the corridor.

Table 3.2-19 qualitatively compares recreational impacts (group size, boating, trail and camping management) to impacts on migratory birds.

Table 3.2-19. Qualitative Comparison Of Potential Recreational Effects Of Alternatives On Identified Migratory Birds

Alternative Number	Group Size Management	Boating Management	Trail Management	Camping Management	Overall Protection To Species
2	Yes – Throughout corridor	No Boating	Same or Less Trails	Less Camping	1 = greatest
3	Yes – Throughout corridor	No Boating	Same or Less Trails	Same or Less Camping	2
1	Yes – In Wilderness	No Boating	Same or More Trails	More New Camps Due to Relocation	3
5	Yes – Throughout corridor	Boating; (highest rare wildlife protection restriction)	Same or Less Trails	Same or Less Camping	4
9	Yes – Throughout corridor	Boating; (high restriction)	Same or Less Trails	Same or Less Camping	5
4	Yes – Throughout corridor	Boating; (moderate restriction)	Same or Less Trails	Same or Less Camping	6
10	Yes – Throughout corridor	Boating; (low restriction)	Same or Less Trails	Same or Less Camping	7
8	Yes – Throughout corridor	Boating; (lowest rare wildlife protection restriction)	Same or Less Trails	Same or Less Camping	8 = least

Alternative 1 – Direct, Indirect and Cumulative Effects

Generally, this alternative protects these species from human-related disturbances and habitat damage by limiting group size within the wilderness areas. Large groups, especially when camping, are more likely to have a “larger” footprint on sensitive habitats and wildlife species in any given area.

Under this alternative, it can be assumed that trails and campsites in the river corridor above Highway 28 may increase slightly in the future. Currently, there are 127 campsites within the upper corridor, 26 of which are within 20 feet of the river. It is assumed several campsites would be decommissioned and new campsites would be constructed in more suitable locations. Although new trails and campsite construction/relocation, if not carefully planned, could affect these species, this is not expected to be the case since any new actions would require project level NEPA analysis including effects of project proposals on wildlife, including migratory birds.

Past, present, and foreseeable projects (Table 3.1-9) are aimed at improving ORVs in the corridor by reducing erosion and sediment from roads and recreational facilities, improving native vegetation and keeping forests healthy. These activities would disturb migratory birds in the short term but would not cumulatively cause migratory birds to abandon the river corridor or cause a decline in individual species population trends.

Alternative 2 - Direct, Indirect and Cumulative Effects

This alternative is generally the most user restrictive of all alternatives and provides the most protection to these species. These restrictions would inevitably reduce human related

disturbances and impacts in the upper corridor, thus protecting these species and their habitat. Cumulative effects are the same as in Alternative 1.

Alternative 3 - Direct, Indirect and Cumulative Effects

This alternative is generally more restrictive (and protective) than Alternative 1, but slightly less restrictive than Alternative 2. This alternative would inevitably reduce human related disturbances and impacts in the upper corridor, thus protecting these species and their habitat. Cumulative effects are the same as in Alternative 1.

Alternative 4 - Direct, Indirect and Cumulative Effects

This alternative is similar to alternatives 2, 3, 5 and 9 with respect to the management of group size, trails and camping. It differs from other boating alternatives in that it allows boating between December 1 and March 1 from the confluence of Norton Mill Creek in North Carolina to ¼ mile above Burrells Ford Bridge, and from ¼ mile below Burrells Ford Bridge to Lick Log Creek. This alternative is considered less protective than Alternative 9 because it does allow boating through the rock gorge portion of the upper corridor.

Potential direct and indirect effects to these species from this alternative 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 would have no effect on these species. It is therefore assumed that some individuals of these species may be directly or indirectly affected by this alternative. Although individuals of these species may be directly or indirectly impacted under this alternative, it is not likely that the alternative would have a cumulative effect on the population viability of these species when combined with other past, present and future management actions on both public and private land.

Alternative 5 - Direct, Indirect and Cumulative Effects

This alternative is similar to alternatives 2 and 3 with respect to the management of group size, trails and camping. It is less restrictive than the above mentioned alternatives in that it allows boating on a portion of the upper Chattooga River, approximately from Bull Pen Road Bridge to Lick Log. Boating would be a new use in the upper Chattooga corridor, and would therefore likely increase the number of users and the associated habitat disturbance in that area.

In this analysis, the most important aspects of the boating alternatives, which may have impacts on wildlife, include those sections of the river proposed for boating and their total length. Other aspects of the boating alternatives, such as season (in relation to potential impacts) and minimum flow are more unpredictable and more likely to change over time. For instance, the number of boatable days (based on flow) would likely vary from year to year, and may actually increase as a result of less evapotranspiration and more water runoff due to the loss of hemlocks. In addition, heavy concentrations of boaters during the seasonal boating period (specifically, December 1 –

March 1) could result in wildlife habitat damage comparable to that resulting from all-season boating particularly if the season coincides with large quantities of recent hemlock fall increasing the need for portage trails.

However, of all the boating alternatives, Alternative 5 is the most protective of migratory bird species. It excludes the majority of the North Carolina section of the upper Chattooga from boating, thereby protecting the most pristine wildlife habitats within the corridor. This alternative also includes season and flow restrictions which further limit boating opportunities and thus provide more protection to migratory bird species and associated habitat. Nevertheless, any additional recreational use, such as boating, in the upper corridor would likely result in more user-created resource impacts, due simply to to increased user densities in the area.

Potential direct and indirect effects to these species from this alternative 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 would have no effect on these species. It is therefore assumed that some individuals of these species may be directly or indirectly affected by this alternative. Although individuals of these species may be directly or indirectly impacted under this alternative, it is not likely that the alternative would have a cumulative effect on the population viability of these species when combined with other past, present and future management actions on both public and private land.

Alternative 8– Direct, Indirect and Cumulative Effects

This alternative is more restrictive than all alternatives in terms of maximum group size. However it is similar to alternatives 2-5, 9 and 10 with respect to trail and camping management. Alternative 8 is the least restrictive where boating management is concerned allowing for boating the entire stretch of the upper Chattooga without seasonal or flow restrictions. To control user encounters the alternative includes an adaptive management framework that could require a user permitting system if proposed user encounters are exceeded. However, user limitations would only be put into affect three to five years after the implementation of this alternative. Under this timeline most of the user created impacts, such as portage trails, access trails and dispersed campsites would have likely already occurred. Thus, this alternative most likely would be the least protective of the species and their habitat.

Potential direct and indirect effects to these species from this alternative 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 would have no effect on these species. It is therefore assumed that some individuals of these species may be directly or indirectly affected by this alternative. Although individuals of these species may be directly or indirectly impacted under this alternative, it is not likely that the alternative would

have a cumulative effect on the population viability of these species when combined with other past, present and future management actions on both public and private land.

Alternative 9– Direct, Indirect and Cumulative Effects

This alternative is similar to alternatives 2, 3 and 5 with respect to the management of group size, trails and camping. Alternative 9 allows boating from November 1 to March 31 (with flow restrictions from below private land in NC to East Fork Trail above Burrells Ford). Although this alternative has a seasonal restriction and excludes the Rock Gorge section of the upper Chattooga from boating, this alternative does allow for more boating access into the most sensitive and rare wildlife habitat in the upper corridor above Bull Pen Road. Therefore, this alternative is considered less restrictive than Alternative 5, but more restrictive than Alternative 10 since it does exclude and protect a portion of the upper corridor (Rock Gorge) from additional user access and associated impacts.

Potential direct and indirect effects to these species from this alternative 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 would have no effect on these species. It is therefore assumed that some individuals of these species may be directly or indirectly affected by this alternative. Although individuals of these species may be directly or indirectly impacted under this alternative, it is not likely that the alternative would have a cumulative effect on the population viability of these species when combined with other past, present and future management actions on both public and private land.

Alternative 10– Direct, Indirect and Cumulative Effects

This alternative is similar to alternatives 2-5 and 9 with respect to the management of group size, trails and camping. This alternative allows boating from November 1 to March 1 (with flow restrictions along the entire upper stretch of the Chattooga River from below private land to Hwy 28 bridge). This alternative is less restrictive than the above mentioned alternatives in that it would allow boating along the entire upper corridor.

Potential direct and indirect effects to these species from this alternative 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 would have no effect on these species. It is therefore assumed that some individuals of these species may be directly or indirectly affected by this alternative. Although individuals of these species may be directly or indirectly impacted under this alternative, it is not likely that the alternative would have a cumulative effect on the population viability of these species when combined with other past, present and future management actions on both public and private land.

3.2.3 Aquatic Species and Habitats

SUMMARY OF FINDINGS

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, roads 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.

Regardless of alternative, there is the potential for the spread of aquatic NNIS plants, animals, insects and diseases into the Chattooga River. As the number of forest visitors increases, there is the potential for the increased spread of NNIS.

AFFECTED ENVIRONMENT

This analysis encompassess 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 Chattooga watershed above Tugaloo Lake.

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 3.2-20). Of these five species, there are state natural heritage program element occurrence (EO) 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 3.2-20. PETS Aquatic Species For The SNF, CONF And NNF.

Species	Species Ranking				Forest List	Habitat
	Global	State	AFS	Forest		
Chauga crayfish *Cambarus chaugaensis*	G2	GA-S1 NC-S2 SC-S2S3	T	Sensitive	CONF NNF SNF	Fast-moving, rocky tributaries of the upper Savannah River.
Brook floater *Alasmidonta varicosa*	G3	GA-S2 NC-S1 SC-SNR	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 *Beloneuria georgiana*	G2	GA-S2 NC-S1S3		Sensitive	CONF	High elevation waterfalls, spray cliffs and spring brooks.
Mountain river cruiser *Macromia margarita*	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 *Ophiogomphus incurvatus*	G2G2	GA-S1 NC-S1?		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 3.2-21. For these species, there are EO 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 Forest Service, SCDNR and Georgia Department of Natural Resources (GADNR). *Stylurus scudderi* was sampled from the Chattooga River between 2001and 2003 (Smock et al. 2004). *Micrasema burksi* was sampled from the Chattooga River and one tributary by English (1990).

Table 3.2-21. Forest Listed Locally Rare Aquatic Species For The CONF And NNF.

Species	Species Ranking				Forest List	Habitat
	Global	State	AFS	Forest		
Hellbender *Cryptobranchus alleganiensis*	G3G4	GA-S2 NC-S3 SC-SNR		LR	NNF	Rocky, clear creeks and rivers, usually where there are large shelter rocks.
Oconee crayfish ostracod *Cymocythere clavata*	GNR	NC-S2?		LR	NNF	Symbiotic on crayfish in mountain streams and rivers in the Savannah River system.
Whitewater crayfish ostracod *Dactylocythere prinsi*	GNR	NC-S1		LR	NNF	Symbiotic on crayfish in mountain streams and rivers in the Savannah River system.
A caddisfly *Rhyacophila amicis*	G2	NC-S2 SC-SNR		LR	NNF	Mountain rivers and creeks.
A caddisfly *Matrioptila jeanae*	G4	GA-SNR NC-S3 SC-SNR		LR	NNF	Streams and rivers.
A caddisfly *Micrasema burksi*	G4G5	GA-SNR NC-S3 SC-SNR		LR	NNF	Mountain streams.
A caddisfly *Micrasema sprulesi*	G5	NC-S3 SC-SNR		LR	NNF	Streams and rivers.
Ski-tipped emerald *Somatochlora elongata*	G5	GA-S1 NC-S2S3		LR	NNF	Slow to moderate streams
Zebra clubtail *Stylurus scudderi*	G4	GA-S1 NC-S3? SC-SNR		LR	NNF	Creeks and rivers of moderate gradient in gravel or sandy substrates.
Habrophlebiodes mayfly *Habrophlebiodes spp.*	GNR	NC-S2		LR	NNF	Very small streams.
Williams' rare winter stonefly *Megaleuctra williamsae*	G2	NC-S1 SC-SNR		LR	NNF	Streams and rivers.
Redeye bass *Micropterus coosae*	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.
Yellowfin shiner *Notropis lutipinnis*	G4Q	GA-S4 NC-S1 SC-SNR	CS	LR	NNF	Clear rocky pools of headwaters, creeks and rivers.
Turquoise darter *Etheostoma inscriptum*	G4	GA-S4 NC-S1 SC-SNR	CS	LR	NNF	Rocky riffles of large creeks and small to medium rivers
Whitetail shiner *Cyprinella galactura*	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 *Notropis leuciodus*	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 3.2-22. Aquatic MIS And Communities For The NNF And SNF.

Aquatic Management Indicator Species and Communities	Forest	Habitat
Management Indicator Species		
Brook trout *Salvelinus fontinalis*	NNF	Coldwater streams.
Rainbow trout *Oncorhynchus mykiss*	NNF	Coldwater streams.
Brown trout *Salmo trutta*	NNF	Coldwater streams.
Blacknose dace *Rhinichthyes atratulus*	NNF	Coldwater streams.
Management Indicator Communities		
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 (Table 3.2-22) 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 3.2-23, 3.2-24 and 3.2-25 address the aquatic community and provide list of fish species from surveys conducted in the Chattooga River watershed by the Forest Service, SCDNR and GADNR.

Table 3.2-23. Fish Species Sampled In The Chattooga River Watershed.

Scientific Name	Common Name
Catostomidae	Suckers
Catostomus commersoni	White sucker
Hypentelium nigricans	Northern hogsucker
Scartomyzon rupiscartes	Striped jumprock
Centrarchidae	Sunfishes
Lepomis auritus	Redbreast sunfish
Lepomis macrochirus	Bluegill
Micropterus coosae	Redeye bass
Cottidae	Sculpins
Cottus bairdi	Mottled sculpin
Cyprinidae	Carps and Minnows
Campostoma anomalum	Central stoneroller
Clinostomus funduloides funduloides	Rosyside dace
Cyprinella nivea	Whitefin shiner
Hybopsis rubrifrons	Rosyface chub
Luxilus coccogenis	Warpaint shiner
Nocomis leptocephalus leptocephalus	Bluehead chub
Notropis leuciodus	Tennessee shiner
Notropis lutipinnis	Yellowfin shiner
Notropis spectrunculus	Mirror shiner
Rhinichthys atratulus	Blacknose dace
Rhinichthys cataractae	Longnose dace
Semotilus atromaculatus	Creek chub
Ictaluridae	Bullhead Catfishes
Ameiurus brunneus	Snail bullhead
Noturus leptacanthus	Speckled madtom
Percidae	Perches
Etheostoma inscriptum	Turquoise darter
Salmonidae	Trouts
Oncorhynchus mykiss	Rainbow trout
Salmo trutta	Brown trout
Salvelinus fontinalis	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 (SCDNR unpublished data). All of the fish species in the community have been assigned a Global Rank of either G4 (apparently secure) or G5 (secure) 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, which is most successful in tributaries to the Chattooga River, has already occurred in one tributary and is planned in two additional tributaries.

Ameiurus brunneus is listed as vulnerable by the AFS (Jelks et. al. 2008). This indicates that the species is in imminent danger of becoming threatened throughout all or a significant portion of its range due to present or threatened destruction, modification, or reduction of its habitat or range. The remaining fish species in the community are ranked as CS (currently stable) by the AFS (Warren et al. 2000).

Eversole et al. (2002) conducted crayfish surveys in the Chattooga River watershed. Crayfish species known to occur are listed in Table 3.2-24.

Table 3.2-24. Crayfish Species That Are Known To Occur In The Chattooga River Watershed.

Scientific Name	Common Name
Cambarus asperimanus	Mitten crayfish
Cambarus bartonii	Common crayfish
Cambarus chaugaensis	Chauga crayfish
Procambarus spiculifer	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 (Taylor et. al. 2007). In addition, *Cambarus asperimanus* is ranked as S1 by the SC Natural Heritage Program, S2 by the GA Natural Heritage Program, and S3? by the NC 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 3.2-25).

Table 3.2-25. Mussel Species That Are Known To Occur In The Chattooga River Watershed.

Scientific Name	Common Name
Alasmidonta varicosa	Brook floater
Elliptio angustata	Carolina lance
Elliptio complanata	Eastern elliptio
Elliptio producta	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 (Williams et. al. 1992). *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. Of the mussel species found on the Andrew Pickens Ranger District, the brook floater (*Alasmidonta varicosa*) population within the Chattooga River is of global significance. From Georgia through at least Maryland, this is the best extant population within this range (Alderman, 2008). 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 15 percent of the total wood surveyed within the streams. The larger, most stable, woody debris class (greater than five meters in length and 55 cm in diameter) ranged from one to seven percent 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 and Sumter National Forests 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 one meter long and 10 cm in diameter that had the potential to influence stream channel shape and function (Table 3.2-26); 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 3.2-27). 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 two percent of total LWD in each stream (Figure 3.2-2).

Table 3.2-26. 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 3.2-27. 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 SNF Desired Future Condition For LWD.

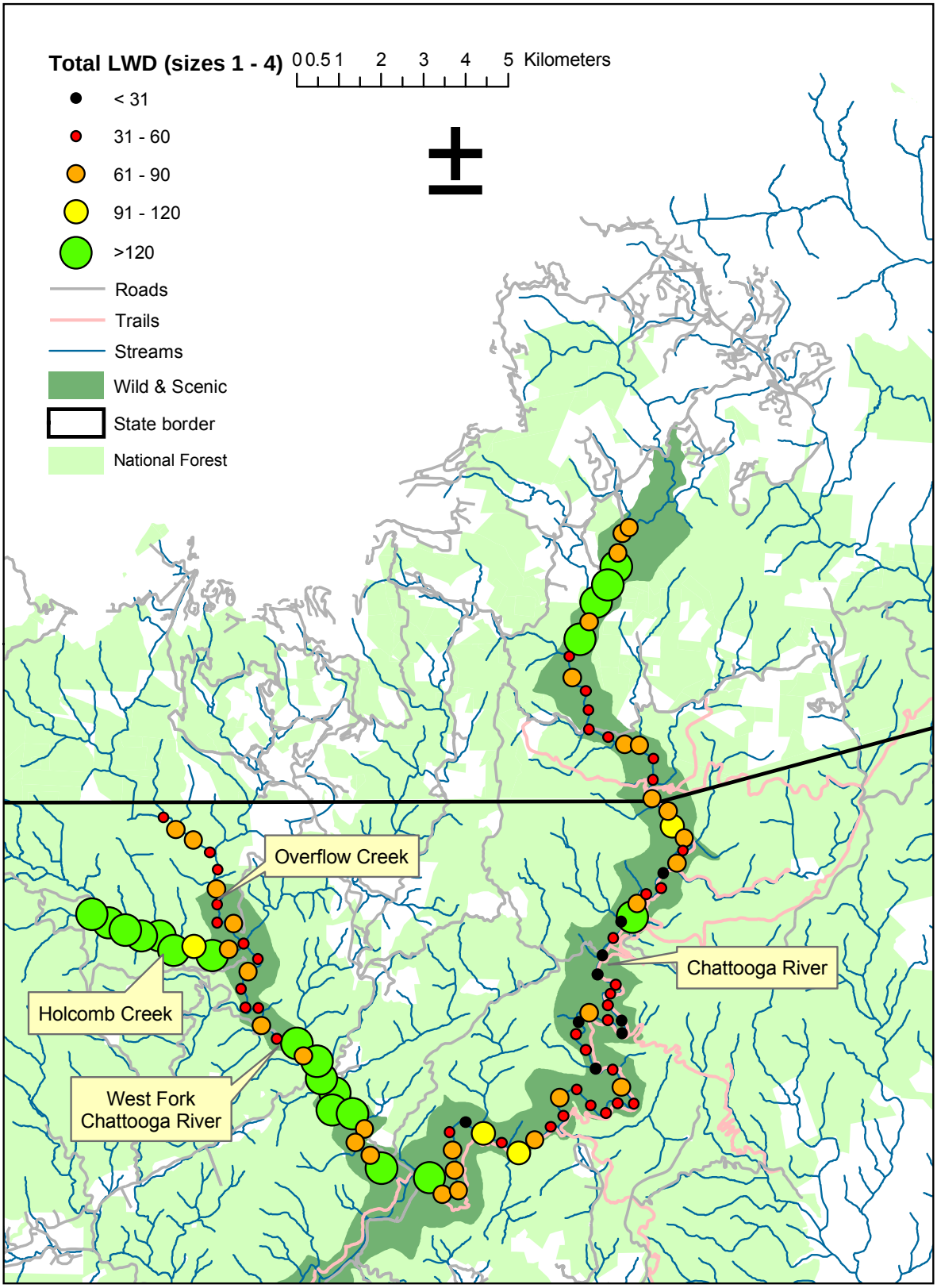
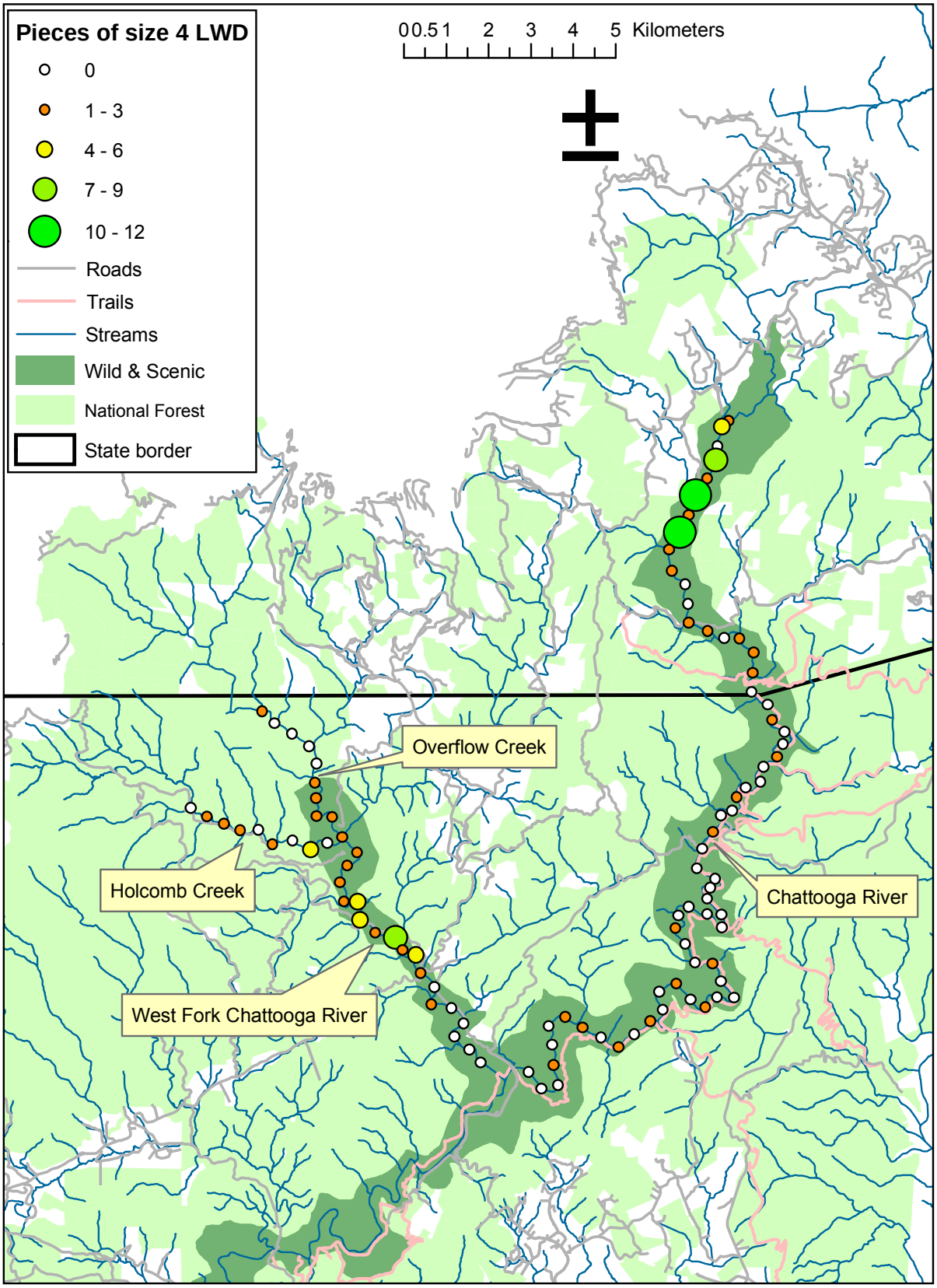


Figure 3.2-2. Size 4 LWD (Longer Than Five Meters, Greater Than 50 Cm Diameter) Counts From 500 M Reaches In The Chattooga River Watershed, November 2007. Figure Modified From Roghair Et Al. (2008).



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 percent 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 traffic 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 percent of the total number of sediment sources in the Chattooga River watershed during the study 12 years ago. 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 percent over the next decade, increasing the use of roads, trails and campsites.

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 and Shelby (2007) also note 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. Once the hemlock component of the riparian corridor is gone, there are no other hemlocks to replace them. Over time, recruitment of hemlock to the river will diminish. There is no other tree that will replace the performance of hemlock within mountain stream systems.

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 and from Overflow Creek by boaters (www.boatertalk.com/forum/BoaterTalk/1381138). Boater message board comments (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 Web site (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. 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. In alternatives 4, 5, 8, 9 and 10, no LWD would be removed solely to accommodate recreation within the river or stream banks on the upper Chattooga River or its tributaries.

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

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. The Chattooga River tributaries are not included for boating under this alternative; therefore, user-created trails would not be created for the purpose of boating access 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 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. The closure of roadside parking at Burrells Ford Bridge may decrease some sediment input. LWD recruitment would be maintained with current LRMP direction for each forest. Impacts to the Chattooga River tributaries are protected as in Alternative 1.

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. Impacts of new parking restrictions are the same as in Alternative 2. LWD recruitment would be maintained with current LRMP direction for each forest. Impacts to the Chattooga River tributaries are protected as in Alternative 1.

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 1. 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 recreation within the river or stream banks on the upper Chattooga River.

Alternative 4 proposes boating on the main stem of the Chattooga River for approximately seven miles from the confluence of Norton Mill Creek 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. However, in Alternative 4, no LWD would be removed to accommodate recreation within the river or stream banks on the upper Chattooga River. Impacts to the Chattooga River tributaries are protected as in Alternative 1.

Alternative 5 - Direct and Indirect Effects

Under Alternative 5, impacts and actions 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. However, in Alternative 5, no LWD would be removed to accommodate recreation within the river or stream banks on the upper Chattooga River. Impacts to the Chattooga River tributaries are protected as in Alternative 1.

Alternative 8 - Direct and Indirect Effects

Under Alternative 8, impacts and actions for trails, camping, parking and LWD remain the same as Alternative 5. The number of access and portage trails may be greater than in alternatives 4 and 5 because Alternative 8 provides the most miles open to 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. However, in Alternative 8, no LWD would be removed to accommodate recreation within the river or stream banks on the upper Chattooga River. Impacts to the Chattooga River tributaries are protected as in Alternative 1.

Alternative 9 - Direct and Indirect Effects

Under Alternative 9, impacts and actions for trails, camping, parking and LWD remain the same as alternatives 5 and 8. However, the number of access and portage trails may be less than those in alternatives 4, 5 and 8.

Alternative 9 proposes boating on the main stem of the Chattooga River for approximately six 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. However, in Alternative 9, no LWD would be removed to accommodate recreation within the river or stream banks on the upper Chattooga River. Impacts to the Chattooga River tributaries are protected as in Alternative 1.

Alternative 10 - Direct and Indirect Effects

Under Alternative 10, impacts and actions for trails, camping, parking and LWD remain the same as alternatives 5, 8 and 9. However, the number of access and portage trails may be more than in 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. However, in Alternative 10, no LWD would be removed to accommodate recreation within the river or stream banks on the upper Chattooga River. Impacts to the Chattooga River tributaries are protected as in Alternative 1.

Cumulative Effects for All Alternatives

Under the 2004 Plan Revision for the Sumter National Forest, a watershed condition rank was assigned to 5th level watersheds across the forest. The Chattooga River watershed (Tugaloo

Reservoir to headwaters) 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. Van Lear (1995) found that the wild and scenic corridor of the main stem of the Chattooga River contributes relatively little new sediment. All proposed alternatives address sediment issues in the Chattooga River corridor upstream of Highway 28, through trail and campsite condition improvements.

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 listed above associated with the Watershed Condition Rank were designed to eliminate this risk.

As stated under Aquatic Species and Habitat Affected Environment, the fish species diversity in the Chattooga River watershed has not changed in more than 20 years of sampling the main stem of the river (SCDNR unpublished data). Also, Alderman (2004) reported that mussel species were reproducing and have viable populations in the Chattooga River. Of the mussel species found on the Andrew Pickens Ranger District, the brook floater (*Alasmidonta varicosa*) population within the Chattooga River is the best extant population within its range from Georgia through at least Maryland (Alderman, 2008). In addition, 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 1995 report concluded that water quality in the Chattooga River basin was good to excellent using macroinvertebrates as biological indicators of water quality.

Cumulative impacts pertain to the entire Chattooga River watershed from Tugaloo Reservoir upstream into the headwaters. Refer to Table 3.1-9. for a complete list of past, present and future projects.

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. As a part of this proposal, these sediment issues would be addressed through trail and campsite condition improvements. 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. Brook trout restoration and habitat enhancement have a positive impact on aquatic populations. LWD is removed from river sections downstream of Highway 28 for boating passage (Joe Robles personal communication September 2007) and from Overflow Creek by boaters (www.boatertalk.com/forum/BoaterTalk/1381138). LWD is also actively removed from river sections upstream of Highway 28 in association with dispersed campsites. LWD recruitment would be maintained with current LRMP direction for each forest. LWD monitoring is included in Chapter 2.1 of this EA. Possible future activities include prescribed burning, timber management, invasive plant management and road reconstruction.

LRMP directions and standards are designed to minimize adverse impacts from any of these activities. There will be an overall net reduction in sediment when watershed improvement projects are implemented in the Chattooga River watershed These include treatment and maintenance of trails, campsites, erosion sources, and roads. Refer to Section 3.1.1 Water and Riparian Corridor Cumulative Effects for discussion on sediment impacts.

There is the potential for the spread or introduction of new NNIS by recreation visitors to the Chattooga River and its tributaries. Aquatic NNIS, such as didymo (*Didymosphenia germinana*) or zebra mussel (*Dreissena polymorpha*) have been identified in numerous streams in the Southeastern United States. Humans can be vectors of these aquatic NNIS and the NNIS could be spread by fishing or boating equipment. The risk of spread of aquatic NNIS would increase as the number of forest visitors increases.

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 MIS 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 geology, biology, recreation, scenery and history values were recognized by Congress when it designated the Chattooga 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 due to warmer water temperatures chances of developing a wild fishery there was marginal; the upper river was much 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 based on 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. 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 to be closed to boating (TetraTech, Inc., 2006). Limited written documentation of the specific reasons for the prohibition 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 prohibiting boating above Highway 28 was to ensure that these conflicts did not migrate to the upper river. At the time, the upper river had less use, a better trout fishery due to geological and biological characteristics and lower water temperatures, a more primitive setting, and few boaters because of lower water levels, less specialized boating 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. Interviews with Forest Service personnel indicate that the boater/angler conflict was the driving force behind the 1978 prohibition. Thedecision to limit boating to below Highway 28 was a joint decision between the Forest Service and DNRs in Georgia, South Carolina and North Carolina (TetraTech, Inc., 2006).

Even after the boating prohibition (43 FR 3706, Jan. 27, 1978; later codified at 36 CFR 261.77) in 1976, the boater/angler or local/non-local conflicts may still have lingered to some degree.

The Handbook for River Guides (Wildwater 1980) includes a section on "community relations" that describes the issue in terms of locals vs. outsiders, and warns of past "acts of destruction and harassment." The substantial changes in use and access due to the movie, and the river's wild and scenic status clearly made some local people feel that "their" river had been taken away. 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 recur 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 26 miles of the river were 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 suggests the prohibition 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 states "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 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 upper river. When citing reasons for wanting to visit the upper Chattooga, 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 3.3-2 describes potential recreation opportunities that are currently prohibited, where and when they might 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 day hikers 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. 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 a wild and scenic river, 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.

Section 10(a) of the Wild and Scenic Rivers Act (Act) establishes a nondegradation and enhancement policy for the values for which a river is added to the National System. These values are the river's free-flowing condition, water quality and its specifically identified ORVs. The Interagency Wild and Scenic Rivers Coordinating Council (IWSRCC) provides further interpretation of the protective framework of the Act. When recreation is an ORV (as on the Chattooga), it must be managed to protect the attributes that made it regionally or nationally significant while also protecting free-flow, water quality and nonrecreation ORVs (IWSRCC 2007 draft p. 5). This guidance recognizes the need to balance recreation with other values through the Comprehensive River Management Plan (currently incorporated into the revised Sumter LRMP). The river-administering agency is required to "address…user capacities" consistent with protecting the desired recreation experience and other nonrecreation values (Whittaker and Shelby 2007).

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).

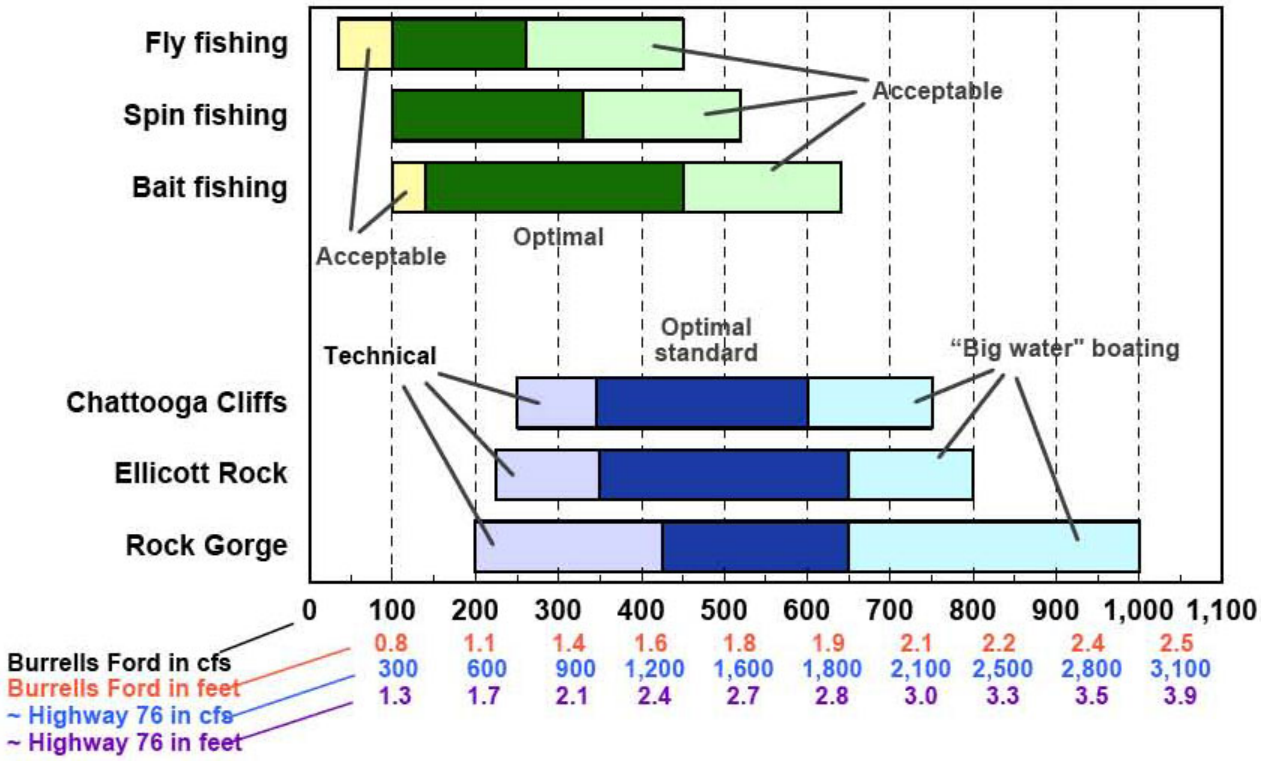
However, Whittaker and Shelby (2007) also documents that acceptable but lower quality fishing opportunities would overlap with optimal boating and acceptable but lower quality technical boating would overlap with optimal fishing. At these overlap flows, some users of each group could be present (if boating 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 frontcountry 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 interactions 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 through 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 related social science issues:

- Social carrying capacity/solitude which is chiefly focused on overall encounter levels, particularly on-trail and on-river encounters, but also includes competition for resources;
- 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 boating segments; and
- Recreation opportunities.

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.

Social Carrying Capacity/Solitude Definitions and Background:

For the purposes of this analysis, *social carrying capacity* is addressed indirectly by establishing encounter limits for different reaches and areas on the upper Chattooga, monitoring whether actual encounters exceed those limits, and taking adaptive management actions to reduce encounters to acceptable levels as necessary. Action alternatives in this analysis (alternatives 2-10) vary encounter limits by river segments, and these differences thus vary social capacities (although Alternative 1, current management, offers no encounter limits or capacities).

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)).* Information from the public indicates that solitude is one of the most valued, if not *the* most valued quality of the recreation experience in the upper Chattooga corridor. Solitude is also one component of the Chattooga River's recreation ORV and also part of the "outstanding opportunities for solitude" goal in the Wilderness Act.

Action alternatives in this analysis (alternatives 2-10) offer different amounts and types of recreation opportunities (e.g. hiking, camping, angling, boating) and different encounter limits (that define acceptable levels of impacts), but all maintain outstanding opportunities for solitude in the Ellicott Rock Wilderness (Wilderness Act) and the upper Chattooga as a whole, and protect and enhance high quality recreation experiences (including opportunities to experience outstanding natural environments, challenge, solitude, etc.) that are part of the recreation ORV (Wild and Scenic Rivers Act). Additionally, all action alternatives in this analysis protect and enhance the river's free-flowing condition, water quality, and the non-recreation ORVs (Wild and Scenic Rivers Act).

Encounters refer to contact (sight or sound) between groups or individuals and can be distinguished by user types (e.g., anglers-boaters, hikers-anglers, swimmers-boaters), timing (e.g., season, weekend/weekdays) and location (e.g., on river, on trails, in camps or at attraction sites). Encounters are a common social impact indicator for backcountry settings and have received considerable attention in recreation literature. They are one of the most important indicators of solitude in backcountry areas like the upper Chattooga River corridor (Whittaker and Shelby 2007).

For the purposes of this analysis, *backcountry encounters* refer to encounters that occur more than ¼ mile from roads or bridges.

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 users may experience while fishing, swimming or participating in other on- or in-river activities (this analysis defines those as "on-river encounters").

On-river encounters occur while users are on or in the river itself. As with on-trail encounters, on-river encounters (e.g., anglers/anglers, anglers/swimmers, boaters/boaters, boaters/swimmers) 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).

Studies in wilderness and backcountry settings show that users agree encounter levels should be low. In general, encounter tolerances in wilderness are about four–five per day, while less primitive backcountry experiences are higher, but usually less than ten encounters per day. However, 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 to 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 more sensitive to the impacts of another group (boaters), but not the reverse, the impact is described as “asymmetric.”

Current information on the existing condition of backcountry encounters for all sections of the river was not available for this analysis. However, the results of the Use Estimation Workshop (Berger and CRC 2007) were used to estimate the average and peak use levels in the upper river 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 encounter estimates for existing users (see Appendix D).

For the alternatives which provide additional boating opportunities on the main stem 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., the above referenced working papers assume that an average of 75 percent of all boating groups floating a specific stretch on a particular day (independent of season or flow level) will be encountered by on-river recreationists such as anglers. Similarly, a percentage of all boating groups equal to the percentage of trails within 100 feet of the river are assumed to be seen or heard by on-trail users.

In this analysis, the average number and range of “boatable” days (the days that boaters are predicted to actually float the river over the course of an average year based on water flow levels – see Table 3.3-3 – and the “Estimating potential whitewater boating use” section in Whittaker and Shelby 2007) were derived by using the “mean daily flow” method. For example, in Alternative 4, a mean daily flow of approximately 450 cfs was established as the lower limit for boaters to float the river. According to 67 years of data, there is an average of six “boatable days” per year between December 1 and March 1 at flows of 450 cfs or higher.

In addition to encounters, biophysical attributes and impacts can influence perceptions of solitude and the quality of the recreation experience. The condition of trails, whether official or user created, can impact user perceptions of solitude and remoteness by their width, clearing limits, condition, location, density, etc. Similarly, campsites can affect user perceptions by their size, amount of bare ground, condition, distribution, etc. User-created trails may form if boating is allowed on the upper Chattooga because of "attraction" sites unique to boating, increased hemlock mortality, and the agency's policy of not removing LWD to accommodate recreation within the river or stream banks (alternatives 4-10). However, new user-created trails solely associated with boating are expected to be minimal, and should therefore only minimally influence the perception of remoteness and solitude when compared to existing biophysical impacts. 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.

Regardless, the biophysical impacts are not typically addressed through use/encounter limits, but through "technical fixes" (e.g.: campsite hardening/rehabilitation/obliteration, trail reconstruction/realignment/obliteration, etc.) or through education and regulation (Whittaker and Shelby 2007). All action alternatives in this proposal incorporate some of the above management actions to mitigate biophysical impacts to perceptions of solitude and remoteness.

Existing Condition of Social 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. Estimates Of Existing Trail Encounter Levels Per Day In Backcountry Areas By Reach

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

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

Reach	Season	Encounters Per Day			
Chattooga Cliffs		< = 3	4 - 7	8 - 10	> 10
	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			
Nicholson Fields	Dec-Feb	Most weekdays	Most weekends		
	Mar-May	Most weekdays	Most weekends	Some weekends	
	June-Aug	Most days			
	Sept-Nov	Most weekdays	Some 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 percent of fishing areas in the backcountry are passed because they are occupied (Whittaker and Shelby 2007).

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 percent 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 or more 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.

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 are often more challenging to address through separation of uses by space or time or educating users on how to minimize conflict behavior.

Goal interference occurs when the behavior of one group prevents another from achieving its goals. Contact can be direct while in the resource setting itself, such as when a rafter encounters a motorized boat, or indirect, such as when a skier sees a track left by a snowmobile. It can also occur between groups involved in the same activity such as interactions between loud vs. quiet campers. Goal interference is one commonly cited explanation for recreation use conflicts (Jacob and Schreyer 1980), and may occur even between groups sharing the same goals (Whittaker and Shelby 2007).

Face-to-face conflict can occur when two users/groups encounter one another in the resource setting itself, particularly if one group blocks the other from achieving its goals. This conflict, as well as the goal interference that might have led to it, can often be mitigated by separating strategies, such as flow or season restrictions.

Asymmetrical conflict occurs when group A reports adverse impacts from group B, but not the converse (i.e. the goals of one are interfered with, but not the other). 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 the resource while the sensitive group may not. In such cases, sharing does not have the same consequence for each group (Whittaker and Shelby 2007).

As documented previously, boating has been absent on the upper Chattooga for 30 years, creating a "place attachment" unique to the upper Chattooga (no boating, outstanding trout fishing), as well as a "place attachment" unique to the lower Chattooga (nationally recognized boating challenge). Boating was rare on the river even before 1976, so the current baseline setting is based on the absence of boating. Not surprisingly, some users support the status quo and are resistant to changes in it. For these users, any boating may represent a problem. They consider the 1976 boating closure a "compromise solution" that would be eroded by additional boating of any sort (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).

The physical characteristics of each individual reach, the flow levels at which boating occurs or is allowed, the location of trails along the river, and other factors (e.g. stocking or lack thereof) can work independently or collectively to determine whether boater interference with angling occurs. For example, the Chattooga Cliffs reach is the narrowest of the four reaches on the upper Chattooga; therefore, interactions between boaters and anglers might be expected to cause interference. However, the potential for interference would likely diminish during periods of higher flow, since high flows are less favorable for angling and more favorable for boating. Travel within the stream channel on foot is difficult at best during high flow periods, often necessitating an overland hike for anglers who wish to fish more than one location.

In the Ellicott Rock reach, the stretch from Bull Pen Bridge downstream to the Ellicott Rock marker is narrow but not heavily fished, probably because there are no trails along the river providing easy access. Stocking does not occur there and both the river gradient and surrounding terrain are steep, making it a difficult area to fish, particularly during high water. The stretch from the Ellicott Rock marker downstream to Burrells Ford has a trail along the eastern side of the river making it more accessible. The river is also wider and the gradient is not so steep. The latter could compensate for the former thereby allowing boaters to give anglers some space while passing and potentially mitigate interference. This section is more heavily fished than the Chattooga Cliffs reach, especially below the East Fork confluence.

The Rock Gorge reach downstream 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, higher than in both the Chattooga Cliffs and Ellicott Rock reaches. Again, the wider channel and easier gradient may serve to help mitigate interference in a popular and easily accessible fishing reach. The steeper gradients starting at Big Bend Falls to about half way down the Rock Gorge reach and extending through the Rock Gorge itself tend to be difficult to fish during higher boatable flows, and therefore would naturally present less opportunity for interference.

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, particularly at lower flows that most whitewater boaters would not use. It could be eliminated completely at popular swimming holes 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. Conversely, many boaters have indicated that their goal of floating the upper Chattooga has been foregone because they are not allowed to float the river.

Existing Condition of Conflict:

As documented by Whittaker and Shelby (2007) there are use conflict issues on the upper Chattooga among existing and potential user groups. These conflicting issues were equally evident during public meetings, public scoping and a public hearing, in Web articles and on message boards. 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 the expectation of encounters and goal interference 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 they want that use to be very low).

The face-to-face conflict is expected to be largely asymmetrical in nature. Backcountry anglers as a user group, for example, are likely to be more concerned about boater encounters (expecting goal interference from boating activity) than boaters as a user group might be about encounters with anglers. Such asymmetry 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 additional boating opportunities while the other feels it is being unfairly excluded from the upper reaches of the river. The conflict between existing users, as well as potential users, is tangible and may exist to a greater extent on the Chattooga than it does on other rivers. This is because non-boating groups have

developed a “place attachment” to the area over the last 30 years that does not include boats. Conversely, boaters have developed an antipathy towards various existing users and land managers, the perception being that they are unfairly excluded from the use of the upper river.

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. Conversely, opportunities foregone for boaters, along with the associated conflict, are very real.

Recreation Opportunities Definition and Background:

For the purposes of this analysis, *recreation opportunities* are those recreational activities and experiences provided in the nature based setting that is the upper Chattooga River corridor. The proposed alternatives provide a mix of recreation opportunities (types and amounts) consistent with protecting the recreation ORV while, at the same time, protecting other values (free-flow, water quality and nonrecreation ORVs), and ensuring an “enduring resource of wilderness” in the Ellicott Rock Wilderness.

Existing Condition of Recreation Opportunities:

Currently, existing users are able to experience their desired recreation opportunity on the upper Chattooga whether they seek solitude, campsites near the water, a variety of hiking trails, fishing opportunities, or just an opportunity to enjoy the river environment, all without the possible interference from boats. However, boaters are unable to experience their desired recreation opportunity on the upper Chattooga because they currently are not allowed to legally float the river.

ENVIRONMENTAL CONSEQUENCES

Alternative 1

Direct and Indirect Effects

Social Carrying Capacity/Solitude: Current management on all three national forests in the upper Chattooga has no encounter limits except those established for the North Carolina portion of the Ellicott Rock Wilderness in the Nantahala National Forest Plan. However, from empirical observation the agency knows that North Carolina has the lowest use in the Ellicott Rock Wilderness and therefore encounter limits are not likely being reached or exceeded. Appendix D makes assumptions and estimates about encounter levels likely under Alternative 1 and the other seven action alternatives.

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 may have 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 encounter limits have been prescribed.

The number of campsite encounters is likely to decrease from existing levels under this alternative because existing management includes implementation of forest wide 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 but they will be fewer in number and positioned farther from each other. 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 which emphasize a trail system that is designed to enhance solitude.

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: Current management would likely result, at least for a time, in an escalation of boater antipathy toward those who oppose boating on the upper Chattooga because of the opportunities foregone for this user group. The expectation of goal interference and the resulting face-to-face conflict for anglers and other existing users would disappear under this alternative because boaters would not be allowed on the upper river. The social values conflict for those who believe that boating is an inappropriate use on the upper Chattooga would also be resolved.

Recreation Opportunities: Recreation opportunities are the same as under the Existing Condition section. No boating would be allowed, while all other existing uses would continue to be permitted. Closing campsites within 50 feet of the river and decreasing their overall number throughout the corridor may result in less recreation opportunities for users wishing to camp.

Cumulative Effects

The vast majority of the recreational effects are direct/indirect as described above. There will be no cumulative adverse effects on boaters or cumulative beneficial effects on existing users from a year-round boating 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 encounter limits are established to help address social carrying capacity on the upper Chattooga. The encounter limits would be implemented through a permit system that limits encounters to three in the upper three reaches and six in the Nicholson Fields reach (along with the reduction in trail and campsite density) that would in turn serve to more closely align

these areas to the wilderness and remote backcountry preferences described in the literature (Whittaker and Shelby 2007). Based on empirical observation as well as the Use Estimation Workshop results (Berger and CRC 2007), the above encounter limits are predicted to lower use and encounters from current levels in the upper Chattooga River corridor. The permit system would 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. This alternative fundamentally trades off increased bureaucracy for users (and some loss of access at high-use times) to provide higher quality (lower density and greater solitude) experiences. The latter separation of uses is important to preserve the unique year-round backcountry angling opportunities on the upper Chattooga, an important component of which is on-river solitude.

Social Carrying Capacity/Solitude: Opportunities to experience solitude are greater under this alternative 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. Wilderness character and "outstanding opportunities for solitude" would also be enhanced, both critical ingredients for a unique backcountry angling experience on the river.

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 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 Limits by Reach:

Chattooga Cliffs Reach: Encounters may be slightly reduced by this alternative but the decrease is likely to be small. The agency will likely need to limit the number of permits on weekends June - August and October and on some weekdays in July, August and October, when 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 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). Therefore, some users are expected to be displaced during these times due to the permit requirement. 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 are expected to be displaced 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 is expected to 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.

Reduction of 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, or could remain an issue because fewer legal campsites will be available (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 fishing opportunities would also be reduced. Lower use numbers should similarly reduce competition for parking as well as, potentially, for campsites. Competition for the limited number of backcountry permits during the high-use times of the year where encounters already exceed limits would likely increase over time given recreation trends.

Conflict: Goal interference for existing users and opportunities foregone for boaters, along with the resulting conflict, are the same as Alternative 1.

Recreation Opportunities: Recreation opportunities, or lack thereof, are the same for boaters and existing users as Alternative 1; however, the permit system is likely to decrease recreation opportunities for some existing users. Also, recreation use trend information suggests that demand for these permits will increase over time, either resulting in less recreation opportunities for those unable to secure a permit or use/demand shifting into the lower-use seasons (e.g. winter months) spreading use/demand more evenly over the course of the year.

Cumulative Effects

Cumulative effects are the same as in Alternative 1.

Alternative 3

Direct and Indirect Effects

This alternative maintains current encounter levels in the upper Chattooga River corridor in the future (see Tables 3.3-4 and 3.3-5), a contrast to Alternative 2 where encounter levels are reduced. It addresses social carrying capacity by establishing encounter limits and a monitoring program that initiates adaptive management actions if limits are exceeded. As stated in Appendix B under Implementation and Monitoring Questions, the established encounter limits may be adjusted to reflect actual encounter levels as the agency obtains better information on user dynamics during project implementation and monitoring. However, if use levels rise and associated encounters start to exceed specified limits, actions will be taken to reduce encounters. In addition, this alternative (as with alternatives 1 and 2) maintains a year-round, boat-free recreation experience on the upper Chattooga designed to eliminate potential conflict between boaters and anglers on river. The latter separation of uses is important to preserve the unique, year-round backcountry angling opportunities on the upper Chattooga, an important component of which is on-river solitude.

Social Carrying Capacity/Solitude: In the three lower reaches, most average daily encounters on trails are not expected to exceed the encounter limits except on some weekends May - August and on some weekdays May - August. The Chattooga Cliffs reach should have fewer days where average daily on-trail encounters exceed limits (some weekends May - August and October). On-river encounters in the upper three reaches are low and are not expected to exceed the encounter limits in the foreseeable future. However, on-river encounters in the Nicholson Fields reach are the highest of all four reaches because of the popularity of this delayed harvest stretch among anglers. Encounter limits will likely be exceeded on some weekends March - May and November - December (Berger and CRC 2007).

Encounter Limits by Reach:

***Chattooga Cliffs Reach*:** Average daily encounters on trails are expected to exceed the four-encounter limit on 14 days per year on some weekend days May - August and in October. On-river encounters in the backcountry are not expected to reach the four-encounter limit in the foreseeable future (Berger and CRC 2007).

***Ellicott Rock Reach*:** Average daily encounters on trails are expected to exceed the encounter limit on 36 days per year 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 limit in the foreseeable future (Berger and CRC 2007).

The encounter limits established for the Ellicott Rock Wilderness are slightly higher than the desired tolerances in the literature, particularly on trails on weekends, but closer to the tolerances found in the literature on trails on weekdays and on river, both weekends and weekdays (Whittaker and Shelby 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 on trails are expected to exceed the limit on 24 days per year on some weekend days June - August and some weekdays June - August. On-river encounters are very low and are not expected to reach the encounter limits in the foreseeable future (Berger and CRC 2007).

***Nicholson Fields Reach*:** Average daily encounters on trails are expected to exceed the limit on 47 days per year on some weekend days April - August and November and on some weekdays April - August. On-river encounter limits are expected to be exceeded on ten days per year on some weekends March - May and November - December (Berger and CRC 2007).

Table 3.3-6 summarizes the average number of daily encounters among existing backcountry users and the number of days per year the established encounter limits are expected to be exceeded by these same users (see Appendix D and the project file for more on how these numbers were estimated).

Table 3.3-6. Estimated Contribution Of Existing Backcountry Users To The Number Of Backcountry Encounters In Alternative 3

Reach	Average # of on-trail encounters per day in an average year	Average # of days on-trail encounter limits are exceeded in an average year	Average # of on-river encounters per day in an average year	Average # of days on-river encounter limits are exceeded in an average year
Chattooga Cliffs	1.6	14	0.2	0
Ellicott Rock	2.9	36	0.6	0
Rock Gorge	4.9	24	0.5	0
Nicholson Fields	6.5	47	2.1	10

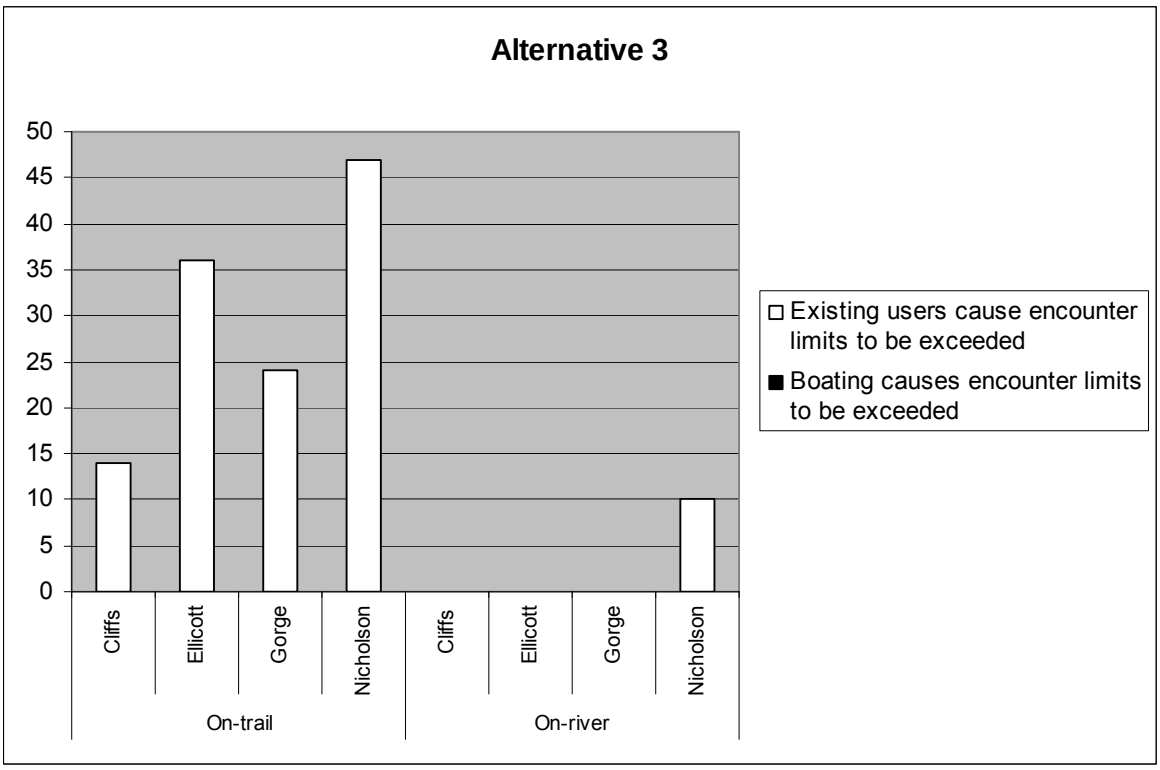
The average number of daily encounters per year in Table 3.3-6 is another way of broadly depicting the existing level of solitude in each of the reaches over a year, both on trail and on river (this is also depicted in Tables 3.3-4 and 3.3-5). The Chattooga Cliffs has the lowest on-trail and on-river encounter rate per day signifying the lowest use/encounters, while Nicholson Fields has the highest signifying that it has the highest use/encounters of the four reaches.

Under Alternative 3, opportunities to enhance solitude, remote experiences and the wilderness character are greater than in Alternative 1 (due to the encounter limits), but less than Alternative 2. Similar to Alternative 1, the solitude experiences of existing backcountry users are already being diminished during high use times of the year and in certain locations. As shown in Table 3.3-6, this is occurring mostly on trails on the lower three reaches (including Ellicott Rock Wilderness) and on river in the Nicholson Fields Reach. This could lead to some slight erosion of solitude on the highest use days, and may cause more use to shift to the lower use times of the year, or may displace some users from the river altogether before the agency takes action. In contrast, opportunities for experiencing solitude on river in the three upper reaches (including the Ellicott Rock Wilderness) and on trails in the Chattooga Cliffs Reach are excellent [in the three encounters and under (< = 3) category (see Tables 3.3-4 and 3.3-5)]. It is important that these

solitude experiences be preserved to continue offering a unique year-round backcountry angling opportunity on the upper Chattooga.

On-trail encounter limits on all four reaches and the on-river encounter limits for Nicholson Fields may be exceeded on several days in recent "average" years (see Figure 3.3-1), but the analysis suggests they have not been exceeded for more than 20% of days in a year [for example, in the highest encounter segment (Nicholson Fields), current on-trail encounters exceed limits about 47 days or 13% of the year]. At this encounter level, actions to reduce encounters are not currently needed to achieve the desired levels of solitude and quality recreation experience defined in this alternative. This in turn ensures that both the Chattooga River's recreation ORV, and in particular its solitude component, are being "protected and enhanced," and the "outstanding opportunities for solitude" in the Ellicott Rock Wilderness are being preserved at the desired levels for this alternative.

Figure 3.3-1. Estimated Number Of Days Per Year On-Trail And On-River Encounters From Existing Users And Boaters Are Likely To Exceed Encounter Limits By Reach For Alternative 3.



Closing unsustainable campsites and rehabilitating remaining campsites would enhance perceptions of solitude and remoteness more than Alterative 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.

Additionally, this alternative emphasizes a designated trail system, not to the degree of Alternative 2, but improved from Alternative 1 in terms of enhancing perceptions of solitude and

remoteness. As in Alternative 2, closing, rehabilitating and redesigning some trails would help enhance the desired perceptions of solitude and remoteness.

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 limits during the higher use times of the year. Some use/demand will begin to shift into the 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, encounters in Alternative 3 would be limited at existing levels to maintain current experiences.

For the immediate future, competition for fishable water would be the same as Alternative 1, except possibly in the Nicholson's Fields reach where, if trends continue, encounter limits could be reached and require management actions. These actions would be indirect, followed by direct measures to reduce encounters below the established limits in the Nicholson Fields reach. New campsite restrictions would likely increase competition for campsites more than alternatives 1 and 2 (encounter levels in Alternative 2 are lower than Alternative 3; lower encounter levels lead to less users which, in turn, equates to less competition for resources). New parking restrictions in Alternative 3 would likely increase competition for parking. In general, given recreation trend information, competition for resources is likely to increase.

Conflict: Goal interference for existing users and opportunities foregone for boaters, along with the resulting conflict, are the same as Alternative 1 and 2.

Recreation Opportunities: Recreation opportunities for boaters and existing users are the same as Alternative 1.

Cumulative Effects

Cumulative effects are the same as in alternatives 1 and 2.

Alternative 4

Direct and Indirect Effects

This alternative maintains current encounter levels in the upper Chattooga River corridor and address social carrying capacity in the same way as Alternative 3 while providing some boating on the main stem Chattooga. Boating is only allowed when it is very likely that boaters will not encounter any other river users (especially anglers on river, where existing encounter levels are very low and where asymmetric impacts are most likely) to preserve the unique year-round backcountry angling opportunities, an important component of which is on-river solitude. Separation would be accomplished by limiting boating by flow [to approximately 450 cubic feet per second (cfs) or higher at Burrells Ford], by season (between December 1 and March 1) and by zoning (from the confluence of Norton Mill Creek south to Burrells Ford Bridge). The upper end of the optimal flow range for bait angling on the upper Chattooga (and near the upper end of the acceptable range for fly and spin angling) occurs at levels of approximately 450 cfs (see Table 3.3-3). Additionally, 450 cfs is near the bottom end (within 100 cfs) of the optimal range

for whitewater boating opportunities. Therefore, the 450 cfs minimum flow restriction for boaters makes it much less likely that anglers would be present when boaters are on the water and vice versa (Whittaker and Shelby 2007). Flow levels of approximately 450 cfs occur during the designated season on six days in an average year (Hansen 2007). Using data from the last 67 years, the number of boatable days in this alternative would range from a low of zero to a high of 11 (Hansen 2007). See Appendix C for terminology definitions.

Social Carrying Capacity/Solitude: Existing backcountry users exceed the on-trail and on-river encounters per day limits to the same extent as in Alternative 3 since the same encounter limits are used in both alternatives (see Table 3.3-6). Given the minimum flow, zoning, and seasonal use restrictions on boating, the effects of adding boaters to the mix (which are additive to existing user impacts) is summarized in Table 3.3-7.

Table 3.3-7. Estimated Effects Of Adding Whitewater Boating To The Number Of Backcountry Encounters In Alternative 4.

Reach	Average # of add'l on-trail encounters on an average of 6 days/year	Average # of days on-trail encounter limits will be exceeded due to boating on an average of 6 days/year	Average # of add'l on-river encounters on an average of 6 days/year	Average # of days on-river encounter limits will be exceeded due to boating on an average of 6 days/year
Chattooga Cliffs	0.5	0	1.7	0
Ellicott Rock	1.5	0	4.7	1
Rock Gorge	0	0	0	0
Nicholson Fields	0	0	0	0

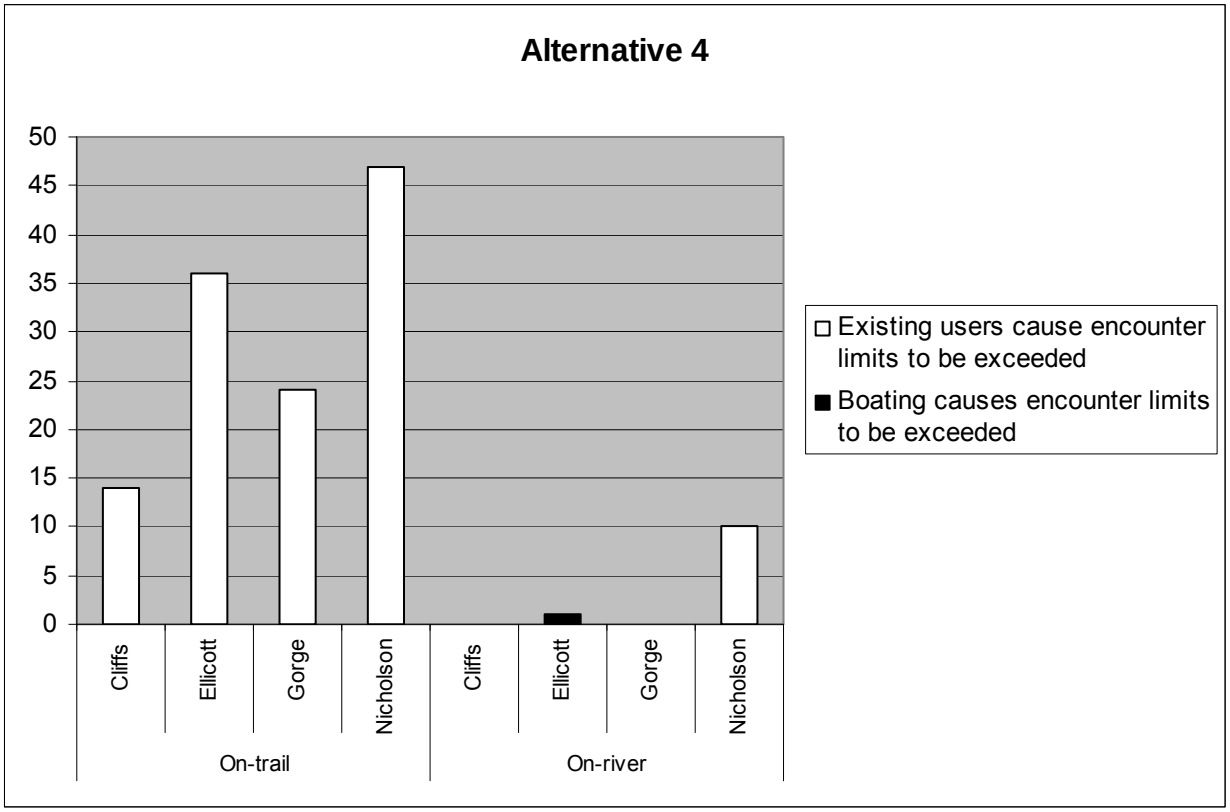
As depicted in Table 3.3-7, only two reaches are affected by boating on an average of six days per year between December 1 and March 1 because of the limitations on boating (flow, zoning and season) in this alternative. Average number of daily encounters generated by boaters is lowest on trails (and in the Chattooga Cliffs in particular) and highest on river (in the Ellicott Rock reach in particular). This is due in part to the assumption that a greater percentage of boaters (75% of boating groups per day) would be encountered by on-river recreationists (as opposed to a much smaller percentage by on-trail recreationists), and the greater popularity expected among boaters for the Ellicott Rock reach (Whittaker and Shelby 2007). Angler/boater on-river encounters are among the most important impacts associated with allowing boating use on the upper Chattooga River. When they occur, these encounters are likely to be asymmetrical—adverse for backcountry anglers, but less so for boaters (Whittaker and Shelby 2007).

However, Table 3.3-7 also shows that boaters do not contribute to exceeding on-trail encounter limits, and are expected to contribute one day towards exceeding on-river encounter limits in the Ellicott Rock reach on an average of six days per year. Because of the limitations on boating (flow, zoning and season) in this alternative, boaters are expected to be a small contributor to on-trail and on-river encounters thereby preserving the unique year-round backcountry angling opportunities on the upper Chattooga, a critical ingredient of which is on-river solitude.

When boater impacts are combined with the impacts from existing users (Figure 3.3-2), the analysis suggests that none of the reaches are expected to exceed the specified on-trail or on-river encounter limits on more than 20% of days in a year (the closest is Nicholson Fields reach

on trails, presently estimated to be at 13% or 47 days independent of boating). At these encounter levels, actions to reduce encounters are not currently needed to achieve the desired levels of solitude and quality recreation experience defined in this alternative. These encounter levels ensure that both the Chattooga River's recreation ORV, and in particular its solitude component, are being "protected and enhanced," and the "outstanding opportunities for solitude" in the Ellicott Rock Wilderness are being preserved at the desired levels for this alternative.

Figure 3.3-2. Estimated Number Of Days Per Year On-Trail And On-River Encounters From Existing Users And Boaters Are Likely To Exceed Encounter Limits By Reach For Alternative 4.



Under Alternative 4, opportunities to enhance solitude, remote experiences and the wilderness character are almost identical to Alternative 3. The main difference is that existing users might encounter boaters on trail or on river on an average of six days per year between December 1 and March 1 at flows of 450 cfs or higher.

Impacts of parking restrictions are the same as Alternative 1.

Dispersed campsite management and trail management are the same as in Alternative 3. Also as in Alternative 3, more trails and campsites would be in better condition than current management, would conform better 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 unique to boating, which may slightly influence the perception of

remoteness and solitude. Impacts would be minimal, however, compared to existing user-created trails and campsites.

Given the information on future trends among existing and potential uses provided earlier in this section, over time use/demand will start to exceed the encounter limits and require agency action during the higher use times of the year. Some use/demand will begin to shift into the lower use times of the year spreading use/demand more evenly over the course of the year. These impacts are the same as in Alternative 3.

Competition for fishable water would be the same as Alternative 3. 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. Competition for campsites would be the same as in Alternative 3. Finally, given recreation trend information, competition for resources in general is likely to continue to increase in the future.

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, some boaters may experience opportunities foregone 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 may experience goal interference because they might encounter boaters on six days in an average year; this goal interference could lead to face-to-face conflict. However, at flows of approximately 450 cfs or higher, the interference from boaters may be mitigated, particularly with those anglers who wade to fish. Additionally, Table 3.3-3 shows that flow levels of approximately 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 fly and spin anglers.

The take-out at Burrells Ford avoids potential on-river encounters with anglers in the Rock Gorge and in the delayed-harvest area.

This alternative would not address the concerns of those who have a social values based conflict with boating on the upper Chattooga. In addition, conflict will remain for some boaters who want to float all reaches above Highway 28 at all flow levels. 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 six days in an average year.

Recreation Opportunities: When compared to alternatives 1-3, Alternative 4 provides more recreation opportunities for boaters because they can legally float two sections of the river on six days in an average year; however, they have less recreation opportunities than in alternatives 5, 8, 9 and 10 as those alternatives provide more boatable days. Some existing users may have less recreation opportunities because they cannot experience a boat-free opportunity 365 days per year. However, given the separation strategies in Alternative 4 (allowing boating only in the Chattooga Cliffs and Ellicott Rock reaches from December 1 to March 1 at flows of

approximately 450 cfs), impacts to the recreation opportunities of existing users is expected to be minimal.

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 by flows, season or zone since there are no other rivers in the region where boating is limited in this manner. There will be a very small cumulative adverse effect on some existing users from allowing some boating use in an average year. This is because, while there are several similarly-sized river segments in the region that permit some boating use at higher flow levels, this option would reduce the number of rivers in the region that do not permit boating at any flow level.

Alternative 5

Direct and Indirect Effects

This alternative maintains current encounter levels in the upper Chattooga River corridor and address social carrying capacity in the same way as alternatives 3 and 4 while providing more boating than Alternative 4 on the main stem Chattooga. Similar to Alternative 4, boating is allowed when it is likely that boaters will not encounter many other river users (especially anglers on river, where existing encounter levels are very low and where asymmetric impacts are most likely) to preserve the unique year-round backcountry angling opportunities, an important component of which is on-river solitude. Separation would be accomplished by limiting boating above Highway 28 using flow levels (approximately 350 cfs or higher at Burrells Ford) and zoning (from Bull Pen Bridge south to Lick Log Creek). The highest optimal flow level for fly and spin angling on the upper Chattooga is approximately 350 cfs (bait angling is optimal up to approximately 450 cfs); conversely, flow levels of approximately 350 cfs or higher also provide optimal boating opportunities (Whittaker and Shelby 2007). Flow levels of approximately 350 cfs occur on 37 days in an average year (Hansen 2007). Using data from the last 67 years the number of boatable days in this alternative would range from a low of 12 to a high of 64 (Hansen 2007). This alternative would provide for more boatable days than Alternative 4.

Social Carrying Capacity/Solitude: Existing backcountry users would exceed the on-trail and on-river encounters per day limits to the same extent as in alternatives 3 and 4 since the same encounter limits are used in all three alternatives (see Table 3.3-6). The effects of adding boating are summarized in Table 3.3-8.

Table 3.3-8. Estimated Effects Of Adding Whitewater Boating To The Number Of Backcountry Encounters In Alternative 5

Reach	Average # of add'l on-trail encounters on an average of 37 days/year	Average # of days on-trail encounter limits will be exceeded due to boating on an average of 37 days/year	Average # of add'l on-river encounters on an average of 37 days/year	Average # of days on-river encounter limits will be exceeded due to boating on an average of 37 days/year
Chattooga Cliffs	0	0	0	0
Ellicott Rock	1.6	6	4.9	7
Rock Gorge	1.5	3	2.9	7
Nicholson Fields	0	0	0	0

As depicted in Table 3.3-8, only two reaches are affected by boating on an average of 37 days per year because of the limitations on boating (flow and zoning) in this alternative. Average daily encounters generated by boaters are lowest on trails because boats are not seen as easily from trails (e.g.: vegetation buffering, distance from the river, etc.). Additionally, daily on-trail encounters are similar between the two affected reaches because Ellicott Rock Reach has a lower percentage of trails within 100 feet of the river and hence boats are harder to spot from trails in that reach.

Average daily encounters are highest on river because on-river recreationists are assumed to encounter an average of 75% of boating groups per day, a higher percentage than on trails. Also, the Ellicott Rock reach has a higher average daily on-river encounter rate because it is expected to be more popular among boaters (Whittaker and Shelby 2007).

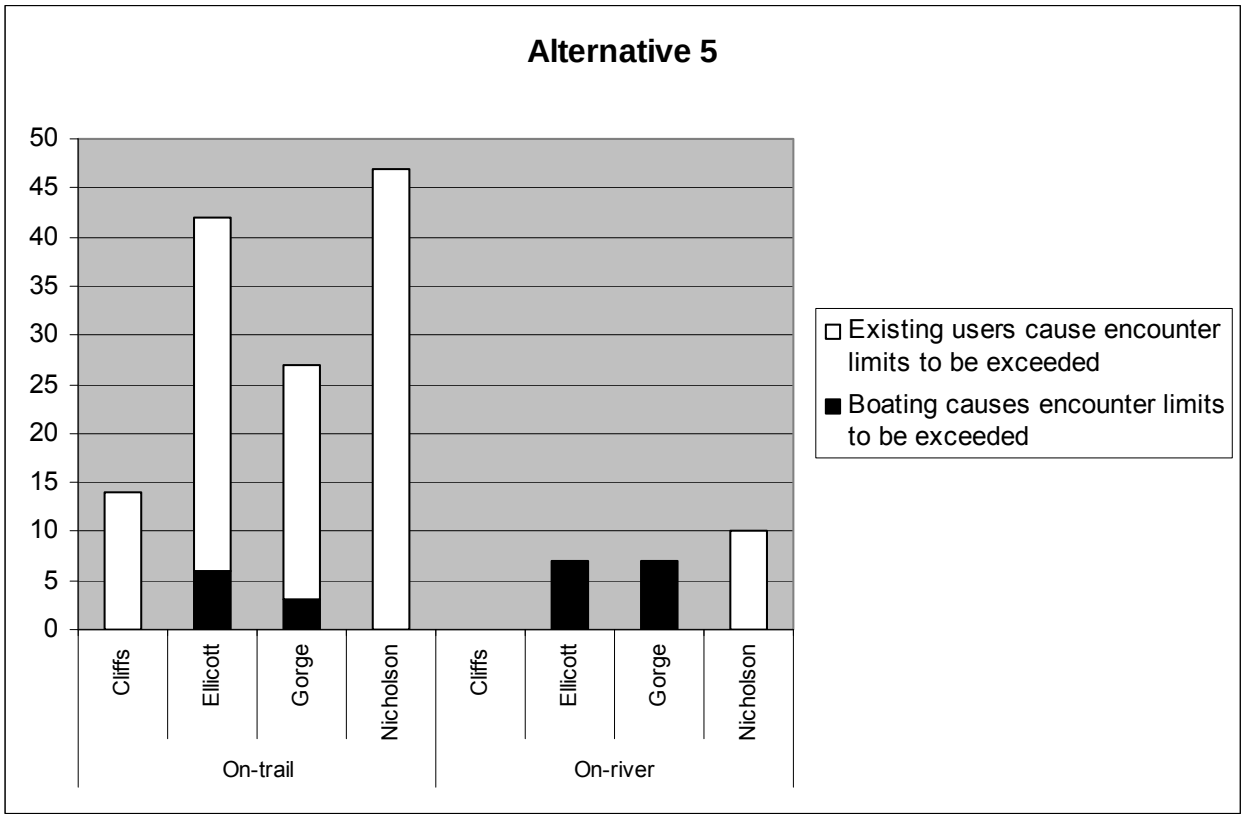
Table 3.3-8 also shows that boaters contribute to exceeding on-trail encounter limits, but compared to existing users, their impact is less (six vs. 36 in Ellicott Rock, for example, as shown in Table 3.3-6). Additionally, many hiker/boater encounters tend to be more similar to hiker/hiker and hiker/angler encounters (Whittaker and Shelby 2007).

On the other hand, boaters are estimated to exceed on-river encounter limits on seven days each for both Ellicott Rock and Rock Gorge reaches. In addition, more boatable days may lead to increased on-river encounters. Should on-river encounters increase, this is a more substantial change than in Alternative 4, especially in the wilderness section along the Ellicott Rock reach and in the Rock Gorge reach. There, according to estimates, existing users have not exceeded the on-river encounter limits on a single day (see Table 3.3-6) and on-river daily encounters are very low (less than one). This is underscored further because angler/boater on-river encounters are among the most important impacts associated with allowing boating use on the upper Chattooga River. Solitude on river is a key ingredient to the unique, year-round backcountry angling opportunities that are desired on the river.

When the boater impacts listed in Table 3.3-8 are combined with the impacts from existing users (Table 3.3-6), the analysis suggests that none of the reaches are expected to exceed the on-trail or on-river encounter limits on more than 20% of days in a year (see Figure 3.3-3). At these encounter levels, actions to reduce encounters are not currently needed to achieve the desired levels of solitude and quality recreation experience defined in this alternative. This in turn ensures that both the Chattooga River's recreation ORV, and in particular its solitude component, are being "protected and enhanced," and the "outstanding opportunities for solitude"

in the Ellicott Rock Wilderness are being preserved at the desired levels for this alternative (the same as alternatives 3 and 4).

Figure 3.3-3. Estimated Number Of Days Per Year On-Trail And On-River Encounters From Existing Users And Boaters Are Likely To Exceed Encounter Limits By Reach For Alternative 5.



Even though Alternative 5 has the same encounter limits as Alternative 4, it provides more boatable days (an average of 37 over the course of an entire year versus six between December 1 and March 1) and therefore a greater likelihood for boater-generated encounters, particularly on river in the Ellicott Rock Wilderness and Rock Gorge reaches. Under Alternative 5, opportunities to enhance solitude, remote experiences and the wilderness character are less than in Alternative 4, especially on river.

Impacts of parking restrictions are the same as in Alternative 2.

Dispersed campsite management and trail management are the same as in Alternative 4. The impacts of potential portage and user-created trails to attraction sites unique to boating may be slightly increased over Alternative 4.

Given the information on future trends among existing and potential uses provided earlier in this section, over time use/demand will start to exceed the encounter limits and require agency action during the higher use times of the year. Some use/demand will begin to shift into the lower use times of the year spreading use/demand more evenly over the course of the year. These impacts

will not occur as quickly or as immediately as in Alternative 2, but will occur sooner than in alternatives 3 and 4.

Competition for fishable water and campsites would be the same as in alternatives 3 and 4. Competition for parking is the same as in alternatives 2 and 3. Finally, given recreation trend information, competition for resources in general is likely to continue to increase in the future.

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 4, 9 and 10 but less than Alternative 8. However, it has the potential to introduce more conflict than alternatives 1-3.

Opportunities foregone for some boaters in this alternative and the resulting antipathy is slightly less than Alternative 4 because it allows more boatable days. For some existing users, goal interference and the potential resulting face-to-face conflict with boaters is higher than under Alternative 4 because a boat-free experience is not guaranteed on 37 days in an average year.

Specifically, boaters may interfere with angling on days when boating is allowed although, at flows of approximately 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 approximately 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 approximately 525 cfs respectively) and “optimal” (up to approximately 450 cfs) and “acceptable” (up to approximately 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.

The take-out at Lick Log Creek may mitigate interference with anglers in the delayed-harvest area. As outlined earlier, the angler/boater on-river encounters are more impactive than those on trails.

In summary, opportunities foregone for some boaters in this alternative are more than Alternative 8, but less than in the other boating alternatives. The opposite is true for existing 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 on the upper Chattooga. In addition, conflict will remain for some 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 boat-free 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 37 days in an average year.

Recreation Opportunities: Alternative 5 provides more recreation opportunities for boaters than alternatives 4, 9 and 10, but less than Alternative 8. The opposite is true for existing users seeking a boat-free experience.

Cumulative Effects

Cumulative effects are the same as in Alternative 4.

Alternative 8

Direct and Indirect Effects

Alternative 8 generally reduces current on-trail encounter levels below those established for alternatives 3-5, while maintaining the same on-river encounter levels as alternatives 3-5 (see the alternative descriptions in Chapter 2). As in the previous alternatives, this alternative addresses social carrying capacity by establishing encounter limits and a monitoring program that initiates adaptive management actions if limits are exceeded. Under this alternative, the encounter limits established for the Ellicott Rock Wilderness are closer to the desired tolerances in the literature (Whittaker and Shelby 2007) when compared to alternatives 3-5. Alternative 8 does not set on-trail or on-river encounters limits as low as Alternative 2.

This alternative allows boating on the main stem Chattooga from just below private property to the Highway 28 bridge year round with no flow restrictions. Alternative 8 responds directly to the concern that the Forest Service should allow natural river flows to separate users and mitigate potential conflict. This is particularly important on river between boaters and backcountry anglers because on river is where existing encounter levels are very low and where asymmetric impacts are most likely. The latter separation of uses is important to preserve the unique year-round backcountry angling opportunities, an important component of which is on-river solitude.

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. There are 114 days which include the “big water boating” (three), “high overlap” (34), and “low overlap” (77) days (see definitions in Whittaker and Shelby 2007). However, Whittaker and Shelby (2007) predict that only half of the 77 “low overlap” days would be used. Even so, half of these boatable days (38 or 77/2) would occur during optimal fly, spin and bait angling flows where there would likely be impacts on greater numbers of anglers than in the other boating alternatives.

Additionally, this is the only alternative in which scenic boating is anticipated on the main stem upper Chattooga. Whittaker and Shelby (2007) estimate this activity would likely occur on 50 days or less per year in the Nicholson Fields reach, and on ten days or less per year in portions of Ellicott Rock and Rock Gorge reaches. This translates into 75 boatable days in an average year for the Chattooga Cliffs reach (3 + 34 + 77/2), 85 for the middle two reaches (3 + 34 + 77/2 + 10 scenic boaters), and 125 (3 + 34 + 77/2 + 50 scenic boaters) for Nicholson Fields. Using data from the last 67 years the number of boatable days would range from 85 to 168 in Nicholson Fields (Hansen 2007), and less in the other three reaches.

Use attributed to scenic boaters would be expected 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 float the segment from the East Fork confluence down to Burrells Ford, but use here is less likely because of the approximate 2.5-mile portage. Scenic boaters may also choose to float the section from Burrells Ford to the Big Bend area; however this would require a portage on the take-out side. The highest use would likely occur in the Nicholson Fields reach and would increase encounters by one per day on 50 days in the summer. This section may also be of interest to boating-based anglers. In the other two reaches, encounters may increase by one per day on ten days in the summer.

Social Carrying Capacity/Solitude: Table 3.3-9 summarizes the average number of daily encounters among existing backcountry users and the number of days per year the encounter limits established in Alternative 8 are expected to be exceeded.

Table 3.3-9. Estimated Contribution Of Existing Backcountry Users To The Number Of Backcountry Encounters In Alternatives 8 - 10 (Independent Of Boating)

Reach	Average # of on-trail encounters per day in an average year	Average # of days on-trail encounter limits are exceeded in an average year	Average # of on-river encounters per day in an average year	Average # of days on-river encounter limits are exceeded in an average year
Chattooga Cliffs	1.6	0	0.2	0
Ellicott Rock	2.9	29	0.6	0
Rock Gorge	4.9	86	0.5	0
Nicholson Fields	6.5	139	2.1	10

The average number of daily on-trail and on-river encounters per year in Table 3.3-9 is another way of broadly depicting the existing level of solitude in each of the reaches (also depicted in tables 3.3-4 and 3.3-5). The Chattooga Cliffs has the lowest on-trail and on-river encounter rate per day signifying the lowest use/encounters, while Nicholson Fields has the highest signifying that it has the highest use/encounters of the four reaches. These average daily encounters are the same for all alternatives (1-10).

The difference lies in the average number of days on-trail encounter limits are exceeded by existing backcountry users. When Table 3.3-9 is compared with Table 3.3-6 in Alternative 3, existing backcountry users in Alternative 8 generally exceed on-trail encounter limits on more days than in alternatives 3-5 (slight exceptions are the upper two reaches) because the on-trail encounter limits are generally more stringent than those in alternatives 3-5 (see the encounter limits in Chapter 2). On the other hand, on-river encounter limits stay the same as in alternatives 3-5. Therefore, no changes are seen in the number of days on-river encounter limits are exceeded.

The effects of adding unlimited whitewater boating on all four reaches (along with some scenic boating) on existing backcountry encounters (which is additive to the above existing user impacts) is summarized in Table 3.3-10.

Table 3.3-10. Estimated Effects Of Adding Whitewater Boating On The Number Of Backcountry Encounters In Alternative 8

Reach	Average # of add'l on-trail encounters in an average year	Average # of days on-trail encounter limits will be exceeded due to boating in an average year	Average # of add'l on-river encounters in an average year	Average # of days on-river encounter limits will be exceeded due to boating in an average year
Chattooga Cliffs	0.5	0	1.6	0
Ellicott Rock	1.0	8	3.0	7
Rock Gorge	1.3	15	2.2	7
Nicholson Fields	1.5	24	2.6	11

Average daily encounters from boaters are lowest on trail and highest on river. Of the on-river encounters, Ellicott Rock is the highest (three) because that reach is expected to be the most popular among boaters, which in turn leads to more boaters and more encounters.

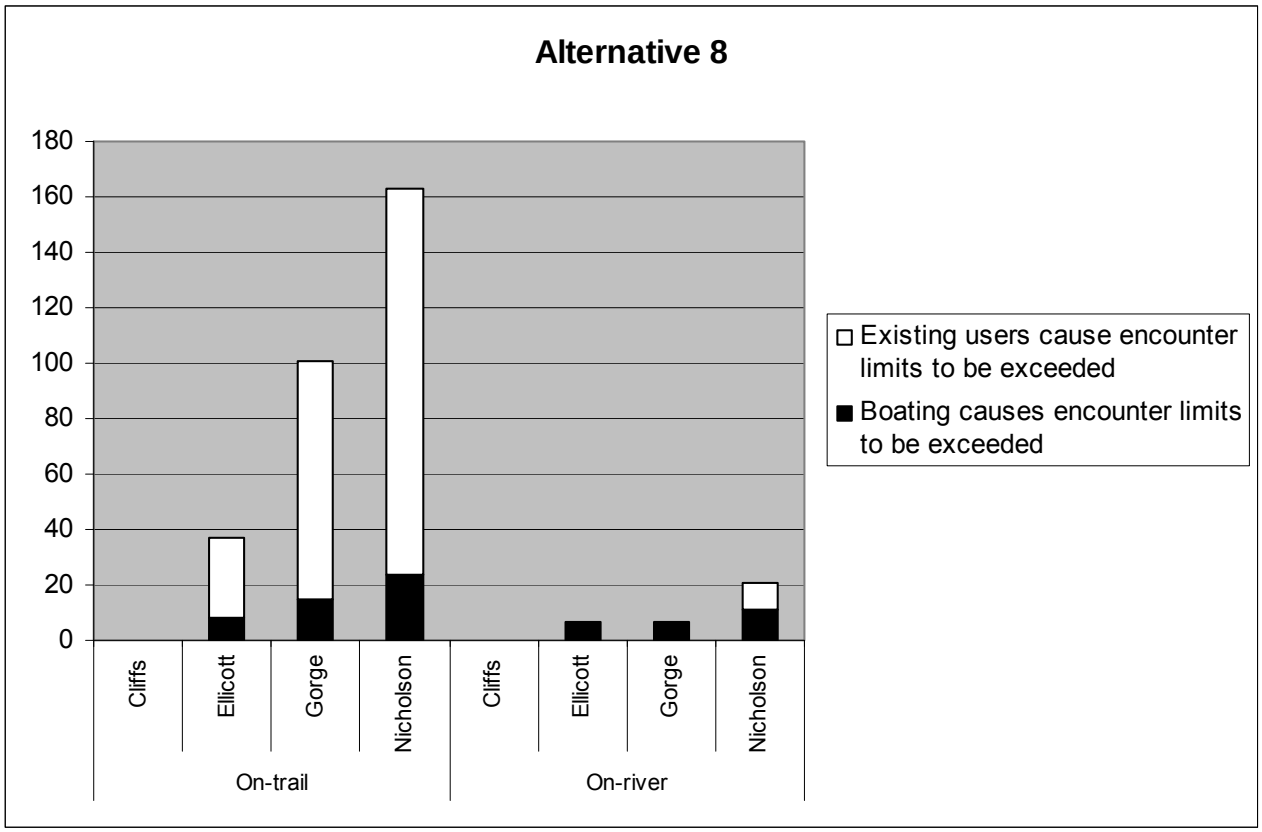
Table 3.3-10 also shows that boaters contribute to exceeding on-trail encounter limits on all four reaches, as opposed to only two in Alternative 5. As expected, encounter limits are exceeded more in Ellicott Rock and Rock Gorge (compared to Alternative 5) because of the more stringent encounter limits in Alternative 8, more boatable days, and a few scenic boaters. On the positive side, the more stringent on-trail encounter limits could, in the long run, equate to lower on-trail encounter rates than in alternatives 1 and 3-5. Relatedly, the encounter limits established for the Ellicott Rock Wilderness are closer to the desired tolerances in the literature than those established for alternatives 3-5. Finally, when impacts are compared to existing users in Table 3.3-9, on-trail encounter impact from boats is less. Additionally, many hiker/boater on-trail encounters tend to be more similar to hiker/hiker and hiker/angler encounters (Whittaker and Shelby 2007).

On river, however, boaters have a greater impact. They are estimated to exceed on-river encounter limits on seven days each for both Ellicott Rock and Rock Gorge reaches, and 11 days for Nicholson Fields reach. The effects appear similar to Alternative 5, but in this case, all four reaches are open to boats, there are more boatable days on each reach, and additionally, on-river encounter limits are exceeded on 11 days in the Nicholson Fields reach. These impacts are more substantial than in alternatives 4 and 5, especially in the wilderness section along the Ellicott Rock reach and in the Rock Gorge reach. There, according to estimates, existing users have not exceeded the on-river encounter limits on a single day (see Table 3.3-9) and their daily on-river encounters are very low (less than one). This is underscored further because angler/boater on-river encounters are among the most important impacts associated with allowing boating use on the upper Chattooga River. Solitude on river is a key determinant to the unique, year-round backcountry angling opportunities that are desired on the river.

Therefore, even though Alternative 8 has more stringent on-trail encounter limits than alternatives 3-5 (which in the long run could equate to lower on-trail encounter rates than in alternatives 1 and 3-5), the on-river encounter limits are the same as in alternatives 3-5 while the on-river impacts are higher. As outlined earlier, this is especially true during "low overlap" flows and while scenic boaters are on the river. Under Alternative 8, opportunities to enhance solitude, remote experiences and the wilderness character while still providing for some boating are less than in alternatives 4 and 5, especially on river.

When the boater impacts (Table 3.3-10) are combined with the impacts from existing users (Table 3.3-9), both the Rock Gorge and Nicholson Fields reaches may exceed encounter limits on trails (Figure 3.3-4 below). At this encounter level, if after two years of implementation, encounter limits are still being exceeded, then indirect measures would be taken to reduce encounter levels for the following two years. If after that time encounters have not been reduced, then a permit system would be implemented to continue maintaining the desired levels of solitude and quality recreation experiences defined in this alternative. These actions ensure that both the Chattooga River's recreation ORV, and in particular its solitude component, are being "protected and enhanced," and the "outstanding opportunities for solitude" in the Ellicott Rock Wilderness are being preserved at the desired levels for this alternative.

Figure 3.3-4 Estimated Number Of Days Per Year On-Trail And On-River Encounters From Existing Users And Boaters Are Likely To Exceed Encounter Limits By Reach For Alternative 8.



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 further impinge on the encounter limits during the higher use times of the year. 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. Finally, impacts of competition for resources in the future are the same as in 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 an average of 75 days per year in the Chattooga Cliffs, 85 days each in the Ellicott Rock and Rock Gorge Reaches, and 125 days per year in the Nicholson Fields reach. 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 easily attained in the winter months, may be more difficult to achieve as boating could increase encounters during that time.

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

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 some existing users than any other alternative. However, it also provides the least opportunities foregone for boaters than any other alternative.

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 (especially below 350 cfs when bait, spin and fly fishing are optimal – see Table 3.3-3).

Boaters would experience fewer foregone opportunities in this alternative than in any other alternative. Existing users seeking a boat-free experience would have more goal interference in this alternative than in any of the others, particularly at flows below 350 cfs during the optimal angling ranges for spin and fly fishing.

Like alternatives 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 likely 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 boat-free 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 125 days in an average year.

Recreation Opportunities: Boaters would have more recreation opportunities in this alternative than any other; existing backcountry users seeking a boat-free experience would have the least amount of recreation opportunities under this alternative.

Cumulative Effects

Cumulative effects are the same as in Alternative 4. The vast majority of the recreational effects are direct/indirect as described above. There will be no cumulative adverse effects on boaters. There will be a very small cumulative adverse effect on some existing users from allowing some boating use in an average year. This is because, while there are several similarly-sized river segments in the region that permit some boating use at higher flow levels, this option would reduce the number of rivers in the region that do not permit boating at any flow level.

Alternative 9

Direct and Indirect Effects

Alternative 9 manages encounter levels and addresses social carrying capacity in the upper Chattooga River corridor in the same way as Alternative 8. As is the case with alternatives 4, 5 and 8, this alternative also provides additional boating opportunities on the main stem Chattooga while separating users to mitigate potential conflict. This is particularly important on river between boaters and backcountry anglers because here is where existing encounter levels are very low and where asymmetric impacts are most likely. The latter separation of uses is important to preserve the unique year-round backcountry angling opportunities, an important component of which is on-river solitude.

Separation of users would be accomplished by limiting boating above Highway 28 using flow levels (approximately 350 cfs or higher at Burrells Ford), by season (between November 1 and March 31) and by zoning (boating from below private land south to East Fork Trail). Flow levels of approximately 350 cfs or higher occur during the designated season on 21 days in an average year (Hansen 2007). Using data from the last 67 years the number of boatable days in this alternative would range from a low of four to a high of 38 (Hansen 2007).

Social Carrying Capacity/Solitude: Existing backcountry users would exceed the on-trail and on-river encounter limits to the same extent as in Alternative 8. The effects of adding boating are summarized in Table 3.3-11.

Table 3.3-11. Estimated Effects Of Adding Whitewater Boating On The Number Of Backcountry Encounters In Alternative 9

Reach	Average # of add'l on-trail encounters on an average of 21 days/year	Average # of days on-trail encounter limits will be exceeded due to boating on an average of 21 days/year	Average # of add'l on-river encounters on an average of 21 days/year	Average # of days on-river encounter limits will be exceeded due to boating on an average of 21 days/year
Chattooga Cliffs	0.5	0	1.6	0
Ellicott Rock	1.4	2	4.4	3
Rock Gorge	0	0	0	0
Nicholson Fields	0	0	0	0

Average daily encounters from boaters in Table 3.3-11 shows that the greatest impacts from boats are on river in the Ellicott Rock reach. Note that average daily encounters cannot be compared across alternatives since they are based on the average number of boatable days per year, which vary by alternative.

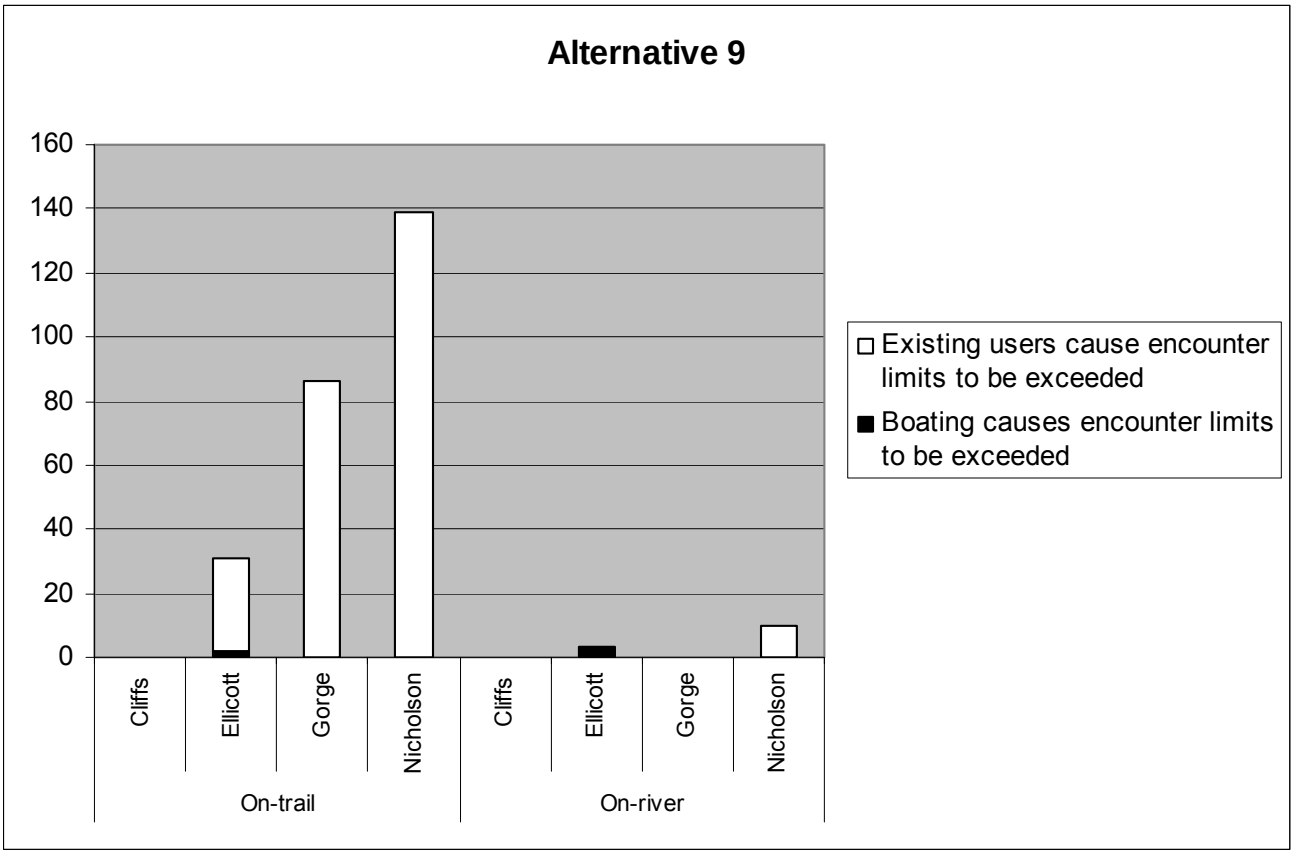
Table 3.3-11 also shows that boaters contribute to exceeding on-trail encounter limits in the Ellicott Rock reach alone (two days). This is less than boating contributions in the same reach in alternatives 5 and 8, but more than in Alternative 4. However, like Alternative 8, Alternative 9 has more stringent on-trail encounter limits than alternatives 1 and 3-5 which, in the long run, could equate to lower on-trail encounter rates. Relatedly, the encounter limits established for the Ellicott Rock Wilderness under this alternative are closer to the desired tolerances in the literature than are those in alternatives 3, 4 and 5. Finally, when impacts are compared to existing users in Table 3.3-9, on-trail encounter impacts from boats in Alternative 9 are very small. Additionally, many hiker/boater on-trail encounters tend to be more similar to hiker/hiker and hiker/angler encounters (Whittaker and Shelby 2007).

Table 3.3-11 also shows that boaters exceed on-river encounter limits in the Ellicott Rock reach alone (three days). This is less than boating contributions in the same reach in alternatives 5 and 8, but more than Alternative 4 by two days. Additionally, existing users have not exceeded the on-river encounter limits on a single day in the Ellicott Rock reach (see Table 3.3-9) and their estimated daily on-river encounters are very low (less than one). This impact is underscored further because angler/boater on-river encounters are among the most important impacts associated with allowing boating use on the upper Chattooga River. Solitude on river is a key determinant to the unique year-round backcountry angling opportunities that are desired on the river.

Under Alternative 9, opportunities to enhance solitude, remote experiences and the wilderness character while still providing boating opportunities are greater than in alternatives 5 and 8, and possibly than in Alternative 4, especially on river. Alternative 9 appears better than Alternative 4 in this respect because of the more stringent encounter limits in wilderness that more closely align to the tolerances in the literature (Whittaker and Shelby 2007). In the long run, these could equate to lower encounter rates in Alternative 9 than in Alternative 4. On the negative side, Alternative 9 does have the potential for two more on-river encounters in the Ellicott Rock Wilderness than Alternative 4 due entirely to the higher number of boatable days.

The analysis suggests that independent of boater impacts (Table 3.3-11), existing user impacts (Table 3.3-9) in the Rock Gorge and Nicholson Fields reaches may exceed encounter limits on trails (Figure 3.3-5 below), the same as Alternative 8. If encounter limits are still being exceeded after two years of implementation, then indirect measures would be taken to reduce encounter levels. If after two years, encounter levels have not been reduced, a permit system would be implemented to achieve the desired levels of solitude and quality recreation experiences. These actions ensure that both the Chattooga River's recreation ORV, and in particular its solitude component, are being "protected and enhanced," and the "outstanding opportunities for solitude" in the Ellicott Rock Wilderness are being preserved at the desired levels for this alternative.

Figure 3.3-5. Estimated Number Of Days Per Year On-Trail And On-River Encounters From Existing Users And Boaters Are Likely To Exceed Encounter Limits By Reach For Alternative 9.



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. 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.

Requiring boaters to take out at the East Fork confluence will increase on-trail encounters inside the Ellicott Rock Wilderness. Conversely, it will reduce on-river encounters with anglers through the most heavily fished portion the Ellicott Rock reach. As mentioned earlier, the angler/boater on-river encounters are more impactive than those on trails.

Competition for fishable water would be the same as in Alternative 1. Competition for parking is the same as Alternative 2, as is predicted increased competition for resources in the future.

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.

Conflict: Compared to the other alternatives that provide boating opportunities, Alternative 9 has the potential to introduce more goal interference and the resulting potential face-to-face conflict than alternatives 1, 2, 3 and 4, but less than alternatives 5, 8 and 10 (even though 10 has fewer boatable days than 9, boating occurs on all four reaches in 10).

Specifically, boaters may interfere with angling on days when boating is allowed although, at flows of approximately 350 cfs or higher, the interference may be mitigated, particularly with those anglers who wade to fish. Additionally, Table 3.3-3 shows that flow levels of approximately 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 approximately 450 cfs) and "acceptable" (up to approximately 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.

As mentioned above, the take-out at the East Fork Trail will mitigate interference with anglers through the heaviest fished portion the Ellicott Rock reach just upstream of Burrells Ford.

Opportunities foregone for some boaters in this alternative and the resulting antipathy are more than alternatives 5, 8 and possibly 10, but less than all the other alternatives. Goal interference for some existing backcountry users seeking a boat-free experience is less than alternatives 5, 8 and possibly 10, but more than 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 some 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 10, this alternative will create a new "norm" and users with a "zero tolerance" for boating will either adjust or be displaced on 21 days in an average year.

Recreation Opportunities: In Alternative 9, boaters have more recreation opportunities than in alternatives 1, 2, 3 and 4 and less than in alternatives 5, 8 and 10. The opposite is true for existing backcountry users seeking a boat-free experience.

Cumulative Effects

Cumulative effects are the same as in Alternative 4.

Alternative 10

Direct and Indirect Effects

Alternative 10 manages encounter levels and addresseses social carrying capacity in the upper Chattooga River corridor in the same way as alternatives 8 and 9. As is the case with

alternatives 4, 5, 8 and 9, this alternative also provides additional boating opportunities on the main stem Chattooga while separating users to mitigate potential conflict. This is particularly important on river between boaters and backcountry anglers because here is where existing encounter levels are very low and where asymmetric impacts are most likely. The latter separation of uses is important to preserve the unique, year-round backcountry angling opportunities, an important component of which is on-river solitude.

Separation of users would be accomplished by limiting boating above Highway 28 using flow levels (approximately 350 cfs or higher at Burrells Ford) and by season (between November 1 and March 1). Flow levels of approximately 350 cfs occur during the designated season on 14 days in an average year (Hansen 2007). Using data from the last 67 years the number of boatable days in this alternative would range from a low of zero to a high of 28 (Hansen 2007).

Carrying Capacity/Solitude: Existing backcountry users would exceed the on-trail and on-river encounters per day limit to the same extent as Alternative 8. The effects of adding boating are summarized in Table 3.3-12.

Table 3.3-12. Estimated Effects Of Adding Whitewater Boating On The Amount Of Backcountry Encounters In Alternative 10.

Reach	Average # of add'l on-trail encounters on an average of 14 days/year	Average # of days on-trail encounter limits will be exceeded due to boating on an average of 14 days/year	Average # of add'l on-river encounters on an average of 14 days/year	Average # of days on-river encounter limits will be exceeded due to boating on an average of 14 days/year
Chattooga Cliffs	0.6	0	1.6	0
Ellicott Rock	1.4	1	4.4	2
Rock Gorge	1.4	1	2.6	2
Nicholson Fields	1.9	3	2.9	2

Average daily encounters from boaters in Table 3.3-12 shows that the greatest impacts from boats are on river in the Ellicott Rock reach. Note that average daily encounters cannot be compared across alternatives since they are based on the average number of boatable days per year, which vary by alternative. The Ellicott Rock reach is the most impacted because this is the reach that is expected to be most popular among boaters and would therefore receive the most use/encounters.

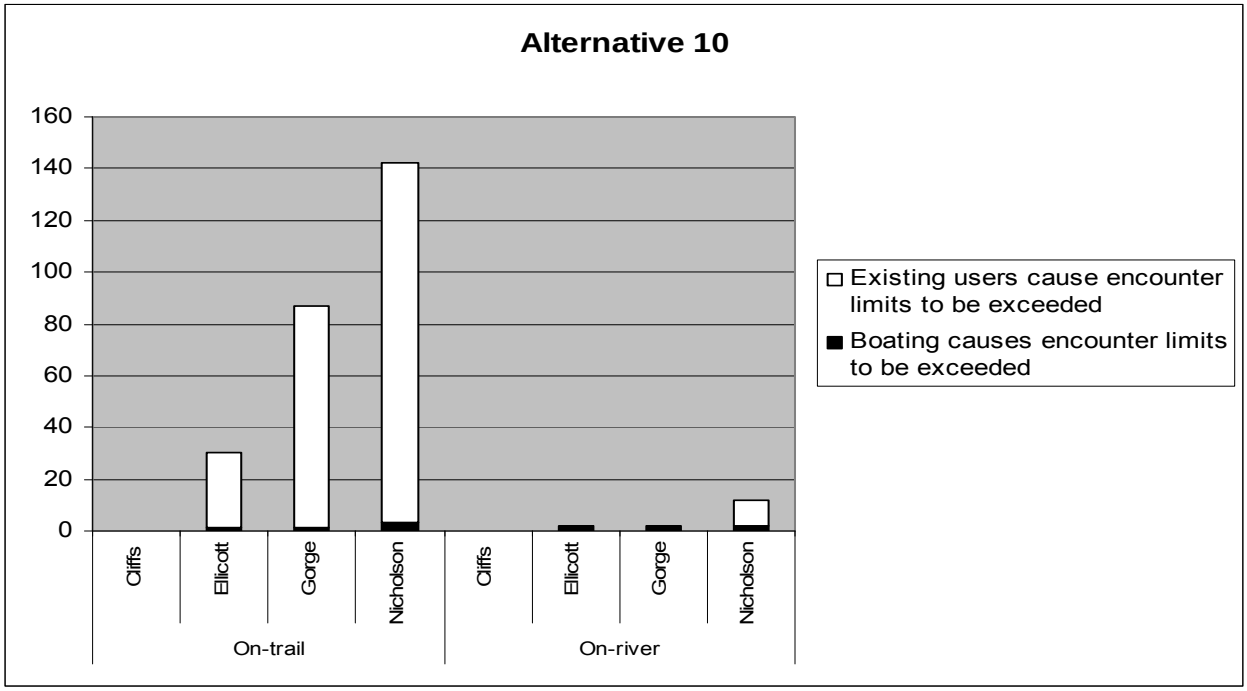
Table 3.3-12 also shows that boaters contribute to exceeding on-trail encounter limits in the three lower reaches. These on-trail impacts are less than in alternatives 5 and 8, but more than in alternatives 4 and 9. However, like alternatives 8 and 9, Alternative 10 has more stringent on-trail encounter limits than alternatives 1 and 3-5, which, in the long run, could equate to lower on-trail encounter rates than would occur in those alternatives. Relatedly, the encounter limits established for the Ellicott Rock Wilderness are closer to the desired tolerances in the literature than those in alternatives 3-5. Finally, when impacts are compared to existing users in Table 3.3-9, on-trail encounter impact from boaters in Alternative 10 is very small. Additionally, many hiker/boater on-trail encounters tend to be more similar to hiker/hiker and hiker/angler encounters (Whittaker and Shelby 2007).

Table 3.3-12 also shows that boaters exceed on-river encounter limits in the three lower reaches (two in Ellicott Rock, two in Rock Gorge, and two in Nicholson Fields). This is less than boating contributions in the same reach in alternatives 5 and 8, but more than in alternatives 4 and 9. Existing users have not exceeded the on-river encounter limits on a single day in the Ellicott Rock and Rock Gorge reaches (see Table 3.3-9) and their estimated daily on-river encounters are very low (less than one). This impact is underscored further because angler/boater on-river encounters are among the most important impacts associated with allowing boating use on the upper Chattooga River. Solitude on river is a key determinant to the unique, year-round backcountry angling opportunities that are desired on the river.

In summary, under Alternative 10, opportunities to enhance solitude, remote experiences and the wilderness character while still providing boating are less than in alternatives 4 and 9, but greater than in alternatives 5 and 8, especially on river.

Independent of boater impacts (Table 3.3-12), existing user impacts (Table 3.3-9) in the Rock Gorge and Nicholson Fields reaches may exceed the desired encounter levels on trails (Figure 3.3-6 below), the same as in alternative 8 and 9. At this encounter level, if, after two years of implementation, encounter limits are still being exceeded, then indirect measures would be taken to reduce encounter levels. If after two years, encounters have not been reduced, then a permit system would be implemented to achieve the desired levels of solitude and quality recreation experiences. These actions ensure that both the Chattooga River's recreation ORV, and in particular its solitude component, are being "protected and enhanced," and the "outstanding opportunities for solitude" in the Ellicott Rock Wilderness are being preserved at the desired levels for this alternative.

Figure 3.3-6. Estimated Number Of Days Per Year On-Trail And On-River Encounters From Existing Users And Boaters Are Likely To Exceed Encounter Limits By Reach For Alternative 10.



Impacts of parking restrictions are the same as Alternative 2.

To a lesser extent than in Alternative 2, the encounter limits 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 (Whittaker and Shelby 2007).

Competition for fishable water would be the same as in Alternative 1. Competition for parking 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.

Conflict: Compared to the other alternatives, 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.

Opportunities foregone for some boaters and the resulting antipathy are less than in alternatives 1, 2, 3 and 4, about the same as in Alternative 9, and more than in alternatives 5 and 8. The opposite is true for some existing users who might experience goal interference due to boaters and the potential resulting face-to-face conflict.

Specifically, boaters may interfere with angling on days when boating is allowed although, at flows of approximately 350 cfs or higher, the interference may be mitigated, particularly with those anglers who wade to fish. Additionally, Table 3.3-3 shows that flow levels of approximately 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 approximately 450 cfs) and “acceptable” (up to approximately 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.

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 14 days in an average year.

Recreation Opportunities: Recreation opportunities for boaters in this alternative are less than alternatives 5 and 8, about the same as in Alternative 9 but more than in alternatives 1, 2, 3 and 4. The opposite is true for existing users seeking a boat-free experience.

Cumulative Effects

Cumulative effects are the same as Alternative 4.

Alternatives 3-10 Summary Charts

Figure 3.3-7. Estimated Number Of Days Per Year On-Trail Encounters From Existing Users And Boaters Are Likely To Exceed Encounter Limits By Reach And Alternative.

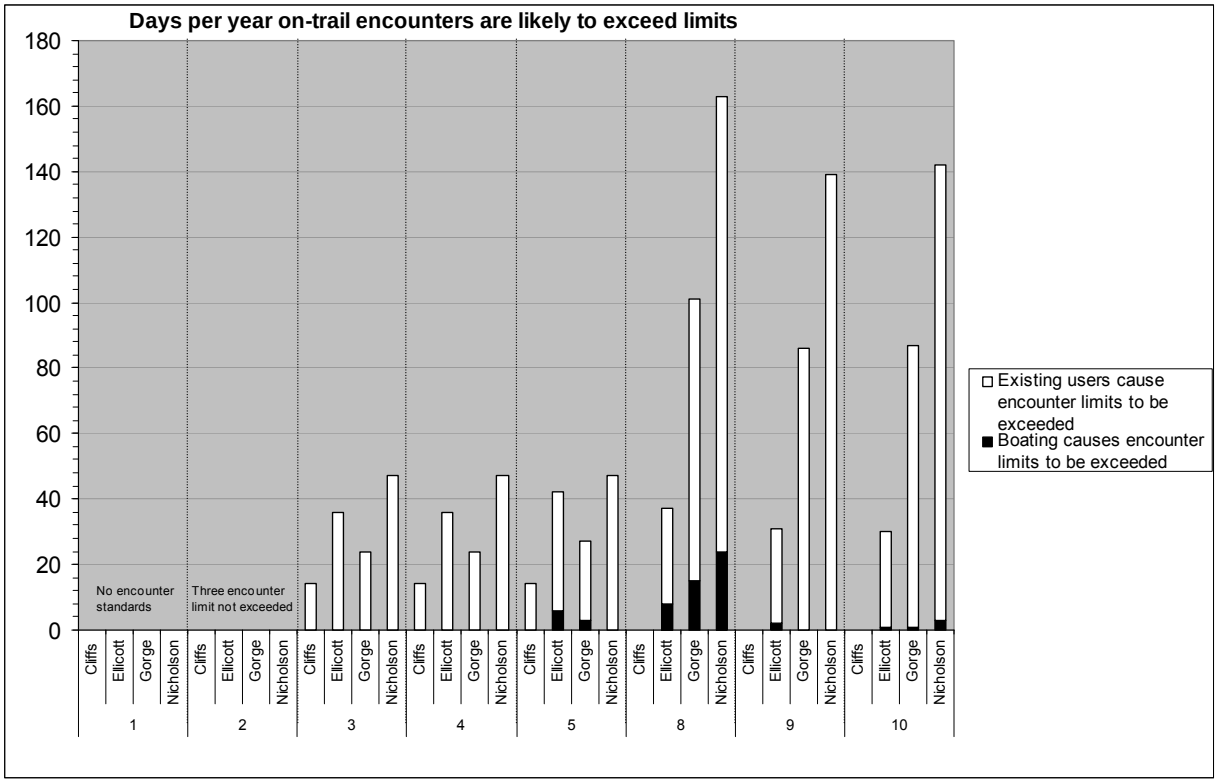


Figure 3.3-8. Estimated Number Of Days Per Year On-River Encounters From Existing Users And Boaters Are Likely To Exceed Encounter Limits By Reach And By Alternative.

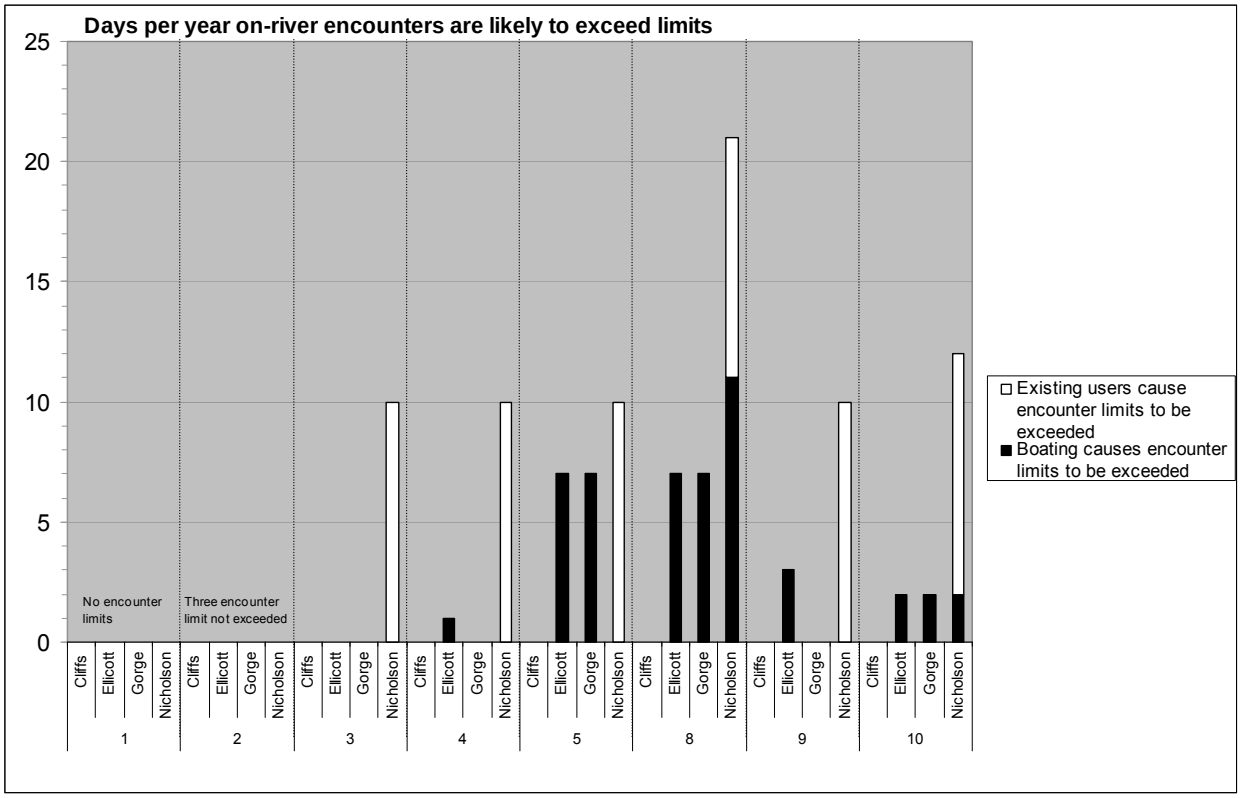
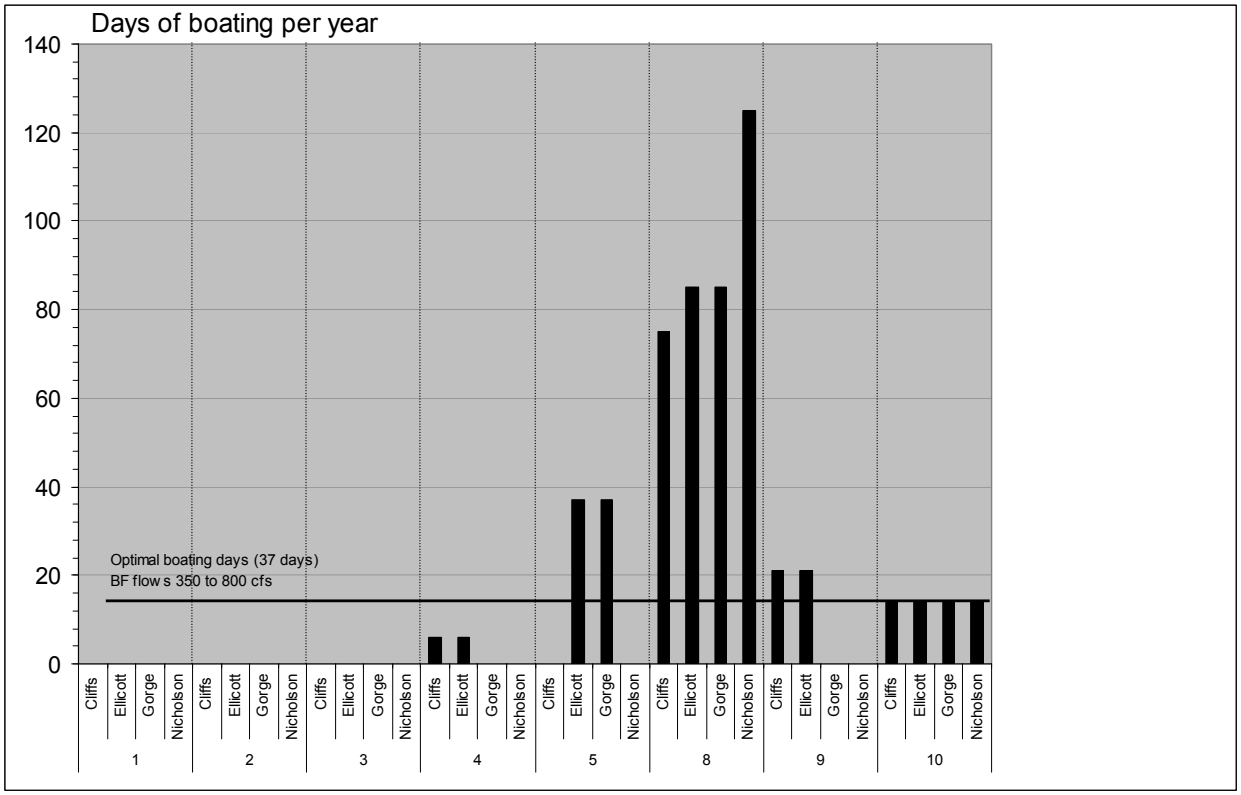


Figure 3.3-9. Estimated Number Of Boating Days Per Year By Alternative And Reach.



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 existing use as follows: 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 (except Alternative 4) 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 existing use as follows: 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 specification, 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 may also 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 kayaks 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 scarred 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 given new materials being used in the manufacturing of boats and kayaks.

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 (see Section 3.2.3 Aquatic Species and Habitat). 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 existing and boater use and aesthetic impacts of additional human waste and trash accumulation.

However, alternatives 4 and 8 propose 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 (except Alternative 4), campsite and trail actions 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 Grimshawes Bridge downstream to the Highway 28 bridge. The river has an ever-changing bottom ranging from accumulations of sand and sediments to a rough and rocky bottom with a substantial distribution of large and irregularly shaped boulders within its banks. Downed trees may also be present, particularly in the narrower sections in the upper reaches. 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 impactive (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. However, 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 user 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 20th century	eligible
Bull Pen Gold Mine	NC	historic period mine	19th/early 20th century	not evaluated
Ellicott Rock	NC,SC,GA	boundary monument	early 19th century	on register
Winchester Cemetery	SC	cemetery	early 19th century	not eligible
Chattooga Town 38OC18	SC	Cherokee village earlier occupations, Euro-American farm	17th, 18th, 19th, 20th century, Late Archaic, Woodland, Mississippian Periods	eligible
9RA125	GA	prehistoric lithic scatter, historic period house site	Early Archaic, early 20th century	not evaluated
9RA126	GA	prehistoric artifact scatter	Woodland Period	not evaluated
9RA127	GA	Cherokee village	17th, 18th century, part of Chattooga Town on GA side of the river.	not evaluated
Lick Log House	SC	historic period house site	19th/20th 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 archaeological 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 archaeological 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 archaeological 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

Interdisciplinary (ID) Team – Responsible for analyzing environmental effects for the EA

John Cleeves – Team Leader (FMS)
Joe Robles – Recreation Specialist (FMS)
Tom Fearrington – Recreation Specialist (CONF)
Jeanne Riley – Fisheries Biologist (FMS)
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Eric Crews – Landscape Architect (NC)
Greg Barnes – Social Scientist (LBL)
Jim Bates, Bob Morgan – Heritage (FMS)
Ruth Berner – Writer/Editor, Forest Planner (NC)

Core Team – Responsible for developing and leading the process within budget and time constraints. This team took the lead in developing alternatives for the EA and ensuring its completion.

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PAOs – Develop and implement the Public Involvement strategy

Michelle Burnett – FMS
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Steering Team

Jerome Thomas – Former Forest Supervisor (FMS)
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Mike Wilkins – Nantahala Ranger District (NC)
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Other Major Contributors

William Hansen – FMS Hydrologist (hydrology data collection/analysis; estimates of boatable days; hydrologic record analysis; hydrology information connected with Berger and Whittaker and Shelby reports; information in Appendix C; and review of technical hydrologic content)
Mary Lou Addor, Steve Smutko – Natural Resources Leadership Institute (Public Meetings)
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)

APPENDICES
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 percent 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 archaeological sites have been recorded within the corridor. These include 15 prehistoric sites, 15 historic house and farmstead sites, a railroad embankment, two 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 1600s until the 1730s 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

- Monitoring and enforcement
- Fees and the use of http://www.recreation.gov

Boater Registration

- Develop permit
- Install permit boxes and signage
- Develop/modify database
- Monitoring, data input, enforcement
- Some alternatives will require the use of http://www.recreation.gov and fees

User Registration

- Develop permit
- Install permit boxes and signage
- Develop database
- Monitoring, 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. Regardless of which 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 recreation use above Highway 28, additional large woody debris from hemlock mortality and removal of large wood debris by users affecting rare plant species and aquatic habitats?**

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

2. Above Highway 28 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 the introduction of boating?

Item: Recreation Use by activity
On-Water and Off-Water Encounters
Technique: User Survey, Direct Observations of Encounters

Specific Requirements for Implementing Monitoring Question #1:

For all action alternatives

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 annually for any downed trees spanning the river and requiring portage:
   - Confluence with Norton Mill Creek downstream to Bull Pen Road Bridge
   - 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

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.

Specific Requirements for Implementing Monitoring Question #2:

Should encounters exceed the respective encounter limits ("on trail" and "in river" by river section by day or by weekend/weekday) on 20% of days (weekend or weekdays, whichever comes first) in one calendar year for two consecutive calendar years, indirect measures will be employed in an attempt to lower encounters. Then, after two

consecutive calendar years of implementing indirect measures, if encounters continue to exceed limits, more direct measures (i.e. self registration, permits, reservations) will be implemented for all users to manage the level of encounters.

APPENDIX C – Flow Level and Boatable Day Estimates

In the EA, the average number and range of "boatable" days in alternatives 4 – 10 were calculated by using a "mean daily flow" (MDF) method (Whittaker and Shelby 2007). MDF used in the description of the boating alternatives (i.e. alternatives 4 – 10) is defined as the average flow that occurs over a 24-hour day and is typically reported as cubic feet per second (cfs). The determination of MDF is made after numerous estimates of flow during a day are compiled and averaged.

For implementation, the Forest Service may predict a boatable day using methods other than MDF if it provides a more effective prediction of a boatable day. Other methods would likely produce more or less predicted boatable days. The key factor with any method of predicting a boatable day is to use the approximate flow level as described by Whitaker and Shelby (2007) when separation of various users occurs.

Another prediction approach is to use the Minimum Flow Level (MFL) method. The MFL is defined as when flow levels are predicted to or actually do reach a designated flow level at least once during a 24-hour day.

Given that a variety of methods could be used (or refined in the future) to predict boatable days, a sensitivity analysis was conducted to assess the encounter calculations sensitivity to increasing or decreasing boatable days during implementation (see the Encounter Sensitivity Analysis in the project file). The sensitivity analysis used the MFL method to estimate the average number of boatable days. Table C-1 displays a comparison of predicted boatable days between the MDF and MFL methods by alternative. (For a more comprehensive discussion of these two methods, see "Background Estimates of Days with Boatable Flows in the North Fork Chattooga River from Existing Chattooga River and Other Data" (Hansen 2008 in the project file).

The sensitivity analysis found that the number of encounters per day would not change based on the number of boatable days. However, as would be expected, the number of days with boater-generated encounters would increase proportionately to the increase in the number of boatable days.

Table C-1. Estimated Average Annual Number Of Boatable Days By Alternative, Prediction Method (MDL And MFL) Using 68- And 16-Year Data Sets And Flow Level (Cfs).

	4	5	9	10
	Dec 1 – Mar 1	Oct – Sep	Nov 1 – Mar 31	Nov 1 – Mar 1
68 year MDF				
350 cfs	12.7	37.9	20.9	14.4
450 cfs	5.8	17.4	9.8	6.8
16 year MDF				
350 cfs	12.4	38.1	21.1	15
450 cfs	6.3	18.3	10.5	7.9
16 year MFL				
24-hour period				
350 cfs	19.1	*	30.8	23.1
450 cfs	11.6	*	*	*
16 year MFL				
Daylight only				
350 cfs	15.5	*	25.9	19
450 cfs	9.2	*	*	*

* Not calculated.

APPENDIX D

Encounter Calculations

Existing User Encounter Information

1. Specific information about trail encounters has not been collected for most parts of the Chattooga River. The following information/assumptions were used for analysis purposes:

    - Average trail encounter estimates for Ellicott Rock Wilderness (Rutlin 1995) were collected by researchers over three seasons from users who were contacted at major trailheads.

    - Encounters have increased with the increase in population since 1995, based on *Use Estimation Workshop* judgments (Berger and CRC 2007).

2. The Use Estimation Workshop (Berger and CRC 2007) brought together local agency experts to estimate and describe the current level of use in the Chattooga River corridor by recreation opportunity type and location.

3. Data about the relationship between use and encounters is not available. The 1995 Rutlin study did not attempt to estimate use or to correlate it with encounters. However, a comparison was made between that study's average encounter estimates and current use estimates from the Use Estimation Workshop (Berger and CRC 2007) in order to develop an approximate relationship between the two and estimate average encounters for the Chattooga.

Assumptions about Existing User Encounters

Average **on-trail** encounters per day were estimated from the results of the Use Estimation Workshop (Berger and CRC, 2007) by applying the following formula:

> 50% of day hiking GAOT[3] + 50% of backpacking GAOT + 25% of angling PAOT (except for Nicholson Fields reach where angling is assumed to be 50% also)

Day hikers and backpackers are assumed to represent all recreation opportunity types in the corridor not categorized as anglers.

[3] GAOT refers to "Groups at one time" and PAOT refers to "People at one time."

Average **on-river** encounters per day were estimated from the results of the Use Estimation Workshop (Berger and CRC, 2007) by applying the following formula:

25% of angling PAOT (except Nicholson Fields reach, where 50% is used)

Day hikers and backpackers are assumed NOT to contribute to on-river encounters (they are on-river for a much shorter amount of time than anglers).

- The 50% estimate for day hiking and backpacking use on-trail assumes average encounters to be about half of all groups using the trail system in a particular reach. 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.

- 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 (Berger and CRC 2007), PAOTs for anglers equals GAOTs. For trail encounters, however, it is assumed that anglers spend about half their time on trails (since they are headed to their favorite fishing spot) when compared to hikers/backpackers. Therefore, encounters for anglers on trails is assumed to be 50% of 50% of PAOTs or 25% of PAOT.

- Average on-river encounters between anglers are assumed to be 25% of PAOT since the ground covered while fishing is less than that covered while walking on trails, and 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 Nicholson Fields reach (delayed harvest reach from Lick Log to Highway 28) where average encounters between anglers would be 50% of PAOT (Durniak 2007). This is assumed to be the case both on-trail -because the trail is close to the river for a good portion of the Nicholson Fields reach, and on-river -because the low gradient of the channel and availability of trails along both banks allow for easier travel within the corridor.

Example Calculations for Estimating Existing User Encounters

Table 1. Use Estimation Workshop Results (Berger And CRC 2007) In GAOT And PAOT For The Ellicott Rock Reach (ERR) From December Through February.

Ellicott Rock Reach	**Weekdays**		**Weekends**	
Day Hiking (GAOT)	Average	Peak	Average	Peak
Dec	1	2	2	2
Jan	1	2	2	2
Feb	1	2	2	4
	Weekdays		**Weekends**	
Backpacking (GAOT)	Average	Peak	Average	Peak
Dec	0.5	1	1	1
Jan	0.5	1	1	1
Feb	0.5	1	1	2
Backcountry	**Weekdays**		**Weekends**	
Angling (PAOT)	Average	Peak	Average	Peak
Dec	0.5	1	1	2
Jan	0.5	1	1	2
Feb	0.5	1	1	2

A. Ellicott Rock Reach On-Trails December to February

Using the data in Table 1, use estimates were converted to encounters for the three user group categories and added together using the following formula (derived from the above assumptions and relationships):

50% of day hiking GAOT + 50% of backpacking GAOT + 25% of angling PAOT

The results are shown in Table 2 (e.g. for average weekdays in December: [0.5*1] + [0.5*0.5] + [0.25*0.5] = 0.5 + 0.25 + 0.125 = 0.875 ~ 0.9 encounters).

Table 2. Total On-Trail Encounters Between Existing Users (hikers, backpackers and backcountry anglers) for the Ellicott Rock reach (ERR) from December Through February.

Total Encounters	**Weekdays**		**Weekends**	
On-Trails (ERR)	Average	Peak	Average	Peak
Dec	0.9	1.8	1.8	2.0
Jan	0.9	1.8	1.8	2.0
Feb	0.9	1.8	1.8	3.5

B. Ellicott Rock Reach On-River December to February

Using the data in Table 1 for backcountry angling alone, use estimates were converted to encounters using the following formula (derived from the above assumptions and relationships):

25% of angling PAOT

The results are shown in Table 3 (e.g. for peak weekends in December: [0.25*2] = 0.5 encounters).

Table 3. Total On-River Encounters Between Backcountry Anglers For The Ellicott Rock Reach (ERR) From December Through February.

Encounters On-River (ERR)	**Weekdays** Average	Peak	**Weekends** Average	Peak
Dec	**0.1**	**0.3**	**0.3**	**0.5**
Jan	**0.1**	**0.3**	**0.3**	**0.5**
Feb	**0.1**	**0.3**	**0.3**	**0.5**

In summary, Table 2 and similar calculations in the project file were used to populate Table 3.3-4 in the EA. Also, Table 3 and similar calculations in the project file were used to populate Table 3.3-5 in the EA.

Example Calculations for Estimating Average Number of Days Encounter Limits are Exceeded in an Average Year by Existing Users

A. Protocols

Go to the encounter calculation spreadsheet in the project file. Table 2 is a subset of the on-trail portion of the encounter calculation spreadsheet, and Table 3 is a subset of the on-river portion. For the purpose of this example, both tables show only the months of December through February. The encounter calculation spreadsheet includes calculations for all 12 months of the year.

Then:

(1) Look first at the weekend encounter averages for a particular month.

a. If weekend encounter averages are near, at or minimally above the assigned encounter limit, then assume 50% of the days represented in that month actually exceed the limit (assuming a normal distribution of encounter data), or

b. If weekend encounter averages exceed the assigned encounter limit by 50%, then assume 75% of the days represented actually exceed the limit, or

c. If weekend encounter averages are less than the assigned encounter limit and within 25% of the limit, assume 25% of the days represented exceed the limit, or

d. If a, b and c above are not applicable, then go to step 2 below.

(2) Look at the peak encounter for the same month; if peak is at or above the assigned encounter limit, then assume one day exceeded.

(3) Go to the next month (until all months are completed) and repeat steps (1) and (2) above.

(4) For weekdays, follow steps (1)-(3) outlined above.

B. Example using Alternative 4, Ellicott Rock Reach (ERR) On-Trail

Given the established encounter limits of nine on weekends and four on weekdays in Alternative 4 for the Ellicott Rock reach on-trail, and following the above protocol:

No encounter limits were estimated to be exceeded by existing users from October through March.
However, average encounters on weekends in May, June, July, August and September are within 25% of the assigned encounter limit of nine. Therefore 25% of weekend days in these months are estimated to exceed the encounter limit: 44 weekend days * 0.25 = **11 days exceed.**

A peak weekend day in April exceeds the encounter limit of nine, so **one day exceeds**.

Average encounters on weekdays in June (22 days) are right at 4 total encounters, so:
22 weekdays * 0.5 = **11 days exceed**.

Average encounters on weekdays in July and August are within 25% of the encounter limit of 4, so 25% of weekdays in these months are estimated to exceed the encounter limit: 44 weekdays * 0.25 = **11 days exceed**.

And finally, a peak weekday in April and May exceeds the four (4) encounter limit, so **2 days exceed**.

Adding up the above days renders a total of **36 days exceeded** by existing users. This number is reported in the on-trail portion of Table 3.3-6 in the EA (in the Environmental Consequences section under Alternative 3).

Similar calculations were performed for the Ellicott Rock reach on-river and for the other three reaches, on-trail and on-river. See project file.

Assumptions about Boater-Generated Encounters

Boating group sizes: four boaters per group on average when the number of groups per day is unlimited (based on Vagias 2006 analysis of Section 4 private boating use).

Average number of days per year boaters would float the river (boatable days) are estimated by using the prescribed mean daily flow (MDF) and season of use for the alternative in question (e.g.: in Alternative 4, flow levels of approximately 450 cfs or higher between December 1 and March 1 occur on six days in an average year (Hansen 2007)). See definition of boatable day in Appendix C.

The following two assumptions about boatable days are taken directly from page 37 of Whittaker and Shelby (2007):

1. About 1/2 of the boatable days are ideal[4] and would have predictable flows that can be used by regional boaters. About 1/3 of these days would occur on weekends and might approach peak weekend maximums as described in Whittaker and Shelby (2007), page 36-37. The remaining ideal days might approach weekday maximum use levels as described in Whittaker and Shelby (2007), page 36-37.
2. The other half of the boatable days would have less predictable flows and might have about half the use of ideal weekdays.

On-trail on boatable days, assume that the percentage of boating groups (estimated for that day) encountered by existing backcountry trail users is directly related to the percentage of trail miles within 100 feet of the river in the reach in question (independent of water levels, season or time of year, inclement weather and/or temperatures). For example, 24% of total trail miles within the Ellicott Rock reach are within 100 feet of the river, therefore 24% of the estimated boating groups for a particular day would be encountered by existing trail users on-trail. Also reference Whittaker and Shelby (2007, p.61-62) for additional rationales for this assumption.

On-river on boatable days, assume existing users (primarily anglers) will encounter an average of 75% of boating groups that are estimated to be on the river on that day. Existing users are not expected to encounter every boating group because: (1) the higher flows necessary for boating generally make the reach more challenging to access and wade (while some stretches are made totally inaccessible); (2) more care is required to wade at the higher flows; (3) 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), and (4) geography and timing can also interact to affect the likelihood of

[4] "Ideal Conditions" are defined near the bottom of page 36 in Whittaker and Shelby 2007

encounters (Whittaker and Shelby 2007). Alternately, the 75 percent encounter average is assumed to be constant, independent of flow, season, or weather conditions.

Example Calculations for Estimating Boater Generated Encounters under Alternative 4

A. Ellicott Rock Reach On-Trail – Alternative 4

The months of December through February generate six boatable days in an average year (with a prescribed mean daily flow of 450 cfs or higher). Based on the above assumptions, of those days:

Approximately half (three) are ideal and have predictable flows:

- About 1/3 of those ideal days**,** or one day**, falls on a weekend**. Based on Whittaker and Shelby (2007) page 36, an ideal weekend day in the Ellicott Rock reach would attract 70 boaters. Based on the assumption that boating group size would be comprised of an average of four boaters, this equates to 18 boating groups per day (70/4). The 18 groups would in turn generate **four encounters** (18 * 0.24) based on 24% of trails in the Ellicott Rock reach being within 100 feet of the river;

- The two remaining ideal days **fall on weekdays**. An ideal weekday would attract 20 boaters or five groups per day (20/4). The five groups per day would in turn generate **one encounter** (5 * 0.24);

The other three of the six boatable days in an average year are less predictable/usable and have about half the use of ideal weekdays. Therefore:

- One **weekend day** with about half the use of ideal weekdays in the Ellicott Rock reach would attract about ten boaters or three groups per day (10/4). The three groups per day would in turn generate **one encounter** (3 * 0.24);

- Finally, **two weekdays** would have about half the use of ideal weekdays and would attract about ten boaters or three groups per day (10/4). The three groups per day would in turn generate **one encounter** (3 * 0.24).

The average number of on-trail encounters generated by boaters within the Ellicott Rock reach in Alternative 4 is calculated as follows:

	1 ideal weekend day with 4 encounters =	4 encounters
	2 ideal weekdays with 1 encounter ea =	2 encounters
	1 weekend day with 1 encounter =	1 encounter
+	2 weekdays with 1 encounter each =	2 encounters
	6 days generate	9 encounters
	or an average of	**1.5 encounters/day** (9/6)

The average of 1.5 encounters per day on-trail (on six days/year) for Alternative 4 in the Ellicott Rock reach is reported in Table 3.3-7 of the EA.

B. Ellicott Rock Reach On-River – Alternative 4

On-river encounters are calculated in the same way as on-trail calculations, the only exception being that a factor of 0.75 (75%) is used instead of 0.24 (24%) in the above example for the Ellicott Rock reach. The results are as follows:

The months of December through February generate six boatable days in an average year (with a prescribed mean daily flow of 450 cfs or higher). Based on the above assumptions, of those days:

Approximately half, or three, are ideal and have predictable flows:

- About 1/3 of those ideal days, or one, falls on a weekend that attracts 18 boating groups per day, which in turn generates 14 encounters (18 * 0.75);

- The two remaining ideal days fall on weekdays that attract five groups per day, which in turn generate four encounters (5 * 0.75).

The other half of the six boatable days in an average year are less predictable/usable and have about half the use of ideal weekdays. Therefore:

- One weekend day with about half the use of ideal weekdays would attract about three groups per day and in turn generate two encounters (3 * 0.75);

- Finally, two weekdays would have about half the use of ideal weekdays and would attract three groups per day and generate two encounters (3 * 0.75).

The average number of on-river encounters generated by boaters within the Ellicott Rock reach in Alternative 4 is calculated as follows:

	1 ideal weekend day with 14 encounters =	14 encounters
	2 ideal weekdays with 4 encounters ea =	8 encounters
	1 weekend day with 2 encounters =	2 encounters
+	2 weekdays with 2 encounters each =	4 encounters
	6 days generate	28 encounters
	or an average of	**4.7 encounters/day** (28/6)

The average of 4.7 encounters per day on-river (on 6 days/year) for Alternative 4 in the Ellicott Rock reach is reported in Table 3.3-7 in Chapter 3 of the EA.

Example Calculations for Estimating Average Number of Days Encounter Limits are Exceeded in an Average Year by Boaters

A. Protocols

Go to the encounter calculation spreadsheet in the project file. Table 2 is a subset of the on-trail portion of the encounter calculation spreadsheet, and Table 3 is a subset of the on-river portion. For the purpose of this example both tables show only the months of December through February. The encounter calculation spreadsheet includes calculations for all 12 months of the year.

Examine the applicable average encounters on weekend and weekdays per month and round to whole numbers. The exception is on-river in the Chattooga Cliffs reach and on-river December through February in the Ellicott Rock reach where there are not enough anglers to generate one encounter independent of boaters. In those cases, round down to zero encounters generated by existing users.

Add boater-generated encounters per day to the existing user encounter estimates on the applicable days per month (in the encounter calculation spreadsheet), unless existing user encounters have already exceeded encounter limits. Boater-generated encounters were allocated to specific months based on the proportion of optimal boating days per month (see Whittaker & Shelby 2007 for definition of optimal boating days).

- If the sum is approximately the same as the encounter limit, then assume that 50% of boatable days will exceed the encounter limits (assumes a normal distribution).

- If the sum notably exceeds the encounter limit, all boatable days contribute to exceeding the encounter limits.

B. Example using Alternative 4, Ellicott Rock Reach (ERR) On-Trail

There is an established on-trail encounter limit in the ERR of nine on weekends and four on weekdays.

Go to the encounter calculation spreadsheet (or Table 2):

Table 2. Total On-Trail Encounters Between Existing Users (Hikers, Backpackers And Backcountry Anglers) For The Ellicott Rock Reach (ERR) From December Through February.

Total Encounters	**Weekdays**		**Weekends**	
On-Trails (ERR)	Average	Peak	Average	Peak
Dec	0.9	1.8	1.8	2.0
Jan	0.9	1.8	1.8	2.0
Feb	0.9	1.8	1.8	3.5

Using the boater generated encounters (for Alternative 4 – Ellicott Rock reach – on-trail) estimated earlier in this document:

1 ideal weekend day with **4 encounters**
2 ideal weekdays with **1 encounter** each
1 weekend day with **1 encounter**
2 weekdays with **1 encounter** each

Add the four boater generated encounters on the ideal weekend day above to the two encounters generated by existing users on a weekend day (Table 2): 4 + 2 = 6

The total of 6 encounters does not exceed the weekend encounter limit of nine on weekends. So in this case boats do not cause on-trail encounter limits to be exceeded on the one ideal weekend day in the Ellicott Rock reach.

The same process is applied to the two ideal weekdays, one weekend day, and two weekdays above where boaters generate encounters. Since the encounters generated by boaters on all of these days are less than four, none of these causes encounter limits to be exceeded.

Therefore, under Alternative 4 in the ERR, there are zero days on which boats are expected to cause on-trail encounter limits to be exceeded. This is also reported in Table 3.3-7 of the EA.

C. Example using Alternative 4, Ellicott Rock Reach (ERR) On-River

There is an established encounter limit of six on weekends and weekdays in the ERR on-river.

Go to the encounter calculation spreadsheet (or Table 3):

Table 3. Total On-River Encounters between Backcountry Anglers for the Ellicott Rock Reach (ERR) from December through February.

Encounters On-River (ERR)	**Weekdays** Average	Peak	**Weekends** Average	Peak
Dec	**0.1**	**0.3**	**0.3**	**0.5**
Jan	**0.1**	**0.3**	**0.3**	**0.5**
Feb	**0.1**	**0.3**	**0.3**	**0.5**

Using the boater generated encounters (for Alternative 4 – Ellicott Rock reach – on-river) estimated earlier in this document:

1 ideal weekend day with **14 encounters**
2 ideal weekdays with **4 encounters each**
1 weekend day with **2 encounters**
2 weekdays with **2 encounters each**

Add the14 boater-generated encounters on the one ideal weekend day above to the zero encounters generated by existing users on a weekend day (Table 3): 14 + 0 = 14

The total of 14 encounters exceeds the on-river encounter limit of six on one weekend day in the Ellicott Rock reach.

The same process is applied to the two ideal weekdays (four encounters each), one weekend day and two weekdays where boaters generate encounters. Since the encounters generated by boaters when combined with those generated by existing users (zero encounters) are less than six, none of these causes encounter limits to be exceeded.

Therefore, under Alternative 4, boats cause on-river encounter limits to be exceeded on only one day in the Ellicott Rock reach. This is also reported in Table 3.3-7 of the EA.

APPENDIX E – All Rare Wildlife Species Listed on the CONF, NNF and SNF

TYPE	SCIENTIFIC NAME	COMMON NAME	HABITAT/RANGE	FOREST	LISTING	ANALYZED / REASON[1]
Mammal	*Glaucomys sabrinus coloratus*	Carolina Northern Flying Squirrel	High elevation forests, mainly spruce-fir	NNF	E	No / 4
Mammal	*Myotis sodalis*	Indiana Bat	Roots in hollow trees or under loose bark (warmer months), in caves (winter).	NNF	E	No / 3
Mammal	*Puma concolor cougar*	Eastern Cougar	Extensive forests, remote areas	NNF CONF SNF	E	No / 5
Reptile	*Clemmys muhlenbergii*	Bog Turtle	Bogs, wet pastures, wet thickets	NNF	T (S/A)	No / 4
Spider	*Microhexura montivaga*	Spruce-fir Moss Spider	In moss of spruce-fir forests (endemic to North Carolina and adjacent Tennessee)	NNF	E	No / 4
Terrestrial Gastropod	*Patera clarki nantahala*	Noonday Globe	Nantahala Gorge (endemic to this site)	NNF	T	No / 3
Amphibian	*Desmognathus santeetlah*	Santeetlah Dusky Salamander	stream headwaters and seepage areas; southwestern mountains	NNF	S	No / 4
Amphibian	*Eurycea junaluska*	Junaluska Salamander	Forests near seeps and streams in the southwestern mountains	NNF	S	No / 3
Amphibian	*Plethodon aureolus*	Tellico Salamander	Forests in the Unicoi Mountains	NNF	S	No / 3
Amphibian	*Plethodon teyahalee*	Southern Appalachian Salamander	moist forests, in southwestern mountains at all elevations	CONF NNF SNF	S	Yes / 1
Beetle	*Cicindela ancocisconensis*	Appalachian Tiger Beetle	Habitat specialist preferring sand and cobble along permanent streams or grassy openings , above 4000 feet	CONF NNF	S	No / 4
Beetle	*Cicindela patruela*	A Tiger Beetle	Sandy soil in open pine or pine-oak woods	CONF	S	No / 4
Beetle	*Trechus luculentus unicoi*	A ground beetle	Beneath rocks and moss in wet ravines and near seeps and springs	NNF	S	No / 3
Beetle	*Trechus rosenbergi*	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	*Aimophila aestivalis*	Bachman's Sparrow	Dry, open, pine or oak woods with well developed herb layer	CONF	S	No / 4
Bird	*Falco peregrinus*	Peregrine Falcon	Cliffs (for nesting)	CONF NNF	S	No / 4
Bird	*Haliaeetus leucocephalus*	Bald Eagle	Mature forests near large bodies of water (for nesting)	CONF NNF SNF	S	No / 4
Bird	*Lanius ludovicia migrans*	Migrant Loggerhead Shrike	Fields and pastures (breeding season only)	CONF NNF	S	No / 4
Bird	*Thryomanes bewickii altus*	Appalachian Bewick's Wren	Woodland borders or openings, farmlands or brushy fields, at high Elevations (breeding season only)	NNF	S	No / 4
Butterfly	*Callophyrs irus*	Frosted Elfin	Open woods and borders, usually in dry situations; host plant-lupines (*Lupinus*) and wild indigos (*Baptisia*)	NNF	S	No / 4
Butterfly	*Speyeria diana*	Diana Fritillary	Rich woods and adjacent edges and openings; host plants violets (Viola), Pine Forests	CONF NNF SNF	S	No/ 2
Grass-hopper	*Melanoplus divergens*	Divergent Melanoplus	Glades and balds, 1800-4717 feet	NNF	S	No / 4
Grass-hopper	*Melanoplus serrulatus*	Serrulate Melanoplus	Valleys and lower slopes, Nantahala Mountains	NNF	S	No / 3

TYPE	SCIENTIFIC NAME	COMMON NAME	HABITAT/RANGE	FOREST	LISTING	ANALYZED / REASON[1]
Grass-hopper	*Scudderia septentrionalis*	Northern Bush Katydid	Woodlands	NNF	S	No / 4
Grass-hopper	*Trimerotropis saxatilis*	Rock-loving Grasshopper	Boulderfields	NNF	S	No / 4
Mammal	*Microtus chrotorrhinus carolinensis*	Southern Rock Vole	Rocky areas at high elevations, forests, or fields	NNF	S	No / 4
Mammal	*Myotis austroriparius*	Southeastern Bat	Standing snags, hollow trees and buildings	CONF	S	No / 4
Mammal	*Myotis leibii*	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	*Sorex palustris punctulatus*	Southern Water Shrew	Stream banks in montane forests or northern hardwood forests above 3000 ft.	CONF NNF	S	No / 4
Mammal	*Corynorhinus rafinesquii*	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	*Euchlaena milnei*	Milne's Euchlaena	Hardwood forest and riparian areas in mountains	NNF	S	No/ 2
Moth	*Semiothisa fraserata*	Fraser Fir Angle	spruce/fir forests with fraser fir	NNF	S	No / 4
Reptile	*Clemmys muhlenbergii*	Bog Turtle	Bogs, wet pastures, wet thickets	CONF	S	No / 4
Spider	*Nesticus cooperi*	Lost Nantahala Cave Spider	Caves and along Nantahala River (apparently endemic to Swain County, NC)	NNF	S	No / 3
Spider	*Nesticus sheari*	a nesticid spider	on the ground in moist or rich forests (apparently endemic to Graham County, NC)	NNF	S	No / 4
Spider	*Nesticus silvanus*	a nesticid spider	Habitat not indicated (apparently endemic to southern mountains of NC)	NNF	S	Yes / 1
Terrestrial Gastropod	*Pallifera hemphilli*	Black Mantleslug	High elevation forest, mainly spruce-fir	NNF	S	No / 4
Terrestrial Gastropod	*Paravitrea placentula*	Glossy Supercoil	Leaf litter on wooded hillsides	NNF	S	No / 3
Amphibian	*Ambystoma talpoideum*	Mole Salamander	Breeds in fish-free semipermanent woodland ponds; forages in adjacent woods	NNF	LR	Yes / 1
Amphibian	*Aneides aeneus*	Green Salamander	Damp, shaded crevices of cliffs or rock outcrops in deciduous forests (southern forests)	CONF NNF	LR	Yes / 1
Amphibian	*Eurycea longicauda longicauda*	Longtail Salamander	Moist woods and floodplains; small ponds for breeding	NNF	LR	No / 3
Amphibian	*Hemidactylium scutatum*	4-toed Salamander	Pools, bogs and other wetlands in hardwood forests	CONF	LR	No / 4
Bird	*Accipiter striatus*	Sharp-shinned hawk	Forests and Woodlands	NNF	LR	No / 3
Bird	*Aegolius acadicus pop. 1*	Northern Saw-whet Owl	Spruce-fir forests or mixed hardwood/spruce forests (for nesting) [breeding season only]	NNF	LR	No / 4
Bird	*Bombycilla cedrorum*	Cedar Waxwing	Hardwood, pine forest / woodland (breeding season only)	CONF	LR	No / 4
Bird	*Catharus guttatus*	Hermit Thrush	Spruce-fir forests (for nesting) [breeding season only]	NNF	LR	No / 4
Bird	*Coccyzus erythropthalmus*	Black-billed Cuckoo	Deciduous forests, mainly at higher elevations [breeding season and habitat only]	NNF	LR	No / 4

TYPE	SCIENTIFIC NAME	COMMON NAME	HABITAT/RANGE	FOREST	LISTING	ANALYZED / REASON[1]
Bird	*Contopus cooperi*	Olive-sided Flycatcher	Montane conifer forests (mainly spruce-fir) with openings or dead trees [breeding season only]	NNF	LR	No / 4
Bird	*Corvus corax*	Common Raven	High elevation, remote cliffs and rock outcrops	CONF	LR	No / 4
Bird	*Dendroica cerulea*	Cerulean Warbler	Mature hardwood forests; steep slopes and coves in mountains [breeding season only]	NNF CONF	LR	No/ 2
Bird	*Dendroica magnolia*	Magnolia Warbler	Spruce-fir forests, especially in immature stands [breeding season only]	NNF	LR	No / 4
Bird	*Empidonax alnorum*	Alder flycatcher	High elevation, shrub/sapling thicket	NNF	LR	No / 4
Bird	*Empidomax minimus*	Least Flycatcher	Open hardwood forests, groves, streamside trees (breeding season only)	CONF	LR	No/ 2
Bird	*Empidomax trailii*	Willow Flycatcher	Wet thickets, streamsides, riparian areas (breeding season only)	CONF	LR	No/ 2
Bird	*Loxia curvirostra*	Red Crossbill	Pine and pine / oak forests and woodlands (breeding season only)	CONF	LR	No / 4
Bird	*Pheucticus ludovicianus*	Rose-breasted Grosbeak	Hardwood forests at mid-to high elevations (breeding season only)	CONF	LR	No / 4
Bird	*Regulus satrapa*	Golden-crowned Kinglet	Mixed pine / hardwood forests at mid-to high elevations (breeding season only)	CONF	LR	No / 4
Bird	*Shyrapicus varius appalachiensis*	Appalachian Yellow-bellied Sapsucker	Mature, open hardwoods with scattered dead trees [breeding season only]	NNF	LR	No/ 2
Bird	*Sitta canadensis*	Red-breasted Nuthatch	Mixed conifer and hardwood forest and woodland (breeding season only)	CONF	LR	No/ 2
Bird	*Troglodytes troglodytes*	Winter Wren	Mixed conifer and hardwood forest and woodland at mid to high elevations (breeding season only)	CONF	LR	No / 4
Bird	*Vermivora chrysoptera*	Golden-winged Warbler	Old fields, woodlands and hardwood successional forests (breeding season only)	CONF	LR	No / 4
Bird	*Vermivora pinus*	Blue-winged Warbler	Low elevation brushy fields and thickets	NNF	LR	No / 4
Bird	*Vireo gilvus*	Warbling Vireo	Scattered hardwoods in open country [breeding season only]	NNF	LR	No / 4
Bird	*Wilsonia canadensis*	Canada Warbler	Shrub thickets in riparian areas, second growth deciduous hardwoods (breeding season only)	CONF	LR	No / 4
Butterfly	*Autochton cellus*	Golden-banded Skipper	Moist woods near streams; host plant-hog peanut (*Amphicarpa bracteata*)	NNF	LR	No/ 2
Butterfly	*Chlosyne gorgone*	Gorgone Checkerspot	Woodland Openings and borders	NNF	LR	No / 4
Butterfly	*Celastrina niger*	Dusky Azure	Rich, moist deciduous forests; host plant-goat's beard (*Aruncus dioicus*)	NNF	LR	No/ 2
Butterfly	*Euphydryas phaeton*	Baltimore Checkerspot	Bogs, marshes, wet meadows, rarely upland habitat, host plants turtle hrad (Chelone) and false foxglove (Aureolaria)	NNF	LR	No / 4
Butterfly	*Papilio cresphontes*	Giant Swallowtail	Primarily coastal in maritime forests or thickets	NNF	LR	No / 4
Butterfly	*Phyciodes batesii maconensis*	Tawny Crescent	Rocky ridges, woodland openings, at higher elevations; host plants- Asters, mainly *Aster undulatus*	NNF	LR	No / 4
Butterfly	*Polygonia progne*	Gray comma	Rich deciduous woods	NNF	LR	No / 3
Butterfly	*Satryium edwardsii*	Edward's Hairstreak	Xeric oak woods , host plants oaks	NNF	LR	No / 4
Butterfly	*Erora laeta*	Early Hairstreak	Deciduous forests, especially along roads or edges at high elevations	NNF	LR	No / 4

TYPE	SCIENTIFIC NAME	COMMON NAME	HABITAT/RANGE	FOREST	LISTING	ANALYZED / REASON[1]
Fly	*Eulonchus marialiciae*	Mary Alice's Small-headed Fly	High-elevation hardwood – hemlock forests	NNF	LR	No / 4
Grasshopper	*Melanoplus cherokee*	Cherokee Melanoplus	Woodlands, 1800-5100 feet	NNF	LR	No / 4
Grasshopper	*Melanoplus viridipes eurycerus*	Green-legged Melanoplus	Woodlands and forest edges	NNF	LR	No / 4
Grasshopper	*Melanoplus acrophilus acrophilus*	A short-winged Melanoplus	Shrubby areas, 3600-5000 feet elevation	NNF	LR	No / 4
Mammal	*Condylura cristata*	Star – nosed mole	Forested wetlands, bogs/fens and swamps	CONF	LR	No / 4
Mammal	*Mustela nivalis*	Least Weasel	Mixed hardwood pine grassy upland and riparian woodland, grassland	CONF	LR	No / 4
Mammal	*Neotoma floridana haematoreia*	Eastern Woodrat – Southern Appalachian Pop.	Rocky places in deciduous or mixed forests	CONF	LR	Yes / 1
Mammal	*Neotoma magister*	Allegheny woodrat	Rocky places and abandoned buildings in deciduous or mixed forests in the northern mountains and adjacent Piedmont.	NNF	LR	No / 3
Mammal	*Sorex dispar*	Long-tailed Shrew	High elevation forests with talus or rocky slopes	CONF NNF	LR	No / 4
Mammal	*Sylvilagus obscurus*	Appalachian cottontail	High elevation balds and shrub thickets	CONF	LR	No / 4
Mammal	*Tamiasciurus hudsonicus*	Red Squirrel	Mixed conifer and hardwood forest and riparian areas	CONF	LR	No/ 2
Moth	*Hepialus sciophanes*	a ghost moth	Spruce-fir forests	NNF	LR	No / 4
Moth	*Itame subcessaria*	Barred Itame	High elevation forests with gooseberries	NNF	LR	No / 4
Reptile	*Eumeces anthracinus*	Coal Skink	Rocky slopes, wooded hillsides and roadbanks	CONF	LR	Yes / 1
Reptile	*Pituophis m. melanoleucus*	Northern Pine Snake	Dry and/or sandy pine/oak uplands	CONF	LR	Yes / 1
Reptile	*Sternotherus minor*	Loggerhead Musk Turtle	Streams and rivers in Mississippi drainage	NNF	LR	No / 3
Spider	*Nesticus species nova 1*	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	*Nesticus species nova 2*	A nesticid spider	Rocky talus fields along the Chattooga River and rock crevices of Whiteside Mountain	NNF	LR	Yes / 1
Terrestrial Gastropod	*Glyphyalinia junaluskana*	Dark Glyph	Moist leaf litter in deciduous woods on mountainsides	NNF	LR	Yes / 1
Terrestrial Gastropod	*Glyphyalinia pentadelphia*	Pink Glyph	Pockets of moist leaves in upland woods	NNF	LR	Yes / 1
Terrestrial Gastropod	*Haplotrema kendeighi*	Blue-footed Lancetooth	Mountainsides in leaf litter, usually above 2000 feet elevation	NNF	LR	Yes / 1
Terrestrial Gastropod	*Helicodiscus bonamicus*	Spiral Coil	Leaf litter on wooded hillsides	NNF	LR	No / 3
Terrestrial Gastropod	*Helicodiscus fimbriatus*	Fringed Coil	Leaf litter and under rocks on wooded hillsides	NNF	LR	No / 3
Terrestrial Gastropod	*Appalachina chilhoweensis*	Queen Crater	Under leaf litter or in rock piles	NNF	LR	No / 3
Terrestrial Gastropod	*Patera clarki*	Dwarf Proud Globe	Under leaf litter on wooded mountainsides	NNF	LR	Yes / 1
Terrestrial Gastropod	*Inflectarius ferrissi*	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	*Fumonlelix orestes*	Engraved Covert	In crevices in rock ledges; high elevations in the Plott Balsam Mountains	NNF	LR	No / 3

TYPE	SCIENTIFIC NAME	COMMON NAME	HABITAT/RANGE	FOREST	LISTING	ANALYZED / REASON[1]
Terrestrial Gastropod	*Paravitrea lacteodens*	Ramp Cove Supercoil	Habitat unknown-probably leaf litter on mountainsides	NNF	LR	No / 3
Terrestrial Gastropod	*Paravitrea lamellidens*	Lamellate Supercoil	Pockets of deep, moist leaf litter on wooded hillsides or in ravines	NNF	LR	Yes / 1
Terrestrial Gastropod	*Paravitrea umbilicarus*	Open Supercoil	Pockets of deep, moist leaf litter on wooded hillsides or in ravines	NNF	LR	Yes / 1
Terrestrial Gastropod	*Zonitoides patuloides*	Appalachian Gloss	Pockets of deep, moist leaves on mountainsides and in ravines	NNF	LR	Yes / 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.

APPENDIX F – Map of the Chattooga Wild and Scenic River Corridor

Please see separate file Appendix F Chattooga W&S River Corridor.pdf

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