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Department of
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Environmental Assessment

Managing Recreation Uses in the Upper Segment of the Chattooga Wild and Scenic River Corridor

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Figure 1. The Chattooga Wild and Scenic River Corridor

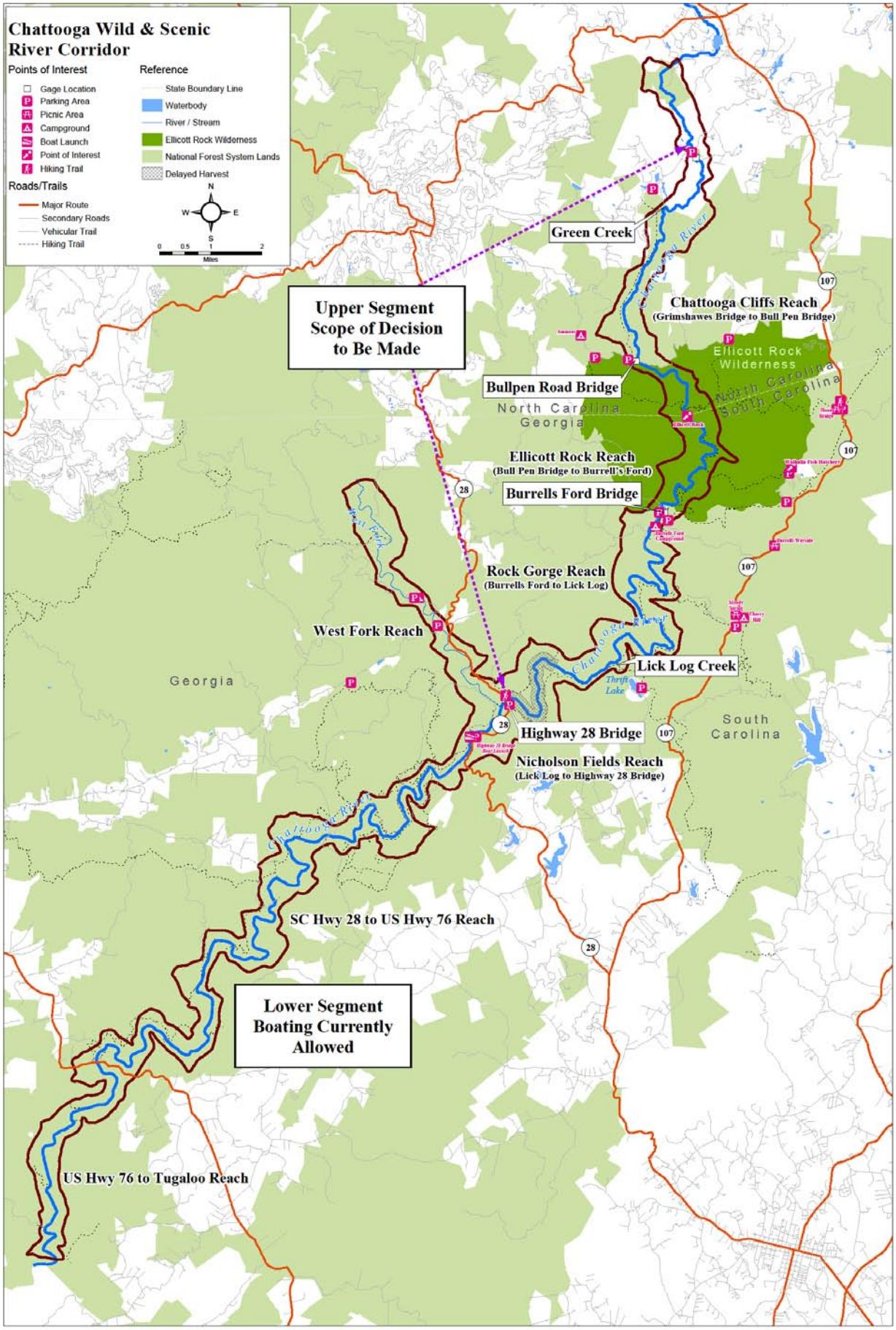
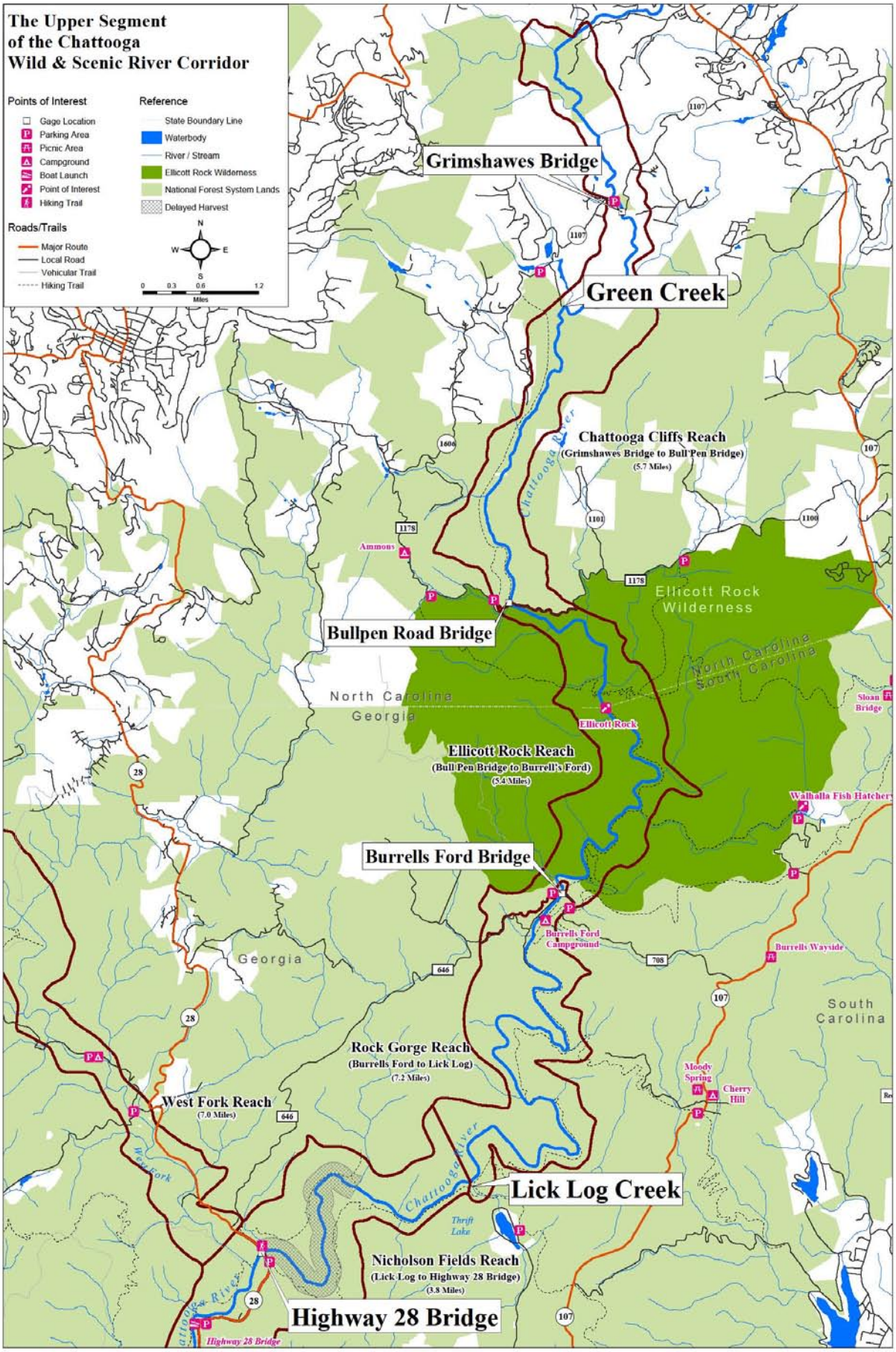


Figure 2. The Upper Segment of the Chattooga Wild and Scenic River Corridor



CHAPTER 1 PURPOSE AND NEED FOR ACTION

1.1 SUMMARY

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, upper segment of the Chattooga Wild and Scenic River (WSR) Corridor above the Highway 28 bridge (see Figure 2). This upper segment encompasses approximately one-third of the 57-mile Chattooga WSR Corridor (see Figure 1).

New management direction would amend the land and resource management plans for the three national forests. The purpose of the new management direction is to ensure enjoyment of the upper segment of the Chattooga WSR by a variety of recreationists consistent with protecting and enhancing the river's Outstandingly Remarkable Values (ORVs), as well as preserving the river's free-flowing condition and protecting water quality as required under the Wild and Scenic Rivers Act (WSRA). This new direction also would preserve the natural conditions, wilderness character, "outstanding opportunities for solitude" and a "primitive and unconfined type of recreation" of the five-mile reach within the federally designated Ellicott Rock Wilderness as required under the Wilderness Act. The scope of this decision is limited to the upper segment of the Chattooga WSR, but will be considered within the context of the entire Chattooga WSR.

1.2 NEED FOR THE PROPOSED ACTION

Congress designated the 57-mile Chattooga River (and its 15,432-acre corridor) as part of the National Wild and Scenic Rivers System in 1974 to preserve the river's free-flowing condition, protect its water quality and protect and enhance the river's ORVs—biology, geology, recreation, scenery and history. For five miles, the corridor also passes through the 8,724-acre Ellicott Rock Wilderness which is provided additional protection under the Wilderness Act for its undeveloped setting and opportunities for solitude.

The river's many natural attributes, access and recreation infrastructure provide a variety of recreation opportunities including hiking and backpacking, fishing, swimming and wading, whitewater and scenic boating, hunting, photography and nature study. Many of these opportunities occur in largely unmodified natural surroundings that feature a sense of remoteness, little interaction between visitors and few signs of previous use. However, some segments and sites receive higher use and associated visitor impacts that have required ongoing management attention in forest plans (1976, 1985, 2004).

Specific need for action statements and relevant laws are summarized below:

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

In 2004, the Sumter National Forest issued its Revised Land and Resource Management Plan (RLRMP) which addressed several visitor impact management issues in the entire river corridor, including refining previously developed boating capacities for four lower

river segments, regulating several aspects of commercial boating on those segments and reaffirming the size and general capacities of recreation infrastructure (e.g., campgrounds, parking lots, miles of designated trails) that facilitate various recreation pursuits. The RLRMP also retained a 1976 boating prohibition (that was reaffirmed in a 1985 forest plan update) on the upper segment of the Chattooga WSR (USFS, 2004a, 2004b). This management direction in the RLRMP was later appealed by whitewater boaters who are interested in floating the upper segment of the river.

The US Forest Service agreed to reassess the boating prohibition as part of a broader examination of visitor capacity issues on the upper segment of the river (USFS, 2005). The appeal response specifically directed the US Forest Service 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" (http://fs.usda.gov/scnfs).

As part of that analysis, the US Forest Service identified several additional visitor impact concerns on the upper segment of the Chattooga, while recognizing that boating issues could not be resolved without a comprehensive review of all recreation uses and impacts in the Chattooga WSR Corridor. A summary report integrated findings from several documents, analyses, workshops and studies involved in this review (Whittaker and Shelby 2007, hereafter referred to as the Integrated Report).

The Integrated Report details several visitor impact issues, including: litter, expanded "user-created" trails and campsites, increased backcountry[1] encounters between users that may diminish solitude, potential conflict between different types of users and potential congestion at frontcountry[2] areas or facilities. The report also notes 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 reduce existing or prevent future unacceptable impacts to the river's values from increasing use levels, and thus preserve the river's free-flowing condition, protect water quality and protect and enhance the river's outstandingly remarkable values in addition to protecting its wilderness characteristics.

B. Action is needed to provide consistent management of the upper segment of the Chattooga WSR on all three national forests.

Currently, the three forest plans independently address management in the Chattooga WSR Corridor. This EA and the subsequent decisions would provide consistent management on issues such as encounters, campsites, trails, large woody debris, group sizes, parking and user registration.

[1] Backcountry areas lie beyond one-quarter mile of roads and bridges and are referred to by stream reaches: Chattooga Cliffs Reach, Ellicott Rock Reach, Rock Gorge Reach and Nicholson Fields Reach. In these areas, visitors are more interested in opportunities that feature solitude, self-reliance, a sense of remoteness and a primitive setting.

[2] Frontcountry areas exist within one-quarter mile of four bridges on the upper segment of the Chattooga WSR: Grimshawes/Sliding Rock Bridge, Bullpen Road Bridge, Burrells Ford Bridge and the Highway 28 bridge. These areas offer easy access to the corridor and visitors appear more tolerant of interaction with others there as long as at-one-time use does not overwhelm the natural setting or create high levels of crowding and congestion.

C. Action is needed to preserve the upper river's free-flowing condition, protect its water quality and protect and enhance its outstandingly remarkable values, as well as preserve the natural conditions and wilderness character of the Ellicott Rock Wilderness to provide "outstanding opportunities for solitude" and a "primitive and unconfined type of recreation."

1. Wild and Scenic Rivers Act

Congress created the National Wild and Scenic Rivers System in 1968 through the WSRA (P.L. 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 recognizing the potential for their appropriate use and development. The WSRA requires that the managing agency preserve a designated river's free-flowing condition, protect its water quality and "protect and enhance" its specific "outstandingly remarkable" values (which are individual for each river).

Specifically, 16 U.S.C. § 1271: Congressional declaration of policy states:

> It is hereby declared to be the policy of the United States that certain selected rivers of the Nation which, with their immediate environments, possess outstandingly remarkable scenic, recreational, geologic, fish and wildlife, historic, cultural, or other similar values, shall be preserved in free-flowing condition, and that they and their immediate environments shall be protected for the benefit and enjoyment of present and future generations. The Congress declares that the established national policy of dam and other construction at appropriate sections of the rivers of the United States needs to be complemented by a policy that would preserve other selected rivers or sections thereof in their free-flowing condition to protect the water quality of such rivers and to fulfill other vital national conservation purposes.

In addition, 16 U.S.C. § 1281(a) Public use and enjoyment of components; protection of features; management plans states:

> Each component of the national wild and scenic rivers system shall be administered in such manner as to protect and enhance the values which caused it to be included in said system without, insofar as is consistent therewith, limiting other uses that do not

> substantially interfere with public use and enjoyment of these values. In such administration primary emphasis shall be given to protecting its esthetic, scenic, historic, archeologic, and scientific features. Management plans for any such component may establish varying degrees of intensity for its protection and development, based on the special attributes of the area.

Section 3.2 of this EA reviews ORVs for the Chattooga WSR (and the upper segment) and section 3.3 reviews other River Values which provide the basis for decisions that address capacity and related visitor impact issues.

2. Wilderness Act

Congress established a National Wilderness Preservation System through the Wilderness Act in 1964 (P.L. 88-577 (16 U.S. C. § 1131-1136)). The act specifies preservation of natural conditions and the wilderness character of designated wilderness like the Ellicott Rock Wilderness 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.

3. Potential conflict between WSRA and Wilderness Act

16 U.S.C. § 1281(b) of the WSRA addresses potential conflicts between the Wilderness Act and the WSRA as follows:

> Any portion of a component of the national wild and scenic rivers system that is within the national wilderness preservation system, as established by or pursuant to the Wilderness Act [16 U.S.C. 1131 et seq.], shall be subject to the provisions of both the Wilderness Act and this chapter with respect to preservation of such river and its immediate environment, and in case of conflict between the provisions of the Wilderness Act and this chapter the more restrictive provisions shall apply.

1.3 Proposed Actions

Forest plan amendments are proposed for the three national forests to establish new management direction for the upper segment of the Chattooga WSR. The responsible officials (three forest supervisors) are proposing to establish new management direction for their respective forest plans that would:

- Manage biophysical impacts to natural resources from recreation use by redesigning, relocating or closing trails and campsites, and limiting or reducing group sizes and parking. Trails and campsites that violate current or proposed forest plan standards would be closed and rehabilitated. Remaining campsites and fire rings would be designated.

Camping would be limited to three tents per campsite (except for larger, designated group campsites).

- Manage large woody debris (LWD) recruitment and retention on the upper segment of the Chattooga WSR consistently across all three national forests to assure that no LWD is removed to accommodate recreation within the river or stream banks.
- Maintain or increase opportunities for solitude and a sense of remoteness in the backcountry by redesigning, relocating or closing some trails and campsites.
- Protect and enhance the recreation ORV and maintain the quality of recreation experiences by establishing "per day" or "at-one-time" visitor use capacities for frontcountry and backcountry areas in the corridor. Backcountry capacities limit the size and number of groups per day to reduce social impacts such as encounters or competition for fishing and camping areas. Frontcountry capacities limit parking at specific sites to reduce congestion and related social impacts.
- Use vehicle counts at access points to monitor whether backcountry or frontcountry use is approaching capacities and correlate these to use-impact relationships in different areas and/or for different types of use. Monitoring may result in adaptive management actions that ensure desired conditions are met. Allow boating opportunities on the main stem Chattooga above SC Highway 28 (upper segment of the Chattooga WSR).
- Manage social impacts (including potential recreation use conflicts) by using "separation strategies" that include zoning by space (river reach), time (season), and flows.

1.4 Decisions to be Made

Decisions to be made are specific to the upper segment of the Chattooga WSR. Management of the river below Highway 28 was not challenged in the 2004 Sumter RLRMP and is not subject to further review. Management activities are considered within the context of the entire Chattooga WSR and are analyzed in the cumulative effects sections in Chapter 3.

This environmental assessment (EA) discloses environmental effects of the action alternatives and the no-action alternative (current management). Based on a review of this environmental assessment (EA), the forest supervisors will decide:

A. Whether to adopt an alternative to amend the three forest plans; and
B. Whether the selected alternative will have a significant impact on the quality of the human environment. If they determine that the impact is not significant, then three Findings of No Significant Impact (FONSIs) would be prepared and documented in decision notices (FSH, 1909.15, 43.2) signed by the forest supervisors. Significant impacts on the quality of the human environment would require the preparation of an Environmental Impact Statement [National Environmental Protection Act (NEPA), 1501.4 (c) and (e)].

1.5 Public Involvement

The public has shown considerable interest in management of the upper segment of the Chattooga WSR since American Whitewater et al. appealed the 2004 Sumter RLRMP. During

the last seven years, the US Forest Service has encouraged and documented public involvement throughout the process. Major public involvement components include:

A. October, November and December 2005: Three initial public meetings

The agency selected the Limits of Acceptable Change (LAC) planning framework (Stankey, Cole, Lucas, Petersen & Frissell, 1985) and used it to guide public meetings with stakeholders and existing users in October, November and December 2005 (please see Appendix F for more details on these meetings). During each of three meetings, more than 60 workshop participants worked through the steps of the LAC process. At the first meeting, US Forest Service personnel presented an overview of the LAC process. The second and third meetings focused on completing the first five steps of the LAC process.

Outcomes included:

- Better understanding among participants of the appeal decision on the Sumter Land and Resource Management Plan (2004);
- Descriptions of a commonly held vision for the upper segment of the Chattooga in the context of the entire Chattooga River;
- Descriptions of desired conditions on the upper segment and measurable indicators for various recreational opportunities; and
- Input into the design of the data collection and analysis process necessary to respond to the appeal decision.

B. January – June 2006

Following the three initial public meetings, the US Forest Service developed the Upper Chattooga Capacity Analysis Plan (Whittaker and Shelby 2006) that described potential data collection and analysis approaches to be used as part of the LAC effort to address issues in the appeal and related management concerns. The plan reviewed several elements for collecting and integrating social and biophysical impact information, and examined costs, challenges and trade-offs between data collection options. Potential elements included literature reviews on different topics; organizing existing use and impact data; convening expert panels of boaters and anglers; collecting baseline biophysical data (trails and campsites); focus groups and user surveys; and trial public boating.

C. July 2006: Public meeting to review the proposed analysis process

On July 27, 2006 in Walhalla, SC the US Forest Service hosted an information sharing session about the ongoing data collection activities. A proposed capacity and conflict analysis process was presented to more than 100 people at this fourth public meeting. In addition, the attendees were encouraged to provide feedback on the agency's proposal.

D. July 2006 – June 2007: Capacity and conflict analysis and reports

During this 11-month period, the agency focused on conducting analysis using several (but not all) of the elements outlined in the capacity analysis plan and producing several reports including literature reviews, biological and physical data collection, flow data, proxy river information, case studies on seven other wild and scenic rivers, existing use observations and expert panels. These reports were then incorporated into *Capacity and Conflict on the Upper Chattooga River: An integrated analysis of the 2006-2007 reports* often referred to as the Integrated Report (Whittaker and Shelby 2007).

Members of the public and stakeholders provided the US Forest Service with additional information and suggestions throughout this period and reviewed the agency's findings as they became available. A public forum on the US Forest Service Web site allowed users to further comment on issues related to the upper segment of the Chattooga.

E. June 2007: Three open houses on capacity and conflict findings

Three open houses in South Carolina, North Carolina and Georgia presented findings from the capacity and conflict analysis and encouraged public and stakeholder feedback. Depending on the venue, between 33 and 64 people attended these meetings. Individual stations at each open house allowed the attendees to interact with specialists on the following topics:

- Current management standards for the upper segment of the Chattooga WSR;
- Path forward and timeframe for alternative development, environmental analysis, public involvement and agency decisions;
- Biophysical data results;
- Social data results; and
- Flow data results

F.July 2007: A public hearing in Walhalla, SC

On July 7, 2007 the US Forest Service held a formal hearing to document public responses to findings and suggestions for management. Fifty-six people provided 153 pages of testimony.

G. July 2007: Public workshop to identify biophysical and social impacts and opportunities

On July 14, 2007 approximately 70 people attended an additional public workshop to identify key impacts and opportunities, as well as brainstorm management options for addressing problems.

H. July – August 2007: Agency development of preliminary alternatives

With the wealth of comments, ideas and recommendations gathered from the public for almost two years, as well as findings from analyses summarized in the Integrated Report, the US Forest Service developed a preliminary set of alternatives and began formal scoping as directed by NEPA. Six preliminary alternatives covered a broad range of management actions, including maintaining current management, introducing additional boating in the corridor and restricting all existing users.

I. August 14 – September 13, 2007: Scoping

The public provided more than 1,200 responses to the agency's 2007 scoping package, some of which included more than 100 individual comments.

J. September 2007: Public meeting on a modified set of preliminary alternatives

Based on comments received during scoping, the agency presented a set of revised preliminary alternatives, as well as three new alternatives (for a total of nine) and presented them at a public meeting in Clayton, GA on September 29, 2007.

K. October 2007 – July 2008: Development of the July 2008 EA

During this nine-month period, the US Forest Service developed a set of alternatives and then analyzed them in an EA. The agency posted this document on the Francis Marion and Sumter National Forests' Web site on July 2, 2008 and provided it to all individuals and stakeholders who had responded to the 2007 scoping letter.

L. July – August 2008: Public comments on the July 2008 EA

Although not required, the US Forest Service provided this EA to the public and, during a six-week comment period, received more than 3,000 additional comments between July 2 and mid-August 2008. The comments addressed several issues, but primarily were related to the user capacity analysis, boating on the tributaries, the equitable treatment of boaters, allowing boating below Grimshawes Bridge, the incompatibility of boating with other users, using mean daily flows as an implementation tool for boating, management of large woody debris on the river, the range of the alternatives, the scope of the analysis (should include the entire river), responding adequately to the Chief's appeal decision, the effects of recreational uses on the biophysical resources and the agency's overall ability to implement a decision. A list of the comments and the agency's responses can be found at http://fs.usda.gov/scnfs.

M. August 2009: Three forest supervisors issue decision notices and FONSIs

In August 2009, the three forest supervisors issued decision notices and FONSIs on managing recreation uses on the upper segment of the Chattooga WSR.

N. Fall 2009: American Whitewater et al. lawsuit

American Whitewater and associated organizations sued the US Forest Service over the agency's previously withdrawn decisions.

O. December 2009: The three forest supervisors withdraw the decision notices

The three forest supervisors withdrew the decision notices because of inconsistencies between the alternative analyzed in the Biological Assessment/Biological Evaluation and the chosen alternative.

P. December 2010: Reinitiation of NEPA

After reviewing documents for inconsistencies and completing additional analysis, in December 2010, the US Forest Service reinitiated the NEPA process by releasing the 2010 scoping letter. This letter asked the public to identify any new information (e.g., recently released articles or publications) or concerns that should be analyzed. The scoping letter also clarified that any comments submitted to the US Forest Service between 2005 and 2009 would be considered in the decision-making process. The agency received almost 50 comments; notable new information focused on how people are using a new Burrells Ford gage and concerns about adaptive management. The list of comments received and the agency's responses can be found at http://fs.usda.gov/scnfs.

1.6 Key Issues

Issues raised by the public during scoping generally were related to the purpose and need described above – preserving the Chattooga WSR's free flowing nature, protecting its water quality and protecting and enhancing its ORVs. The US Forest Service has addressed these concerns by classifying issues into two categories: key issues and other issues. Issues (cause-effect relationships) serve to highlight effects of unintended consequences that may occur from the proposed action, providing opportunities during the analysis to explore alternative ways to meet the purpose and need for the proposal while reducing adverse effects. Key issues have been addressed by the development and refinement of specific alternatives (described in Chapter 2). Other issues are addressed in the environmental effects analysis in Chapter 3; a few issues are outside the scope of the decision to be made. All alternatives respond to the purpose and need and address key issues. The section below integrates and summarizes issues and how alternatives or effects analysis have been developed to address them.

A. Trails and campsites

Issue: Concern that the current distribution and concentration of campsites and trails is excessive and, in some cases, their condition is causing unacceptable erosion, soil compaction or impacts to scenery.

Response: If needed, all trails and campsites would be redesigned, closed or relocated and designated under all action alternatives. The goal in Alternative 1 is to ensure campsite and trail management is consistent with current forest plan direction on all three national forests. Over time, management actions associated with all action alternatives would eliminate user-created campsites and trails that have an unacceptable impact on natural resources.

B. Potential conflict between boaters and other users

Issue: Concern that allowing boating above Highway 28 could diminish opportunities for solitude or the quality of experiences for backcountry users engaged in non-boating activities such as but not limited to fishing, swimming, hiking or watching nature. Some believe boating is completely incompatible with the upper segment of the Chattooga setting (a social values conflict), while others suggest boating on the 36-mile lower segment of the Chattooga has impacted recreation experiences for non-boating users and that it is fair to protect solitude of non-boating users by providing some boating experiences on the upper segment of the Chattooga through zoning by space, time and flow to minimize interaction and maximize separation (to mitigate face to face conflict) between boaters and other users.

Response: All alternatives provide a range of responses to this potential conflict. Alternatives 1-3 would maintain the current zoning approach to provide year-round, boat-free experiences on the upper segment of the Chattooga WSR for those who maintain that any boating is incompatible with the upper segment's setting. Boating would continue year-round on the lower segment of the river. Alternatives 8, 11, 12, 13 and 14 would allow varying levels of boating use on different reaches on the upper river segment, during different seasons or at different flows. Alternatives that provide more opportunities for boating on the upper segment would generate fewer opportunities for a boat-free experience.

C. Boating access and equitable treatment of boating.

Issue: Concern that boating previously occurred on the upper segment of the Chattooga WSR and should be considered a compatible use that deserves equitable opportunities with other uses. Some believe there would be little or no conflict between boating and other uses because few boaters are capable of running the most challenging upper segments and use would most often occur on days when river flows are less desirable for other activities. Some are philosophically opposed to zoning by space, time or flows to address potential conflicts. Others acknowledge boating use may increase encounters on some days; however, they only support limits on boating use if encounters exceed

acceptable levels. In addition, if limits are imposed to reduce encounters, they believe any limits should be applied equitably to all user groups, not just boaters.

Response: Alternatives 8, 11, 12, 13 and14 were developed to respond to this issue. Alternative 8 would allow year-round boating on all reaches of the upper segment and at all flows. Alternatives 11, 12, 13 and 14 would vary the amount of boating on different reaches of the upper segment, during different seasons or at different flows (to address Issue B, above). In all alternatives, the number of boating groups anticipated on days when boating opportunities may occur are treated equitably as part of the total capacity for each reach—they are not singled out or treated any differently than existing user groups.

D. General loss of solitude and related social impacts from potential use increases

Issue: Concern that the upper segment of the Chattooga River corridor cannot support increased use (regardless of the type) without degrading biophysical resources, opportunities for solitude, a sense of remoteness or other related wilderness or primitive recreation values.

Response: All action alternatives provide a range of responses to this concern. Alternatives 2, 3, 8, 11, 12, 13 and 14 would establish capacities for frontcountry and backcountry areas as well as group size limits. They also describe a monitoring/adaptive management strategy that together would ensure that use would not exceed capacities; monitoring would be used to detect when use is approaching capacities as well as develop more precise use-impact relationships; adaptive management would in turn trigger actions to keep use levels from exceeding capacities.

1.7 Other Issues

Several other issues have been raised, including:

A. Commercial boating

Issue: Concern that commercial boating would be permitted if boating is allowed on any reach in the upper segment of the Chattooga WSR Corridor.

Response: No boating group or outfitter has advocated for commercial boating on the upper segment of the Chattooga WSR. In addition, the appeal from American Whitewater, et al. and the subsequent appeal decision from the Washington Office directed the three forests to “conduct the appropriate visitor use capacity analysis, including non-commercial boating use.” Therefore, none of the alternatives allow commercial boating.

B. New access points and portage trails

Issue: Concern that allowing boating would initiate use or development of new access points or lead to the development of user-created portage trails and their related impacts.

Response: All action alternatives require that all trails be designated by the US Forest Service. In alternatives 8, 11, 12, 13 and 14, long-term portage trail needs would be addressed on a site-specific basis to ensure trail sustainability and adequate protection of biophysical resources. In addition, alternatives 8, 11, 12, 13 and 14 have designated put-ins and take-outs for boating.

C. Potential search and rescue impacts.

Issue: Concern about increased risk of search and rescue incidents (and their associated costs as well as biophysical and social impacts) if boating were allowed on the upper segment of the Chattooga WSR.

Response: The alternatives that provide opportunities for boating on the upper segment of the Chattooga WSR have been analyzed for this likelihood and their potential consequences in Section 3.6.1 Human Health and Safety (Search and Rescue).

D. Large woody debris (LWD) retention

Issue: Concern that allowing boating use or wood gathering by camping or other land-based users would reduce LWD in the river channel.

Response: All action alternatives include the provision that no LWD removal would occur to accommodate recreation within the river or on the stream banks on the upper segment of the Chattooga WSR.

E. Trespass on private land

Issue: Concern that allowing boaters on the upper segment of the Chattooga WSR (from Green Creek downstream) may increase chances of boater trespass on private lands, with particular concern about boaters floating through adjacent private land between Grimshawes Bridge and Green Creek.

Response: This issue is outside the scope of this EA. The US Forest Service does not encourage trespass on private lands; boating use under consideration in alternatives 8, 11, 12, 13 and 14 focus on use downstream of Green Creek (please see "Alternatives Considered But Not Evaluated in Detail" for further clarification about why this EA does not analyze potential visitor use issues upstream of Green Creek.

F. Tributary boating

Issue: Concern about impacts from boating (e.g., LWD removal, user-created portage trails and loss of solitude) if boating were allowed on the tributaries in the upper segment of the Chattooga WSR Corridor.

Response: None of the alternatives propose allowing boating in the tributaries of the Chattooga WSR Corridor (see "Alternatives Considered but Not Evaluated in Detail" for further clarification).

G. Implementation costs

Issue: Concern that implementation of any new management proposal would exceed the available budget or staffing resources of the US Forest Service. An increase in personnel and effort would be required for full implementation of any action alternative.

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

H. Preserving the Chattooga WSR's free-flowing condition

Issue: Concern that any deviations from current management could affect the free-flowing condition of the upper section of the Chattooga River.

Response: Section 7 of the WSRA requires a review of any federal actions that occur within the bed and banks of the river and that they do not diminish the free-flowing condition of the river. None of the alternatives propose any recreation management direction that would diminish the free-flowing condition of the river (see Section 3.3.1).

I. Protecting water quality

Issue: Concern that increased use or other visitor management could degrade water quality.

Response: All alternatives address water quality concerns. The potential impacts to water quality are described in Section 3.3.2 Water Quality.

1.7 Outstandingly Remarkable Values

The WSRA requires federal land managers to protect and enhance the ORVs that merit a river's designation as wild and scenic, which are individual to each river.

To protect and enhance these values, the WSRA directs managers to prepare a comprehensive management plan for each wild and scenic river; for the Chattooga, this plan is embedded within the three forest plans. Collectively, they must address resource protection, development of lands and facilities, user capacity and other management practices necessary or desirable to achieve the WSRA's purposes.

Pursuant to the WSRA, the plan will ensure the river:

> will be administered in such manner as to protect and enhance the values which caused it to be included in said system without, insofar as is consistent therewith, limiting other uses that do not substantially interfere with public use and enjoyment of these values. In such administration primary emphasis shall be given to protecting its esthetic, scenic, historic, archeologic, and scientific features. Management plans for any such component may establish varying degrees of intensity for its protection and development, based on the special attributes of the area.

Similarly, Section 10(a) of the WSRA is interpreted as a "nondegradation and enhancement policy for all designated river areas, regardless of classification" (Wild and Scenic River Interagency Guidelines). Existing uses on federal lands may continue where they do not conflict with river protection. Adverse effects to the ORVs, free-flowing condition and water quality on federal and nonfederal lands must be identified in management proposals along with mitigation measures to resolve these potential adverse impacts. To achieve a nondegradation standard, the river-administering agency must document baseline resource conditions and monitor changes to these conditions.

The river's ORVs are a foundational element of such a plan. These are the exceptional qualities that merit the rivers' designation as a wild and scenic river. In many cases, ORVs are defined when the river is designated, often with direct quotations from a WSR study report. However, for some rivers, including the Chattooga, rivers were designated without explicit discussion of their ORVs, so this became a post-designation administrative task to be conducted in accordance with revised interagency guidelines published in the Federal Register in 1982 (47 FR 39454).

Guidelines suggest ORVs should be river-related or river-dependent (e.g., located in the river or on its immediate shorelands [generally within one-quarter mile on either side of the river], contribute substantially to the functioning of the river ecosystem and owe its location or existence to the presence of the river). The IWSRCC also suggest that ORVs must be rare, unique or exemplary at a comparative regional or national scale. As expressed by the IWSRCC in 1999, this means that "such a value would be one that is a conspicuous example from among a number of similar values that are themselves uncommon or extraordinary" (IWSRCC, 1999).

This section summarizes the ORVs for the entire Chattooga WSR. These ORVs are largely based on information in the original WSR study report forwarded to Congress in 1971 (USFS, 1971) as well as a more recent formal analysis of the river's ORVs and conditions that the US Forest Service conducted in the mid-1990s (USFS, 1996; hereafter labeled the 1996 ORV Report).

In Chapter 3, these ORVs will be used to structure discussion of the affected environment and the effects analysis. For each ORV, this EA describes baseline conditions as they exist today and at the time of designation. In addition, the effects sections describe how the ORVs and related resources would be affected by any alternative. Other resources not related to specific ORVs are discussed in subsequent sections.

ORVs are identified by their location in the river corridor if they are only found in a particular area. Direct, indirect and cumulative effects on the ORVs are discussed for each alternative and a determination is made relative to nondegradation and enhancement. Cumulative effects are discussed in the context of the entire Chattooga WSR.

Other considerations in reviewing the ORVs include:

- ORVs may be refined or extended in future reports of planning as more information about the river's resources become available. Subsequent generations reserve the right to find other resources in the river corridor valuable.
- Some ORVs are often described at a general level; others are more specific. In general, the protect and enhance mandate applies to ORVs at the river corridor or segment scale, and more specific indicators and standards need to be applied to determine if specific visitor use or impacts are degrading an ORV in a specific area.
- Visitor management decisions related to protecting or enhancing recreation ORVs often involve trade-offs among the types, quantity and quality of recreation opportunities. The recreation ORV for the Chattooga is generally not specific enough to define which opportunities deserve priority. Therefore, alternatives explore different balances among potentially competing or conflicting uses.
- At a larger scale, no new types of recreation activities are being proposed within the Chattooga WSR Corridor, only a rezoning of current recreation activities.
- Some ORVs would not be affected by the proposed action or alternatives considered in this EA.
- All ORVs must be protected and enhanced.

In 1974, when the Chattooga River was designated, the ORVs included geology, biology, scenery, recreation and history. The following provides a detailed description of the ORVs; additional information is available in the 1971 and 1996 reports.

A. History ORV

Archeological artifacts indicate human use of the corridor may trace back 12,000 years. More than 15 prehistorical and 15 historical sites have been surveyed, although other known sites have not been systematically examined. The Chattooga Town site has regional significance and contributes to the outstanding historic (heritage) rating for the

Chattooga River; it is eligible for the National Register of Historic Places (NRHP). Few other sites apparently qualify. The History ORV is not expected to be affected by any of the alternatives in this EA.

B. Geology ORV

Geologic and geomorphological values of the Chattooga WSR include monolithic treeless domes of exposed resistant granite in the upper segment of the river and geomorphic processes that produced the narrow rocky gorges characteristic of the corridor. Other noteworthy geologic features include a substantial "river capture" that sends the Chattooga to the Atlantic (most other rivers in the Southern Blue Ridge drain into the Gulf of Mexico). The Geology ORV is not expected to be affected by any of the alternatives in this EA.

C. Biology ORV

The Biology ORV is comprised of three components: botany, wildlife and fisheries. Periodic studies and surveys have been done over the years to better understand the diversity of species and habitats that have been found in the Chattooga WSR Corridor since the river was designated.

1. Fisheries

The Chattooga Wild and Scenic River includes both coldwater and warm-water fisheries. The coldwater fisheries and trout habitat are located above Highway 28 in the upper segment of the Chattooga River; the warm-water fisheries are located in the lower segment. Trout stocking occurs periodically throughout the year and has been done since before the river was designated as wild and scenic. The fisheries component of the Biology ORV may be affected by the alternatives and is analyzed in Section 3.2.2a.

2. 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 provide a full spectrum of important and unique wildlife habitats. In addition, they are mostly associated with the upper portion of the watershed; for this reason, approximately 70% of all rare species known or with potential to occur in the Chattooga River Watershed are restricted to the upper portion of the watershed above the Highway 28 bridge. The species evaluated in this EA include Southern Appalachian salamander, green

salamander, dark glyph, pink glyph, blue-footed lancetooth, dwarf proud globe, lamellate supercoil, open supercoil and Appalachian gloss.

Other species mentioned in the 1996 ORV Report or the habitat they represent is considered critical to the wildlife component of the Biology ORV. The habitat represented includes: large contiguous forest interior; hard mast forest; pine/pine–oak forest; mid–late successional riparian forests; and mid–late successional mesic forests. The species evaluated include black bear, white-tailed deer, ovenbird, pine warbler, Acadian flycatcher, hooded warbler, scarlet tanager and Eastern wild turkey.

The wildlife component of the Biology ORV may be affected by the alternatives and is analyzed in Section 3.2.2b.

3. Botany

The botany component of the Biology ORV is composed of the Southern Appalachian endemics, spray cliff communities and old growth forests. These were considered rare when botanical values were designated. They include liverworts, rock gnome lichen, Blue Ridge bindweed, Fraser's loosestrife, Manhart's sedge, Biltmore's sedge, pink shell azaleas, mountain camellia, Oconee bells and divided leaf ragwort.

Spray cliff plant communities occur on vertical to gently sloping rock faces that are constantly wet from the spray of waterfalls. They are inherently rare and dominated by mosses, liverworts and algae with vascular herbs having substantially less cover. A comprehensive old growth assessment was completed in the Chattooga River watershed in 1995 (Carlson 1995). Of the 4,578 acres of old growth in the Chattooga Watershed identified in the 1995 report, 564 acres were located within the upper segment of the Chattooga WSR Corridor.

The botany component of the Biology ORV may be affected by the alternatives and is analyzed in Section 3.2.2c.

D. Scenery ORV

Scenery in the Chattooga WSR Corridor has remained largely unchanged since the time of designation and features several outstanding views that are regionally exemplary and carefully described in the 1971 study report. In most sections of the river, the deeply entrenched forested gorge between two high ridges is characteristic, along with constantly changing scenes due to meandering bends and frequent rapids, cataracts and falls in the river itself. Seasonal vegetation changes affect the color, texture and character of the scenery, with winter exposing occasional bedrock cliffs. The upper segment of the Chattooga features a more incised canyon than the lower segment of the river, as well as the largest falls on the entire river at Big Bend. The Scenery ORV may be affected by the alternatives and is analyzed in Chapter 3.

E. Recreation ORV

The Chattooga WSR offers a variety of activities along the river's 57-mile course. It offers slow-water opportunities for swimming and fishing (from cold water to warm water habitats) as well as fast water for boating, canoeing and kayaking. Opportunities for hiking, camping, backpacking, wildlife and scenery viewing, horseback riding and hunting all take place in a spectacular setting. Opportunities for solitude, challenge, risk and adventure are found throughout the Chattooga WSR and attract many visitors to the area.

Specific components of the Recreation ORV include:

1. Fishing

Outstanding fishing opportunities for warm and cold water species are described in the 1971 and 1996 reports and accounted for the majority of recreation use on the river at the time of designation. Cold and cool water species were noted in the upper river, with warm water species in the lower river. The 1971 study team in particular noted that "trout fishing is excellent in the upper areas [but] marginal in the lower most reaches" and there might be "special interest from a wild river fishery" from Highway 28 north to Bullpen Road Bridge (comprising most of the upper segment of the river).

2. Hiking

Hiking is mentioned in the 1971 report, but only four miles of designated trail (in the upper segment of the river from Burrells Ford to Ellicott Rock) were available at that time, with unofficial trails offering a more rugged hiking opportunity into other areas. In subsequent years, more trails were built, including several in the upper segment of the river corridor that offer similarly outstanding opportunities to see the backcountry.

3. Horseback riding, hunting and motorized use

Horseback riding, hunting and motorized use on several river-adjacent roads were also common and provided recreation, with most of it occurring in the lower segment of the river. All roads except for major highway crossings were removed or converted to trails in the 1970s after designation, making the river appear more remote and less developed. As a trade-off, the river became less accessible to day users, particularly those interested in picnicking or camping near their vehicles.

4. Boating

Boating has occurred on the upper and lower segments of the river, but higher boating use has occurred downstream, even prior to the boating prohibition on the upper river segment in 1976. The original WSR study team travelled the entire river in small rafts, noting in reference to the upper segment of the Chattooga that "some method of floating is the best way to see this rugged portion of the river." Commercial use has burgeoned on the lower river segment since designation and the access and diversity of whitewater and flat water trips are also regionally exemplary.

5. Experience

Most of these recreation opportunities depend on primitive or semi-primitive settings with lower use levels, unmodified natural environments that offer a high degree of challenge as well as self-reliance. However, use is higher and more diverse (e.g., fishing, camping, hiking, boating, swimming and relaxing) at some frontcountry locations where development is generally greater also.

Several components of the recreation ORV would be affected by the alternatives in this EA; they are analyzed in Section 3.2.1.

CHAPTER 2 ALTERNATIVES

2.1 SUMMARY

The US Forest Service has developed several alternatives that would meet the purpose and need described in Chapter 1. All alternatives preserve the Chattooga Wild and Scenic River's free-flowing condition, protect its water quality and protect and enhance its ORVs as required by the WSRA. All alternatives also preserve the wilderness character of Ellicott Rock Wilderness as required by the Wilderness Act. However, the alternatives vary the type and amount of recreation use, as well as other management actions, on different reaches of the upper river segment to assess the trade-offs of providing different mixes of high-quality recreation opportunities. The scope of the alternatives is limited to providing management direction for the upper segment of the Chattooga Wild and Scenic River, consistent with the appeal decision described in the purpose and need.

In a variety of venues, the public provided the agency with input to help define desired recreation experiences in the upper segment of the Chattooga WSR Corridor, consistent with the WSRA and the Wilderness Act. At the most general level, public comments indicate distinctions between frontcountry and backcountry experiences on the upper river segment:

A. Frontcountry Areas and Experiences

As noted in Chapter 1, frontcountry areas exist within one-quarter mile of four bridges: Grimshawes/Sliding Rock Bridge, Bullpen Road Bridge, Burrells Ford Bridge and the Highway 28 Bridge. These frontcountry areas offer easy access to the corridor where visitors appear more tolerant of interaction with other visitors. Proposed management actions for these areas are designed to protect biophysical resources while allowing higher use and interaction levels. Safety and resource damage are generally considered limiting factors for frontcountry capacities, which are designed to fit with existing facilities (e.g., designated parking spaces in lots or along roads, campsites in Burrells Ford campground).

B. Backcountry Reaches and Experiences

As noted in Chapter 1, backcountry areas lie beyond one-quarter mile of the four bridges and are referred to by stream reaches: Chattooga Cliffs Reach, Ellicott Rock Reach, Rock Gorge Reach and Nicholson Fields Reach. In these reaches, visitors are more interested in opportunities for solitude, self-reliance, a sense of remoteness and a primitive setting. Proposed management actions for these reaches are designed to limit encounters and separate potentially conflicting uses (boaters and others), as well as address biophysical and related aesthetics (few signs of previous use such as litter, user-created trails and campsites as well as fire rings). Alternatives offer different mixes of recreation uses in these reaches which trade-off access for different groups with different levels of social and biophysical impacts.

The rest of this section outlines the proposed management actions in each alternative (please see Appendix A for maps of each alternative).

2.2 Alternatives Considered in Detail

A. Alternative 1

Alternative 1 is the no-action alternative and maintains current management (See Table 2.2-1) on all three national forests. It zones the river to provide boating opportunities below Highway 28 and boat-free opportunities above Highway 28.

Table 2.2-1 Alternative 1

<table>
<tr><th>Current Management</th><th>Actions</th></tr>
<tr><td>Maximum Use Levels</td><td>
No explicit capacities in frontcountry areas, but designated parking areas physically accommodate the following maximum number of vehicles:
• Grimshawes/Sliding Rock Bridge Area—about 25 vehicles at one time
• Bullpen Road Bridge Area—about 15 vehicles at one time
• Burrells Ford Bridge Area— about 80 vehicles at one time
• Hwy. 28 Bridge Area— about 30 vehicles at one time

There are no explicit capacities for frontcountry or backcountry areas. However, current maximum use levels are as follows:
<table>
<tr><th>Backcountry Reach</th><th>Average Groups per Weekday</th><th>Average People per Weekday</th><th>Average Groups per Weekend Day</th><th>Average People per Weekend Day</th></tr>
<tr><td>Chattooga Cliffs</td><td>5</td><td>10</td><td>10</td><td>15</td></tr>
<tr><td>Ellicott Rock</td><td>10</td><td>35</td><td>20</td><td>110</td></tr>
<tr><td>Rock Gorge</td><td>15</td><td>40</td><td>30</td><td>95</td></tr>
<tr><td>Nicholson Fields</td><td>15</td><td>40</td><td>30</td><td>95</td></tr>
<tr><td></td><td></td><td></td><td></td><td></td></tr>
<tr><th>Frontcountry Areas</th><th colspan="2">Groups at One Time</th><th colspan="2">People at One Time</th></tr>
<tr><td>Grimshawes/Sliding Rock Bridge</td><td colspan="2">25</td><td colspan="2">65</td></tr>
<tr><td>Bullpen Road Bridge</td><td colspan="2">15</td><td colspan="2">40</td></tr>
<tr><td>Burrells Ford Bridge</td><td colspan="2">80</td><td colspan="2">205</td></tr>
<tr><td>Highway 28 Bridge</td><td colspan="2">35</td><td colspan="2">85</td></tr>
</table>
</td></tr>
<tr><td>Encounters</td><td>
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:
<table>
<tr><th colspan="3">Number of encounters with other parties:</th></tr>
<tr><td>Zone 1 (No trails)</td><td>Zone II (Secondary trails)</td><td>Zone III (Primary trails and access points)</td></tr>
<tr><td>80% probability of 0 per day</td><td>80% probability of 3 or fewer per day</td><td>80% probability of 5 or fewer per day</td></tr>
<tr><th colspan="3">Number of other parties camped within sight or continuous sound:</th></tr>
<tr><td>Zone I</td><td>Zone II</td><td>Zone III</td></tr>
<tr><td>80% probability of 0 per day</td><td>80% probability of 1 or fewer per day</td><td>80% probability of 3 or fewer per day</td></tr>
<tr><td colspan="3">Reduce use when it exceeds the limits on more than 10 days during the peak-use season.</td></tr>
</table>
</td></tr>
</table>

Table 2.2-1 Alternative 1

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.
Camping	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. •
Group Size Limits	SUMTER NATIONAL FOREST • Commercial and organized group size is limited to 12 in the Ellicott Rock Wilderness and the proposed wilderness area. 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.
User Registration	Users are not required to register.

Large 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.

B. Alternative 2

1. Objectives

- Continue current zoning of the river to provide high-quality whitewater opportunities on the lower segment of the Chattooga WSR and to provide cold water angling and other recreational opportunities on the upper segment without the impacts of boating use.
- Rely on year-round formal zoning by space (river reach) to separate boating and non-boating users on the entire river. This provides no boating access on the upper river, but maintains a year-round boat-free segment for those who believe any boating is incompatible with that part of the river.
- Increase opportunities for solitude in the summer season by establishing capacity limits below current high-use season (summer) levels.
- Allow visitation in the low-use seasons (winter, fall and spring) to increase to the level established in this alternative for the high-use season (summer). Opportunities for solitude may change accordingly in the low-use seasons, although future recreation trends suggest this growth is likely to be small.

2. Management Direction

Direction to achieve these objectives is described in Table 2.2-2. Highlights are summarized below:

- Establish frontcountry capacities that reduce crowding and congestion at the highest use area during high season periods. This capacity would be managed by reducing the number of designated parking spaces (no roadside parking) at Burrells Ford.
- Establish backcountry capacities that reduce trail and river encounters during the high-use season. Backcountry capacities would be the same on weekends and weekdays. Backcountry capacities would be enforced through a permit system for both day and overnight use.
- Establish group sizes for all types of use.
- Reduce campsite density to increase opportunities for solitude. Limit camping to designated sites. Camping limits would be enforced through a reservation system.
- All trails would be designated and their alignment would enhance opportunities for solitude and mitigate resource impacts.
- Prohibit large woody debris removal without agency approval or to accommodate recreation use.

Table 2.2-2 Alternative 2

<table>
<tr><th>Decision Points</th><th>Actions</th></tr>
<tr><td>Capacities</td><td>
<table>
<tr><th>Backcountry Reach</th><th>Average Groups per Weekday</th><th>Average People per Weekday</th><th>Average Groups per Weekend Day</th><th>Average People per Weekend Day</th></tr>
<tr><td>Chattooga Cliffs</td><td>5</td><td>10</td><td>5</td><td>10</td></tr>
<tr><td>Ellicott Rock</td><td>5</td><td>20</td><td>5</td><td>35</td></tr>
<tr><td>Rock Gorge</td><td>5</td><td>15</td><td>5</td><td>20</td></tr>
<tr><td>Nicholson Fields</td><td>15</td><td>25</td><td>15</td><td>25</td></tr>
<tr><td></td><td></td><td></td><td></td><td></td></tr>
<tr><th>Frontcountry Areas</th><th colspan="2">Groups at One Time</th><th colspan="2">People at One Time</th></tr>
<tr><td>Grimshawes/Sliding Rock Bridge</td><td colspan="2">25</td><td colspan="2">65</td></tr>
<tr><td>Bullpen Road Bridge</td><td colspan="2">15</td><td colspan="2">40</td></tr>
<tr><td>Burrells Ford Bridge</td><td colspan="2">40</td><td colspan="2">100</td></tr>
<tr><td>Highway 28 Bridge</td><td colspan="2">35</td><td colspan="2">85</td></tr>
</table>
</td></tr>
<tr><td>Trails</td><td>▪ Designated trails only. Close: redundant trails; trails where resource damage cannot be mitigated; and trails where closure is needed to reduce encounters or minimize conflict.
▪ Rerouting may be necessary to correct existing problems on designated trails.
▪ No new trail construction except where needed to enhance opportunities for solitude.
▪ Management actions related to designated trails would require site-specific decisions.</td></tr>
<tr><td>Camping</td><td>▪ Camping only in designated sites; reservations required.
▪ Campsites would be spaced at least one-quarter mile apart.
▪ 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.
▪ Management actions related to designated campsites would require site-specific decisions.</td></tr>
<tr><td>Parking</td><td>▪ Close roadside parking at Burrells Ford Bridge.</td></tr>
<tr><td>Backcountry Group Size Limits</td><td>▪ 12 per group on trails
▪ 6 per group at campsites (with group campsite exceptions).
▪ 4 per group for anglers</td></tr>
<tr><td>Permit System</td><td>▪ Permits required for day and overnight use in backcountry. Overnight campsites would be assigned.</td></tr>
<tr><td>Large Woody Debris</td><td>▪ No large woody debris removal without agency approval or to accommodate recreation use.</td></tr>
</table>

C. Alternative 3

1. Objectives

- Continue current zoning of the river to provide high-quality whitewater opportunities on the lower segment of the Chattooga WSR and to provide cold water angling and other recreational opportunities on the upper segment without the impacts of boating use.
- Rely on year-round formal zoning by space (river reach) to separate boating and non-boating users on the entire river. This provides no boating access on the upper river, but maintains a year-round boat free segment for those who believe any boating is incompatible with that part of the river.
- Maintain existing opportunities for solitude in the summer high-use season by establishing capacity limits that do not exceed current high-use season (summer) levels.
- Allow visitation in the low-use seasons (winter, fall and spring) to increase to the level established for the high-use season (summer). Opportunities for solitude may change accordingly in the low-use seasons, although future recreation trends suggest this growth is likely to be small.

2. Management Direction

Direction to achieve these objectives is described in Table 2.2-3 below. Highlights are summarized below:

- Establish frontcountry capacities that prevent crowding and congestion from increasing during the high-use season. This capacity would be managed by establishing a limited number of designated parking spaces at each site.
- Establish backcountry capacities that do not cause encounters to exceed levels that currently occur during the high-use season. Backcountry capacities would be lower on weekdays and higher on weekends to provide more opportunities for solitude on weekdays than weekends and allow greater access on traditionally high-use weekend days than on weekdays.
- Backcountry capacities would be managed indirectly through designated parking. Relevant vehicle counts would be correlated to backcountry use and encounters in the different reaches.
- Establish maximum group sizes for all types of use.
- Reduce campsite density to increase opportunities for solitude. Limit camping to designated sites.
- All trails would be designated and designed to mitigate resource impacts first, as well as enhance opportunities for solitude (but less than Alternative 2).
- Prohibit large woody debris removal without agency approval or to accommodate recreation use.

Table 2.2-3 Alternative 3

Decision Point	Actions
Capacities	

Backcountry Reach	Average Groups per Weekday	Average People per Weekday	Average Groups per Weekend Day	Average People per Weekend Day
Chattooga Cliffs	5	10	10	15
Ellicott Rock	10	35	20	110
Rock Gorge	15	40	30	95
Nicholson Fields	15	40	30	95

Frontcountry Areas	Groups at One Time	People at One Time
Grimshawes/Sliding Rock Bridge	25	65
Bullpen Road Bridge Area	15	40
Burrells Ford Bridge Area	80	205
Highway 28 Bridge Area	35	85

Trails	▪ Designated trails only. Close redundant trails; trails where resource damage cannot be mitigated; and trails where closure is needed to limit encounters or minimize conflict. ▪ Rerouting may be necessary to correct existing problems on designated trails. ▪ Management actions related to designated trails would require site-specific decisions.
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. ▪ Management actions related to designated campsites would require site-specific decisions.
Backcountry Group Size Limits	▪ 12 per group on trails ▪ 6 per group at campsites (with group campsite exceptions). ▪ 4 per group for anglers
User Registration	▪ Manage encounters using adaptive management strategy that may include indirect measures such as user registration, monitoring, surveys, etc., followed by direct measures such as permits.
Large Woody Debris	▪ No large woody debris removal without agency approval or to accommodate recreation use.

D. Alternatives 4, 5, 6, 7, 9 and 10

These alternatives were considered but not evaluated in detail (please see Section 2.4).

E. Alternative 8

1. Objectives

- Remove formal zoning of the river regarding boating. Boating would be allowed on the entire river downstream of Green Creek, year-round (with no flow restrictions).
- Rely on the river's natural characteristics to separate boating and non-boating users on the entire river. This alternative would not guarantee any boat-free opportunities in any reaches or on any days.
- Provide flexibility for boaters to float the river at flow levels most appropriate for their skill level and experience.
- Maintain existing opportunities for solitude in the summer high-use season by establishing capacity limits that do not exceed current high-use season (summer) levels.
- Allow visitation in the low-use seasons (winter, fall and spring) to increase to the level established for the high-use season (summer). Opportunities for solitude may change accordingly in the low-use seasons, although future recreation trends suggest this growth is likely to be small.

2. Management Direction

Direction to achieve these objectives is described in Table 2.2-4 below. Highlights are summarized below:

- Allow boating at all flows year round on the upper segment of the Chattooga WSR from the Green Creek put-in to the Highway 28 bridge. In addition, maintain current boating opportunities from Highway 28 bridge to Tugaloo Lake, but prohibit commercial boating on the upper segment of the Chattooga WSR.
- Boaters would be required to self-register to assess the amount and timing of this new use on the upper river segment, and improve use estimates of different types of users.
- Establish frontcountry capacities that prevent crowding and congestion from increasing during the high-use season. This capacity would be managed by establishing a limited number of designated parking spaces at each site.
- Establish backcountry capacities that do not cause encounters to exceed levels that currently occur during the high-use season. Backcountry capacities would be lower on weekdays and higher on weekends to provide more opportunities for solitude on weekdays than weekends and allow greater access on traditionally high-use weekend days than on weekdays.
- Backcountry capacities would be managed indirectly through designated parking. Relevant vehicle counts would be correlated to backcountry use and encounters in the different reaches. Establish maximum group sizes for all types of use and minimum group sizes for boaters.
- Reduce campsite density to increase opportunities for solitude. Limit camping to designated sites.
- All trails would be designated and designed to mitigate resource impacts first, as well as enhance opportunities for solitude (but less than Alternative 2).
- Prohibit large woody debris removal without agency approval or to accommodate recreation use.

Table 2.2-4 Alternative 8

<table>
<tr><th>Decision Points</th><th>Actions</th></tr>
<tr><td>Capacities</td><td>
<table>
<tr><th>Backcountry Reach</th><th>Average Groups per Weekday</th><th>Average People per Weekday</th><th>Average Groups per Weekend Day</th><th>Average People per Weekend Day</th></tr>
<tr><td>Chattooga Cliffs</td><td>5</td><td>10</td><td>10</td><td>15</td></tr>
<tr><td>Ellicott Rock</td><td>10</td><td>35</td><td>20</td><td>110</td></tr>
<tr><td>Rock Gorge</td><td>15</td><td>40</td><td>30</td><td>95</td></tr>
<tr><td>Nicholson Fields</td><td>15</td><td>40</td><td>30</td><td>95</td></tr>
<tr><th>Frontcountry Areas</th><th colspan="2">Groups at One Time</th><th colspan="2">People at One Time</th></tr>
<tr><td>Grimshawes/Sliding Rock Bridge Area</td><td colspan="2">25</td><td colspan="2">65</td></tr>
<tr><td>Bullpen Road Bridge Area</td><td colspan="2">15</td><td colspan="2">40</td></tr>
<tr><td>Burrells Ford Bridge Area</td><td colspan="2">80</td><td colspan="2">205</td></tr>
<tr><td>Highway 28 Bridge Area</td><td colspan="2">35</td><td colspan="2">85</td></tr>
</table>
</td></tr>
<tr><td>Boating from Green Creek put-in to Highway 28 bridge</td><td>▪ Boating from the Green Creek put-in to the Highway 28 boat launch at all flows year round.
▪ Craft type: Tandem/single-capacity hard boats, tandem/single-capacity inflatable kayaks and up to four-person rafts.
▪ Put-ins: Green Creek; Bullpen Road Bridge; Burrells Ford Bridge; Lick Log Creek.
▪ Take-outs: Bullpen Road Bridge; Burrells Ford Bridge; Lick Log Creek; Highway 28 bridge.
▪ Boating not allowed in the tributaries.</td></tr>
<tr><td>Trails</td><td>▪ Designated trails only. Close redundant trails; trails where resource damage cannot be mitigated; and trails where closure is needed to limit encounters or minimize conflict.
▪ Rerouting may be necessary to correct existing problems on designated trails.
▪ Designated portage trails may be necessary to avoid unacceptable impacts to resources.
▪ Management actions related to designated trails would require site-specific decisions.</td></tr>
<tr><td>Camping</td><td>▪ 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.
▪ Management actions related to designated campsites would require site-specific decisions.</td></tr>
<tr><td>Backcountry Group Size Limits</td><td>▪ 12 per group on trails
▪ 6 per group at campsites (with group campsite exceptions).
▪ 4 per group for anglers
▪ 6 for boaters; minimum of two craft for boaters</td></tr>
<tr><td>Self-Registration Floating Permit</td><td>▪ Boaters must self-register (the same as current management below Highway 28).
▪ Safety equipment for boaters to be determined at the district level as a condition of the self-registration permit.</td></tr>
<tr><td>Large Woody Debris</td><td>▪ No large woody debris removal without agency approval or to accommodate recreation use.</td></tr>
</table>

F. Alternative 11

1. Objectives

- Zone the river by flows to provide high-quality whitewater opportunities on the lower segment of the Chattooga WSR and to provide optimal cold water angling and other boat-free recreational opportunities on the upper segment at flows below 450 cfs.
- Rely on year-round formal zoning by flows to provide optimal boating opportunities on the upper segment of the Chattooga WSR at flows of 450 cfs and greater that are not optimal for fly, spin and bait fishing to minimize impacts on anglers. Flows of 450 cfs and higher are more likely to occur in the low-use seasons to minimize impacts on other upper river users (e.g., hikers, swimmers, etc.).
- Maintain existing opportunities for solitude in the summer high-use season by establishing capacity limits that do not exceed current high-use season (summer) levels.
- Allow visitation in the low-use seasons (winter, fall and spring) to increase to the level established for the high-use season (summer). Opportunities for solitude may change accordingly in the low-use seasons, although future recreation trends suggest this growth is likely to be small.

2. Management Direction

Direction to achieve these objectives is described in Table 2.2-5 below. Highlights are summarized below:

- Allow boating at flows of 450 cfs or higher year round on the upper segment of the Chattooga WSR from the Green Creek put-in to the Highway 28 bridge. In addition, maintain current boating opportunities from Highway 28 bridge to Tugaloo Lake, but prohibit commercial boating on the upper segment of the Chattooga WSR.
- Boaters would be required to self-register to assess the amount and timing of this new use on the upper river segment, and improve use estimates of different types of users.
- Establish frontcountry capacities that prevent crowding and congestion from increasing during the high-use season. This capacity would be managed by establishing a limited number of designated parking spaces at each site.
- Establish backcountry capacities that do not cause encounters to exceed levels that currently occur during the high-use season. Backcountry capacities would be lower on weekdays and higher on weekends to provide more opportunities for solitude on weekdays than weekends and allow greater access on traditionally high-use weekend days than on weekdays.
- Backcountry capacities would be managed indirectly through designated parking. Relevant vehicle counts would be correlated to backcountry use and encounters in the different reaches.
- Establish maximum group sizes for all types of use and minimum group sizes for boaters.
- Reduce campsite density to increase opportunities solitude. Limit camping to designated sites.
- All trails would be designated and designed to mitigate resource impacts first, as well as enhance opportunities for solitude (but less than Alternative 2).
- Prohibit large woody debris removal without agency approval or to accommodate recreation use.

Table 2.2-5 Alternative 11

<table>
<tr><th>Decision Points</th><th>Actions</th></tr>
<tr><td>Capacities</td><td>
<table>
<tr><th>Backcountry Reach</th><th>Average Groups per Weekday</th><th>Average People per Weekday</th><th>Average Groups per Weekend Day</th><th>Average People per Weekend Day</th></tr>
<tr><td>Chattooga Cliffs</td><td>5</td><td>10</td><td>10</td><td>15</td></tr>
<tr><td>Ellicott Rock</td><td>10</td><td>35</td><td>20</td><td>110</td></tr>
<tr><td>Rock Gorge</td><td>15</td><td>40</td><td>30</td><td>95</td></tr>
<tr><td>Nicholson Fields</td><td>15</td><td>40</td><td>30</td><td>95</td></tr>
<tr><td></td><td></td><td></td><td></td><td></td></tr>
<tr><th>Frontcountry Areas</th><th colspan="2">Groups at One Time</th><th colspan="2">People at One Time</th></tr>
<tr><td>Grimshawes/Sliding Rock Bridge Area</td><td colspan="2">25</td><td colspan="2">65</td></tr>
<tr><td>Bullpen Road Bridge Area</td><td colspan="2">15</td><td colspan="2">40</td></tr>
<tr><td>Burrells Ford Bridge Area</td><td colspan="2">80</td><td colspan="2">205</td></tr>
<tr><td>Highway 28 Bridge Area</td><td colspan="2">35</td><td colspan="2">85</td></tr>
</table>
</td></tr>
<tr><td>Boating from Green Creek put-in to Highway 28 bridge</td><td>▪ Boating from the Green Creek put-in to the Highway 28 boat launch at flows of 450 cfs or greater, year-round.
▪ Craft type: Tandem/single-capacity hard boats and tandem/single-capacity inflatable kayaks
▪ Put-ins: Green Creek; Bullpen Road Bridge; Burrells Ford Bridge; Lick Log Creek.
▪ Take-outs: Bullpen Road Bridge; Burrells Ford Bridge; Lick Log Creek; Highway 28 bridge.
▪ Boating not allowed in the tributaries.</td></tr>
<tr><td>Trails</td><td>▪ Designated trails only. Close redundant trails; trails where resource damage cannot be mitigated; and trails where closure is needed to limit encounters or minimize conflict.
▪ Rerouting may be necessary to correct existing problems on designated trails.
▪ Designated portage trails may be necessary to avoid unacceptable impacts to resources.
▪ Management actions related to designated trails would require site-specific decisions.</td></tr>
<tr><td>Camping</td><td>▪ 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.
▪ Management actions related to designated campsites would require site-specific decisions.</td></tr>
<tr><td>Backcountry Group Size Limits</td><td>▪ 12 per group on trails
▪ 6 per group at campsites (with group campsite exceptions).
▪ 4 per group for anglers
▪ 6 for boaters; minimum of two craft for boaters</td></tr>
<tr><td>Self-Registration Floating Permit</td><td>▪ Boaters must self-register (the same as current management below Highway 28).
▪ Safety equipment for boaters to be determined at the district level as a condition of the self-registration permit.</td></tr>
<tr><td>Large Woody Debris</td><td>▪ No large woody debris removal without agency approval or to accommodate recreation use.</td></tr>
</table>

G. Alternative 12

1. Objectives

- Zone the river by space (river reach) and time (season) to; maintain high-quality whitewater opportunities on the lower segment of the river year round; provide new boating opportunities on the upper segment of the river in the winter; and provide opportunities for boat-free, cold water angling and other recreational activities.
- Mitigate impacts to anglers and other upper river users (e.g., hikers, swimmers, etc.) by allowing boating in the winter in reaches where use is traditionally low.
- Provide predictable trip planning for boaters and for visitors who desire a boat-free experience.
- Provide flexibility for boaters to float the river at flow levels most appropriate for their skill level and experience.
- Maintain existing opportunities for solitude in the summer high-use season by establishing capacity limits that do not exceed current high-use season (summer) levels.
- Allow visitation in the low-use seasons (winter, fall and spring) to increase to the level established for the high-use season (summer). Opportunities for solitude may change accordingly in the low-use seasons, although future recreation trends suggest this growth is likely to be small.

2. Management Direction

Direction to achieve these objectives is described in Table 2.2-6 below. Highlights are summarized below:

- Allow boating at all flows December 1 - January 15 from the Green Creek put-in to the Burrells Ford Bridge and from January 15 - March 1 from the Burrells Ford Bridge to Lick Log Creek. In addition, maintain current boating opportunities from Highway 28 bridge to Tugaloo Lake, but prohibit commercial boating on the upper segment of the Chattooga WSR.
- Boating would not be allowed in the Nicholson Fields Reach.
- Boaters would be required to self-register.
- Establish frontcountry capacities that prevent crowding and congestion from increasing during the high-use season. This capacity would be managed by establishing a limited number of designated parking spaces at each site.
- Establish backcountry capacities that do not cause encounters to exceed levels that currently occur during the high-use season. Backcountry capacities would be lower on weekdays and higher on weekends to provide more opportunities for solitude on weekdays than weekends and allow greater access on traditionally high-use weekend days than on weekdays.
- Backcountry capacities would be managed indirectly through designated parking. Relevant vehicle counts would be correlated to backcountry use and encounters in the different reaches. Establish maximum group sizes for all types of use and minimum group sizes for boaters.
- Reduce campsite density to increase opportunities for solitude. Limit camping to designated sites.
- All trails would be designated and designed to mitigate resource impacts first, as well as enhancing opportunities for solitude (but less than Alternative 2).
- Prohibit large woody debris removal without agency approval or to accommodate recreation use.

Table 2.2-6 Alternative 12

Decision Points	Actions
Capacities	

Backcountry Reach	Average Groups per Weekday	Average People per Weekday	Average Groups per Weekend Day	Average People per Weekend Day
Chattooga Cliffs	5	10	10	15
Ellicott Rock	10	35	20	110
Rock Gorge	15	40	30	95
Nicholson Fields	15	40	30	95

Frontcountry Areas	Groups at One Time	People at One Time
Grimshawes/Sliding Rock Bridge Area	25	65
Bullpen Road Bridge Area	15	40
Burrells Ford Bridge Area	80	205
Highway 28 Bridge Area	35	85

Boating from Green Creek put-in to Lick Log Creek	▪ Boating from the Green Creek put-in to the Burrells Ford Bridge December 1 – January 15 and Burrells Ford Bridge to Lick Log Creek from January 15 to March 1 at all flows. ▪ Craft type: Tandem/single-capacity hard boats and tandem/single-capacity inflatable kayaks. ▪ Put-ins: Green Creek; Bullpen Road Bridge; Burrells Ford Bridge. ▪ Take-outs: Burrells Ford Bridge; Bullpen Road Bridge; Lick Log Creek. ▪ Boating not allowed in the tributaries.
Trails	▪ Designated trails only. Close redundant trails; trails where resource damage cannot be mitigated; and trails where closure is needed to limit encounters or minimize conflict. ▪ Rerouting may be necessary to correct existing problems on designated trails. ▪ Designated portage trails may be necessary to avoid unacceptable impacts to resources. ▪ Management actions related to designated trails would require site-specific decisions.
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. ▪ Management actions related to designated campsites would require site-specific decisions.
Backcountry Group Size Limits	▪ 12 per group on trails ▪ 6 per group at campsites (with group campsite exceptions). ▪ 4 per group for anglers ▪ 6 for boaters; minimum of two craft for boaters
Self-Registration Floating Permit	▪ Boaters must self-register (the same as current management below Highway 28). ▪ Safety equipment for boaters to be determined at the district level as a condition of the self-registration permit.
Large Woody Debris	▪ No large woody debris removal without agency approval or to accommodate recreation use.

H. Alternative 13

1. Objectives

- Zone the river by space (river reach) and time (season) to; maintain high-quality whitewater opportunities on the lower segment of the river year round; provide new boating opportunities on the upper segment of the river in the winter; provide opportunities for boat-free, optimal fly and spin, cold water angling and other recreational activities year round.
- Mitigate impacts to anglers and other upper river users (e.g., hikers, swimmers, etc.) by allowing boating in the winter at flows of 350 cfs or greater in reaches where use is traditionally low.
- Provide a boat-free experience in the Nicholson Fields Reach year round.
- Maintain existing opportunities for solitude in the summer high-use season by establishing capacity limits that do not exceed current high-use season (summer) levels.
- Allow visitation in the low-use seasons (winter, fall and spring) to increase to the level established for the high-use season (summer). Opportunities for solitude may change accordingly in the low-use seasons, although future recreation trends suggest this growth is likely to be small.

2. Management Direction

Direction to achieve these objectives is described in Table 2.2-7 below. Highlights are summarized below:

- Allow boating at flows above 350 cfs from December 1 - March 1 from Green Creek put-in to the Lick Log Creek confluence. In addition, maintain current boating opportunities from Highway 28 bridge to Tugaloo Lake, but prohibit commercial boating on the upper segment of the Chattooga WSR. Boating is not allowed in the Nicholson Fields Reach.
- Boaters would be required to self-register to assess the amount and timing of this new use on the upper river segment, and improve use estimates of different types of users.
- Establish frontcountry capacities that prevent crowding and congestion from increasing during the high-use season. This capacity would be managed by establishing a limited number of designated parking spaces at each site.
- Establish backcountry capacities that do not cause encounters to exceed levels that currently occur during the high-use season. Backcountry capacities would be lower on weekdays and higher on weekends to provide more opportunities for solitude on weekdays than weekends and allow greater access on traditionally high-use weekend days than on weekdays.
- Backcountry capacities would be managed indirectly through designated parking. Relevant vehicle counts would be correlated to backcountry use and encounters in the different reaches. Establish maximum group sizes for all types of use and minimum group sizes for boaters.
- Reduce campsite density to increase opportunities for solitude. Limit camping to designated sites.
- All trails would be designated and designed to mitigate resource impacts first, as well as enhancing opportunities for solitude (but less than Alternative 2)..
- Prohibit large woody debris removal without agency approval or to accommodate recreation use.

Table 2.2-7 Alternative 13

<table>
<tr><th>Decision Points</th><th>Actions</th></tr>
<tr><td>Capacities</td><td>
<table>
<tr><th>Backcountry Reach</th><th>Average Groups per Weekday</th><th>Average People per Weekday</th><th>Average Groups per Weekend Day</th><th>Average People per Weekend Day</th></tr>
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<tr><td>Rock Gorge</td><td>15</td><td>40</td><td>30</td><td>95</td></tr>
<tr><td>Nicholson Fields</td><td>15</td><td>40</td><td>30</td><td>95</td></tr>
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<tr><th>Frontcountry Areas</th><th colspan="2">Groups at One Time</th><th colspan="2">People at One Time</th></tr>
<tr><td>Grimshawes/Sliding Rock Bridge</td><td colspan="2">25</td><td colspan="2">65</td></tr>
<tr><td>Bullpen Road Bridge Area</td><td colspan="2">15</td><td colspan="2">40</td></tr>
<tr><td>Burrells Ford Bridge Area</td><td colspan="2">80</td><td colspan="2">205</td></tr>
<tr><td>Highway 28 Bridge Area</td><td colspan="2">35</td><td colspan="2">85</td></tr>
</table>
</td></tr>
<tr><td>Boating from Green Creek put-in to Lick Log Creek</td><td>▪ Boating from the Green Creek put-in to the Lick Log Creek from December 1 to March 1 at flows of 350 cfs or greater.
▪ Craft type: Tandem/single-capacity hard boats and tandem/single-capacity inflatable kayaks.
▪ Put-ins: Green Creek; Bullpen Road Bridge; Burrells Ford Bridge.
▪ Take-outs: Bullpen Road Bridge; Burrells Ford Bridge; Lick Log Creek.
▪ Boating not allowed in the tributaries.</td></tr>
<tr><td>Trails</td><td>▪ Designated trails only. Close redundant trails; trails where resource damage cannot be mitigated; and trails where closure is needed to limit encounters or minimize conflict.
▪ Rerouting may be necessary to correct existing problems on designated trails.
▪ Designated portage trails may be necessary to protect/avoid unacceptable impacts to resources.
▪ Management actions related to designated trails would require site-specific decisions.</td></tr>
<tr><td>Camping</td><td>▪ 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.
▪ Management actions related to designated campsites would require site-specific decisions.</td></tr>
<tr><td>Backcountry Group Size Limits</td><td>▪ 12 per group on trails
▪ 6 per group at campsites (with group campsite exceptions).
▪ 4 per group for anglers
▪ 6 for boaters; minimum of two craft for boaters</td></tr>
<tr><td>Self-Registration Floating Permit</td><td>▪ Boaters must self-register (the same as current management below Highway 28).
▪ Safety equipment for boaters to be determined at the district level as a condition of the self-registration permit.</td></tr>
<tr><td>Large Woody Debris</td><td>▪ No large woody debris removal without agency approval or to accommodate recreation use.</td></tr>
</table>

I. Alternative 14

1. Objectives

- Zone the river by flows to provide high-quality whitewater opportunities on the lower segment of the Chattooga WSR and to provide optimal fly and spin cold water angling and other boat-free recreational opportunities on the upper segment at flows below 350 cfs. Maintain current year-round boating opportunities on the lower segment of the river.
- Rely on year-round formal zoning by flows to provide optimal boating opportunities on the upper segment of the Chattooga WSR at flows of 350 cfs and greater that are not optimal for fly and spin fishing to minimize impacts on all anglers except bait anglers. Flows of 350 cfs and higher are more likely to occur in the low-use seasons to minimize impacts on other upper river users (e.g., hikers, swimmers, etc.).
- Maintain existing opportunities for solitude in the summer high-use season by establishing capacity limits that do not exceed current high-use season (summer) levels.
- Allow visitation in the low-use seasons (winter, fall and spring) to increase to the level established for the high-use season (summer). Opportunities for solitude may change accordingly in the low-use seasons, although future recreation trends suggest this growth is likely to be small.

2. Management Direction

Direction to achieve these objectives is described in table 2.2-8 below. Highlights are summarized below:

- Allow boating at flows of 350 cfs or higher year round on the upper segment of the Chattooga WSR from the Green Creek put-in to the Highway 28 bridge. In addition, maintain current boating opportunities from Highway 28 Bridge to Tugaloo Lake, but prohibit commercial boating on the upper segment of the Chattooga WSR.
- Boaters would be required to self-register to assess the amount and timing of this new use on the upper river segment, and improve use estimates of different types of users.
- Establish frontcountry capacities that prevent crowding and congestion from increasing during the high-use season. This capacity would be managed by establishing a limited number of designated parking spaces at each site.
- Establish backcountry capacities that do not cause encounters to exceed levels that currently occur during the high-use season. Backcountry capacities would be lower on weekdays and higher on weekends to provide more opportunities for solitude on weekdays than weekends and allow greater access on traditionally high-use weekend days than on weekdays.
- Backcountry capacities would be managed indirectly through designated parking. Relevant vehicle counts would be correlated to backcountry use and encounters in the different reaches. Establish maximum group sizes for all types of use and minimum group sizes for boaters.
- Reduce campsite density to increase opportunities for solitude. Limit camping to designated sites.
- All trails would be designated and designed to mitigate resource impacts first, as well as enhancing opportunities for solitude (but less than Alternative 2).
- Prohibit large woody debris removal without agency approval or to accommodate recreation use.

Table 2.2-8 Alternative 14

Decision Points	Actions
Capacities	

Backcountry Reach	Average Groups per Weekday	Average People per Weekday	Average Groups per Weekend Day	Average People per Weekend Day
Chattooga Cliffs	5	10	10	15
Ellicott Rock	10	35	20	110
Rock Gorge	15	40	30	95
Nicholson Fields	15	40	30	95

Frontcountry Areas	Groups at One Time	People at One Time
Grimshawes/Sliding Rock Bridge	25	65
Bullpen Road Bridge Area	15	40
Burrells Ford Bridge Area	80	205
Highway 28 Bridge Area	35	85

Boating from Green Creek put-in to Highway 28 bridge	▪ Boating from the Green Creek put-in to the Highway 28 boat launch at flows of 350 cfs or greater, year-round. ▪ Craft type: Tandem/single-capacity hard boats and tandem/single-capacity inflatable kayaks. ▪ Put-ins: Green Creek; Bullpen Road Bridge; Burrells Ford Bridge; Lick Log Creek. ▪ Take-outs: Bullpen Road Bridge; Burrells Ford Bridge; Lick Log Creek; Highway 28 bridge. ▪ Boating not allowed in the tributaries.
Trails	▪ Designated trails only. Close redundant trails; trails where resource damage cannot be mitigated; and trails where closure is needed to limit encounters or minimize conflict. ▪ Rerouting may be necessary to correct existing problems on designated trails. ▪ Designated portage trails may be necessary to protect/avoid unacceptable impacts to resources. ▪ Management actions related to designated trails would require site-specific decisions.
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. ▪ Management actions related to designated campsites would require site-specific decisions.
Backcountry Group Size Limits	▪ 12 per group on trails ▪ 6 per group at campsites (with group campsite exceptions). ▪ 4 per group for anglers ▪ 6 for boaters; minimum of two craft for boaters
Self-Registration Floating Permit	▪ Boaters must self-register (the same as current management below Highway 28). ▪ Safety equipment for boaters to be determined at the district level as a condition of the self-registration permit.
Large Woody Debris	▪ No large woody debris removal without agency approval or to accommodate recreation use.

2.3 Monitoring and Adaptive Management

All action alternatives include a monitoring plan (Appendix G) and adaptive management plan. Monitoring helps the agency determine whether management actions for the selected alternative are protecting and enhancing the river's ORVs. Adaptive management refers to additional management actions the agency would use to address problems revealed through monitoring. The system uses an "implement-monitor-adapt" strategy that provides the US Forest Service with the management flexibility it needs to account for inaccurate initial assumptions, to adapt to changes in environmental conditions or to respond to subsequent monitoring information (FSH 1909.15, Chapter 10, 14.1).

A. Recreation Use

As discussed in the Recreation ORV analysis (Section 3.2.1), recreation use and social impact data for the upper segment of the Chattooga WSR is limited. Although a few studies have been conducted in parts of the corridor, and monitoring, workshops or logic-based calculations have informed impact analyses as part of this planning process, precise estimates of use, social impacts and use-impact relationships are approximate. Recreation monitoring would allow the agency to address these data shortcomings over time.

1. Monitoring

Recreation monitoring for all action alternatives would focus on vehicle counts at parking lots to determine if recreation use is changing. In addition, use by type and proportion of visitors in the frontcountry and backcountry would be estimated and correlated to vehicle counts. Information would also be collected to determine if desired levels of solitude (as measured by encounters) are being achieved. The use levels and social impacts are directly related to the Recreation ORV.

Monitoring would measure frontcountry use (groups at one time or GAOT) and backcountry use (groups per day or GPD) and correlate them with the average number of vehicles-at-one-time (VAOT) in select parking areas that provide access to the frontcountry and backcountry. Monitoring would focus on peak times of the day during the high-use season (summer), and would distinguish information for weekdays and weekends. These are the most likely days when use may approach capacities that could impact opportunities for solitude in the backcountry. However, monitoring also would include vehicle counts during other moderate use times of the year (spring and fall). Results would be compared to the 2007 vehicle counts to assess use trends and determine whether estimates are approaching capacities for these locations. If average counts in a month are more than 10% higher than the 2007 average count for the highest use month (indicating an increasing use trend), adaptive management would be triggered (see below).

In addition, the agency would use information from monitoring to correlate vehicle counts to proportions of use associated with 1) frontcountry/backcountry recreation; 2) day/overnight recreation; 3) hiking/backpacking/angling/boating use in backcountry reaches and frontcountry areas. Monitoring would also help the agency examine relationships between use and impacts (e.g., river, trail or camp encounters).

With improved information about use and related impacts, the agency would be able to determine if the prescribed capacities are set at appropriate levels. Use may be measured by mechanical counters, systematic observations, self-registration programs or surveys. If surveys are conducted, reported trail, river and camp encounters (as well as tolerances for them) would also be measured and correlated with use. If monitoring shows that higher use could be allowed and still provide the same levels of opportunities for solitude without degrading the ORVs, the US Forest Service may adjust capacities as appropriate.

2. Adaptive Management

In general, management responses to increasing use or impacts would focus on indirect measures first, but direct measures may utilized if indirect measures are insufficient (FSM 2354.41a, pages 48-50). Indirect measures generally attempt to redistribute recreational use by encouraging users to visit lower use segments or times, or by changing infrastructure (e.g., reducing the size of some parking lots) to match capacity goals and cue users to use other areas. Direct measures regulate behavior through restrictions or formal use limit systems (e.g., permits); they can ensure a capacity is met, but also may create a more "heavy-handed" management footprint that restricts individual choice.

If direct measures are needed, monitoring would help identify the specific type of use and encounters that are at issue, and develop appropriate regulations or permit system that will address the use or impact problem. For example, if monitoring shows that competition for backcountry campsites or camp encounters are the impacts that exceed tolerances, a permit system that targets overnight use would make more sense than an "all user" permit system. Similarly, if high use was focused during a specific season, type of day, or segment, permits could be required for those defined times and locations only (e.g., the Delayed Harvest reach on weekends during the Delayed Harvest season).

Monitoring would also show the proportion of different types of users during high-use periods, which may help design permit systems that manage the contributions of different types of use. If use on high-use days is disproportionately one type of user (e.g., day use hikers, anglers, or boaters), permit systems could establish equitable allocations within different use categories to reduce this problem, or possibly target the highest use groups only. For example, several multi-day western rivers require permits for boating (the highest type of use, with greater demand) but not for backpackers (with much lower use and demand). The issues and considerations in developing effective and publically acceptable permit systems are complex (Whittaker and Shelby, 2008); additional planning and public involvement would be conducted before implementation of a specific system for the upper Chattooga.

B. Endangered, Sensitive and Locally Rare Plants and Aquatic Habitats

1. Monitoring

Recreation impacts to LWD can indirectly affect endangered, sensitive and locally rare plants and aquatic habitats which are tied to the botany and fisheries components of the Biology ORV. These impacts could be exacerbated in the future by the expected input of more LWD from dying hemlock. Recreationists getting around this woody material could create trails or result in unlawful removal of this material which is critical to aquatic habitat.

For all action alternatives, LWD would be monitored to determine if aquatic habitats and endangered, sensitive and locally rare plant species are being impacted by recreation use or by increased levels of LWD from ongoing hemlock mortality.

Populations of the following plant species would be monitored:

- *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; and
- *Gymnoderma lineare* (endangered) on the NNF.

2.4 Alternatives Considered But Not Evaluated In Detail

A. Boating through private land on the upper segment of the Chattooga WSR

All boating alternatives (8, 11, 12, 13 and 14) allow boating use downstream from Green Creek in the Chattooga Cliffs Reach. Any of these alternatives could have allowed boating to start about 1.8 miles further upstream at Grimshawes/Sliding Rock Bridge. However, this reach has private land on both sides of the river and the landowners claim that public use would constitute trespass.

Navigability and public access rights on this reach have not been formally analyzed by any federal or state agency or authority, nor has its navigability been adjudicated by a court of law. Public access rights and navigability are complex topics, and the outcome of a formal analysis or adjudication for the upper segment of the Chattooga WSR is uncertain. According to FSM 2354.14 - Navigability of Rivers, “Most rivers in the country have not been adjudicated as navigable or non-navigable. Consider them non-navigable until adjudicated otherwise.” Until decisions about boating are made for the sections of the river with public land along them, or public access rights on this reach are determined, the US Forest Service considers this decision to be beyond the current scope of analysis.

B. 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 within the corridor. 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 inside the wild and scenic river corridor. 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, this alternative was considered but not developed.

The tributaries provide more fisheries restoration opportunities than the main stem of the Chattooga. 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 US 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.

C. Preliminary Alternative 6

This alternative would have managed biophysical impacts on natural resources and encounters between users by limiting trails, campsites, group size and parking while providing boating opportunities. It 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.

D. Preliminary Alternative 7

This alternative would have allowed boating from December 1 – March 10 between Bullpen Road Bridge and Highway 28 Bridge and managed biophysical impacts on natural resources by limiting trails, campsites, group size and parking. It was presented at the September 29, 2007 public meeting for review and comment. Some components of this alternative were rolled into alternatives 11 to 14; Alternative 7, therefore, became redundant and unnecessary.

E. Alternative 4

This alternative would have emphasized high quality trout fishing while allowing boating opportunities on the main stem upper segment of the Chattooga WSR at 450 cfs and greater from December 1 – March 1 from the confluence of Norton Mill Creek to Burrells Ford Bridge. It was not developed because we have new information regarding angling opportunities above Bullpen Road Bridge. As a follow up from the Use Estimation Workshop (which suggested that bait angling does not occur in this reach), agency personnel contacted the North Carolina Department of Natural Resources. Information from this state agency indicated that bait angling is illegal above Bullpen. Therefore, flows set in Alternative 4 were protecting a type of angling that is currently illegal. In addition, the elements of Alternative 4 are analyzed in Alternative 11 (the effects will be analyzed by reach, season and flow level). Using the confluence of Norton Mill Creek as a put in was considered but was not developed because another location was found at Green Creek which provides easier access to the river and increased the miles of boating in the Chattooga Cliffs Reach.

F. Alternatives 5, 9 and 10

Alternative 5 would have emphasized year round boating opportunities from Bullpen Road Bridge to Lick Log Creek at 350 cfs while providing high-quality trout fishing. Alternative 9 would have allowed boating from the Chattooga River Trail just below private land to the East Fork Trail at 350 cfs in the stretch of river most highly rated for creek boating while still providing high-quality trout fishing opportunities. Alternative 10 would have allowed boating from Chattooga River Trail just below private land to Highway 28 bridge from November 1–March 1 at 350 cfs while still providing for quality trout fishing.

Elements in these three alternatives were analyzed in Alternative 14 (the effects will be analyzed by reach, season and flow level). Using the confluence of Norton Mill Creek as a put in was considered but was not developed because another location was found at Green Creek which provides easier access to the river and increased the miles of boating in the Chattooga Cliffs Reach.

G. Alternative 15

This alternative would have allowed increased recreation use levels by increasing parking lot sizes and encouraging additional primitive camping. It was not developed because of public input gathered during the Limits Acceptable Change (LAC) process, where there was a general opposition to increased recreation use levels in the upper segment of the Chattooga WSR Corridor (see Section 3.2.1 Recreation).

2.5 Comparison of the Alternatives Considered in Detail

Table 2.5-1 Comparison of Alternative Components GC=Green Creek; BP = Bullpen Road Bridge; BF = Burrells Ford Bridge; 28 = Highway 28 Boat Launch; LLC = Lick Log Creek; GAOT=Groups at one time; GPD= Groups per day; MDF=Mean Daily Flow; PDF=Peak Daily Flow

Alternative	1	2	3	8	11	12	13	14
Frontcountry Capacities [1]								
Grimshawes Bridge/Sliding Rock Area	25 (GAOTs) 65 (PAOTs)	25 (GAOTs) 65 (PAOTs)	25 Groups at One Time (GAOTs) 65 People at One Time (PAOTs)					
Bullpen Road Bridge Area	15 (GAOTs) 40 (PAOTs)	15 (GAOTs) 40 (PAOTs)	15 (GAOTs) 40.(PAOTs)					
Burrells Ford Bridge Area	80 (GAOTs) 205 (PAOTs)	40 (GAOTs) 100 (PAOTs)	80 (GAOTs) 205 (PAOTs)					
Highway 28 Bridge Area	35 (GAOTs) 85 (PAOTs)	35 (GAOTs) 85 (PAOTs)	35 (GAOTs) 85 (PAOTs)					
Backcountry Capacities								
Chattooga Cliffs—Weekend/Weekday	10/5 Groups per Day (GPD) 15/10 People per Day (PPD)	5/5 GPD 15/10 PPD	10/5 GPD 15/10 PPD					
Chattooga Cliffs—Weekend/Weekday	20/10 GPD 110/35 PPD	5/5 GPD 35/20 PPD	20/10 GPD 110/35 PPD					
Rock Gorge/Upper Nicholson Fields —Weekend/Weekday s	30/15 GPD 95/40 PPD	5/5 GPD 20/15 PPD	30/15 GPD 95/40 PPD					
Lower Nicholson Fields—Weekend/Weekday	30/15 GPD 95/40 PPD	15/15 GPD 25/25 PPD	30/15 GPD 95 /40 PPD					
Boating								
Zone	Hwy. 28 south to Tugaloo Lake			GC south to Tugaloo Lake		GC to LLC; Hwy. 28 to Tugaloo Lake		GC south to Tugaloo Lake
Craft - Single/tandem capacity hardboats & inflatable kayaks	N/A			Yes + up-to-4- person rafts	*Yes*			
Season	N/A			Year-round		12/1 – 1/15 (GC to BF) 1/16 – 3/ 1 (BF to LLC)	Dec 1 - March 1	Year-round
Flows	N/A			All	450 cfs	All	350 cfs	
Estimate of Probable Boating Days (Mean Daily Flow/Peak Daily Flow)	N/A			63/99 GC – LLC; 97/118 in Nicholson Fields	15/35	12/1 – 1/15 (GC-BF) 9/14 1/16 – 3/ 1 (BF-LLC) 12/17	11/21	32/66
Designated put-ins	N/A			GC, BP, BF,				
Designated take-outs	N/A			BP, BF, 28		BP; BF, LLC		BP; BF, 28

[1] Represents maximum use levels in Alternative 1

Alternative	1	2	3	8	11	12	13	14
Group Size	Maintain current management	12 trails, 6 camping, 4 anglers		12 trails	6 camping, 4 anglers; 6 boaters (min.)		2 craft per group)	
Trails		No new except for solitude. Reroute ok.	Expect reroutes, portage and possible closures					
Camping		Designated, reserved sites/ fire rings; 1 site per ¼ mile	Designated sites and fire rings					
Registration Permits		Permits	None initially, but monitoring, may reveal a need to limit visitor use through a permit sy stem.					
Large Woody Debris		No LWD removal without agency approval or to accommodate recreation						
Boater Registration Permits	Lower segment—self-registration			Upper and lower segments—self-registration .				

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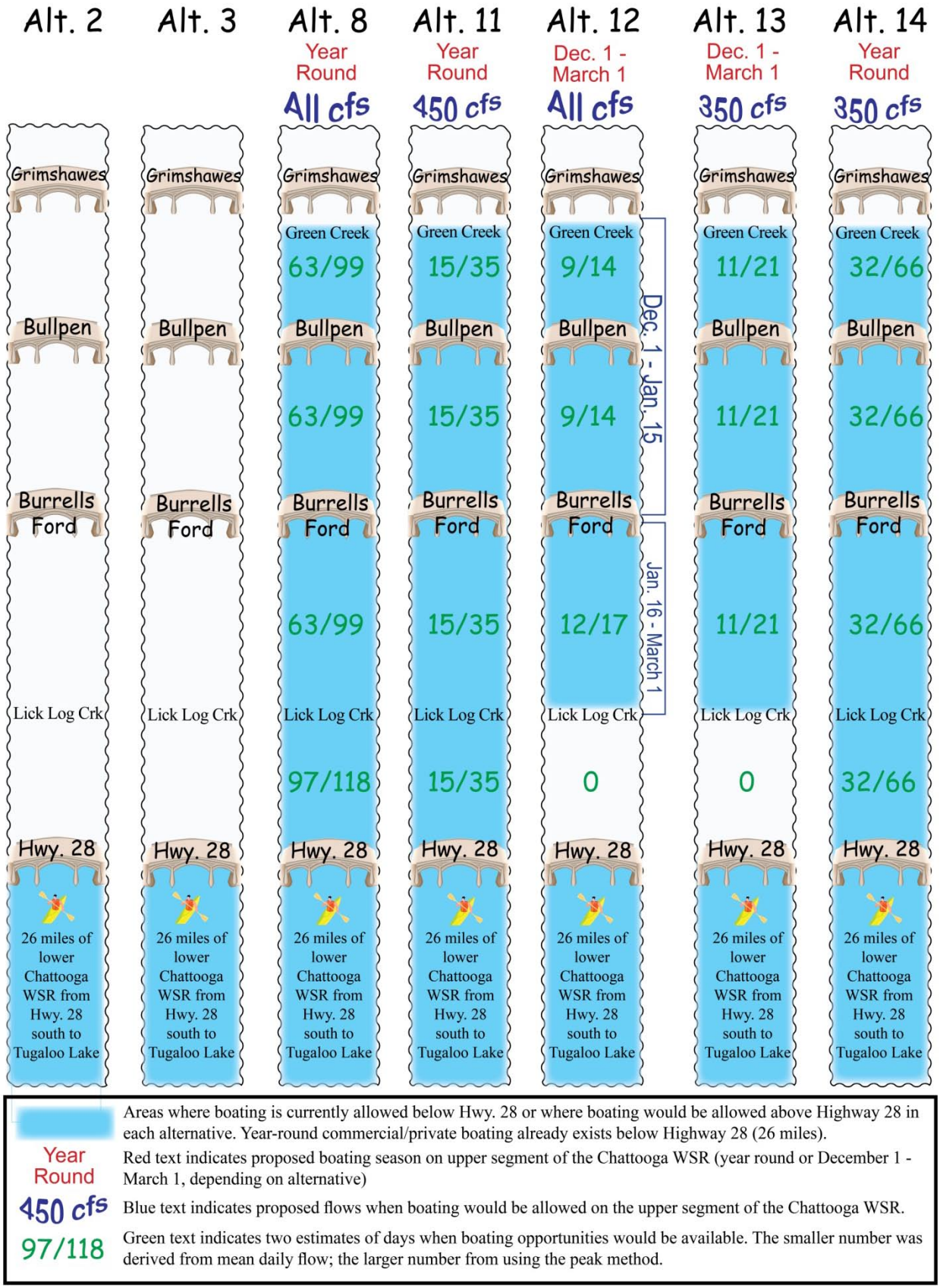

Alt. 2
Alt. 3
Alt. 8
Year Round
All cfs
Alt. 11
Year Round
450 cfs
Alt. 12
Dec. 1 - March 1
All cfs
Alt. 13
Dec. 1 - March 1
350 cfs
Alt. 14
Year Round
350 cfs
Grimshawes
Green Creek
63/99
15/35
9/14
11/21
32/66
Bullpen
Burrells Ford
Lick Log Crk
97/118
0
12/17
Hwy. 28
26 miles of lower Chattooga WSR from Hwy. 28 south to Tugaloo Lake
Dec. 1 - Jan. 15
Jan. 16 - March 1
Year Round
450 cfs
97/118
Areas where boating is currently allowed below Hwy. 28 or where boating would be allowed above Highway 28 in each alternative. Year-round commercial/private boating already exists below Highway 28 (26 miles).
Red text indicates proposed boating season on upper segment of the Chattooga WSR (year round or December 1 - March 1, depending on alternative)
Blue text indicates proposed flows when boating would be allowed on the upper segment of the Chattooga WSR.
Green text indicates two estimates of days when boating opportunities would be available. The smaller number was derived from mean daily flow; the larger number from using the peak method.

CHAPTER 3 AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

3.1 INTRODUCTION

This chapter describes existing environmental conditions (affected environment) for resources potentially affected by the alternatives described in Chapter 2. Potential impacts to following are identified, described and evaluated for current management (Alternative 1) and the action alternatives 2, 3, 8, 11, 12, 13 and 14:

- 3.2 The Chattooga Wild and Scenic River's outstandingly remarkable values
  - 3.2.1 Recreation
  - 3.2.2 Biology ORV (Fisheries, Wildlife and Botany Components)
  - 3.2.3 Scenery
  - 3.2.4 History
  - 3.2.5 Geology
- 3.3 Other river values
  - 3.3.1 Free-flowing Condition
  - 3.3.2 Water Quality
- 3.4 Other Physical Resources
  - 3.4.1 Soils
  - 3.4.2 Water and Riparian
  - 3.4.3 Climate Change
- 3.5 Other Biological Resources—Vegetation
- 3.6 Other Social Resources
  - 3.6.1 Human Health and Safety
  - 3.6.2 Social Impact Analysis
- 3.7 Ellicott Rock Wilderness

Familiarity with the upper segment of the Chattooga WSR is essential to understanding the proposed action and the potential environmental consequences. The environmental consequences disclose the direct, indirect and cumulative effects of implementing each of the alternatives and are directly related to the issues outlined above.

A. Spatial Bound for All Effects

The spatial bound for direct and indirect effects is one-quarter mile on either side of the upper segment of the Chattooga WSR and the spatial bound for cumulative effects is the Chattooga River watershed measured at two scales; the portion above Hwy. 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 (2007-2016).

The upper segment of the Chattooga WSR 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 Bullpen Road Bridge	5.3
Ellicott Rock	Bullpen Road 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

B. Estimates of Biophysical Impacts

Estimates of biophysical impacts in the upper segment of the Chattooga WSR Corridor are based on monitoring conducted in 2006-07 (USDA 2007) that includes 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 forest visitors 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 increases the potential for erosion of soil into stream channels.

1. 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 3.1-2 provides information on the number of existing campsites, cleared area and bare ground associated with those campsites. 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 3.1-2 Data on the Size and Number of Existing Campsites on the Upper Segment of the Chattooga WSR

Reach	# of Campsites	# of Campsites within 20 ft. of the river	# of Campsites/ 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.

2. Designated and User-Created Trails

Designated trails are trails planned and designed to minimize biophysical impacts 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 and 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.

Table 3.1-3 displays the number of miles of existing designated and user-created trails in the upper segment of the Chattooga WSR Corridor.

Table 3.1-3 Summary of Existing Trail Information for the Entire Upper segment of the Chattooga WSR Corridor (All Reaches and for a Distance of One Quarter Mile on Both Sides of the Chattooga River)

Reach	Designated Trail (mi)	User-created Trails (mi)	User-Created Trail Miles per River Mile
Chattooga Cliffs	6.1	1.9	0.4
Ellicott Rock	13.4	2.5	0.5
Rock Gorge	11.1	8.4	1.1
Nicholson Fields	4.4	6.5	1.7
Total	35	19.3	n/a

Sources: USDA 2007 and Whittaker and Shelby 2007

Table 3.1-4 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 3.1-4. Summary of Trail Information for Existing Trails within 20-100 Feet of the Chattooga River (All Reaches of the Upper Segment of the Chattooga WSR)

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 segment of the Chattooga WSR 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 Hwy. 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.

Table 3.1-5 places the miles of user-created trails and designated trails in context of the entire watershed and the upper part of the watershed above Burrells Ford.

Table 3.1-5. Total Miles of Existing Designated Trails and User-Created Trails for Both the Chattooga Watershed (Above Tugaloo Lake) and Upper Segment of the Chattooga WSR Watershed (Above Hwy. 28).

	Chattooga River Watershed miles (miles / square mile)	Upper segment of the Chattooga WSR Watershed miles (miles / square mile)
Designated trails	80.2 (0.29)	35 (0.54)
User-created trails	52.5 (0.19)	19.3 (0.30)

C. Chattooga River Flows

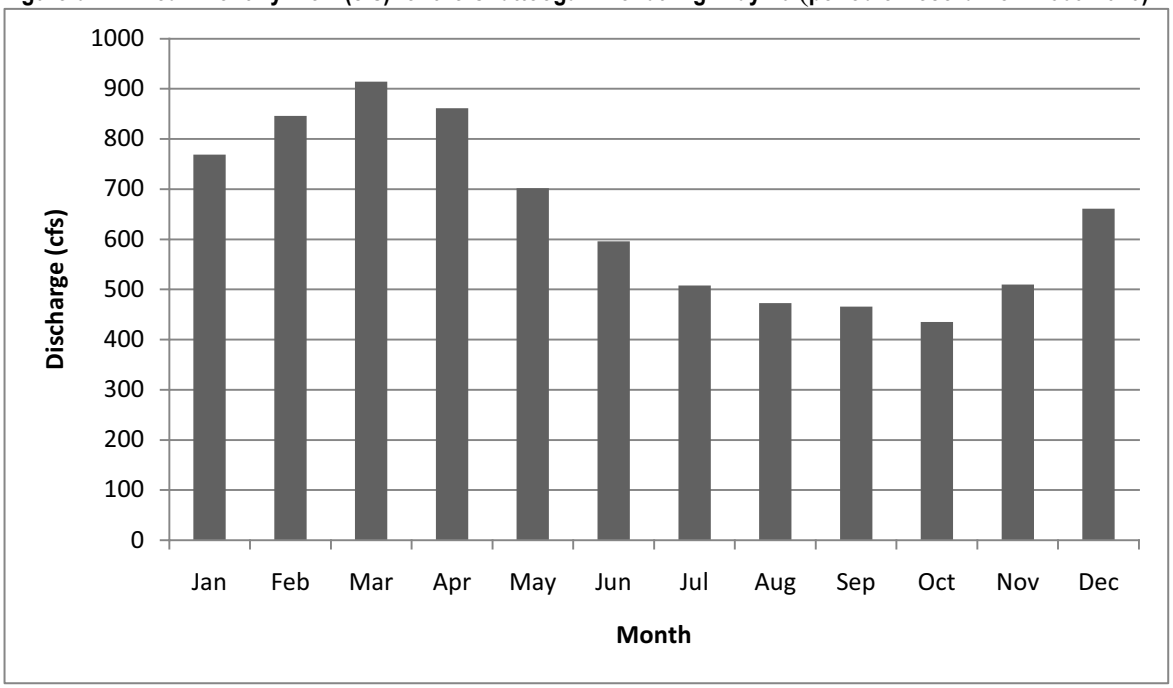
Average annual precipitation in the Chattooga watershed is 70-80 inches; mean water yield is about 40–45 inches. Figure 3.1-1 shows the mean monthly discharge (period of record from 1939-2010) at the United States Geological Survey (USGS) gauge station (USGS 02177000) on the Chattooga at Hwy. 76. Monthly streamflow is fairly constant throughout the year with the highest flows occurring December–May 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,[3] the decline from April–October is linked to vegetation growth and its impact on moisture stress and water table depth.

The long-term data at Hwy. 76 was used as an indicator of boating frequency for planning purposes. The correlation data involve comparisons of flow between two stream stations (Hwy. 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

[3] 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.

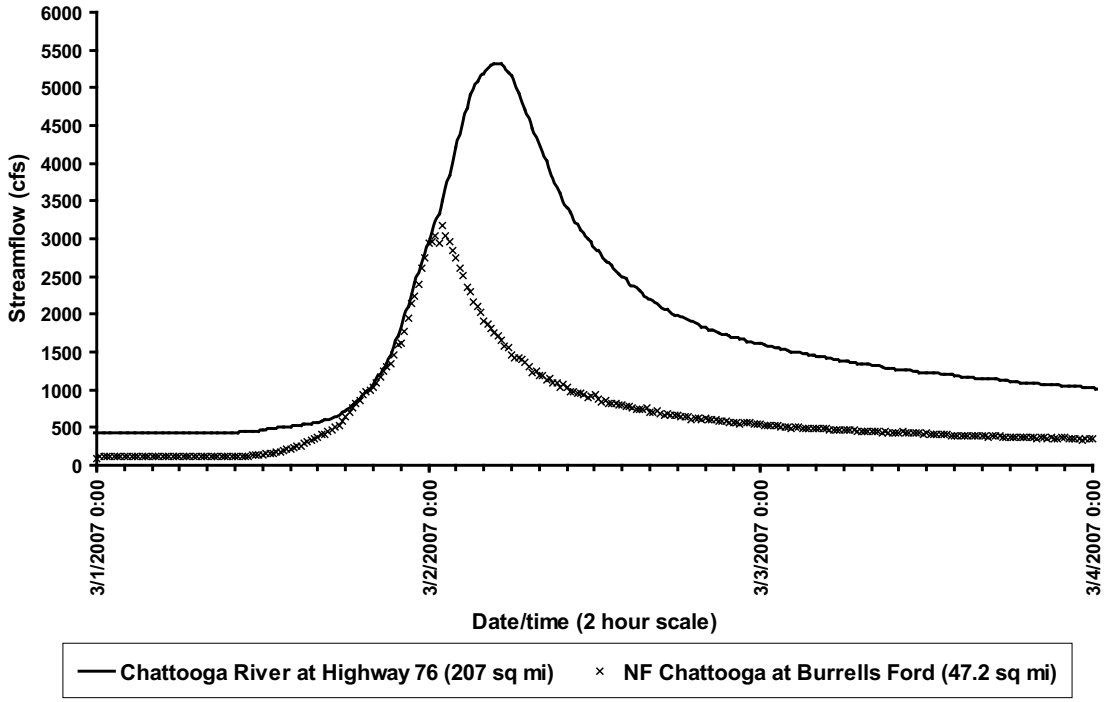
limitations of using Hwy. 76 as a sole predictor for flow in the North Fork. The new gauge at Burrells Ford will be used to help the US Forest Service to determine mean daily flow and peak flow and be able to better correlate flows in the upper segment of the Chattooga WSR to other gauges in the watershed.

Figure 3.1-1 Mean Monthly Flow (cfs) for the Chattooga River at Highway 76 (period of record from 1939-2010)



A permanent water level recorder was installed in June 2006 on the upper segment of the Chattooga WSR at the Burrells Ford Bridge. Correlations between the Hwy. 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 Hwy. 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 Hwy. 76. Bankfull events of this magnitude occur, on average, about once every year or two; 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–three inches of rainfall to achieve flows approximating 450 cfs at the Burrells Ford gauge.

Figure 3.1-2 Hydrograph for a Typical Early Spring Storm at the Chattooga River at Burrells Ford and Hwy. 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 segment of the Chattooga WSR 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 flows after the initial storm peak. This hydrograph also shows the difference in the timing of storm peaks between the two gauges, with the Hwy. 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 to three hours at very high flows (Hansen 2007).

D. Past, Present and Reasonably Foreseeable Future Actions

Table 3.1-6 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.

Table 3.1-6. 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	Duck's Nest Gap Rx Burn	2010-14	1050 a	X	X	X
GA	Roach Mill Rx Burn	2010-14	695 a	X	X	X
GA	Chintilly Rx Burn	2010-14	230 a	X	X	X
GA	Rabun Bald Trail Reroute	2008-2010	3.5 mi	X		
GA	Water Gauge Yellow Pine-Oak Woodland Restoration (Rx Burn)	2010-14	232 a	X	X	X
GA	Tri-District Land Exchange	2010	157 a	X		
GA	Bartram Trail Reroute @ Wilson Gap	2009	0.5 mi	X		
GA	Satolah Soil and Water Complex	2009	5	X		
GA	Camp Creek Rx Burn	2009	1800	X		X
GA	Upper Warwoman Vegetation Management	2009-2010	200 a	X		
GA	Invasive Plant Eradication	2014	50a		X	X
GA	Herbicide Release of Young Forest Communities	2009-2012	150 a	X	X	X
GA	Vegetation Management for Forest Health	2009-2014	500 a	X	X	X
GA	Woodall Shoals Rx Burn	2010-2011	1100 a	X	X	
GA	Buckeye Branch/Lick Log Rx Burn	2010-2011	2470 a	X	X	
GA	Willis Knob Horse Trail Reroutes	2010-2014	5 mi	X	X	X
GA	Sarah's Creek Crossing Replacement	2010	0.05 mi	X		
GA	Burrells Ford North Rx Burn	2010-2015	2545 a	X	X	X
GA	Burrells Ford South Rx Burn	2010-2015	1341 a	X	X	X
GA	Willis Knob 1 Rx Burn	2010-2015	1560 a	X	X	X
GA	Willis Knob 2 Rx Burn	2010-2015	1628 a	X	X	X
GA	Willis Knob 3 Rx Burn	2010-2015	1654 a	X	X	X
GA	Hale Ridge East Rx Burn	2010-2015	834 a	X	X	X
GA	Hale Ridge West Rx Burn	2010-2015	870 a	X	X	X
GA	Tallulah Gorge Co-Op RX Burn	2010-2015	100 a	X	X	X
GA	Water Gauge Rock Mtn. Rx Burn	2010-2015	1100 a	X	X	X
GA	Water Gauge Stone Place RX Burn	2010-2015	750 a	X	X	X
GA	Ammons Culvert Replacement	2011	-		X	
GA	Buck Branch Timber Sale	2013	50 a			X
GA	Pre-commercial Thinning	2012-2013	200 a			X
GA	Bog Restoration – Hale Ridge	2010-2015	5 a	X	X	X
GA	Bog Restoration –Hedden	2010	5 a	X		
GA	Bog Restoration – Water Gauge	2010	7 a	X		
SC	Loblolly Removal and Restoration Project	2010-2014	5605 a		X	X
SC	Crane Mountain RX Burn	2009, 2013	300 a	X		X
SC	Earls to Sandy Rx Burn	2010	1000 a	X		
SC	Whetstone Thinning	2008-2009	64 a	X		
SC	Garland Tract Rx Burn and Dove Field Mtc	2004-2014	600 a	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		
SC	Horse trail closures, relocations	2010-2011	10 mi		X	
SC	Horse camp reconstruction	2011	12 a		X	
SC	Burrells Ford Campground Reconstruction	2009-2010	6 a	X		
SC	Southern Appalachian Living Farmstead with parking area	2010-2014	20 a		X	X
SC	Outfitting and Guiding Special Use Permits	2011-2016	-		X	X
SC	Simms Field and Fishermen's Trail Reconstruction	2011	1.3 mi		X	
SC	Highway 76 Parking Lot Repaving	2010	0.75 a	X		
NC	White Bull/Blue Ox Timber Sales	2007	225	X		
NC	Bullpen/Journ McCall Paving Project (NCDOT proposal)	2008	1.5	X		
NC	Whiteside Cove Paving (NCDOT Proposal)	2008	3	X		
NC	Garnet Hill Paving (NCDOT proposal)	2008	.3	X		
NC	County Line Road Parking Lot Construction	2012	~1 a			X
NC	Silver Run Rx Burn	2012	300 a			X
NC	Ammons Branch Campground – replace pit toilet	2011	-		X	
NC	Dulaney Bog Restoration	2011-2012	5		X	X
NC	Buckwheat Vegetation Management (restoration, wildlife and timber sale projects)	2012	187 a harvest 46 a burn & plant 345 a Rx burn 74 a riparian restoration			X
NC	Green Creek Trail Construction – off of Chattooga river Trail to River	2012	1 mi			X
All	Wildlife Opening Maintenance	Ongoing	-		X	X
All	System Road Maintenance	Ongoing	-		X	X
All	Recreational activities including hiking, biking, and driving for pleasure.	Ongoing – various locations	-		X	X

Source: USDA 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 Hwy. 28 are described below. Table 3.1-7 displays information about existing dispersed campsites on the Chattooga River downstream of Hwy. 28 and the West Fork Chattooga.

Table 3.1-7 Data on the Size and Number of Existing Camps on the Lower Segment of the Chattooga WSR

Reach	# of Campsites	# of Campsites within 20 Ft. of the river	# of Campsites/ 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 3.1-8 displays existing trail mileage for the lower segment of the Chattooga WSR and the West Fork. Table 3.1-9 summarizes additional trail information associated with existing trails in close proximity to the lower segment of the Chattooga WSR and the West Fork.

Table 3.1-8. Summary of Existing Trail Information for the Lower Segment of the Chattooga WSR and the West Fork Chattooga

Reach	Designated Trails (mi)	User-created Trails (mi)	User-created Trail Miles per River Mile
Hwy 28 to Hwy 76	36.8	18.6	0.9
Hwy 76 to Tugaloo	3.0	7.5	1.3
West Fork Chattooga	5.4	7.0	1.2
Total	45.2	33.1	n/a

Sources: USDA 2007, and Whittaker and Shelby 2007

Table 3.1.9 Summary of Existing Trail Information for Trails in Close Proximity to the Lower Segment of the Chattooga WSR 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

E. Biology ORV and Other Biological Resources (Vegetation)

The Biology ORV discussion and the Other Biological Resources (Vegetation) sections reference a status rank to certain species in the analyses. Nature Serve (2011) 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 3.1-10)

Table 3.1-10 Global and state conservation status ranks to species (Nature Service 2011 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, very few populations, 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 and animals, 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. 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.

F. Three National Forests Discussed in this Environmental Analysis

For the purposes of this EA, 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 or the Chattahoochee; and the Sumter National Forest in South Carolina will be referred to as SNF.

3.2 OUTSTANDINGLY REMARKABLE VALUES

3.2.1 RECREATION ORV

I. AFFECTED ENVIRONMENT

A. Condition at Time of Designation

The US Forest Service has long recognized the Chattooga River's outstandingly remarkable recreational values (ORVs). The 1976 Federal Register notice states, "The main attraction of the Chattooga River is its recreation opportunity - the chance to visit a whitewater river and experience solitude, adventure, and challenge." Similarly, the 1971 Designation Study Report describes a diverse range of high quality recreation opportunities (USFS, 1971, pp. 19-22).

> Although fishing accounts for most recreation use, there are other attractions to the river. The canoeist and floater are showing up in increasing numbers to experience the challenge of the river. Sections of the river are ideal for floating in canoes and rubber rafts. Motorized boat use is impractical because of the shallow water and rocks. The only camping facilities are provided at a campground near Burrells Ford in South Carolina. River runners on extended float trips can enjoy camping under primitive conditions at sites along the river. Hiking provides another way of seeing the river. There is only one developed trail extending the four miles from Burrells Ford to Ellicotts (sic) Rock. However, most of the shoreline is accessible to those hikers willing to test themselves against the rugged country.

As stated in Chapter 1, the Chattooga River recreational values are outstanding and offer a variety of activities along its 57-mile course. It offers slow water opportunities for swimming and fishing (from cold water to warm water habitats) as well as fast water for boating, canoeing and kayaking. Opportunities for hiking, camping, backpacking, wildlife and scenery viewing, horseback riding and hunting all take place in a spectacular scenic setting.

Since the initial development of the 1976 river management plan for the Chattooga, the US Forest Service has used zoning to manage the upper and lower segments for different recreation opportunities. Language in the 1976 plan 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 upper segment above Highway 28 was closed to boating. 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 boating prohibition on the upper segment of the Chattooga WSR in 1978 (43 FR 3706, Jan. 27, 1978; later codified at 36 CFR 261.77) appears to address angler concerns about boating impacts in the Nicholson Fields Reach, as well as upstream river reaches. As trails were developed along the upper river segment in the 1970s and 1980s, many users, in addition to anglers—hikers, wildlife viewers, backpackers and swimmers—became accustomed to the lower use levels and boat-free conditions of the upper river segment which contrasted with higher use and development levels on the lower segment, as well as the presence of private and commercial boating.

B. The 1996 ORV Report

The 1996 ORV Report concludes that the outstanding recreation values that contributed to the designation of the river are still in place. However, from 1971 to 1996, a number of changes took place that altered the recreation experience within the Chattooga WSR Corridor. There are fewer road-accessible access points and roads than in the 1970s, even as other facilities and trail access have increased. In 1970, only one four-mile trail and one campground (Burrells Ford) existed in the river corridor. Several facilities have been developed since that time, including those at the Highway 76 bridge, as well as other parking lots and toilets. Many system hiking trails have been built including portage trails down to the lower river segment. Other user-created trails and campsites also have appeared, but the majority of roads within a quarter mile of the river have been closed, except for major roadways already in use such as Highway 28 and Highway 76. These closures have increased the river's sense of naturalness and made it feel more remote. A self-registration permit system was put into place to facilitate monitoring of floating below Highway 28. Use by commercial outfitters on the lower river segment has dramatically increased since designation. For example, in the 1970s it would have been unlikely to canoe/float the river and encounter large parties with several rafts.

The 1996 ORV Report concludes:

> The recreational values of this river are outstanding. It has the ability to offer a wide variety of activities within its 57-mile long course. These range from slow water and swimming areas to hiking with spectacular scenery to whitewater rafting. The river still provides these values but the pressures on the river and its recreational values are vastly different from in the early 1970s. There are more people using the river and its environs than ever before in its history."

C. Conditions as They Exist Today

1. Types of Use on the Upper and Lower River Segments

The agency decision to zone the river, in combination with natural conditions and national/regional recreation use trends has affected types of use on the upper and lower river segments. While many types of use can be conducted on either segment (e.g., day hiking, swimming, hunting, nature watching, backpacking, camping and fishing), cold water fishing is decidedly better on the upper segment (with its cooler waters, better trout fishery, better riverside trail access and more intimate environments). Boating on the other hand is generally better and more frequently available on the lower river segment because of higher flows, and a range of Class I to V reaches that are popular for a broader range of boaters. The upper segment has more frequent Class IV and V rapids that were substantial safety hazards in the 1970s, and still require advanced or expert skill today.

2. Amount of Use on the Upper and Lower River Segments

A second notable difference between the segments is the amount of use. In part due to its national reputation for whitewater boating, 40,000-70,000 boaters per year run sections of the lower Chattooga. These boaters include outfitter and guide rafting operations that serve thousands of visitors, as well as many private boaters who bring their own rafts, kayaks and canoes. The US Forest Service has established capacities (boaters per day) for both commercial and private boating sectors on the lower river segment. The commercial guides use their full quotas on many days of the year and are prevented from growing during the high-use times; their trips are carefully regulated to reduce: 1) numbers of encounters; 2) wait times at rapids; and/or 3) sight/sound impacts at campsites. Private boaters generally have not approached their allocations; therefore capacities have not had to be enforced. The lower river segment also has more river access points and parking to accommodate the high boating use, as well as two developed campgrounds that attract boaters, hikers, swimmers and others.

As discussed in Chapter 1, continuation of the agency's current zoning allocations has been challenged (see the Purpose and Need in Chapter 2). Boaters' skill levels and equipment have progressed since the 1970s, so today greater numbers of kayakers have

the skill to navigate the upper river segment safely. In addition, many boaters suggest their activity is fully compatible with the upper river setting, even though some other users object to the impacts from boating on the days when it is floatable.

3. Desired Recreation Experiences in the Upper Segment of the Chattooga River Corridor

Some boaters suggest that US Forest Service guidelines discourage zoning as a solution to managing impacts from recreation. For example, agency policy notes "when it becomes necessary to limit use, ensure that all potential users have a fair and equitable chance to obtain access to the river" (FSM 2354.41a). The zoning concept itself is fundamental to many recreation management planning efforts and not in opposition to the policy described above. In addition, the term equitable is not synonymous with the word equal as other factors may be considered when allocating access (e.g., which group is causing impacts? Are impacts asymmetric? Are some recreation opportunities rarer or less substitutable if lost?).

The US Forest Service recognizes that not every recreation use can or should be provided on every mile of river, and considers zoning and capacities important tools for addressing potential conflicting uses or impacts (FSM 2354.1 - Exhibit 01). The remainder of this section of the EA reviews the affected recreation environment and consequences of alternatives through a lens that recognizes the possibility of zoning to meet diverse users' goals within a broad geographic context.

During the LAC and planning processes, current users and boaters interested in access to the upper segment of the Chattooga WSR described characteristics of the river they appreciate most. Opportunities for remoteness and solitude in a spectacular scenic setting with little evidence of other humans emerged as the most common comments. Table 3.2.1-1 summarizes existing recreation uses on the upper segment of the Chattooga WSR, where and when they occur and the characteristics of the visitors' desired experience. Table 3.2.1-2 describes potential recreation opportunities that are currently prohibited, where and when they might occur and the characteristics of the visitors' desired experience. While scenic boating (use of the lower gradient reaches such as Nicholson Fields or other short reaches that do not have challenging whitewater) did not receive much attention during the formal LAC process, it was identified as a potential activity by Whittaker and Shelby (2007).

Table 3.2.1-1 Existing Recreation Opportunities in the Upper Segment of the Chattooga River Corridor

Type	Location	Opportunities/Important Features	Season	Characteristics
Frontcountry Recreation (occurs within ¼ mile of access roads and bridges)	Grimshawes/ Sliding Rock	Swimming. Water quality, scenery, a functioning "sliding rock," small beaches	Mostly spring, summer, fall	"Social recreation" setting where solitude is less important.
	Bullpen Bridge	Vehicle-based sightseeing, short walks, swimming, picnicking, sunning/relaxing.	Mostly spring, summer, fall	More remote than other bridges so less interaction with others is probably more important.
	Burrells Ford Bridge	Picnicking, sunning/relaxing, swimming, short walks, camping. Water quality, scenery and availability of uplands sites near wading/swimming or angling areas.	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/ Sliding Rock	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.
	Bullpen Bridge	Limited fishing opportunity. Fly and spin anglers fish for rainbow and brown trout.	Year-round	
	Burrells Ford Bridge	Stocked May to Oct. 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 Oct. Regulated by delayed-harvest (DH) Nov. 1 – May 14 (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 from access roads and bridges)	Chattooga Cliffs/ Ellicott Rock reaches	"Wild" trout fishery. Higher proportions wade rather than fish from the bank and use flies rather than spinning gear or bait. 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. Value water quality and clarity, scenery, insect hatches, "wild" or "naturalized" fishery.
	Burrells Ford to Reed Creek	Stocked May to Oct. 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, fall	
	Reed Creek to Hwy. 28	Stocked May–Oct. This area is regulated by DH Nov. 1 – May 14 (artificial lure, catch and release only). Bait, spin and fly fishing occur here the rest of the year.	Year-round	

Type	Location	Opportunities/Important Features	Season	Characteristics
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. 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 segment of the Chattooga WSR, 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 3.2.1-2 Potential Recreation Opportunities in the Upper Segment of the Chattooga WSR Corridor

Type	Location	Opportunities/Important Features	Season	Characteristics
Whitewater Oriented Boating (Class IV-V whitewater kayaking, canoeing or rafting on steeper reaches 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. Focus on the challenge of running whitewater.
	Ellicott Rock Reach	Offers the most whitewater for its length on the upper segment of the Chattooga WSR.		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.
	Rock Gorge Reach	Longer trip with several good Class IV-V rapids; longer stretches of flat water. Many trips would include travel through the Class I Nicholson Fields Reach too.		Boaters are generally likely to travel in small groups of two to five (based on use data from the lower river).
Scenic 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 Ellicott Rock Reach (below East Fork) Rock Gorge Reach (above Big Bend Falls)	This reach is accessible by trail with a take-out at Hwy. 28 or the Section II boat launch. Some people might be interested in tubing short sections of this reach in the summer. There are 2.1 miles of Class I-II water from the East Fork confluence to Burrells Ford, but this involves a substantial carry to the put-in and likely to limit use. Put-in at Burrells Ford and float about two miles to the start of the rapids above Big Bend Falls and then walk back. This is also likely to limit use to boaters with lightweight craft.	Boating on these lower gradient reaches is probably possible at lower flows than whitewater-oriented boating, and would be available. However, scenic-oriented boaters prefer vehicle access on both ends, so use is likely to be low.	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.

In general, it is helpful to distinguish visitors to the upper segment of the Chattooga WSR by two categories—frontcountry and backcountry (Whittaker and Shelby 2007). For the purpose of this analysis, frontcountry users are defined as those visitors who recreate within one-quarter mile of roads and bridges (Whittaker and Shelby 2007). The river and its dramatic backdrop offer these recreationists outstanding opportunities for river recreation where they can immerse themselves in their surroundings; take in the sights, sounds and feel of the river; relieve stress; and connect with the natural world. They obtain these experiences through a wide variety of activities (see Table 3.2.1-1) that occur in and along the river. These experiences are facilitated by appropriate infrastructure that provides easy access, but does not dominate the landscape or interfere with the natural setting that visitors have come to enjoy. A social element is integral to many of the activities that occur in frontcountry. Use levels/densities are higher than in the backcountry, but they do not overwhelm the natural setting or contribute to crowding and congestion. As would be expected, frontcountry users have a greater tolerance for higher use levels/densities, for settings that are more social and for different types of user groups than backcountry users (see Table 3.2.1-1).

Backcountry users, defined as those who recreate more than one-quarter mile from roads and bridges (Whittaker and Shelby 2007), desire a greater sense of remoteness and solitude and fewer signs of human use than frontcountry users, regardless of their activity (angling, boating, hiking, backpacking, hunting, etc.). Information gathered from the public during the LAC process indicates that solitude is one of the most valued, if not *the* most valued quality of the backcountry recreation experience in the upper segment of the Chattooga WSR Corridor. Solitude is also a component of the Chattooga River's recreation ORV and part of the Wilderness Act goal of "outstanding opportunities for solitude." Similar to frontcountry users, they also seek spectacular scenery where high quality opportunities for river recreation exist.

4. Use and Capacity

The Wild and Scenic Rivers Act requires that the Comprehensive Management Plan (CMP) "shall address resource protection, development of lands and facilities, user capacities, and other management practices necessary or desirable to achieve the [WSRA's] purposes" 16 U.S.C. § 1274(d), Wild and Scenic Rivers Act, Section 3(d) (1). The overall CMP must work together to achieve the WSRA's purposes, but specific planning and analysis requirements to address capacity or related visitor management issues have not been developed. Agencies have broad discretion interpreting this mandate (e.g., which visitor impact framework to use, whether capacities must be expressed as a number, or whether numbers needed to be linked to indicators/standards for identified ORVs).

Recent litigation (2005-2009) regarding the Merced Wild and Scenic River in Yosemite National Park has addressed capacities. Several district court rulings (and an unsuccessful appeal to the Ninth Circuit by the National Park Service in 2008) ultimately led to a 2009 settlement where the National Park Service agreed to revise its third river plan to include

explicit numeric capacities. Therefore, there is increasing interest in interagency guidance on the topic (Interagency Capacity Workgroup, 2011).

Recent papers (Whittaker et al., 2010; Graefe et al., 2011) and sessions at several national river management symposia (Missoula MT 2007; Portland ME 2008; Yosemite 2008 and 2009; Portland OR 2010; Girdwood AK 2011) have added to the conversation. Consensus about many capacity-related concepts, principles and approaches appears to be emerging—even among researchers and practitioners that have offered testimony on opposing sides in capacity litigation. However, a few other differences remain, which will result in some agency variation in regard to capacity befitting the particular river situation.

The US Forest Service Washington Office directed the national forests in North Carolina, South Carolina and Georgia to conduct a use capacity analysis on the upper segment of the Chattooga WSR in 2005, before the Merced case had been decided. The LAC approach used on the upper Chattooga initially placed greater emphasis on indicators and standards than numeric (use level) capacities. After the 2008 Merced decision, and consideration of ongoing debate among river professionals, the agency recognized the need to explicitly identify numeric capacities as well. Both LAC and numeric-focused capacity processes have the same goal: protect river values by ensuring impacts do not exceed unacceptable levels. The numeric approach further recognizes that use is likely to be related to at least some impacts, and that agencies need to identify the highest use level that can occur without causing unacceptable impacts.

For the purposes of this EA, capacity is defined as the amount and type of use that protects and enhances river values; all the action alternatives analyzed in this section have identified capacities. Capacities are numbers on a use-level scale for specific times and places; they were developed to be compatible with the entire management prescription for each alternative (Whittaker et al., 2011).

To develop such capacities, planners considered important indicators, use-impact relationships and how other management actions affect those use-impact relationships. In these deliberations, planners relied on several sources of information, including the Use Estimation Workshop (Berger and CRC 2007), vehicle counts at access areas (Berger 2007a), general relationships between use levels and impacts (as discussed in the Integrated Report), tolerances for impacts from Chattooga studies or those from other rivers, and logic-based calculations or other analyses that associate vehicle counts at access sites with current peak-use levels (see Table 3.2.1-3 with future parking projections).

In all action alternatives, capacities were developed for specified frontcountry areas [discussed as groups at one time (GAOTs), but convertible to people at one time (PAOTs) after assuming an average group size] and backcountry reaches (also discussed as groups per day, as well as people per day which were estimated by applying average group sizes for different activities). Unlike the lower river segment, where capacities

apply to only two types of use (private and commercial boaters), capacities outlined for the upper segment apply to all user groups.

In general, capacities were developed with recognition that social impacts (especially encounters, as well as competition for camps and fishing areas) are probably the most limiting factor for use levels in backcountry areas of the upper Chattooga. While increasing use can have adverse impacts on biophysical or cultural resources, more often it is the type of use (or behavior of the user) rather than amount of use that is decisive with these resources. In addition, many biophysical impacts can be reduced more effectively by other actions in the management prescription (e.g., trail hardening and redesign, directing use away from sensitive resources and encouraging use in more durable areas) rather than adjusting use levels (Cole 1987, 1994, 2000). For example, for a trail that has been well designed, biophysical impacts related to trail use (e.g., sedimentation) may be similar whether five or 50 groups travel it daily. In contrast, the number of encounters between trail users is likely to grow in a linear fashion as the number of groups increases from five to 50. In this example, increased use produces an unacceptable number of encounters (for a wilderness-like setting) much sooner than it produces unacceptable sedimentation. Because capacity is based on achieving a defined management prescription, the element of the management prescription that is violated at the lowest use level is the controlling impact.

II. Existing Impacts to the Environment

A. Frontcountry Conditions

Based on professional judgment after considering several information sources, the most limiting factor in frontcountry areas on the upper segment of the Chattooga appears to be facility-based (available parking spaces in lots or roadside parking). When demand outstrips supply of defined parking spaces in a frontcountry area (and too many cars begin to parallel park along the narrow roads), the scenery, congestion and sense of the natural world are affected.

The upper segment of the Chattooga WSR Corridor has four frontcountry areas that are within one-quarter mile of the river—Grimshawes/Sliding Rock Area, Bullpen Road Bridge Area, Burrells Ford Bridge Area and the Highway 28 Bridge Area. Action alternatives in this EA examine two capacity levels for the Burrells Ford Bridge Area (lower in Alternative 2, higher in the others), while capacities for the other three frontcountry areas remain the same. For the Burrells Ford Bridge Area, the lower capacity is based on the number of vehicles that can fit in designated lots; the higher capacity takes that number and adds the number of vehicles that can fit in parallel parking without causing safety or resource damage and still remain within the corridor (0.25 miles on either side of the river). The capacity at the other three frontcountry areas is

calculated by estimating the number of vehicles that can fit in designated lots as well as in parallel parking without causing safety or resource damage and still remain within the corridor.

In all cases, planners used standard spacing requirements for usual vehicles (cars and pickup trucks) with some adjustments for typical parking configurations (as observed by long-term US Forest Service personnel) and actual counts at lots on peak-use days (primarily during 2007 vehicle counts). The final result is estimates of available vehicle parking spaces at each frontcountry area which have been rounded to reflect the appropriate level of precision. Depending on the size of vehicles and how they are spaced in parking lots and along the road, capacity at each frontcountry area may vary by 10 to 20% (NPS, 2007).

Vehicle-based capacities at these four frontcountry areas have been converted to people-at-one-time (PAOT) using a regional 2.5 people per vehicle multiplier (USDA Forest Service, 2009) and assuming one vehicle equals one group. This is also a simplification, and does not account for the possibility that some users may be dropped off at these parking areas rather than occupying spaces with a vehicle. Observations from long-term agency personnel suggest drop-offs and bus traffic are rare.

The estimated number of parking spaces for each frontcountry area, as well as their existing capacity [both groups at one time (GAOT) and people at one time (PAOT)] is listed in Table 3.2.1-3. Recent vehicle count estimates for each area also are described in narrative form below the table.

Table 3.2.1-3 Existing Parking Capacity in the Upper Segment of the Chattooga WSR Corridor by Frontcountry Area

Frontcountry Area	Parking Spaces (includes roadside parking)	Groups at One Time	People at One Time (using an average of 2.5 people per vehicle)
Grimshawes/Sliding Rock Bridge Area	25	25	65
Bullpen Road Bridge	15	15	40
Burrells Ford Area	80	80	205
Highway 28 Bridge Area	35	35	85

1. Grimshawes/Sliding Rock Bridge Frontcountry Area

Vehicle counts from 2006-2007 (Berger 2007) show that use peaks in summer. Spot counts indicate peak use on weekends June through August, with a peak count of 25 in August, followed by 18 in July. Spot counts September through May did not exceed three vehicles. These counts indicate that parking is still available even on most current high-use days

2. Bullpen Road Bridge Frontcountry Area

Vehicle counts from 2006-2007 (Berger 2007) show that use peaks in mid-summer and during fall color season. Spot counts indicate peak use on weekends in July and August, although maximum counts did not exceed 12 at one time. Spot counts October through January did not exceed eight vehicles; on most weekends, counts averaged less than two. These counts indicate that some parking is still available even on current high-use days.

3. Burrells Ford Bridge Frontcountry Area

Vehicle counts from 2006-2007 (Berger 2007) indicate that use in this area peaks in spring, mid-summer and during fall color season. Peak use occurred in March on one weekend with a maximum of 63 vehicles at one time. The next highest spot count was 46 vehicles (a weekend in October), followed by 45 for both a weekend in October and May. These counts indicate that parking is still available on current high-use days.

However, there are anecdotal reports of congestion at Burrells Ford during the busy summer and fall color seasons. This area is popular with visitors who only stop briefly to view the river from the bridge, and therefore may have higher rates of turnover and be more sensitive to congestion than some other areas (Whittaker and Shelby 2007).

4. Highway 28 Bridge Frontcountry Area

Vehicle counts from 2006-2007 (Berger 2007) indicate that use in this frontcountry area peaks in the spring, especially on weekends, and during the delayed-harvest[4] season starting in November. The very highest use at this site was a weekend in March with 36 vehicles (essentially full capacity), but nearly full counts occurred one November weekend (30 GAOT). Typical August to January counts were ten or less, but weekends in the spring, and in November, December and January can range from 20 to 30 vehicles.

[4] The fishery from Reed Creek to Highway 28 (about 2.5 miles) is managed as a Delayed Harvest (DH) reach. From November 1 to May 14, anglers must practice catch and release fishing with a single hook and artificial lure. DH stocking (part of the roughly 40,000 stocked for frontcountry angling, as discussed above) occurs just before the DH season, and stocked fish remain unharvested until the following summer. The stocked fish "naturalize" through the winter and become more challenging to catch as the season progresses.

5. Frontcountry Conditions and Future Recreation Trends

Frontcountry recreation (e.g. picnicking, sightseeing, swimming, etc.) is likely to increase as more people take shorter trips closer to home. Projections estimate that sightseeing in the South will increase by about 40% from 2000 to 2020. Picnicking is expected to increase at a slightly lower rate of 32% by 2020 (Whittaker and Shelby 2007).
Nationally, projections show fishing participation is likely to grow. More specifically individual reaches of the upper segment of the Chattooga WSR, particularly the delayed-harvest section, are candidates for more growth in the future as long as stocking practices and/or regulations remain the same (Whittaker and Shelby 2007).

Given these frontcountry trends, demand for parking is likely to increase in the future (see Table 3.2.1-4 below).

Table 3.2.1-4 Existing and Projected Use[1] Patterns in Frontcountry Areas for the Three Highest Use Periods

Frontcountry Area	Facility-based Capacity (Parking Lots in Vehicles at One Time)	Facility-based Capacity (Parking Lots in People at One Time)	Peak Use Month[2] Parking Demand	Projected Parking Demand in 20 Years	Second Highest Use Month[2] Parking Demand	Projected Parking Demand in 20 Years	Third Highest Use Month[2] Parking Demand	Projected Parking Demand in 20 Years
Grimshawes/ Sliding Rock Area	25	65	August 25	demand exceeds design capacity	July 18	demand meets design capacity	July 17	demand is below design capacity
Bullpen Road Bridge Area	15	40	August 12	demand exceeds design capacity	July 11	demand meets design capacity	January, August, September & October 8	demand is below design capacity
Burrells Ford Bridge Area	80	205	March 63	demand exceeds design capacity	October 46	demand is below design capacity	May & October 45	demand is below design capacity
Highway 28 Bridge Area	35	85	March 36	demand exceeds design capacity	November 30	demand exceeds design capacity	May & December 25	demand meets design capacity

[1] Projected demand is based on a 40% increase in parking over a 20-year period.
[2] Based on number of vehicles in the parking lot at one time on a single weekend day in a month.

B. Backcountry Social Conditions

1. Existing Use Levels

Limited use research or monitoring had been conducted in the upper segment of the Chattooga WSR Corridor prior to this analysis. To address this data shortcoming, the US Forest Service convened a Use Estimation Workshop in 2007 (Berger and CRC 2007) where agency experts familiar with the area (including staff from the US Forest Service, as well as the three state natural resource departments) reviewed available information and their professional observations to develop consensus use estimates. For each of the four backcountry reaches (Chattooga Cliffs, Ellicott Rock, Rock Gorge and Nicholson Fields), the workshop attendees estimated groups at one time (GAOT) for three types of users (day hikers, backpackers and anglers) on weekdays and weekends for each month of the year. Hikers, backpackers and anglers were chosen to represent all types of current users (see Section 3.6.2 Social Impact Analysis and Appendix F). For simplicity in this analysis, GAOT estimates have been equated with groups per day. Vehicle counts conducted in 2006 and 2007 (Berger 2007) provided additional information that largely corroborated backcountry use estimates as summarized in Table 3.2.1-5. Although the potential exists for whitewater boaters and scenic-oriented boaters/tubers to recreate in the backcountry on the upper segment of the Chattooga WSR, Use Estimation Workshop attendees did not have the appropriate expertise to speculate about the likely numbers of boater groups per day in any of the backcountry reaches.

Table 3.2.1-5 Estimates of Current Backcountry Use in the Upper Segment of the Chattooga River

Reach	Use	Highest Average Weekday Use (Average groups per day) [1]	Highest Average Weekday Use (Average People per day) [1]	Highest Average Weekend Use (Average groups per day) [1]	Highest Average Weekend Use (Average People per day) [1]
Chattooga Cliffs	Day Hikers	~3	10	~ 6	15
	Backpackers	~1		~ 1	
	Anglers	~1		~ 2	
Ellicott Rock	Day Hikers	~ 4	35	~ 10	110
	Backpackers	~ 2		~ 5	
	Anglers	~ 4		~ 6	
Rock Gorge (Burrells Ford to Lick Log) and Upper Nicholson Fields (Lick Log to Reed Creek)	Day Hikers	~ 5	40	~ 10	95
	Backpackers	~ 10		~ 15	
	Anglers	~ 5		~ 6	
Delayed Harvest Area/Lower Nicholson Fields (Reed Creek south to Hwy. 28)	Day Hikers	~ 5	40	~ 10	95
	Backpackers	~ 10		~ 15	
	Anglers	~ 6		~ 15	

[1]Source—Use Estimation Workshop (Berger and CRC 2007)

2. Existing Backcountry Encounter Levels by Reach

Several different social impacts have received attention in the recreation research and planning literature to assess the quality of backcountry social experiences related to solitude and remoteness (Manning 2010). The Integrated Report (Whittaker and Shelby, 2007) describes several potential relevant indicators, including different types of encounters (users who see or hear other groups on trails, the river or at camp); competition for fishing areas or camps; and interference impacts with angling. Of these, encounters are the best single social indicator for backcountry opportunities and are the focus of analysis in this EA.

Encounters are the only indicator of backcountry experiences that have been measured in the upper segment of the Chattooga WSR Corridor (by Rutlin, 1995, in the Ellicott Wilderness only). Taken together with research from other rivers or recreation areas, it is possible to make logic-based calculations to 1) estimate encounter levels in other reaches in the upper segment of the Chattooga WSR and during different time periods; 2) relate those encounter levels to different use levels; and 3) compare encounter levels to user tolerances for encounter impacts. These analyses allow estimates of the use level that would keep encounters from impacting the desired condition, thus protecting the Recreation ORV.

With limited river-specific studies about the relationship between use and encounters, the US Forest Service estimated current encounter levels in different reaches and seasons by applying assumptions and logic-based calculations to use estimates (groups at one time) from the Use Estimation Workshop (with additional consideration given to vehicle count-based estimates from 2006 and 2007). The estimates are provided in Table 3.2.1-6; Appendix D provides more details about encounter and use estimates.

Table 3.2.1-6 Estimates of Existing Average Backcountry Encounters per Day by Reach

Reach	Season	Average Encounters Per Day	
		Weekdays	Weekends
Chattooga Cliffs	Dec-Feb	0	0-1
	Mar-May	0-1	0-3
	June-Aug	0-2	0-4
	Sept-Nov	0-2	0-4
Ellicott Rock	Dec-Feb	0-1	0-2
	Mar-May	0-3	0-8
	June-Aug	0-4	0-9
	Sept-Nov	0-2	0-7
Rock Gorge	Dec-Feb	0-2	0-2
	Mar-May	0-5	0-8
	June-Aug	0-8	0-14
	Sept-Nov	0-5	0-9
Nicholson Fields	Dec-Feb	0-3	0-6
	Mar-May	0-6	0-12
	June-Aug	0-8	0-15
	Sept-Nov	0-5	0-10

Limited information exists about the tolerance levels visitors to the upper segment of the Chattooga WSR have for encounters. Few Ellicott Wilderness users (15%) reported disliking trail encounters, but more were sensitive to camp encounters (58% dislike "seeing others while in camp") or encounters with loud groups (76%) (Rutlin, 1995). However, respondents did prefer low levels of encounters (similar to other wilderness users in several studies). Average preferences were less than four for other groups at the trailhead, three on the trail, and no more than one group within sight or sound at camp. Average tolerances were nine groups at the trailhead, seven on the trail and three in camp. Actual encounters reported in the study were between users' average preferences and tolerances, about six groups at the trailhead, four on the trail and two in camp. Public comments during the Limits of Acceptable Change process suggest general tolerance for existing levels of use and encounters (even during high use months of the year), but people do not want these levels to noticeably increase.

The following information from the Integrated Report (Whittaker and Shelby 2007) reveals that the impact of encounters may depend in part on the type of encounters, which also may vary by season and reach:

a. Hiker/Hiker Encounters

Encounters between hikers (including both day hikers and backpackers) in the backcountry are likely to be the most common encounters in the upper segment of the Chattooga WSR under existing conditions. Hikers have the highest use levels of any existing group, and they travel the same trails to the same destinations. The highest encounter period for this type is during summer and fall color weekends. Low season and middle-of-the-week periods may offer noticeably lower numbers of encounters and particularly low density experiences that some users may seek intentionally.

b. Hiker/Angler Encounters

Encounters between backcountry anglers and hikers are likely to be relatively lower than hiker/hiker encounters, as well as less adverse than other encounter impacts. Hikers in the upper segment of the Chattooga WSR Corridor are more likely to use designated trails, which are often separate from the riverside, user-created trails used by anglers. For example, Nicholson Fields anglers in the Delayed Harvest reach usually travel along the user-created trails on both sides of the river, while hikers use the designated trail that is parallel but usually out of view.

Other factors may reduce the number of hiker/angler encounters. Anglers generally use trails to get to fishable water, but spend most of their time on the river rather than on trails. In the Ellicott Rock Reach backcountry angling use is lower than downstream (while the converse is true for hikers). The highest use periods for hiking (warm, mid-summer weekends) are not usually the highest use periods for backcountry angling (which focuses on cooler water temperatures in winter and spring, particularly in the Delayed Harvest Reach. However, both groups are likely to have higher use and encounter levels during fall color season.

From an angler perspective, encounters with hikers on the route to a fishing location may also have smaller adverse effects than encounters with other anglers on the river (an angler/angler encounter, which is related to fishing competition). In contrast, hikers are unlikely to distinguish between encounters with anglers or other hikers when they see either group along trails.

c. Camp Encounters

Camp encounters refer to nights spent in sight or sound of another group and are only relevant for groups that camp (generally backpackers, but some backcountry anglers may camp as well). In general, groups prefer to camp out of sight and sound of others and value few signs of human use or development. Rutlin's 1995 study of the Ellicott Rock Wilderness discovered that most backpackers are more sensitive to camp encounters than trail encounters.

d. Encounters with Boaters

Under current conditions, boating is not allowed on the upper segment of the Chattooga WSR, so these encounters do not occur. Consequences sections for the alternatives that allow boating will provide additional information about potential tolerances or preferences for encounters with boaters for other groups.

3. Recreation Use Patterns, Resource Characteristics and Season

Visitor management decisions often involve trade-offs among the types, quantity, and quality of recreation opportunities. Legislation such as the Wild and Scenic Rivers Act or the Wilderness Act provides a protective framework for management, but these acts do not, absent specific direction, decide specific priorities. Resource managers generally try to develop solutions that balance the interests of multiple groups by considering resource characteristics, use patterns, or other variables (Whittaker and Shelby 2007). Specific to the Chattooga, recreation use patterns, resource characteristics (especially terrain and trails) and season help to determine the dynamics of current backcountry encounters and are summarized below:

a. Recreation Use Patterns: Flow-Dependent and Flow-Enhanced Activities

Several different recreation activities are or could occur in the upper segment of the Chattooga WSR Corridor. Some of these activities are flow-dependent (require certain flows to provide acceptable or optimal experiences), while others are flow-enhanced (flows may influence the quality of trips, but they are not necessary to engage in a specific activity). For flow-dependent activities, the frequency and duration of flow ranges can have profound effects on use patterns and interactions with other user groups, which may affect opportunities for solitude or potential conflict between users (see discussion below).

i. Flow-Dependent Activities: Angling, Swimming and Boating

Angling and swimming are the existing flow-dependent activities on the upper segment of the Chattooga WSR; if boating were allowed, it would be flow-dependent as well. The US Forest Service contracted a study to assess flow needs for angling and boating on the upper segment of the Chattooga WSR (Berger, 2007). The primary goal was to estimate acceptable and optimal flow ranges for these activities on different river reaches. This would help to determine if the users would recreate using similar parts of the river's flow regime (the amount of overlap between the activities' flow ranges). Given the potential for conflict between these users (see discussion below), it was important to assess how often they might share the river. The study also provided information about:

- boating access options;
- the difficulty and frequency of rapids and other safety concerns;
- the number of rapids or large woody debris hazards that require portages; and
- Other descriptions of boating opportunities that might help estimate demand for such opportunities (and thus help predict potential use levels).

The study used expert panels to assess conditions for their activities at different flows; the experts were chosen from a review of qualifications to maximize years of experience, skill level, previous experience participating in flow studies, level of availability to participate on short notice and knowledge of the area and/or river. Most members of the panels had previously used the Chattooga WSR for several different recreational activities. The creation of small expert panels to assess flow needs is a commonly used methodology in flow-need studies and has been used in several relicensing studies (Whittaker et al., 2003; Whittaker, Shelby, & Gangemi, 2007).

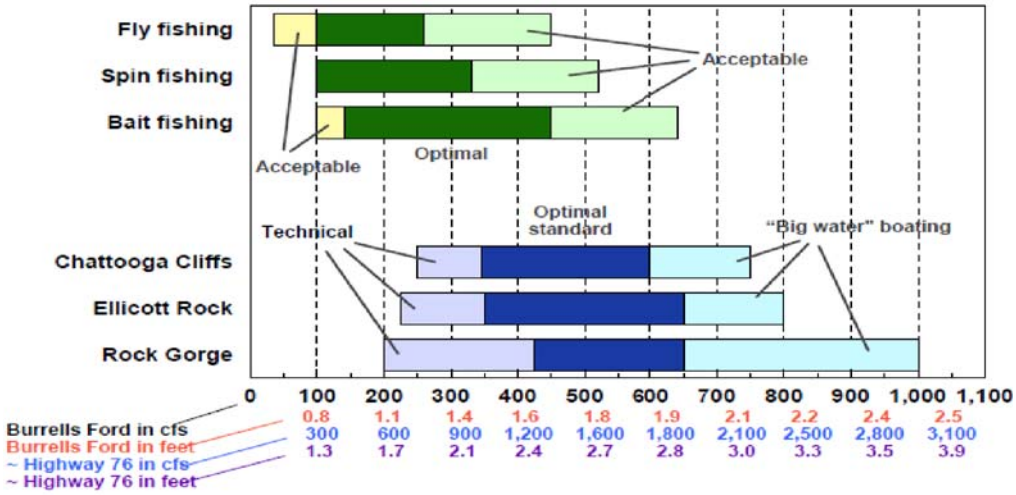
For anglers, many of whom have long histories of use on the river, the study focused on flow comparison survey items where anglers evaluate a range of flows at the gages to which they have become calibrated (for most, this was the USGS gage near Highway 76, about 20 miles downstream of the staff and pressure gage developed at Burrells Ford in 2006, which was later replaced by a real-time USGS gage). However, the expert panel of anglers was also invited to evaluate the single flow being assessed by boaters during the study (about 340 to 400 cfs at Burrells Ford over the two days of fieldwork [equivalent to about 1,200 cfs or 2.3 feet at Highway 76] which occurred shortly after a storm event in January 2007).

For boaters, most of who had not floated the river before, the focus was on a single flow evaluation at 340 to 400 cfs on the Burrells Ford gage. They were also asked to apply their knowledge from other streams to estimate broader acceptable or optimal flow ranges for their activity at this same gage.

Figure 3.2.1-1 illustrates findings from the study for fly, bait and spin fishing as well as technical, optimal standard and big water whitewater boating (Berger 2007; also summarized in Whittaker and Shelby 2007). Findings suggest anglers can fish higher flows (more than 250 to 350 cfs at Burrells Ford), but optimal flows for fly and spin fishing are lower, when wading and crossing are easier, and the water clarity and amount of fishable water increases. Results were largely consistent across all reaches, although anglers recognized that steeper sections of these reaches (e.g., near Big Bend Falls, Bullpen Road Bridge) were more difficult to fish at higher flows than lower gradient areas. Note: Bait angling is illegal in the Chattooga Cliffs Reach.
In contrast, findings suggest that optimal whitewater boating ranges for the Chattooga Cliffs, Ellicott Rock and Rock Gorge reaches are best above 350 to 400 cfs unless they become too high (about 600 to 650 cfs). While more technical, low-flow boating is available as low as 200 to 250 cfs (depending on the river reach), whitewater boaters would rather paddle flows that have fewer boatability problems and more challenging whitewater.

Taken together, these flow range bars show that the highest quality fishing and boating generally occur in different parts of the hydrograph in the upper three reaches (the exception is bait fishing, which remains optimal through higher flows). The best fishing flows are not the best boating flows, and vice versa (Whittaker and Shelby 2007).

Figure 3.2.1-1 Flow Range Bars for Fishing and Whitewater Boating Opportunities on the Upper Segment of the Chattooga WSR (Whittaker and Shelby 2007).



The Nicholson Fields Reach is not shown for boaters in Figure 3.2.1-1 because it has no whitewater. However, it is likely that less skilled boaters could use this reach using open canoes, tubes, or other craft to boat this deeper channel with a more alluvial substrate at lower flows than the whitewater reaches. The 1971 WSR study report notes that the lower gradient reach from Lick Log Creek to Highway 28 was "easy for the inexperienced canoeist" and the Integrated Report notes that "the roughly 4 mile

Nicholson Fields reach from Lick Log confluence to Highway 28 is probably the most likely scenic-oriented boating trip. It is accessible by trail from the Thrift Lake trailhead (about 0.75 miles, all downhill) with a take-out at Highway 28 or the Section II boat launch, about a mile and half downstream."

Swimming opportunities occur mostly in low gradient reaches (pools and runs) on the upper segment of the Chattooga River, and these are probably best during low water periods in warmer months. In periods of higher water, swimmers would need higher skill levels to cope with currents and avoid being swept downstream. The expert panel flow assessment did not focus on determining precise flow needs for these opportunities.

ii. Flow-Enhanced Activities: Hiking and Backpacking

Flow-enhanced activities such as hiking, camping, wildlife observation and other riverside recreation can occur regardless of flow, even as certain flows may be preferred for certain aesthetic benefits (e.g., higher flows for observing the power of the river in falls and rapids; lower flows for observing reflections in pools and runs, or less turbid water). Hikers and backpackers are the most prevalent user group on trails; they travel the same routes and they use the same areas. For additional information on current hiker/backpacker experiences, see Table 3.2.1-1.

b. Resource Characteristics

The physical characteristics of each reach and the location of trails along the river may affect use patterns, behavior and the extent of interaction between users (encounters). During the LAC process (see Table 3.2.1-2), boaters listed three potential whitewater-oriented boating reaches on the upper segment of the Chattooga WSR that would provide Class IV-V whitewater kayaking, canoeing or rafting on steeper reaches by highly skilled boaters: the Chattooga Cliffs (4.0 miles from Green Creek confluence south to Bullpen Bridge; ~73 feet per mile), Ellicott Rock (5.3 miles from Bullpen Bridge south to Burrells Ford Bridge; ~64 feet per mile; in the first 1.5 miles, the river drops ~137 feet per mile) and Rock Gorge (7.4 miles from Burrells Ford south to the Lick Log Creek confluence; ~57 feet per mile). It is also possible for less-skilled boaters using open canoes, tubes or other craft to run some reaches of the upper segment of the Chattooga WSR that lack more challenging rapids and are lower gradient.

i. Chattooga Cliffs Reach

The Chattooga Cliffs Reach is a narrower stretch of stream and is generally more challenging because the terrain is steep. The trails along this reach also offer less access to the water for fishing or swimming, as most are farther than 100 feet from the river. Traveling within the stream channel to fish is also difficult in this steeper reach, particularly at higher flows. To fish more than one location, it is usually necessary to hike up the bank to the trail, walk up or down the trail, and then drop back down to the river.

The expert panel reports that boaters indicate "The Chattooga Cliffs Reach provides the most creek-like whitewater boating opportunity (steeper gradient, more technical rapids)" (Berger 2007c).

ii. Ellicott Rock Reach (Bullpen Road south to Burrells Ford Bridge)

The section of this reach from Bullpen Road Bridge to the Ellicott Rock marker is narrow but not heavily fished nor widely visited, probably because of steep terrain, thick rhododendron, and the lack of designated trails. Stocking is not allowed in this Wilderness area, which further discourages fishing use, and both the steep river gradient and surrounding terrain make off-trail travel in the area difficult, particularly during higher flows.

The section of the reach from the Ellicott Rock marker downstream to Burrells Ford has a trail along the eastern bank, making it more accessible by hikers/backpackers and anglers. The river is also wider and the gradient is not as steep as upstream sections. This encourages higher fishing use than the Chattooga Cliffs Reach, especially below the East Fork confluence.

The expert panel reports that boaters indicate "Ellicott Rock Reach offers the most white water for its length" (Berger 2007c).

iii. Rock Gorge (Burrells Ford Bridge south to Lick Log Creek)

The upper two miles of the Rock Gorge Reach between the Burrells Ford Bridge and the Big Bend area are similar to the section from Ellicott Rock marker to Burrells Ford in terms of gradient, width and access. The designated and well-designed Chattooga Trail follows the east bank and other user-created trails are available on both banks. This section has a wider channel and easier gradient that encourages activities such as swimming, relaxing, and fishing. .

Steeper gradients start at a series of ledge rapids upstream of Big Bend Falls (approximately two miles south of Burrells Ford Bridge) and continue past the falls and through the Rock Gorge to about the confluence of Lick Log Creek. This section in the Rock Gorge Reach offers some of the most remote terrain in the upper segment

of the Chattooga. Designated trails are largely away from the river, so hikers and anglers interested in accessing the water must follow game or user-created trails through steep terrain. Travel in the river channel is difficult except at low flows.

The expert panel reports that boaters indicate "The Rock Gorge Reach offers a longer trip with several good Class IV-V rapids, but also has longer stretches of flat water" (Berger 2007c).

iv. Nicholson Fields (Lick Log Creek South to Hwy. 28 Bridge)

In the roughly four-mile Nicholson Fields Reach from the Lick Log confluence to Highway 28, the river is wide and trails exist on both sides of the river. This section also includes the Delayed Harvest, a fishing designation that requires catch and release fishing from November to May, which attracts the highest angling use on the upper segment of the Chattooga WSR.

Scenic-oriented boating/tubing most likely would occur in this reach (as opposed to whitewater boating). For example, the 1971 study report notes that the Class I-II lower gradient Nicholson Fields Reach from Lick Log Creek to Highway 28 (accessible by a road along the river at the time) was "easy for the inexperienced canoeist" (USFS 1971), and the same reach was identified for potential scenic boating use during the LAC process. However, this reach and similar short sections with scenic boating opportunities may not attract much use due to access challenges (Whittaker and Shelby 2007). Scenic boaters would be less likely to use Lick Log as a put-in for 3.8 miles of flat water (and a long shuttle), especially given the availability of Sections 1 and 2 (with ** miles of similar Class I-II boating) with excellent road access. In contrast, whitewater boaters may be more likely to use Lick Log as a take-out after running the Rock Gorge, which provides 7.4 miles of challenging rapids (and shortens their shuttle from Burrells Ford).

c. Seasonal Opportunities

Use levels for different activities also vary seasonally, which can affect social impact levels. The following describes major seasonal use variation:

i. Hiking/Backpacking

The highest use periods for hiking are warm, mid-summer weekends as well as weekends during the fall color season. Data from the Use Estimation Workshop show that backpackers and hikers spend the least amount of time in upper segment of the Chattooga WSR Corridor during the winter months (November – April in the Chattooga Cliffs; September – May in the Ellicott Rock Reach; and November – March in the Rock Gorge and Nicholson Fields reaches). Use levels also tend to be lower for hikers and backpackers during rainy periods or storms, regardless of season, minimizing the chances for interaction with potential boating use (in alternatives

where it is allowed) that is likely to be higher during or immediately after storm events that increase flows to levels that would allow boating opportunities.

ii. Angling

Fishing use may vary by time of the day during different seasons. In summer, the best fishing is in early morning before temperatures have risen; in winter, the best times are the middle of the day when the sun has raised temperatures slightly. In the spring and fall, there are typically better periods in morning and late afternoon (Whittaker and Shelby 2007).

Optimal flows for fishing that occur in the summer (when water temperatures may be too high) may not attract many fly anglers, but these same flows are highly valued in cooler spring and fall months (October to November or March to April). Anglers are least likely to be in the upper segment of the Chattooga WSR Corridor from December through February (Whittaker and Shelby 2007) with the notable exception of the Delayed Harvest section of the Nicholson Fields Reach, which is consistently used through the winter. Use Estimation Workshop estimates show that the most popular months for anglers in the Delayed Harvest are March to May and October to December.

These same Use Estimation Workshop estimates show that anglers spend the least amount of time in the Chattooga Cliffs Reach from November through April; in the Ellicott Rock Reach from September through February; in the Rock Gorge from December through January and from June through September; and in the Delayed Harvest from June through September and January through February.

iii. Swimming

Swimming opportunities occur mostly during warmer months when water temperatures are more conducive.

4. Backcountry Social Conditions and Future Recreation Trends

Overall backcountry use in the upper segment of the Chattooga WSR Corridor is likely to increase over the planning horizon. This may affect parking availability at access points (shared with frontcountry visitors) or solitude and perceived remoteness during trips (more important concerns for backcountry users). Reduced solitude and related social impacts (e.g., perceived crowding, competition for camps or fishing areas, noise and encounters), may diminish the quality of trips, displace visitors to lower use reaches or times, or displace visitors from the corridor altogether. To protect these backcountry opportunities, the agency must ensure use levels and resulting impacts do not reach unacceptable levels.

a. Backpackers (includes nature watchers, photographers, hunters, etc. who camp)

Nationally, backpacking use appears to be flat or declining. However, participation projections estimate that backpacking in the South will increase about 23% by 2020 (Whittaker and Shelby 2007). As a result, backpacking use may not grow as fast as other uses.

b. Day Hiking (includes nature watchers, photographers, hunters, etc. who do not camp)

Nationally, day hiking appears to be increasing. 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.

c. Backcountry Angling

Nationally, projections show fishing participation is likely to grow. More specifically individual reaches of the upper segment of the Chattooga, particularly the Delayed Harvest section, are candidates for more growth in the future as long as stocking practices and/or regulations remain unchanged (Whittaker and Shelby 2007).

d. Whitewater Boating

About 1 to 2% of the national population participates in whitewater kayaking. Within whitewater kayaking, the proportion of boaters interested in smaller high gradient rivers or Class IV-V rapids is generally small. In an Oregon study (Whittaker and Shelby, 2002), Class IV-V boaters were estimated to be 10 to 15% of all whitewater kayakers; the Southern Appalachian region is probably similar. Whitewater kayaking saw growth in the mid to late 1990s, but that growth has flattened in recent years. In 1998, an estimated four million people kayaked (2% of adults); by 2004 this number had risen to ten million (4.6%). Use data from the lower Chattooga shows considerably higher use in the late-1990s, with a drop-off in the first part of the 2000s (possibly explained by several recent low water years) (Whittaker and Shelby 2007).

e. Scenic Boating

From a national perspective, boating on less challenging rivers in canoes, tubes or other small craft has higher participation rates than whitewater boating, and may be increasing at a greater rate. About 10% of the national population participates in canoeing, and an additional 3% participate in recreational (sit-on-top) kayaking. Not all this use occurs on rivers, but there is probably a larger population of potential users for floating on easy rivers. Scenic floating has grown consistently since 1998; however, use of Sections 1 and 2 on the lower Chattooga (which features scenic floating) has generally declined from peaks in the mid-1990s, and appears to have stabilized over the past decade.

C. Potential Recreation Use Conflict on the Upper Chattooga

Based on public comments made throughout the LAC process, there is evidence of potential recreation use conflict on the upper Chattooga River regarding boating use. Even as stakeholders may dispute the precipitating reasons for the original 1976 boating prohibition, some forest users and local residents clearly value boat-free recreation experiences on the upper segment of the river, and either 1) oppose removal of the boating prohibition, or 2) support strong restrictions on boating to minimize impacts on other users. In contrast, some boaters clearly 1) support re-opening the upper segment to boating, 2) prefer indirect management actions to address any impacts boating use might cause, and 3) request equitable access if restrictions are necessary.

Assessing the extent of potential conflict and analyzing the consequences of various managerial responses is challenging. The following describes concepts and considerations applied in this EA (developed from Whittaker and Shelby, 2007; Graefe and Thapa, 2004):

- The boating issue is labeled a potential conflict because unless boating is allowed, impacts from that use have not occurred. This label is intended to be neutral, and does not presume the existence of impacts or conflict if boating was allowed (nor does it rule those out).

- Recreation use conflict is related to, but different from, capacity. Conflict implies an incompatibility between two recreation uses or behaviors – disagreement about the ***type*** of use, while capacity focuses on concern over the ***amount*** of use. Having noted this, higher levels of an incompatible use may exacerbate conflict.

- Some conflicts are framed as one group's zero tolerance for another activity or behavior, and solutions focus on complete separation of uses. Other conflicts are more multi-faceted and recognize that some interaction between conflicting users may be acceptable if impacts can be reduced to acceptable levels. Successfully addressing conflict requires understanding the impacts which cause problems, the type of conflict (see discussion below) and its overall intensity.

- No study has specifically assessed the intensity of conflict between boating and other uses on the upper segment of the Chattooga (or other similar rivers). Accordingly, analyses focus on qualitative assessments of conflict issues and potential solutions, which have been included in the range of alternatives. Comments from public meetings indicate there are diverse perspectives on potential boating impacts and conflict with other users; consequences assessments will summarize them. However, there is little information that would help estimate the size or proportion of different user groups that hold particular viewpoints about these issues.

1. Types of Potential Conflict on the Upper Segment of the Chattooga WSR

Two different types of potential conflict have been identified on the upper segment of the Chattooga: social values conflict and face-to-face conflict.

a. Social Values Conflict

Social values conflict refers to a situation where a sensitive group opposes an activity that they believe is inappropriate regardless of whether they will encounter it during their trips (Vaske, 1995; 2006). This conceptualization is addressed in the larger Social Impact Analysis in Section 3.6.2 Social Impact Analysis and Appendix F of this EA. Alternatives 1, 2 and 3, which do not allow boating on the upper segment of the Chattooga WSR, presume the existence of a social values conflict and address it by defining the upper river as a boat-free area. The alternatives that allow boating (8, 11, 12, 13 and 14) presume that social values conflict is less central and would not be addressed through a year-round, boating prohibition on the upper segment.

b. Face-to-Face Conflict

Face-to-face conflict refers to a situation where a sensitive group wants to avoid an offending use or minimize impacts from that use. This conceptualization is addressed in the environmental consequences section which explores number of days when both groups might both be in the upper segment of the Chattooga WSR Corridor, and their level of interaction for different alternatives. It presumes that potentially conflicting uses would be allowed, but examines a variety of ways to separate uses or otherwise minimize impacts of offending uses. The year-round boating closure in alternatives 1, 2 and 3 address face-to-face conflict, essentially managing for boating on the lower river segment and maintaining a boat-free experience on the upper segment of the Chattooga WSR. Alternatives that allow boating on the upper segment presume different levels of face-to-face conflict that may need to be addressed, with different alternatives trading-off increased boating access with greater protection of opportunities for boat-free or low boating use experiences.

Many face-to-face conflicts can be considered asymmetrical which occur when group A reports more adverse impacts from group B than the converse. This is characteristic of many recreation use conflicts (e.g., skiers and snowmobilers, motorized and non-

motorized boaters, hikers and horseback users) and helps explain why the non-sensitive groups may be more willing to share while the sensitive group may not; sharing does not have the same consequences for each group.

Conceptually, a boater-angler encounter may equally diminish solitude for both users, but some anglers claim that boats passing also interferes with their activity (e.g., may require wading anglers to move away from boats, fish in a different part of the river, or stop fishing for a short period because of their perception that a passing boat may have spooked fish and lowered fishing success). Similarly, fishing etiquette discourages anglers from approaching or passing another angler in the channel, but boaters have little choice but to pass an angler to complete their trip. In contrast, boaters experience few interference impacts from passing an angler (unless the angler is blocking the channel); their activity is simply less affected by the encounter.

c. Limited Tolerance

For some proportion of current users on the upper segment of the Chattooga WSR, neither face-to-face nor social values conflict may be a central concern, but they still may be interested in minimizing impacts from boating use. These users may be willing to accept some boating use, but they want the amount of boating use (and subsequent encounters or other impacts) to not exceed acceptable levels. For these users, capacity and encounter levels are the primary issue and not conflict, but restrictions or limits addressing conflicts may partially address these issues too.

2. Separation Strategies to Mitigate Potential Conflict

Addressing recreation use conflicts is authorized and encouraged by best practices identified in the US Forest Service Manual (FSM 2354.41a). Directives include:

> When necessary, develop prescriptions to manage the character and intensity of recreational use on the river. Use specific management objectives for each segment. Consider the following factors in developing direction:
>
> 1. Capabilities of the physical environment to accommodate and sustain visitor use.
> 2. Desires of the present and potential recreation users and trends over time in the amounts, types, and distribution of recreational use and the characteristics of recreation users. These help identify what kinds of recreation opportunities to provide and how and where to manage and maintain such opportunities.
> 3. The diversity of river recreation opportunities available within the geographic region.

Separating users by space is a common way to address face-to-face conflict in land-based settings; for example, most national forests define distinct areas where motorized and non-motorized uses can occur. In river settings, zoning by segment or reach is also an effective, often-used tool. The year-round boating closure in alternatives 1, 2 and 3 uses this approach at a larger scale, essentially managing for boating on the lower river and non-boating activities on the upper segment of the Chattooga WSR.

Other examples of zoning under existing conditions on the Chattooga River include:

- Temporal separation on the lower river that encourages commercially guided use on weekdays and in the mornings to separate commercial trips from the self-guided ones that generally occur more frequently on weekends and afternoons.
- Spatial separation that provides designated trails only for horses in the wild and scenic corridor.
- Spatial separation that divides the river into wild, scenic and recreation sections that control the types of development that are allowed to occur there (e.g., no roads along the river in wild or scenic reaches).
- Spatial and temporal separation by season and reach for different types of fishing (although this may primarily focus on fishery rather than social experience objectives).

D. Biophysical Attributes Affecting Recreation Experiences

a. Campsites

Biophysical impacts at campsites are discussed from a biological perspective in other parts of the EA; here the focus is on biophysical effects on recreation experiences. During the LAC process, forest visitors described concern over the amount of bare ground and cleared area, damaged trees, and litter at camps. Such impacts may also increase perceived crowding or decrease a sense of remoteness. Potential management responses include designating campsites in locations that can handle sustained use, while closing or rehabilitating others. This may reduce the number of available campsites, which may increase competition for sites

b. Trails

Biophysical impacts from trails may also affect recreation experiences. During the planning process, forest visitors indicated that poor trail conditions diminished aesthetic or scenic quality of the corridor. They may also increase perceived crowding or decrease the sense of naturalness. In addition, visitors expressed concern about trail erosion and sedimentation, an issue addressed in sections 3.3.2 and 3.4.1.

III. Environmental Consequences

A. Alternative 1 Direct and Indirect Effects

1. Recreation Use Conflicts

Zoning would continue to separate existing users above Highway 28 and boaters below Highway 28. This prevents any face-to-face use conflicts between these groups, with the trade-off being no boating opportunities on the upper Chattooga River. This alternative also addresses the boating issue from a social values conflict perspective, defining the upper river as a year-round boat-free area (and implicitly suggesting the lower river provides adequate opportunities for boating).

2. Frontcountry Conditions

Alternative 1 does not define explicit capacities for any frontcountry area, although existing parking areas (including lots and roadside parking) have *de facto* capacities that may limit some use after they are filled. With projected use increases, visitors on higher use days may fill parking areas and experience higher levels of congestion, perceived crowding or a reduced sense of naturalness than at present. This could displace some users or adversely impact their experiences. During the rest of the year, few problems are expected in frontcountry areas.

Based on use trend projections and estimates of current use levels (Table 3.2.1-6), the most likely locations and seasons with potential for higher congestion and crowding, include:

- Weekends at Highway 28 during the Delayed Harvest season November 1 – May 14; and
- Weekends at Bullpen Road Bridge Area in July and August.

Existing forest plans require management action if visitor parking (at parking areas or along roads) begins creating resource damage. Under this alternative, additional parking areas may be developed to accommodate increased demand for frontcountry access. Any site-specific decisions related to parking would require additional analysis.

Given these frontcountry trends, demand for parking is likely to increase in the future. As a result, more users at the Highway 28 Bridge Area may be displaced on high-use days. At the other three frontcountry areas, the number of available parking spaces for people to use could decrease on high-use days as time goes on.

Table 3.2.1-7 Alternative 1-Existing and Projected Use [1] Patterns in Frontcountry Areas for the Three Highest Use Periods

Frontcountry Area	Facility-based Capacity (Parking Lots in Vehicles at One Time	Facility-based Capacity (Parking Lots in People at One Time)	Peak Use Month[2] Parking Demand	Projected Parking Demand in 20 years	Second Highest Use Month[2] Parking Demand	Projected Parking Demand in 20 years	Third Highest Use Month[2] Parking Demand	Projected Parking Demand in 20 years
Grimshawes/ Sliding Rock Area	25	65	August 25	demand exceeds design capacity	July 18	demand meets design capacity	July 17	demand is below design capacity
Bullpen Road Bridge Area	15	40	August 12	demand exceeds design capacity	July 11	demand meets design capacity	January, August, September & October 8	demand is below design capacity
Burrells Ford Bridge Area	80	205	March 63	demand exceeds design capacity	October 46	demand is below design capacity	May & October 45	demand is below design capacity
Highway 28 Bridge Area	35	85	March 36	demand exceeds design capacity	November 30	demand exceeds design capacity	May & December 25	demand meets design capacity

[1] Projected demand is based on a 40% increase in parking over a 20 year period.
[2] Based on number of vehicles in the parking lot at one time on a single weekend day in a month.

3. Backcountry Social Conditions

Alternative 1 does not define capacities for backcountry reaches. With the exception of the Ellicott Wilderness Area in North Carolina, Alternative 1 also does not establish encounter or similar standards that define when impacts become unacceptable. As a result, the solitude component of the Recreation ORV could become degraded. With projected use increases, visitors on higher use days (particularly weekends from May through August) will have more river, trail, or camp encounters than they experience now. This could displace some users or otherwise detract from the desired recreation experiences. It would also reduce opportunities for solitude in the Ellicott Wilderness. On lower use days during the rest of the year, social impacts are not expected to exceed average summer levels available at present.

Alternative 1 does have encounter standards in the Ellicott Rock Wilderness in North Carolina. Workshop use estimates suggest North Carolina has the lowest amount of use in the Ellicott Rock Wilderness, and encounters are unlikely to be exceeded even with the projected growth in use.

The number of campsite encounters (where users camp within sight or sound of other groups), as well as encounters on trails, is likely to increase from existing levels as use levels rise. Alternative 1 would allow camps and trails to be rehabilitated or closed to reduce biophysical impacts to trails and campsites, or to reduce camps within sight or sound of each other.

4. Biophysical Attributes Affecting Recreation Experiences

a. Campsites

Campsites that violate forest standards would be closed or rehabilitated. Some camps may be closed under this alternative, but less than under any other action alternatives. To the extent camps are closed, visitors may lose opportunities to use those sites, which could exacerbate camp competition. However, this also would increase opportunities for solitude and a sense of remoteness compared to existing conditions. If enough campsites are removed from use, this could displace some backpackers to lower use times or other recreation areas. However, some replacement user-created campsites could replace those closed by the agency since there is no prohibition on user-created campsites in the current forest plans.

b. Trails

Trails that violate forest standards would be rehabilitated, relocated or closed. Some trail work would occur with this alternative, but less than for any of the action alternatives. To the extent that user-created trails (or designated trails in poor condition) are closed, they may reduce some trail opportunities or require users to learn new routes. However, such closures may also increase opportunities for solitude and remoteness by reducing “signs of use” or mileage with sub-standard conditions.

5. Monitoring and Adaptive Management

Limited use and biophysical monitoring were initiated for this planning effort, which has improved information about upper Chattooga River use levels and conditions. However, this alternative does not propose continued intensive monitoring efforts, nor identify adaptive management actions that might be implemented in response to impact problems.

6. Recreation ORV

Opportunities for solitude, the most limiting component of the Recreation ORV, could be impacted given projected future use levels and the lack of capacities and encounter levels in this alternative. However, these effects are not likely to be substantial during the existing planning horizon. The effects described for this alternative would protect and enhance the Recreation ORV in the upper segment of the Chattooga WSR.

B. Alternative 1—Cumulative Effects

Past, present and reasonably foreseeable projects (see Table 3.1-6) have the potential to affect frontcountry and backcountry recreation experiences, including two past projects (2010-2011) Burrells Ford Campground rehabilitation and the ongoing reconstruction/ relocation of the Chattooga Trail) and three future projects (development of the Southern Appalachian Farmstead (SAF), County Line Road parking lot construction, and a request for new outfitter/guide special use recreation permits for hiking/backpacking and fishing in all reaches except the Ellicott Rock Wilderness).

1. Chattooga Trail

The reconstruction/relocation of the Chattooga Trail is not expected to change use, but will reduce biophysical impacts from trail use.

2. Burrells Ford Campground

The Burrells Ford Campground project rehabilitated existing campsites and reduced the number of sites from 25 to 22. This may displace some frontcountry campers during the busier times of the year (when all sites are sometimes occupied), but offers higher quality sites with improved screening as a trade-off.

3. Southern Appalachian Farmstead

The proposed increase in parking spaces from 15 to 30 at the Southern Appalachian Farmstead (about one-half mile south of the Highway 28 bridge) could increase use at the Highway 28 Bridge Area and in the Nicholson Fields Reach during the high-use times of the year, which might exacerbate crowding and congestion in the frontcountry.

4. Parking Lot at County Line Road

Parking lot construction at County Line Road would not affect use or encounters in any reach, since it simply replaces parking spaces lost when a state road was widened.

5. Outfitter/Guide Recreation Special Use Permits

The Andrew Pickens Ranger District is considering a request for new outfitter/guide recreation special-use permits on the upper segment of the Chattooga WSR for hiking/backpacking and fishing (no new use is being requested inside the Ellicott Rock Wilderness).

6. Recreation ORV

The projects listed above could impact opportunities for solitude, the most limiting component of the Recreation ORV, given projected future use levels and the lack of capacities and encounter levels in this alternative. However, implementation of current forest plan standards and guidelines would continue to protect and enhance the Recreation ORV.

C. Alternative 2 Direct and Indirect Effects

1. Recreation Use Conflicts

The effects of this alternative on recreation use conflicts are the same as Alternative 1.

2. Frontcountry Conditions

Alternative 2 defines explicit capacities (groups at one time) for all frontcountry areas, which would be enforced at all four frontcountry parking areas. The alternative would reduce parking availability in some areas (Burrells Ford), and would not allow further parking development even if demand to use these areas increases. This alternative offers the lowest density recreation opportunities of all the alternatives. Table 3.2.1-8 identifies capacities and assesses whether projected use increases will exceed them in the three highest use months. On days when use exceeds these capacities, some users would be displaced. The trade-off is higher quality experiences for those who are present. Specific differences in this alternative compared to other alternatives include:

- Eliminating parking along Burrells Ford Road within one-quarter mile of the river would reduce parking spaces by approximately 50% from current management. This would enhance frontcountry recreation experiences by reducing the number of people in the area at one time (providing greater opportunities for low density recreation) and removing adverse scenic effects from parallel parking along the road. However, it also increases competition for designated parking spaces that remain. Given existing use patterns and trends, this is likely to be most noticeable on weekends from late March through July and again in October. It is likely that some users would be displaced at these times because they could not find a parking space.

- Enforced parking limits at Bullpen Road Bridge would probably also produce some weekends where visitors may be unable find parking, and thus be displaced. Vehicle counts from 2007 indicate that the designated parking area at Bullpen nearly fills on some weekends in July and August.

Enforced parking limits at Highway 28 during the Delayed Harvest season November 1 – May 14 would probably displace some users on weekends due to full parking lots.

Table 3.2.1-8 Alternative 2-Existing and Projected Use [1] Patterns in Frontcountry Areas for the Three Highest Use Periods

Frontcountry Area	Capacity in Groups at One Time	Capacity in People at One Time	Peak Use Month[2] Parking Demand	Projected Parking Demand in 20 years	Second Highest Use Month[2] Parking Demand	Projected Parking Demand in 20 years	Third Highest Use Month[2] Parking Demand	Projected Parking Demand in 20 years
Grimshawes/ Sliding Rock Area	25	65	August 25	demand exceeds capacity	July 18	demand meets capacity	July 17	demand is below capacity
Bullpen Road Bridge Area	15	40	August 12	demand exceeds capacity	July 11	demand meets capacity	January, August, September & October 8	demand is below capacity
Burrells Ford Bridge Area	40	100	March 63	demand exceeds capacity	October 46	demand exceeds capacity	May & October 45	demand exceeds capacity
Highway 28 Bridge Area	35	85	March 36	demand exceeds capacity	November 30	demand exceeds capacity	May & December 25	demand meets capacity

[1] Projected demand is based on a 40% increase in parking over a 20 year period.
[2] Based on number of vehicles in the parking lot at one time on a single weekend day in a month.

3. Backcountry Social Conditions

Alternative 2 defines capacities for backcountry reaches in terms of average groups per day; the capacities in this alternative are the same on weekends and weekdays, and would apply to both day and overnight users Table 3.2.1-9. The capacities are designed to prevent backcountry encounters from exceeding about four per day, depending on the river reach, and overnight users from camping within sight or sound of each other. These encounter levels are consistent with median tolerances for trail/river and camp encounters in wilderness settings (Vaske et al., 1986; Shelby et al., 1996). Backcountry capacities would be enforced through day and overnight permit systems as needed.

When compared to current management, these capacities would increase opportunities for solitude and remoteness for those visitors who are able to obtain a permit. However, the permit system would also displace some users – some may be unable to obtain a permit when demand exceeds supply, others may be unwilling to even compete for permits because they consider it inconvenient. Even for users willing to participate, the managerial footprint imposed by the permit system may be problematic.

Table 3.2.1-9 Alternative 2 backcountry capacities and encounters by river reach

Reach	Capacity (Number of groups per day)	Capacity (Number of people per day)		Encounters (Average number of groups per day)	
	Weekdays and Weekends	Weekdays	Weekends	Weekdays	Weekends
Chattooga Cliffs	5	10	15	0-2	0-3
Ellicott Rock	5	20	35	0-3	0-3
Rock Gorge and Upper Nicholson Fields *(Lick Log Creek to Reed Creek)*	5	15	20	0-3	0-3
Lower Nicholson Fields *(Reed Creek to Hwy.28)*	15	25	25	0-6	0-6

4. Biophysical Attributes Affecting Recreation Experiences

a. Campsites

Alternative 2 would implement a systematic program to designate camps that are out of sight and sound of each other to increase solitude for wilderness-like settings. In general, a maximum of one camp will be retained per quarter-mile of river. This would result in some campsites being closed and, therefore, reducing the number available to users. The permits and campsite reservations designed to meet capacities would also ensure overnight use levels do not exceed campsite supply (and may require individual camps to be reserved as part of the system). Taken together, the permit system and campsite reservation system could displace some backpackers to lower use times or other recreation areas. However, such management actions may also increase opportunities for solitude and remoteness by reducing “signs of use” or campsites with sub-standard conditions.

b. Trails

Alternative 2 would implement a systematic program to identify and rehabilitate, relocate or close out-of-compliance trails. Considerable trail work would occur with this alternative to ensure trails are in better condition, conform better to the landscape, and are environmentally sustainable to enhance opportunities for solitude and remoteness. To the extent that user-created trails (or designated trails in poor condition) are closed, they may reduce some trail opportunities or require users to learn new routes. However, such closures may also increase opportunities for solitude and remoteness by reducing “signs of use” or mileage with sub-standard conditions.

5. Monitoring and Adaptive Management

Monitoring and adaptive management are critical for Alternative 2, which has more stringent backcountry and frontcountry capacities to provide less congestion at trailheads and lower encounters in the backcountry. Once monitoring establishes the relationship between current use levels and encounters, the number of permits issued each year would be reduced to achieve the desired condition of increased opportunities for solitude.

6. Recreation ORV

Opportunities for solitude, the most limiting factor in the Recreation ORV would be enhanced in this alternative compared to Alternative 1. The effects described for this alternative would protect and enhance the Recreation ORV in the upper segment of the Chattooga WSR.

D. Alternative 2—Cumulative Effects

Past, present and reasonably foreseeable actions listed in Table 3.1-6 that have the potential to impact desired recreation experiences include projects that reduce biophysical impacts and improve the recreation experience and include reconstruction or reroute of trails. Past projects have included horse trail relocations and horse camp restoration to reduce resource impacts in the watershed. The following recently completed projects are specifically noted:

1. Chattooga Trail

The reconstruction/relocation of the Chattooga Trail is not expected to change use or related social impacts (encounters), but would reduce biophysical impacts from trail use.

2. Burrells Ford Campground

The Burrells Ford Campground project rehabilitated existing campsites and reduced the number of sites from 25 to 22. This may displace some frontcountry campers during the busier times of the year (when all sites are sometimes occupied), but offers higher quality sites with improved screening as a trade-off.

3. Southern Appalachian Farmstead

The proposed increase in parking spaces from 15 to 30 at the Southern Appalachian Farmstead (about one-half mile south of the Highway 28 bridge) could increase use at the Highway 28 Bridge Area and in the Nicholson Fields Reach during the high-use times of the year, which might exacerbate crowding and congestion, as well as increase backcountry encounters and the number of people/groups at one time in the frontcountry.

4. Parking Lot at County Line Road

Parking lot construction at County Line Road would not affect use or encounters in any reach, since it simply replaces parking spaces lost when a state road was widened.

5. Outfitter/Guide Recreation Special Use Permits

The Andrew Pickens Ranger District is considering a request for new outfitter/guide recreation special-use permits on the upper segment of the Chattooga WSR for hiking/backpacking and fishing (no new use is being requested inside the Ellicott Rock Wilderness). The potential issuance of outfitter/guide recreation special-use permits on the upper segment of the Chattooga WSR for hiking/backpacking and fishing (except inside the Ellicott Rock Wilderness) would be managed to avoid placing additional users into the backcountry when use is at or near capacity (June, July and August). If issued, permits would likely be given outside the peak use season when the demand is below capacity and encounter limits.

6. Recreation ORV

The projects listed above would be approved only after site-specific analysis determines they would protect and enhance the Recreation ORV in the entire Chattooga WSR Corridor.

E. Alternative 3—Direct and Indirect Effects

1. Recreation use conflicts

Effects of Alternative 3 on recreation use conflicts are the same as alternatives 1 and 2.

2. Frontcountry Conditions

Alternative 3 defines explicit capacities (groups at one time) for all frontcountry areas, which would be enforced. The alternative differs from Alternative 2 by maintaining existing parking availability in all four areas (no reduction at Burrells Ford). However, it is similar to Alternative 2 in not allowing additional parking development even if demand for these areas increases. This alternative offers similar medium density recreation opportunities in frontcountry areas as do the remaining alternatives (8, 11, 12, 13 and 14). Table 3.2.1-10 identifies capacities and assesses whether projected demand would exceed them in the three highest use months. On days when use reaches these capacities, some users would be displaced. The trade-off is higher quality experiences for those who are present.

Table 3.2.1-10 Alternative 3-Existing and Projected Use [1] Patterns in Frontcountry Areas for the Three Highest Use Periods

Frontcountry Area	Capacity in Groups at One Time	Capacity in People at One Time	Peak Use Month[2] Parking Demand	Projected Parking Demand in 20 years	Second Highest Use Month[2] Parking Demand	Projected Parking Demand in 20 years	Third Highest Use Month[2] Parking Demand	Projected Parking Demand in 20 years
Grimshawes/ Sliding Rock Area	25	65	August 25	demand exceeds capacity	July 18	demand meets capacity	July 17	demand is below capacity
Bullpen Road Bridge Area	15	40	August 12	demand exceeds capacity	July 11	demand meets capacity	January, August, September & October 8	demand is below capacity
Burrells Ford Bridge Area	80	205	March 63	demand exceeds capacity	October 46	demand is below capacity	May & October 45	demand is below capacity
Highway 28 Bridge Area	35	85	March 36	demand exceeds capacity	November 30	demand exceeds capacity	May & December 25	demand meets capacity

[1] Projected demand is based on a 40% increase in parking over a 20 year period.
[2] Based on number of vehicles in the parking lot at one time on a single weekend day in a month.

3. Backcountry Social Conditions

Alternative 3 defines capacities for backcountry reaches in terms of average groups per day; the capacities in this alternative vary on weekends and weekdays to provide a diversity of opportunities, and would apply to both day and overnight users (Table 3.2.1-11). The capacities are designed to prevent backcountry encounters from exceeding between two and eight per day on weekdays and between four and 15 per day on weekends (depending on the reach). These encounter levels are consistent with median tolerances for trail/river encounters in higher use wilderness settings (Dawson & Alberga, 2003) and similar to findings from a survey of Chattooga user in the Ellicott Wilderness (Rutlin, 1995).

Table 3.2.1-11 Alternative 3 backcountry capacities and encounters by river reach

Reach	Capacity (Number of groups per day)		Capacity (Number of people per day)		Encounters (Average number of groups per day)	
	Weekdays	Weekends	Weekdays	Weekends	Weekdays	Weekends
Chattooga Cliffs	5	10	10	15	0-2	0-4
Ellicott Rock	10	20	35	110	0-4	0-9
Rock Gorge and Upper Nicholson Fields *(Lick Log Creek to Reed Creek)*	15	30	40	95	0-8	0-14
Lower Nicholson Fields *(Reed Creek to Hwy.28)*	15	30	40	95	0-8	0-15

3. Backcountry Social Conditions

a. Campsites

Alternative 3 would implement a systematic program to identify and designate camps that are out of sight and sound of each other to limit encounters and maintain opportunities for solitude (and rehabilitating others). The program would also ensure that remaining campsites are appropriately sized and designed for sustainable use. However, the program is less likely to be as aggressive in closing camps as Alternative 2 but more than Alternative 1. These actions would ensure there are sufficient numbers of camps to handle capacities in this alternative.

b. Trails

Alternative 3 would implement a systematic program to identify and rehabilitate, relocate or close out-of-compliance trails. Some trail work would occur with this alternative to ensure trails are in better condition, conform better to the landscape and are environmentally sustainable to limit encounters and maintain opportunities for solitude and remoteness–less than in Alternative 2 but more than Alternative 1. To the extent that user-created trails (or designated trails in poor condition) are closed, they may reduce some trail opportunities or require users to learn new routes. However, such closures may also increase opportunities for solitude and naturalness by reducing signs of use or trail mileage with sub-standard conditions.

4. Monitoring and Adaptive Management

If monitoring, as described in Chapter 2, shows that use and impacts are increasing or threatening to impact the desired condition for this alternative, the agency would implement adaptive management actions to protect existing opportunities for solitude and remoteness and, therefore, the Recreation ORV. In general, indirect actions would be implemented first; additional limitations on parking would work to reduce encounter levels, and protect opportunities for solitude. The trade-off is that those who cannot obtain parking would have to recreate in less congested areas within the corridor (other reaches), recreate in their desired area at another time, or be displaced.

If indirect actions are ineffective, direct measures would be implemented. Direct measures emphasize regulating behavior and restricting individual choice. These would probably focus on a backcountry use permit system. Some users may be unable to obtain a permit when demand exceeds supply, while others may be unwilling to even compete for permits because they consider it inconvenient, or oppose the loss of freedom under this new, direct management. Even for users willing to participate, the managerial footprint imposed by the permit system may be problematic.

5. Recreation ORV

Opportunities for solitude, the most limiting factor in the Recreation ORV would be enhanced in this alternative compared to Alternative 1. The effects described for this alternative would protect and enhance the Recreation ORV in the upper segment of the Chattooga WSR.

6. Cumulative Effects

Same as Alternative 2.

F. Alternative 8 Direct and Indirect Effects

1. Recreation Use Conflicts and Boating Access

This alternative allows year-round boating to occur on the upper segment of the Chattooga WSR (with no flow, reach or seasonal restrictions). Therefore, it would provide desirable boating opportunities but also potentially create use conflicts between boaters and other users when boaters are present. This alternative addresses this potential conflict from a face-to-face rather than social values perspective. It recognizes that boating use may produce unacceptable impacts for some non-boating users, but does not define the upper segment of the Chattooga WSR as a boat-free setting (or suggest the lower river alone provides adequate boating opportunities). Instead, it relies on natural separation that is likely to occur through most of the year because different groups have some different flow and season preferences. However, on the days when boating and other uses overlap, users would share the river and the potential for face-to-face conflict would increase.

a. Assessing Boating Access and Potential Conflict: Days with and without Boating Opportunities

Analysis of recreation use conflicts initially focuses on estimating days with and without boating; the former have the potential for face-to-face conflict, while the latter do not. The analysis relies on information about 1) flow ranges when boating could occur; 2) estimates about whether boaters would be able to take advantage of those flows; and 3) the number of days in specific flow ranges based on hydrology data. Assumptions about flow ranges and the ability of boaters to use flows are largely based on information from the Integrated Report (Whittaker and Shelby 2007); details of the hydrology analysis (with estimates updated since the Integrated Report to include data from the Burrells Ford USGS gage) are presented in Appendix C. A summary of major assumptions for this analysis are given below; Table 3.2.1-12 summarizes the number of days with and without opportunities for boating.

- At least some whitewater boaters would use every day with optimal boating flows (defined as 350 to 800 cfs at Burrells Ford), but the number of boaters would vary (higher use on weekends when optimal boating flows are more predictable; lower use on weekdays or when flows are provided by smaller storm events that are challenging to predict and use).

- Whitewater boaters would also use an estimated 50% of the days with acceptable but not optimal boating flows (225 to 350 cfs).

- Scenic boating would occur on approximately 50 total days per year on the Lower Nicholson Fields Reach and ten days on the East Fork to Burrells Ford section of the Ellicott Rock Reach and ten days from Burrells Ford Bridge south to Big Bend Falls. All of these days would occur from May to September, and concurrently with days when flows are suitable for whitewater. After accounting for days when both whitewater and scenic boating overlap, any leftover scenic boating days add to the cumulative total of days with opportunities for boating (these can occur at flows that are lower than days when flows are suitable for whitewater boating).

- A low estimate of days when flows would occur in a specific range was developed from mean daily flows (MDF; the average for a 24-hour period). For a day to provide whitewater boating opportunities using this method, the MDF must be within the identified range. This tends to underestimate the number of actual whitewater boating days because some days may have suitable flows for enough of the day for boaters to use it, even if the average or mean daily flow would not qualify.

- A high estimate of days when flows would occur in a specific range was developed from peak flows for a 24-hour period. For a day to provide whitewater boating opportunities using this method, the gage must register just 15 minutes of a flow in the specified range. This tends to overestimate the number of actual whitewater boating because some flows will not last long enough for boaters to use them.

Table 3.2.1-12 Estimated number of days with and without boating opportunities in Alternative 8.

Reach	Mean Daily Flow method (low estimate)		Peak flow method (high estimate)	
	Days with boating opportunities	Days without boating opportunities	Days with boating opportunities	Days without boating opportunities
Chattooga Cliffs	63	302	99	266
Ellicott Rock				
Rock Gorge and Upper Nicholson Fields Reach *(Lick Log Creek to Reed Creek)*				
Lower Nicholson Fields *(Reed Creek to Hwy.28)*	97	268	118	247

Although this alternative would allow boating to occur throughout the year, analysis suggests that boating would occur on many fewer than 365 days, which reduces the potential for conflict. In total, this alternative estimates boating would occur on 63 or 99 days (17 or 27% of the year, depending on the calculation method) for the upper reaches and 97 or 118 days (about 27 or 32% of the year) for the lower part of Nicholson Fields.

This alternative accordingly provides the greatest diversity of boating opportunities among the alternatives, allowing boating to occur whenever flows (or weather) are favorable on all reaches below Green Creek. It would provide Class IV-V whitewater kayaking, canoeing or rafting on steeper reaches by highly skilled boaters at a range of flows, as well as Class I-II scenic boating on short sections at any flows that could be boated (see Affected Environment for descriptions).

b. Assessing Boating Access and Potential Conflict: Factors that Influence Type and Amount of Use

While Alternative 8 would provide a diversity of boating opportunities, it also would increase the potential for conflict between boating and other uses. This conflict depends on more than the mere presence of boats; the potential for face-to-face conflict is also affected by 1) the type of boating; 2) the number of boats and group sizes; 3) the type of non-boating users; and 4) patterns of non-boating use. Relevant findings include:

- All other variables being equal, scenic boating may be more likely to conflict with non-boating users than whitewater boating. Scenic boaters would use lower gradient reaches as well as lower flows that are optimal for fishing and swimming. Scenic boating is also more likely to occur in warmer months when non-boating use is often higher. Alternative 8 is the only alternative that would allow substantial scenic boating in warmer months (other alternatives limit boating use by season or by flow, which make scenic boating less likely). Potential conflicts with swimmers and anglers on the lower part of Nicholson

Fields and the short reaches on either side of Burrells Ford are the most likely reaches of concern with this type of boating.

- Boat-based angling (a sub-category within scenic boating) also could occur with this alternative; the most likely locations include all three low gradient reaches (Ellicott Rock from East Fork to Burrells Ford, Rock Gorge from Burrells Ford downstream to the rapids above Big Bend Falls, and lower Nicholson Fields). This type of boating is also more likely to conflict with other users (particularly anglers) than whitewater boating. In addition to impacts from boats passing anglers, boating-based anglers would also compete for fishing water and thus affect levels of solitude for backcountry anglers. Although access challenges are also likely to keep this use low, there is more uncertainty about whether this use might develop compared to whitewater or other types of scenic boating (there is little history of boat-based angling on the Chattooga, including the lower Chattooga).

- Although it is challenging to estimate how many boaters would seek scenic opportunities with this alternative, the number is likely to be low because of a lack of road access at put-ins and take-outs. The Integrated Report estimates that scenic boating might occur on 50 to 60 days a year (all in summer), and that only one to two small groups of three to five people would boat on each of those days. The total user-days from this estimate is comparable to current boating use levels on Section 1 on the lower segment of the Chattooga WSR (the lowest use section on the lower segment), a reach with road access on both ends. As noted previously, the expert boater "Panelists generally agreed that the upper Chattooga is not appropriate for larger rafts with 4 to 6 people per boat" (Whittaker and Shelby 2007) which are allowed in this alternative. However, Nicholson Fields has lower gradient and flatter water that could support raft use for scenic boating.

- This alternative has the greatest potential for conflict between whitewater boating and other users because it is the only one that allows boating under 350 cfs (which is optimal for fishing) during the high-use season from May through August. However, there are likely to be few whitewater boaters on the river at flows below 350 cfs, which are acceptable but not optimal for whitewater. The Integrated Report estimates about five boaters per day would use these lower flows, thus minimizing the number of encounters even on the days that boating and non-boating uses overlap.

- Higher whitewater boating use would occur at flows between 350 and 800 cfs, increasing the potential for conflict on those days (about 32 or 66 days per year, depending upon whether using the MDF or peak method of calculation). These are the highest value days for whitewater boaters, but they are sub-optimal for most anglers, which would help minimize potential for conflict.

- The likelihood of these optimal whitewater boating flows is higher between December and May, with the highest likelihood from February through April. Storms also tend to be larger and last longer in these months, so there would likely be more advance warning and longer availability of flows with boating opportunities, which would make them easier for boaters to use. These are generally lower use time for other recreationists, with the notable exception of the Delayed Harvest for anglers.

- Compared to other alternatives, Alternative 8 would provide boaters with the greatest flexibility to use these flows because it has no flow, reach or season restrictions. For non-boating users seeking no or low-boating experiences, there would be less certainty about which days would provide those experiences (they would not be able to count on specific flow or season restrictions to eliminate boating on some days).

- Use levels during optimal flows for whitewater boating could affect the potential for conflict in Alternative 8 although backcountry capacities may mitigate this problem (see backcountry conditions below). The Integrated Report estimates as many as 70 boaters a day might use the Ellicott Rock Reach on a spring weekend day that has optimal boating flows (assuming that use is not constrained by a capacity). Peaks of 20 and 40 were similarly estimated for the Chattooga Cliffs or Rock Gorge reaches, respectively, for a similar ideal boating day. Boating stakeholders acknowledge that individual reaches by themselves could attract those peak-use levels, but also note that all three whitewater reaches would be available on the same days and draw from the same pool of highly skilled boaters. This suggests that actual daily use on any given reach may be substantially lower than these peak estimates as boaters spread across the reaches (American Whitewater, 2007, p. 13). Determining the accuracy of these competing demand estimates may not be possible unless boating is allowed on the river and the agency monitors use. Backcountry capacities are designed to prevent too many groups from recreating on any given day. Nonetheless, there remains greater potential for conflict on high-use boating days than those with lower use.

- As with all boating alternatives, boater-angler encounters are likely to be more adverse than boater-hiker encounters or other encounters between non-boating users. Anglers spend most of their time near the river and usually fish a small section of the stream where they are likely to be passed by nearly all boaters present on that day. When these encounters occur, impacts on users are also more likely to be asymmetric (more adverse for anglers than for boaters). Because Alternative 8 allows the most boating, it would affect angling more than any other alternative.

- Encounters with boaters are likely to be less adverse to hikers than anglers because designated hiking trails are often out of view of the river. Based on GPS-based trail mapping, 26% of designated trails and 51% of user-created trails in the

upper segment of the Chattooga WSR Corridor are within 100 feet of the river (a conservative estimate of when it is possible to see the river through vegetation). In many if not most cases, encounters between hikers/backpackers and boaters from these trails will be "brief sightings" through the trees (Whittaker and Shelby 2007). However, when backpackers/hikers are off-trail to recreate in the river or along its banks, they would be more likely to encounter boaters in Alternative 8 than in any of the other alternatives that allow boating.

- The amount of boating produced by this alternative is unlikely to affect camp encounters or camp competition between boaters and backpackers. Whittaker and Shelby (2007) note that "few boaters are expected to camp in the backcountry because flows with boating opportunities often occur for only a day or two and challenging rapids encourage boaters to take as little gear as possible."

- In general, boating is less likely to affect frontcountry users compared to backcountry users. There are fewer expectations of solitude within a quarter mile of road access, and many frontcountry users probably tolerate (and a few may even seek) interaction with other users, which may include boaters.

- There is potential for conflict between boaters and some other frontcountry users with this alternative, particularly anglers who may be fishing water where boaters are launching. Potential impacts could be reduced by developing boater access trails that reach the river at locations that are not heavily used by frontcountry anglers.

- Competition for parking at frontcountry areas may also be an issue, particularly on high-use days at a location with limited parking such as the Bullpen Bridge Area. Parking availability and frontcountry congestion are addressed below.

- Some swimmers are concerned about potential encounters with boaters. Specifically, some have expressed concern about having to move out of the way or about contact between boaters and swimmers in rapids. This alternative has the highest number of days with boating, and is the only one that allows summer boating use at flows that could conceivably produce this problem. However, the most frequent whitewater boating days are still in the winter and spring (when flows tend to be higher), and well outside the prime swimming season. Swimming also tends to occur at defined areas (particularly Sliding Rock, Bullpen Road Bridge and Burrells Ford) and at low flows, which would not attract much simultaneous boating use. Finally, even at rapids on the lower segment of the Chattooga WSR that are popular among boaters and swimmers during the same summer season (e.g., Bull Sluice Rapid), boater-swimmer physical contact appears to be rare and typically addressed through education efforts (Hedden, 2006).

c. Assessing Boating Access and Potential Conflict: Reach-Specific Factors

Physical characteristics of each reach and the location of trails along the river may also factor into the amount of interaction between boaters and other users on days when boats are present with this alternative, therefore affecting the potential for conflict.

i. Chattooga Cliffs Reach

In the Chattooga Cliffs Reach, heavy vegetation and trail locations farther from the river reduce the potential for encounters and conflict with trail users. Boaters may spend more of their time in this reach because of its more difficult rapids; however, designated trails are farther from the river, which reduces the time boaters would spend in areas where other users congregate. North Carolina fishing regulations also make bait angling illegal in this reach, so some anglers are less likely to fish here.

ii. Ellicott Rock Reach

In the Ellicott Rock Reach, steep terrain, thick rhododendron and lack of designated trails would reduce the chance of encounters between boaters and other users between Bullpen Road Bridge and the Ellicott Rock marker, regardless of flows. Downstream of the Ellicott Rock marker, potential encounters and conflict between boaters and others are more likely to be an issue, particularly south of the East Fork confluence where the river is wider, the gradient is not so steep and trails are closer to the river.

iii. Rock Gorge Reach

In the Rock Gorge Reach from Burrells Ford to Lick Log Creek, the most likely area for interaction between boaters and other users is the two-mile section from Burrells Ford to Big Bend Falls. Downstream of Big Bend Falls, steep terrain, thick vegetation and the lack of good access trails to the river make it more challenging for anglers or others to get to the river where they might encounter boaters. However, the Rock Gorge is probably the most remote area in the entire Chattooga WSR Corridor, and it also may attract a few wilderness-seeking anglers or hikers who are even more interested in solitude. For some of these users, an encounter with boaters may be even more adverse.

iv. Nicholson Fields Reach

In the Nicholson Fields Reach from Lick Log Creek to the Hwy. 28 bridge, the lower gradient and trails on both sides of the river increase the chance of encounters and conflict between boaters and other users, particularly anglers and swimmers (the main hiking trail in this reach is often farther away from the river). However, the river is wider in this reach, so there are some opportunities for boaters to pass wading anglers, as well as swimmers, with less impact. Angler use peaks on this reach in

November after the Delayed Harvest season opens; higher flows favored by whitewater boaters generally are more prevalent later in the winter and spring. The most likely time and reach for boater-angler encounters, and greatest potential for conflict, is the area between Reed Creek and the Highway 28 bridge in December and March; however, the potential for these encounters and conflict exists year round.

d. Assessing Boating Access and Potential Conflict: Summary

Taken together, Alternative 8 provides the most opportunities for boating, but the trade-off is greater potential for conflict with other users. Even though most boating would occur when non-boating uses are low, and on less than one-third of the total days in a year, this alternative would have the most overlap use and potential for conflict. Of all the alternatives, Alternative 8 would displace the most other users or decrease opportunities for non-boaters who seek solitude or boat-free experiences on the upper segment of the Chattooga WSR.

2. Frontcountry Conditions

Alternative 8 defines explicit capacities (groups at one time) for all frontcountry areas which would be enforced. The capacities are the same as in alternatives 3, 11, 12, 13 and 14; they do not allow additional parking development even if demand for these areas increases. This offers similar medium density recreation opportunities in frontcountry areas. Table 3.2.1-13 identifies capacities and assesses whether projected use increases will exceed them in the three highest use months. The demand projections account for projected boating use as well as increased non-boating uses. Analysis suggests there would be several months when demand from these projected future users would exceed capacities on some days. On these days, users would compete for limited parking availability, and some would be displaced. The trade-off is higher quality experiences for those who are present.

Table 3.2.1-13 Alternative 8-Existing and Projected Use [1] Patterns in Frontcountry Areas for the Three Highest Use Periods

Frontcountry Area	Capacity in Groups at One Time	Capacity in People at One Time	Peak Use Month[2] Parking Demand	Projected Parking Demand in 20 years	Second Highest Use Month[2] Parking Demand	Projected Parking Demand in 20 years	Third Highest Use Month[2] Parking Demand	Projected Parking Demand in 20 years
Grimshawes/ Sliding Rock Area	25	65	August 25	demand exceeds capacity (independent of boats[4])	July 18	demand meets capacity (independent of boats[4])	July 17	demand is below capacity
Bullpen Road Bridge Area	15	40	August 12	demand exceeds capacity (independent of boats)	July 11	demand exceeds capacity (with boats)	January, August, September & October 8	demand exceeds capacity (with boats)
Burrells Ford Bridge Area	80	205	March 63	demand exceeds capacity (independent of boats)	October 46	demand exceeds capacity (with boats) [3]	May & October 45	demand exceeds capacity (with boats)
Highway 28 Bridge Area	35	85	March 36	demand exceeds capacity (independent of boats[4])	November 30	demand exceeds capacity (independent of boats[4])	May & December 25	demand meets capacity (independent of boats[4])

[1] Projected demand is based on a 40% increase in parking over a 20 year period.
[2] Based on number of vehicles in the parking lot at one time on a single weekend day in a month.
[3] Example: [(46 vehicles parked at BF) + (70 boaters under "ideal conditions" in ER divided by 4 boaters per group - assumes two shuttle vehicles per group) + (40 boaters in RG divided by 4)] X 1.4 (40% increase over 20 years).
[4] This is independent of boats because it is assumed they will not use Grimshawes or they would take out at the Highway 28 boat launch.

This alternative differs from Alternative 3 by adding boating to the mix of frontcountry uses, which could affect parking availability and congestion at some frontcountry areas (primarily the Bullpen Road Bridge Area and the Burrells Ford Bridge Area). The conflict section (above) identifies the estimated frequency of scenic and whitewater boating and social effects under this alternative; the major implications for frontcountry conditions are listed below:

- Most days with boating would occur at higher flows during or immediately after storm events that are more likely to occur in winter and spring. In general, these days are likely to be lower use days for frontcountry areas (which have higher use levels in summer), so parking availability is relatively unchanged by the addition of boating use in these months.

- However, adding boating use in combination with projected increases in hiking and angling use would result in some days with greater demand than supply for parking. The amount of boating use on specific high-use days (those with ideal flows, on weekends, in warmer months) is one major factor that would contribute to this demand. However, boating stakeholders dispute Integrated Report peak estimates used in this analysis (see conflict discussion above). The number of boaters aside, these very high-use, ideal boating days are likely to be rare.

- Demand for parking at the Bullpen Road Bridge Area is probably the most challenging, because parking spaces are more limited than at other frontcountry areas. Assuming projected increases in other uses, boating uses would contribute to demand levels that exceed capacities on weekends in May, summer and the fall color season. Current use is already just below capacity during peak times, and, according to the Use Estimation Workshop, there are already anecdotal reports of congestion during peak times. In addition, Bullpen Road Bridge is both a take-out (for the Chattooga Cliffs Reach) and a put-in (for the Ellicott Rock Reach), so it may have even higher use than just the boater vehicles associated with one reach. Boater vehicles also tend to be parked for a longer duration than many sightseers, exacerbating impacts. Long term projections show demand for parking will be exceeded at the Bullpen Road Bridge Area within 20 years even without the introduction of boaters; with boating allowed year round, there is a greater likelihood that projected demand would exceed allowed capacities on more days at this site and any type of user might be displaced or have to cope with the increased congestion.

- The introduction of boaters is not likely to cause demand for parking at the Burrells Ford Bridge Area to exceed capacity in the short term. However, demand for parking is expected to exceed allowed capacity within 20 years on a few weekend days each year (when flow conditions are ideal for boating). Therefore, any type of user might be displaced or have to cope with the increased congestion.

- Demand already exceeds parking capacity at the Highway 28 Bridge Area during the peak-use month of March. Adding boating would increase the numbers of boaters floating through this area, but would not likely affect the parking situation because boaters most likely would continue downstream to the take out at the Highway 28 Boat Launch that feeds into Section II The parking demand and availability issues projected for the Highway 28 Bridge Area are probably more closely related to increased angling and hiking use.

3. Backcountry Social Conditions

Alternative 8 defines capacities for backcountry reaches in terms of average groups per day; they are the same as those for alternatives 3, 11, 12, 13 and 14. These capacities vary on weekends and weekdays to provide a diversity of opportunities for solitude, and would apply to both day and overnight users (Table 3.2.1-14). The capacities are designed to prevent backcountry encounters from exceeding between two and eight per day on

weekdays and between four and 15 per day on weekends (depending on the reach). These desired conditions are consistent with median tolerances for trail/river encounters in higher use wilderness settings (Dawson & Alberga, 2003) and similar to findings from a survey of Chattooga users in the Ellicott Wilderness (Rutlin, 1995).

Projected increases in demand by all users and the addition of boating on many days per year in this alternative could lead to use levels that approach capacity. The most likely times when demand might exceed these capacities are when high-use boating days (when ideal flows occur on weekends in warmer months) coincide with high use hiking (summer and fall color season) or high-use angling (start of Delayed Harvest season, spring and fall). Based on existing backcountry use levels, these are likely to be infrequent in the near future. In addition, allowing boating year round at all flows likely would not separate existing users and boaters during lower flows or when the weather is warm, mostly in the spring, summer and fall

Table 3.2.1-14 Alternative 8 backcountry capacities and encounters by river reach

Reach	Capacity (Number of groups per day)		Capacity (Number of people per day)		Encounters (Average number of groups per day)	
	Weekdays	Weekends	Weekdays	Weekends	Weekdays	Weekends
Chattooga Cliffs	5	10	10	15	0-2	0-4
Ellicott Rock	10	20	35	110	0-4	0-9
Rock Gorge and Upper Nicholson Fields *(Lick Log Creek to Reed Creek)*	15	30	40	95	0-8	0-14
Lower Nicholson Fields *(Reed Creek to Hwy.28)*	15	30	40	95	0-8	0-15

4. Biophysical Attributes Affecting Recreation Experiences

a. Campsites

Same as Alternative 3.

b. Trails

Same as Alternative 3 except this alternative would identify and designate portage trails around river-wide obstacles or at commonly portaged rapids. Based on the January 2007 boating assessment, there are few portages requiring such trails (between three and five on the entire upper Chattooga, with most being able to be portaged in channel without need of an upland portage trail). However, additional LWD that blocks boat passage may occur.

5. Monitoring and Adaptive Management

This alternative would implement monitoring and, if needed, adaptive management. If monitoring suggests a permit system is needed to keep use below stated capacities, some users may be unable to obtain a permit when demand exceeds supply, while others may be unwilling to even compete for permits because they consider it inconvenient, or oppose the loss of freedom of the direct management. Even for users willing to participate, the managerial footprint imposed by the permit system may be problematic.

6. Recreation ORV

Same as Alternative 3.

7. Cumulative Effects

Same as Alternative 2.

G. Alternative 11 Direct and Indirect Effects

1. Potential Recreation Use Conflicts and Boating Access

This alternative would allow year-round boating on the upper segment of the Chattooga River at flows above 450 cfs at Burrells Ford without any other reach or season restrictions. This alternative would provide several days of whitewater (but few scenic) boating opportunities each year, and generally minimizes the potential for use conflicts on the days that boaters are present. The alternative addresses this potential conflict from a face-to-face rather than social values perspective. It recognizes that boating use may produce unacceptable impacts for some non-boating users, but does not define the upper segment of the Chattooga WSR as a completely boat-free setting (or suggest the lower segment of the river alone provides adequate boating opportunities). Instead, it relies on flows to separate boaters from other users for most of the year, ensuring that the upper segment of the river provides boat-free opportunities during the lower flows that are particularly valued by non-boating opportunities such as fishing and swimming (which also tends to provide boat-free opportunities for hikers and backpackers during their highest use season as well). Overall, this alternative provides extensive boat-free opportunities while allowing some boating, but foregoes some valued whitewater boating opportunities at the low end of the optimal flow range (as well as most scenic boating opportunities).

a. Assessing Boating Access and Potential Conflict: Days with and without Boating Opportunities

Analysis of recreation use conflicts for this alternative follows similar protocols and assumptions first described for Alternative 8 (with a few exceptions noted below). The analysis relies on information about 1) flow ranges when boating could occur; 2) estimates about whether boaters would be able to take advantage of those flows; and 3) the number of days in specific flow ranges based on hydrology data. A summary of major assumptions for the analysis are given below; Table 3.2.1-15 summarizes the number of days with and without boating opportunities.

- At least some whitewater boaters would use every day above 450 cfs (the defined restriction threshold) and less than 800 cfs.
- The number of boaters would vary (higher use on weekends or when flows with boating opportunities were more predictable; lower use on weekdays or when flows would be provided by smaller storm events that are challenging to predict and use).
- Scenic boating could occur on short lower gradient reaches at these higher flow levels, but those days would completely overlap with days with whitewater boating.
- As with Alternative 8, a lower estimate of days when flows exceed 450 cfs was developed from mean daily flows and a higher estimate of days was developed from peak flow records
- This alternative implicitly trades whitewater boating opportunities between 350 and 450 cfs (which is still within the optimal range for whitewater boating) for the assurance of boat-free opportunities for other users at those flows. By not allowing boating at these flows (or even lower ones), the alternative may displace some boaters to the lower Chattooga or other regional rivers.

Reach	Mean Daily Flow method (low estimate)		Peak flow method (high estimate)	
	Days with boating opportunities	Days without boating opportunities	Days with boating	Days with boating opportunities
Chattooga Cliffs	15	350	35	330
Ellicott Rock				
Rock Gorge and Upper Nicholson Fields Reach *(Lick Log Creek to Reed Creek)*				
Lower Nicholson Fields *(Reed Creek to Hwy.28)*				

Although this alternative could allow boating at any time during the year, analysis suggests flows with opportunities for boating would occur on very few days, reducing potential for conflict. In total, this alternative estimates boating would occur on 15 or 35 days (4 or 10% of the year, depending on the calculation method) for all reaches in an average year. This alternative provides relatively little diversity (see Alternative 8) and a lower number of days of boating than most other alternatives because it allows boating only in the upper part of the optimal range for whitewater boating.

b. Assessing Boating Access and Potential Conflict: Factors that Influence the Type and Amount of Use

Alternative 11 would create relatively few days with potential for conflict between boaters and other users. In addition, as with other alternatives that allow boating, the level of face-to-face conflict would vary by factors other than the mere presence of boats. Relevant findings include:

- The days with flows of 450 or higher are much less likely to occur in summer months, substantially reducing the chance that scenic boating would occur, or could be a source of conflict for swimmers, anglers or hikers during this high use period. Boat-based angling (a sub-category within scenic boating) is also unlikely to occur at these flows; at these high flows, bait, fly and spin fishing is sub-optimal (see below).

- Even on days when whitewater boating occurs, potential for conflict is low. Use levels for anglers or swimmers on days with flows higher than 450 cfs are likely to be very low, so even if boaters are present, most other water-based users are not. Based on the information in the Integrated Report summarized earlier in the Affected Environment, optimal flows for fly, spin and bait fishing are lower than 450 cfs (although flows this high are acceptable for spin and bait angling in some reaches). Although winter and spring can attract higher use among anglers in the Lower Nicholson Fields (Delayed Harvest) Reach, there would be much lower use even on this low-gradient reach above 450 cfs. Anglers who always desire a boat-free experience would have to avoid the upper segment of the Chattooga WSR on the 15 or 35 days per year when flows are expected to reach 450 cfs or higher. These anglers could use the river on other days when flows are lower, fish in the tributaries (boat-free under all alternatives), or fish another regional river. Spin and bait anglers willing to fish acceptable flows above 450 cfs would have to share the river with boaters on 15 or 35 days.

- Flows higher than 450 cfs are much more likely to occur in winter or early spring when hiking and backpacking use is also generally low. The likelihood of 450 cfs flows is highest from February through April. In addition, as discussed for Alternative 8, nearly three-quarters of the designated hiking trails are out of view of the river, so contact between hikers/backpackers and boaters may be limited even if both groups are recreating in the same area.

- Flows above 450 cfs are rarely available long enough to allow camping-based boating trips. In addition, in public comments boaters have shown relatively little interest in multi-day trips on the river. Most whitewater boaters in the Southeast appear to focus on day trips, and the challenging rapids of the upper segment of the Chattooga WSR are easier to negotiate in boats that do not carry camping gear and food. This would minimize the chances of campsite competition between boaters and other users.

- This alternative implicitly trades whitewater boating opportunities between 350 and 450 cfs (which is still within the optimal range for whitewater boating) for the assurance of boat-free opportunities for other users at those flows. By not allowing boating at these flows (or even lower ones), this alternative may displace some boaters to the lower segment of the Chattooga, the West Fork Chattooga River or other regional rivers.

- Compared to other alternatives, Alternative 11 provides relatively less flexibility for boaters trying to use days with boating opportunities. Although there are no reach or season restrictions, the days with qualifying flows would be challenging to predict more than a day or two in advance. This would tend to keep boater use levels lower than alternatives that allow boating at lower flows that are more predictable. Therefore, the potential for conflict would be reduced in this alternative. Backcountry capacities (see below) would also constrain boating use, as well as all other uses.

- As discussed with the other alternatives that allow boating, boating is less likely to affect frontcountry users compared to backcountry users.

C . Assessing Boating Access and Potential Conflict: Reach-specific Factors

As discussed with Alternative 8, physical characteristics of each reach and the location of trails along the river may also factor into the amount of interaction between boaters and other users on days when boats are present, affecting the potential for conflict. In general, factors described for Alternative 8 apply to Alternative 11 as well, with the following additional notes:

i. Chattooga Cliffs Reach

- The steeper segments of the Chattooga Cliffs Reach at flows higher than 450 cfs are unlikely to be fished, diminishing the potential for conflict. During the January 2007 expert panel flow assessments, no anglers were interested in fishing the estimated 350 to 400 cfs flows in this reach.

iii. Rock Gorge Reach

- Because of steep gradient, the Rock Gorge Reach is particularly difficult to fish at flows higher than about 400 cfs. In addition, this reach has few trails, and many anglers prefer

to cover some of the reach by traveling in the channel. This is likely to be hazardous at flows above 450 cfs.

- The Nicholson Fields Reach from Lick Log Creek to the Hwy. 28 bridge probably remains fishable longer than any other reach as flows increase. Therefore, this reach is the most likely location for conflict.

d. Assessing boating access and potential conflict: Summary

Taken together, Alternative 11 provides among the fewest opportunities for boating, but the trade-off is less potential for conflict with other users. Boating would occur on fewer than 10% of the days in a year, and on days when non-boating uses are typically low

2. Frontcountry Conditions

Alternative 11 defines explicit capacities (groups at one time) for all frontcountry areas, which would be enforced. The capacities are the same as in alternatives 3, 8, 12, 13 and14; they do not allow additional parking development even if demand increases. This offers similar medium density recreation opportunities in frontcountry areas. Table 3.2.1-17 identifies capacities and assesses whether projected demand would exceed them in the three highest use months. The demand projections account for probable boating use as well as increased non-boating uses. Analysis suggests there would be several months when demand from these projected future users would exceed capacities on some days. On these days, users would compete for limited parking availability, and some would be displaced. The trade-off is higher quality experiences for those who are present.

Table 3.2.1-17 Alternative 11-Existing and Projected Use [1] Patterns in Frontcountry Areas for the Three Highest Use Periods

Frontcountry Area	Capacity in Groups at One Time	Capacity in People at One Time	Peak Use Month[2] Parking Demand	Projected Parking Demand in 20 years	Second Highest Use Month[2] Parking Demand	Projected Parking Demand in 20 years	Third Highest Use Month[2] Parking Demand	Projected Parking Demand in 20 years
Grimshawes/ Sliding Rock Area	25	65	August 25	demand exceeds capacity (independent of boats)	July 18	demand meets capacity (independent of boats)	July 17	demand is below capacity
Bullpen Road Bridge Area	15	40	August 12	demand exceeds capacity (independent of boats)	July 11	demand exceeds capacity (with boats) [3]	January, August, September & October 8	demand exceeds capacity (with boats) [3]
Burrells Ford Bridge Area	80	205	March 63	demand exceeds capacity (independent of boats	October 46	demand is below capacity[4]	May & October 45	demand is below capacity[4]
Highway 28 Bridge Area	35	85	March 36	demand exceeds capacity (independent of boats)	November 30	demand exceeds capacity (independent of boats)	May & December 25	demand meets capacity (independent of boats)

[1] Projected demand is based on a 40% increase in parking over a 20 year period.
[2] Based on number of vehicles in the parking lot at one time on a single weekend day in a month.
[3] On an "ideal" day, 18 vehicles could park at Bullpen to float the Ellicott Rock Reach and could therefore exceed the parking capacity independently (not including Chattooga Cliffs Reach boaters taking out at Bullpen or other recreationists).
[4] Assumes that at 450 cfs or higher there will not be as many existing users parked on an "ideal" day allowing for boaters.

This alternative adds boating to the mix of frontcountry users, which could affect parking availability and congestion at some frontcountry areas (primarily Bullpen Road Bridge Area and Burrells Ford Bridge Area). The conflict section (above) identifies the estimated frequency of scenic and whitewater boating and social effects under this alternative; the major implications for frontcountry conditions are listed below:

- The days with opportunities for boating under this alternative would occur at high flows during or immediately after storm events that are more likely to occur in winter and spring. In general, these are likely to be lower use days for frontcountry areas (which have higher use levels in summer), so parking availability would be relatively unchanged by the addition of boating in these months.

- However, adding boating use in combination with projected increases in hiking and angling use would result in a few days with greater demand than supply for parking at one site, Bullpen Road Bridge Area. These days would only occur if flows above 450 cfs occurred on a weekend day in a warmer month. While boating stakeholders dispute Integrated

Report peak estimates used in this analysis (see conflict discussion above), these very high use days with boating opportunities are likely to be rare.

As discussed with other boating alternatives, parking capacity is already exceeded at the Highway 28 Bridge Area during the peak-use month of March. Adding boating (even if only for a few days per year) would increase the number of boaters passing through this area, but would not likely affect the parking situation because boaters would be likely to continue downstream to the developed boat launch for Section 2 use (Highway 28 Boat Launch). The major parking availability issues at the Highway 28 Bridge Area are probably more closely related to increased angling and hiking.

3. Backcountry Social Conditions

Alternative 11 defines capacities for backcountry reaches in terms of average groups per day; they are the same as those for alternatives 3, 8, 12, 13 and14. These capacities vary on weekends and weekdays to provide a diversity of opportunities for solitude, and would apply to both day and overnight users (Table 3.3.1-17). The capacities are designed to prevent backcountry encounters from exceeding between two and eight per day on weekdays and between four and 15 per day on weekends (depending on the reach). These capacities are consistent with median tolerances for trail/river encounters in higher use wilderness settings (Dawson & Alberga, 2003) and similar to findings from a survey of Chattooga recreation users in the Ellicott Wilderness (Rutlin, 1995).

Projected increases in demand and the addition of boating on a few days per year would be unlikely to require a permit system to enforce capacities. The critical issue is the level of use by different types of users during high use times.

Table 3.3.1-17-Alternative 11 Backcountry Capacities and Encounters by River Reach

Reach	Capacity (Number of groups per day)		Capacity (Number of people per day)		Encounters (Average number of groups per day)	
	Weekdays	Weekends	Weekdays	Weekends	Weekdays	Weekends
Chattooga Cliffs	5	10	10	15	0-2	0-4
Ellicott Rock	10	20	35	110	0-4	0-9
Rock Gorge and Upper Nicholson Fields *(Lick Log Creek to Reed Creek)*	15	30	40	95	0-8	0-14
Lower Nicholson Fields *(Reed Creek to Hwy.28)*	15	30	40	95	0-8	0-15

Under Alternative 11, the most likely times when demand might exceed capacities are when high-use boating days (when ideal flows occur on weekends in warmer months) coincide with high-use hiking (summer and fall color season) or high use angling (the Delayed Harvest season, spring, and fall). Based on existing backcountry use levels, these are likely to be infrequent in the near future

4. Biophysical Attributes Affecting Recreation Experiences on the Upper Segment of the Chattooga WSR

Campsites: Same as Alternative 8.

Trails: Same as Alternative 8.

5. Monitoring/Adaptive Management

Same as Alternative 8

6. Recreation ORV

Same as Alternative 3..

7. Cumulative Effects

Same as Alternative 2.

H. Alternative 12 Direct and Indirect Effects

1. Potential Recreation Use Conflicts and Boating Access

This alternative would allow boating on the upper Chattooga WSR on defined reaches in defined seasons, but without flow restrictions. It opens the river to boating at any flow from December through February, but includes reach restrictions that allow boating from Green Creek to Burrells Ford December 1 – January 15 and from Burrells Ford to Lick Log Creek January 16 – March 1.

This alternative would provide several days of whitewater (but few scenic) boating opportunities each year, but also generally minimizes the potential for use conflicts on the days that boaters are present. It addresses this potential conflict from a face-to-face rather than social values perspective, recognizing that boating use may produce unacceptable impacts for some non-boating users, but without defining the upper segment of the Chattooga WSR as a completely boat-free setting. Instead, it relies on reach and seasonal restrictions to separate boaters from other users for most of the year, and further ensures that there are always some reaches that are boat-free even during the three-month period when boating is allowed (the most popular fishing reach, Nicholson Fields, is boat-free year-round). Overall, this alternative provides extensive boat-free opportunities while allowing some boating in the season most likely to have whitewater flows, but foregoes

whitewater boating opportunities during other seasons or on other reaches (as well as most scenic boating opportunities).

a. Assessing Boating Access and Potential Conflict: Days with and without Boating Opportunities

Analysis for this alternative follows similar protocols and assumptions first described for Alternative 8 (with a few exceptions noted below). The analysis relies on information about 1) flow ranges when boating could occur; 2) estimates about whether boaters would be able to take advantage of those flows; and 3) the number of days in specific flow ranges based on hydrology data. A summary of major assumptions for the analysis are given below; Table 3.2.1-18 summarizes the number of days with and without boating.

- At least some whitewater boaters would use every day with optimal boating flows (defined as 350 to 800 cfs at Burrells Ford) on the reaches that are open to boating.

- The number of boaters using the open reaches on these days would vary. In general boating use would be higher on weekend days when flows were more predictable and lower on weekdays or when flows were provided by smaller storm events that are challenging to predict and use.

- Whitewater boaters would use an estimated 50% of the days with acceptable but not optimal boating flows (225 to 350 cfs) on the reaches that are open.

- Scenic boating could occur in short lower gradient areas in the reaches that are open on an ideal winter day if the weather is warm, but those days would completely overlap with days with whitewater boating. No scenic boating would occur in the Nicholson Fields Reach, which remains boat-free year round.

Table 3.2.1-18 -Estimated Number of Days with and without Boating Opportunities in Alternative 12.

Reach	Mean Daily Flow method (low estimate)		Peak flow method (high estimate)	
	Days with boating opportunities	Days without boating opportunities	Days with boating opportunities	Days without boating opportunities
Chattooga Cliffs	9	356	14	351
Ellicott Rock				
Rock Gorge	12	353	17	348
Total days of boating on at least one reach	21	344	31	334
Nicholson Fields	0	365	0	365

Although this alternative allows boating at any flow in the defined December through February boating season, analysis suggests flows with boating opportunities would occur on few days, considerably reducing potential for conflict (but providing little boating access). In total, this alternative estimates boating would occur on 21 or 31 days (6 or 8% of the year, depending on the calculation method) in an average year. On those days with flows with boating opportunities, restrictions also prevent boating use on roughly half of the whitewater boating mileage on the upper river – foregoing opportunities from a boater perspective, but providing boat-free opportunities for non-boaters. This alternative provides relatively little diversity and a lower number of days with boating opportunities than most other alternatives, but conversely provides a larger number of days of boat-free opportunities.

b. Assessing Boating Access and Potential Conflict: Factors that Influence Type and Amount of Use

Alternative 12 would create relatively few days with potential for conflict between boaters and other users. In addition, as with other alternatives that would allow boating, the level of face-to-face conflict would vary by factors other than the mere presence of boats. Relevant findings include:

- All days of boating would occur in the three designated winter months. This would discourage nearly all scenic boating use that could otherwise be a source of conflict for swimmers, anglers or hikers in higher use warm months. The restrictions also prevent any boating in the Nicholson Fields Reach, which is the most suitable for scenic boating or boat-based angling.

- Focusing all boating use in the winter months when other users are generally low minimizes potential for conflict, as well as ensuring that boater use levels are less likely to contribute to capacity violations (see below).

- Even on days when whitewater boating use occurs, potential for conflict is likely to be low because boaters prefer flows that anglers do not. About one-quarter to one-third of the days with boating opportunities are above 450 cfs, which is sub-optimal for fishing. About one-half to two-thirds of the days with opportunities for boating are above 350 cfs, which is sub-optimal for fly and spin fishing, although within the optimal range for bait angling.

- Users interested in boat-free opportunities would always have at least two reaches they could use: Nicholson Fields would always be boat free, and when boating is allowed in either the Rock Gorge or above Burrells Ford, the other reach remains closed.

- Even on the days and reaches where boating is allowed, hikers may not have extensive contact with them. As discussed for Alternative 8, nearly three-quarters of the designated hiking trails are out of view of the river in any case, so contact

between hikers/backpackers and boaters may be limited even if both groups are traveling in the same area.

- This set of reach and season restrictions would discourage any multi-day trips among boaters because the available reach(es) are generally short. In addition, public comments from boaters have shown relatively little interest in multi-day trips on the river. This will minimize the chances of any campsite competition between boaters and other users.

- Compared to other alternatives, Alternative 12 provides some greater flexibility for boaters trying to use days with opportunities with boating within the defined boating season. They would know the precise dates when boating would be allowed on any particular reach, and with no flow restrictions, predicting qualifying flows is unnecessary. However, boaters would still be likely to carefully watch flows to take advantage of better conditions for their trips; there is little evidence that they would take trips at flows below the acceptable range and most will target flows in the optimal range.

- Non-boaters interested in boat-free opportunities would have certainty about the reach and seasons when those are available.

- This alternative will tend to concentrate boating use when it is allowed. Instead of being able to spread across multiple reaches (as in alternatives 8, 11, 13, and 14) when boating is allowed, all boaters would essentially be taking the same trip on the same days. This will tend to increase boating use levels on those reaches and days, which might approach defined backcountry capacities (see below). It is possible that non-boating use on those reaches and days might be lower than usual (as some users purposely want to avoid seeing boats on their trips), but this effect is speculative. For boaters, most days when they are allowed to boat are likely to have more encounters and crowding than if other reaches were open on those days.

- This alternative foregoes the most high valued whitewater boating opportunities of any alternative that provides boating opportunities on the upper segment. The season restrictions eliminate nine months of the year when at least some flows with boating opportunities occur, and reach restrictions eliminate roughly half the whitewater mileage available on any given day of open boating. The infrequency of flows with boating opportunities acts as an additional constraint.

- With this alternative, there are days in the boating season that boaters can't or won't use because flows are too low, but which provide few benefits to those seeking boat-free opportunities because few will carefully watch flows or recognize that boats are unlikely to use lower flows. On the other hand, there are many days with flows outside the season and reach restrictions that boaters can't use, even if they are too high for many non-boating users to enjoy.

- As discussed with the other alternatives that allow boating, 1) boating is less likely to affect frontcountry users compared to backcountry users, and 2) for the few potential impacts (e.g., conflicts between boater launching areas and frontcountry fishing water), the agency would address these issues on a site-specific basis when taking management actions regarding trails.

c. Assessing Boating Access and Potential Conflict: Reach-Specific Factors

As discussed with Alternative 8, physical characteristics of each reach and the location of trails along the river may also factor into the amount of interaction between boaters and other users on the days when boats are present, affecting the potential for conflict. In general, factors described for Alternative 8 apply to Alternative 12 as well.

d. Assessing Boating Access and Potential Conflict: Summary

Taken together, Alternative 12 provides among the fewest opportunities for boating, but the trade-off is less potential for conflict with other users. Boating would occur on fewer than 8% of the days in a year (with the least number of river miles per day when boating is allowed), most of which have very low non-boating use levels. In addition, those seeking boat-free opportunities will always have multiple reaches that would not allow boating, even during the open boating season.

2. Frontcountry Conditions

Alternative 12 defines explicit capacities (groups at one time) for all frontcountry areas, which would be enforced. The capacities are the same as in alternatives 3, 8, 11, 13 and 14; they do not allowing additional parking development even if demand for these areas increases. This offers similar medium density recreation opportunities in frontcountry areas. Table 3.2.1-19 identifies capacities and assesses whether projected use increases will exceed them in the three highest use months. The demand projections account for projected boating use as well as increased non-boating uses. Analysis suggests there would be several months when projected demands would exceed capacities on some days. On these days, users would compete for limited parking availability, and some would be displaced. The trade-off is higher quality experiences for those who are present.

Table 3.2.1-19 Alternative 12-Existing and Projected Use [1] Patterns in Frontcountry Areas for the Three Highest Use Periods

Frontcountry Area	Capacity in Groups at One Time	Capacity in People at One Time	Peak Use Month[2] Parking Demand	Projected Parking Demand in 20 years	Second Highest Use Month[2] Parking Demand	Projected Parking Demand in 20 years	Third Highest Use Month[2] Parking Demand	Projected Parking Demand in 20 years
Grimshawes/ Sliding Rock Area	25	65	August 25	demand exceeds capacity (independent of boats)	July 18	demand meets capacity (independent of boats)	July 17	demand is below capacity
Bullpen Road Bridge Area	15	40	August 12	demand exceeds capacity (independent of boats)	July 11	demand exceeds capacity (with boats) [3]	January, August, September & October 8	demand exceeds capacity (with boats) [3]
Burrells Ford Bridge Area	80	205	March 63	demand exceeds capacity (independent of boats	October 46	demand is below capacity	May & October 45	demand is below capacity
Highway 28 Bridge Area	35	85	March 36	demand exceeds capacity (independent of boats)	November 30	demand exceeds capacity (independent of boats)	May & December 25	demand meets capacity (independent of boats)

[1] Projected demand is based on a 40% increase in parking over a 20 year period.
[2] Based on number of vehicles in the parking lot at one time on a single weekend day in a month.
[3] On an "ideal" day Dec 1 – Jan 15, 18 vehicles could park at BP to float the ER Reach and could therefore exceed the parking capacity independently (not including CC Reach boaters taking out at BP or other recreationists).

This alternative differs from alternatives 1, 2 and 3 by adding boating to the mix of frontcountry users, which could affect parking availability and congestion at some frontcountry areas (primarily the Bullpen Road Bridge Area and the Burrells Ford Bridge Area) on the few days when it would occur. The conflict section (above) identifies the estimated frequency of whitewater boating and social effects under this alternative; the major implications for frontcountry conditions are listed below:

- Most days with opportunities for boating would occur at higher flows during or immediately after storm events in the defined three month period. In general, these are likely to be lower use days for frontcountry areas (which have higher use levels in summer), so parking availability is relatively unchanged by the addition of boating in these months.

- However, adding boating use in combination with projected increases in hiking and angling would result in a small number of days with greater demand than supply for parking. The amount of boating use on specific high use days (those with ideal flows on weekends in the winter) is one major factor, and boating

stakeholders dispute Integrated Report peak estimates used in this analysis (see conflict discussion for Alternative 8). On the other hand, opening just one or two reaches at a time could concentrate use on those days. The number of boaters aside, these high-use boating days are likely to be rare.

- On the few days with boating opportunities, demand for parking at the Bullpen Bridge Area is probably the most challenging because parking spaces are more limited than other frontcountry areas. In addition, Bullpen Road Bridge is both a take-out (for the Chattooga Cliffs Reach) and a put-in (for the Ellicott Rock Reach), so it may have even higher use than just the boater vehicles associated with one reach (although it is challenging to estimate the proportion that will boat those reaches separately or as one trip).

3. Backcountry Social Conditions

Alternative 12 defines capacities for backcountry reaches in terms of average groups per day; they are the same as those for alternatives 3, 8, 11, 13 and 14. These capacities vary on weekends and weekdays to provide a diversity of opportunities for solitude, and would apply to both day and overnight users (Table 3.2.1-20). The capacities are designed to prevent backcountry encounters from exceeding between two and eight per day on weekdays and between four and 15 per day on weekends (depending on the reach). These encounter levels are consistent with median tolerances for trail/river encounters in higher use wilderness settings (Dawson & Alberga, 2003) and similar to findings from a survey of Chattooga users in the Ellicott Wilderness (Rutlin, 1995).

Table 3.2.1-20 Alternative 12 Backcountry Capacities and Encounters by River Reach

Reach	Capacity (Number of groups per day)		Capacity (Number of people per day)		Encounters (Average number of groups per day)	
	Weekdays	Weekends	Weekdays	Weekends	Weekdays	Weekends
Chattooga Cliffs	5	10	10	15	0-2	0-4
Ellicott Rock	10	20	35	110	0-4	0-9
Rock Gorge and Upper Nicholson Fields *(Lick Log Creek to Reed Creek)*	15	30	40	95	0-8	0-14
Lower Nicholson Fields *(Reed Creek to Hwy.28)*	15	30	40	95	0-8	0-15

Under Alternative 12, use levels are unlikely to exceed these capacities because of boating use except on a rare weekend. Based on existing backcountry use levels, these are likely to be infrequent in the near future.

4. Biophysical Attributes Affecting Recreation Experiences

a. Campsites

Same as Alternative 3.

b. Trails

Same as Alternative 8.

5. Monitoring and Adaptive Management

Same as Alternative 8.

6. Recreation ORV

Same as Alternative 3.

7. Cumulative Effects

Same as Alternative 2.

I. Alternative 13 Direct and Indirect Effects

1. Potential Recreation Use Conflicts and Boating Access

Alternative 13 allows boating on the upper Chattooga WSR at flows above 350 cfs from December through February, and also restricts boats from using the lower Nicholson Fields Reach (the Delayed Harvest reach). This alternative would provide several days of whitewater (but few scenic) boating opportunities each year, but also minimizes the potential for use conflicts on the days that boaters are present. It addresses potential conflict from a face-to-face rather than social values perspective, recognizing that boating use may produce unacceptable impacts for some non-boating users, but it does not define the entire upper Chattooga WSR as a completely boat-free setting. Instead, it relies on formal seasonal, flow and reach restrictions to separate boaters from other users for most of the year. Overall, the alternative provides boat-free opportunities while allowing some boating in the season most likely to have whitewater flows, but foregoes considerable valued whitewater boating opportunities during other seasons (as well as nearly all scenic boating opportunities).

a. Assessing Boating Access and Potential Conflict: Days with and without Boating Opportunities

Analysis for this alternative follows similar protocols and assumptions first described for Alternative 8 (with a few exceptions noted below). The analysis relies on information about 1) flow ranges when boating could occur; 2) estimates about whether boaters would be able to take advantage of those flows; and 3) the number of days in specific flow ranges based on hydrology data. A summary of major assumptions for the analysis is given below; Table 3.2.1-21 summarizes the number of days with and without boating.

- At least some whitewater boaters would use every day in the open boating season that is above 350 cfs (the defined restriction threshold) and less than 800 cfs (the estimated upper end of the optimal range for most whitewater boating).

- The number of boaters on each day with boating opportunities would vary. In general boating use would be higher on weekend days when flows are more predictable and lower on weekdays or when flows are provided by smaller storm events that are challenging to predict and use.

- Scenic boating could occur on short lower gradient reaches on an ideal warm day in the winter, but those days would completely overlap with days with whitewater boating. No boating would be allowed on the lower part of the Nicholson Fields Reach (Delayed Harvest).

Table 3.2.1-21-Estimated Number of Days with and without Boating Opportunities in Alternative 13.

Reach	Mean Daily Flow method (low estimate)		Peak flow method (high estimate)	
	Days with boating opportunities	Days without boating opportunities	Days with boating opportunities	Days with boating opportunities
Chattooga Cliffs (downstream of Green Creek)	11	354	21	344
Ellicott Rock				
Rock Gorge and Upper Nicholson Fields (to Lick Log Creek)				
Lower Nicholson Fields (Lick Log to Highway 28)	0	365	0	365

By including a season, flow and reach restrictions, analysis suggests flows of 350 cfs and higher would occur on few days, considerably reducing potential for conflict. In total, this alternative estimates boating would occur on 11 or 21 days (3 or 6% of the year, depending on the calculation method) in an average year. This alternative provides relatively little diversity and the lowest number of days of boating of any alternative that allows boating, although the days that allow boating all would have optimal whitewater flows.

b. Assessing Boating Access and Potential Conflict: Factors that Influence Type and Amount of Use

Alternative 13 would create relatively few days with potential for conflict between boaters and other users. In addition, as with other alternatives that allow boating, the level of face-to-face conflict would vary by factors other than the mere presence of boats. Relevant findings include:

- The seasonal boating restrictions that allow boating from December through February reduce the chances of short section, scenic boating use on any lower gradient reach, and eliminate any such boating in summer months when there are more swimmers, anglers, or hikers in the corridor. Boat-based angling (a sub-category within scenic boating) is also unlikely to occur at flows above 350 cfs when fly and spin fishing is sub-optimal although they would occur within optimal ranges for bait angling (see below). Boating would not be allowed in the most popular fishing reach, the Delayed Harvest part of the Nicholson Fields Reach.

- Even on days when whitewater boating would occur the potential for conflict is low. Use levels for anglers or swimmers on days with flows higher than 350 cfs are likely to be low, so even if boaters are present, most other users are not. Based on the information in the Integrated Report and summarized earlier in the Affected Environment, optimal flows for fly and spin fishing are lower than 350 cfs (although flows as high as 450 cfs remain optimal for bait fishing, and acceptable flows for spin and bait fishing reach as high as 450 and 525 cfs, respectively). Although winter months are regularly used by anglers in the Nicholson Fields (Delayed Harvest) Reach, this most popular reach would remain closed to boating. Spin and bait anglers on other parts of the upper river segment interested in fishing the acceptable but not optimal flows above 350 cfs would have to share the river with boaters on 11 or 21 days.

- Hiking and backpacking use is also generally low during the defined boating season, suggesting that actual boating on a portion of these days would be unlikely to present much potential for conflict. In addition, as discussed for Alternative 8, nearly three-quarters of the designated hiking trails are out of view of the river, so contact between hikers/backpackers and boaters may be limited even if both groups are traveling in the same area.

- Although flows higher than 350 cfs may occasionally be available for more than one day and thus could offer boaters opportunities for camping-based trips, in public comments boaters have shown relatively little interest in these types of trips. Most whitewater boaters in the Southeast appear to focus on day trips, and the challenging rapids of the upper Chattooga segment are easier to negotiate in boats that don't have to carry camping gear. This would minimize the chances of any campsite competition between boaters and other users.

- This alternative implicitly trades whitewater boating opportunities in months outside the defined boating season (or flows under 350 cfs) for the assurance of boat-free opportunities at those times. By not allowing boating at these flows (or even lower ones), the alternative may displace boaters to the lower Chattooga or other regional rivers.

- Compared to other alternatives, Alternative 13 provides some flexibility for whitewater boaters trying to use days with boating opportunities during the defined boating season. Reach restrictions do not close any prime whitewater areas, and the relatively lower flow threshold makes it easier to predict when flows above 350 cfs would occur. This may increase the demand for these days, as more boaters may have lead time to arrange a day off work or to organize travel to the river. Higher boater use levels may increase the potential for conflict, or require enforcement of backcountry capacities (see below).

- As discussed with the other alternatives that allow boating, boating is less likely to affect frontcountry users compared to backcountry users.

c. Assessing Boating Access and Potential Conflict: Reach-Specific Factors

As discussed with Alternative 8, physical characteristics of each reach and the location of trails along the river may also factor into the amount of interaction between boaters and other users on days when boats are present, affecting the potential for conflict. In general, factors described for Alternative 8 apply to 13 as well, with the following additional notes:

i. Chattooga Cliffs Reach

- The steeper gradients of the Chattooga Cliffs Reach at flows above 350 cfs are unlikely to be fished, diminishing potential for conflict. During the January 2007 expert panel flow assessments, no anglers were interested in fishing the estimated 350 to 400 cfs flows present.

ii. Rock Gorge Reach

- The Rock Gorge Reach below Big Bend Falls is particularly difficult to fish at flows above approximately 400 cfs. In addition, this area has few trails, and many anglers prefer to cover some of the reach by traveling in the channel. For at least some of the days when boating is allowed here, anglers would unlikely be present.

d. Assessing Boating Access and Potential Conflict: Summary

Taken together, Alternative 13 provides the fewest opportunities for boating (although it offers more river miles per day for boaters than Alternative 12), but the trade-off is less potential for conflict with other users. Boating would occur on fewer than 6% of the days in a year, and on days when non-boating uses are typically very low.

2. Frontcountry Conditions

Alternative 13 defines explicit capacities (groups at one time) for all frontcountry areas, which would be enforced. The capacities are the same as in alternatives 3, 8, 11, 12 and14; they do not allowing additional parking development even if demand for these areas increases. This offers similar medium density recreation opportunities in frontcountry areas. Table 3.2.1-22 identifies capacities and assesses whether projected use demands would exceed them in the three highest use months. The demand projections account for projected boating use as well as increased non-boating uses. Analysis suggests there would be several months when these projected demands would exceed capacities on some days. On these days, users would compete for limited parking availability, and some would be displaced. The trade-off is higher quality experiences for those who are present.

Table 3.2.1-22 Alternative 13- Existing Use and Projected Patterns in Frontcountry Areas for the Three Highest Use Periods

Frontcountry Area	Capacity in Groups at One Time	Capacity in People at One Time	Peak Use Month[2] Parking Demand	Projected Parking Demand in 20 years	Second Highest Use Month[2] Parking Demand	Projected Parking Demand in 20 years	Third Highest Use Month[2] Parking Demand	Projected Parking Demand in 20 years
Grimshawes/ Sliding Rock Area	25	65	August 25	demand exceeds capacity (independent of boats)	July 18	demand meets capacity (independent of boats)	July 17	demand is below capacity
Bullpen Road Bridge Area	15	40	August 12	demand exceeds capacity (independent of boats)	July 11	demand exceeds capacity (with boats)[3]	January, August, September & October 8	demand exceeds capacity (with boats)[3]
Burrells Ford Bridge Area	80	205	March 63	demand exceeds capacity (independent of boats	October 46	demand is below capacity	May & October 45	demand is below capacity
Highway 28 Bridge Area	35	85	March 36	demand exceeds capacity (independent of boats)	November 30	demand exceeds capacity (independent of boats)	May & December 25	demand meets capacity (independent of boats)

[1] Projected demand is based on a 40% increase in parking over a 20 year period.
[2] Based on number of vehicles in the parking lot at one time on a single weekend day in a month.
[3] On an "ideal" day Dec 1 – Mar 1, 18 vehicles could park at Bullpen to float the Ellicott Rock Reach and could therefore exceed the parking capacity independently (not including Chattooga Cliffs Reach boaters taking out at Bullpen or other recreationists).

This alternative adds boating to the mix of frontcountry users, which could affect parking availability and congestion at some frontcountry areas (primarily Bullpen Road Bridge Area and Burrells Ford Bridge Area). The conflict section (above) identifies the estimated frequency of scenic and whitewater boating and social effects under this alternative; the major implications for frontcountry conditions are listed below:

- The few days with boating opportunities under this alternative would occur at relatively high flows during or immediately after storm events in winter. In general, these are likely to be lower use days for frontcountry areas (which have higher use levels in summer), so parking availability would be relatively unchanged by the addition of boating on a portion of days in these months.

However, adding boating use in combination with projected increases in hiking and angling would result in a small number of days with greater demand than supply for parking. The amount of boating use on specific high-use days (those with ideal flows on weekends) is one major factor, and boating stakeholders dispute Integrated Report peak estimates used in this analysis (see conflict discussion for Alternative 8).

- On these few days, demand for parking at the Bullpen Bridge Area is probably the most challenging because parking spaces are more limited than other frontcountry areas. In addition, Bullpen Road Bridge is both a take-out (for the Chattooga Cliffs Reach) and a put-in (for the Ellicott Rock Reach), so it may have even higher use than just the boater vehicles associated with one reach (although it is challenging to estimate the proportion that will boat those reaches separately or as one trip).

- As discussed with other alternatives that allow boating, demand for parking is already exceeding capacity at the Highway 28 Bridge Area during the peak use month of March. However, boating would not affect that situation, as boating is prohibited in March, and in the lower part of Nicholson Fields. The major parking availability issues at Highway 28 are more likely related to projected increases in angling and hiking use.

3. Backcountry Social Conditions

Alternative 13 defines capacities for backcountry reaches in terms of average groups per day; they are the same as those for Alternatives 8, 11, 12 and 14. These capacities vary on weekends and weekdays to provide a diversity of opportunities for solitude, and would apply to both day and overnight users (Table 3.2.1-23). The capacities are designed to prevent backcountry encounters from exceeding between two and eight per day on weekdays and between four and 15 per day on weekends (depending on the reach). These encounter levels are consistent with median tolerances for trail/river encounters in higher use wilderness settings (Dawson & Alberga, 2003) and similar to findings from a survey of Chattooga user in the Ellicott Wilderness (Rutlin, 1995).

Table 3.2.1-23-Alternative 13 Backcountry Capacities and Encounters by River Reach

Reach	Capacity (Number of groups per day)		Capacity (Number of people per day)		Encounters (Average number of groups per day)	
	Weekdays	Weekends	Weekdays	Weekends	Weekdays	Weekends
Chattooga Cliffs	5	10	10	15	0-2	0-4
Ellicott Rock	10	20	35	110	0-4	0-9
Rock Gorge and Upper Nicholson Fields *(Lick Log Creek to Reed Creek)*	15	30	40	95	0-8	0-14
Lower Nicholson Fields *(Reed Creek to Hwy.28)*	15	30	40	95	0-8	0-15

Under Alternative 13, projected demand is unlikely to exceed capacities because of boating use except on a rare weekend day. Based on existing backcountry use levels, these are likely to be infrequent in the near future.

4. Biophysical Attributes Affecting Recreation Experiences

a. Campsites

Same as Alternative 3.

b. Trails

Same as Alternative 8.

5. Monitoring and Adaptive Management

Same as Alternative 3.

6. Recreation ORV

Same as Alternative 8.

7. Cumulative Effects

Same as Alternative 2.

J. Alternative 14 Direct and Indirect Effects

1. Recreation Use Conflicts and Boating Access

Alternative 14 allows boating on the upper segment of the Chattooga WSR at flows above 350 cfs with no seasonal or reach restrictions. This alternative would provide considerable days of whitewater and scenic boating opportunities each year, but also minimizes the potential for use conflicts on the days that boaters are present. It addresses this potential conflict from a face-to-face rather than social values perspective, recognizing that boating use may produce unacceptable impacts for some non-boating users, but it does not define the entire upper Chattooga WSR as a boat-free setting. Instead, it relies on flows to separate boaters from other users for most of the year. Overall, the alternative provides extensive boat-free opportunities while allowing boating in the flow ranges when boating is best and only foregoing acceptable but not optimal boating opportunities.

a. Assessing Boating Access and Potential Conflict: Days with and without Boating Opportunities

Analysis for this alternative follows similar protocols and assumptions first described for Alternative 8 (with a few exceptions noted below). The analysis relies on information about 1) flow ranges when boating could occur; 2) estimates about whether boaters would be able to take advantage of those flows; and 3) the number of days in specific flow ranges based on hydrology data. A summary of major assumptions for the analysis are given below; Table 3.2.1-24 summarizes the number of days with and without boating.

- At least some whitewater boaters would use every day in the open boating season that is above 350 cfs (the defined restriction threshold) and less than 800 cfs (the estimated upper end of the optimal range for most whitewater boating).

- The number of boaters each day with boating opportunities would vary. In general boating use would be higher on weekend days when flows above 350 cfs were more predictable and lower on weekdays or when flows were provided by smaller storm events that are challenging to predict and use.

- Scenic boating could occur on short lower gradient sections, but those days would completely overlap with days with whitewater boating because boating is not allowed at lower flows (that scenic boaters could otherwise use on lower gradient reaches).

Table 3.2.1-24 Estimated Number of Days with and without Boating Opportunities in Alternative 14.

Reach	Mean Daily Flow method (low estimate)		Peak flow method (high estimate)	
	Days with boating opportunities	Days without boating opportunities	Days with boating opportunities	Days without boating opportunities
Chattooga Cliffs (downstream of Green Creek)	32	333	66	299
Ellicott Rock				
Rock Gorge				
Nicholson Fields				

Analysis suggests boating at flows of 350 cfs and above would occur on a substantial number of days, although not quite as many as Alternative 8. In total, this alternative estimates boating would occur on 32 or 66 days (9 or 18% of the year, depending on the calculation method) in an average year. This alternative provides more boating diversity than all but Alternative 8, and all of the days with boating opportunities have optimal flows for whitewater boating. Even so, more than 80% to 90% of the days (depending on the calculation method) on the upper segment of the Chattooga WSR would offer boat-free opportunities on all reaches.

b. Assessing Boating Access and Potential Conflict: Factors that Influence Type and Amount of Use

On the days when Alternative 14 would provide boating opportunities, there is some potential for conflict between boaters and other users. However, as with other alternatives that allow boating, the level of face-to-face conflict would vary by factors other than the mere presence of boats. Relevant findings include:

- The flow restrictions that prevent boaters from floating below 350 cfs reduce the chances of summer-based scenic boating use because these higher flows are infrequent in warmer months. This would also reduce potential conflict with the most popular months for swimmers, anglers or hikers in the corridor. Boat-based angling (a sub-category within scenic boating) is also unlikely to occur at flows above 350 cfs, when fly and spin fishing are sub-optimal (see below), although optimal bait angling occurs between 350 cfs and 450 cfs.

- Even on days when whitewater boating use occurs, potential for conflict is low. Use levels for anglers or swimmers on days with more than 350 cfs are likely to be low, so even if boaters are present, most other users are not. Based on the information in the Integrated Report and summarized earlier in the Affected Environment, optimal flows for fly and spin fishing are lower than 350 cfs (although flows as high as 450 cfs remain optimal for bait fishing, and acceptable flows for spin and bait fishing reach as high as 450 and 525 cfs, respectively). Spin and bait anglers interested in fishing the acceptable but not optimal flows above 350 cfs would have to share the river with boaters on 32 or 66 days.

- Hiking and backpacking use is largely independent of flows, and could occur at the same time as boating. However, these uses are generally lower in winter and spring when flows higher than 350 cfs are more frequent. In addition, as discussed for Alternative 8, nearly three-quarters of the designated hiking trails are out of view of the river, so contact between hikers/backpackers and boaters may be limited even if both groups are traveling in the same area.

- Although flows above 350 cfs may occasionally be available for more than one day and thus could offer boaters some opportunities for camping-based trips, in public comments boaters have shown relatively little interest in these types of trips. Most whitewater boaters in the Southeast appear to focus on day trips, and the challenging rapids of the upper segment of the Chattooga WSR are easier to negotiate in boats that do not have camping gear. This would minimize the chances of campsite competition between boaters and other users.

- This alternative implicitly trades whitewater boating opportunities at flows under 350 cfs (which are acceptable but not optimal for whitewater boating) for the assurance of boat-free opportunities at those times. By not allowing boating

at these flows (or even lower ones), the alternative may displace some boaters to the lower Chattooga or other regional rivers.

- Compared to other alternatives aside from Alternative 8, Alternative 14 provides more flexibility for whitewater boaters trying to use days with opportunities for boating. The relatively lower flow threshold makes it easier to predict when flows above 350 cfs would occur. This may increase the demand for days with boating, as more boaters may have lead time to arrange a day off work or to organize travel to the river. Higher boater use levels may increase the potential for conflict, or require enforcement of backcountry capacities (see below).

- As discussed with the other alternatives that allow boating, boating is less likely to affect frontcountry users compared to backcountry users.

c. Assessing Boating Access and Potential Conflict: Reach-Specific Factors

As discussed with Alternative 8, physical characteristics of each reach and the location of trails along the river may also factor into the amount of interaction between boaters and other users on days when boats are present, affecting the potential for conflict. In general, factors described for Alternative 8 apply to 14 as well, with the following additional notes:

i. Chattooga Cliffs Reach

The steeper sections of the Chattooga Cliffs Reach at flows above 350 cfs are even less likely to be fished, diminishing potential for conflict. During the January 2007 expert panel flow assessments, no anglers were interested in fishing the estimated 350 to 400 cfs flows present.

iii. Rock Gorge Reach

The Rock Gorge below Big Bend Falls is particularly difficult to fish at flows above approximately 400 cfs. This area has few trails, and many anglers prefer to cover some of the reach by traveling in the channel. For at least some of the days when boating is allowed on this reach, anglers are unlikely to be present.

d. Assessing Boating Access and Potential Conflict: Summary

Taken together, Alternative 14 provides the second most boating opportunities, but the trade-off is slightly more potential for conflict with other users. Boating would occur on 9 to 18% of the days in a year, and on days when non-boating uses are typically very low.

2. Frontcountry Conditions

Alternative 14 defines explicit capacities (groups at one time) for all frontcountry areas, which will be enforced. The capacities are the same as in Alternatives 3, 8, and 11, 12 and 13; they do not allowing additional parking development even if demand for these areas increases. This offers similar medium density recreation opportunities in frontcountry areas. Table 3.2.1-25 identifies capacities and assesses whether projected demand would exceed capacity in the three highest use months. The demand projections account for projected boating use as well as increased non-boating uses. Analysis suggests there would be several months when these projected demands would exceed capacities on some days. On these days, users would compete for limited parking availability, and some would be displaced. The trade-off is higher quality experiences for those who are present.

Table 3.2.1-25 Alternative 14-Existing Use and Projected Patterns in Frontcountry Areas for the Three Highest Use Periods

Frontcountry Area	Capacity in Groups at One Time	Capacity in People at One Time	Peak Use Month[2] Parking Demand	Projected Parking Demand in 20 years	Second Highest Use Month[2] Parking Demand	Projected Parking Demand in 20 years	Third Highest Use Month[2] Parking Demand	Projected Parking Demand in 20 years
Grimshawes/ Sliding Rock Area	25	65	August 25	demand exceeds capacity (independent of boats)	July 18	demand meets capacity (independent of boats)	July 17	demand is below capacity
Bullpen Road Bridge Area	15	40	August 12	demand exceeds capacity (independent of boats)	July 11	demand exceeds capacity (with boats) [3]	January, August, September & October 8	demand exceeds capacity (with boats) [3]
Burrells Ford Bridge Area	80	205	March 63	demand exceeds capacity (independent of boats	October 46	demand exceeds capacity (with boats) [4]	May & October 45	demand exceeds capacity (with boats) [4]
Highway 28 Bridge Area	35	85	March 36	demand exceeds capacity (independent of boats)	November 30	demand exceeds capacity (independent of boats)	May & December 25	demand exceeds capacity (independent of boats)

[1] Projected demand is based on a 40% increase in parking over a 20 year period.
[2] Based on number of vehicles in the parking lot at one time on a single weekend day in a month.
[3] On an "ideal" day, 18 vehicles could park at Bullpen to float the Ellicott Rock Reach and could therefore exceed the parking capacity independently (not including Chattooga Cliffs Reach boaters taking out at BP or other recreationists).
[4] Assumes that at 350 cfs or higher on an "ideal" day there will not be as much separation between other recreationists and boaters and therefore demand would exceed capacity on these days.

This alternative adds boating to the mix of frontcountry users, which could affect parking availability and congestion at some frontcountry areas (primarily Bullpen Road Bridge Area and Burrells Ford Bridge Area). The conflict section (above) identifies the estimated frequency of scenic and whitewater boating and social effects under this alternative; the major implications for frontcountry conditions are listed below:

- The days with boating opportunities under this alternative would occur at relatively high flows during or immediately after storm events in winter. In general, these are likely to be lower use days for frontcountry areas (which have higher use levels in summer), so parking availability is relatively unchanged by the addition of boating on a portion of days in these months.

- However, adding boating use in combination with projected increases in hiking and angling would result in a small number of days with greater demand than supply for parking. The amount of boating use on specific high use days (those with ideal flows on weekends) is one major factor, and boating stakeholders

dispute Integrated Report peak estimates used in this analysis (see conflict discussion for Alternative 8). The number of boaters aside, these very high use boating days are likely to be rare.

- On these few days, demand for parking at the Bullpen Bridge Area is probably the most challenging because parking spaces are more limited than other frontcountry areas. In addition, Bullpen Road Bridge is both a take-out (for the Chattooga Cliffs Reach) and a put-in (for the Ellicott Rock Reach), so it may have even higher use than just the boater vehicles associated with one reach (although it is challenging to estimate the proportion that will boat those reaches separately or as one trip).

- The introduction of boaters is not likely to cause demand for parking at the Burrells Ford Bridge Area to exceed capacity in the short term. However, demand for parking is expected to exceed allowed capacity within 20 years on a few weekend days each year (when flow conditions are ideal for boating). Therefore, any type of user might be displaced or have to cope with the increased congestion.

- As discussed with other alternatives that allow boating, demand for parking already exceeds capacity at the Highway 28 Bridge Area during the peak use month of March. However, boating would not affect this situation because boats using this reach are expected to float to the Highway 28 Boating Launch on Section 1 of the lower segment of the Chattooga River. The major parking availability issues at Highway 28 on the upper Chattooga WSR are related to projected increases in angling and hiking use

3. Backcountry Social Conditions

Alternative 14 defines capacities for backcountry reaches in terms of average groups per day; they are the same as those for alternatives 8 and 11, 12 and13. These capacities vary on weekends and weekdays to provide a diversity of opportunities for solitude, and would apply to both day and overnight users (Table 3.2.1-26). The capacities are designed to prevent backcountry encounters from exceeding between two and eight per day on weekdays and between four and 15 per day on weekends (depending on the reach). These encounter levels are consistent with median tolerances for trail/river encounters in higher use “wilderness settings” (Dawson & Alberga, 2003) and similar to findings from a survey of Chattooga users in the Ellicott Wilderness (Rutlin, 1995).

Table 3.2.1-26 Alternative 14 Backcountry Capacities and Encounters by River Reach

Reach	Capacity (Number of groups per day)		Capacity (Number of people per day)		Encounters (Average number of groups per day)	
	Weekdays	Weekends	Weekdays	Weekends	Weekdays	Weekends
Chattooga Cliffs	5	10	10	15	0-2	0-4
Ellicott Rock	10	20	35	110	0-4	0-9
Rock Gorge and Upper Nicholson Fields *(Lick Log Creek to Reed Creek)*	15	30	40	95	0-8	0-14
Lower Nicholson Fields *(Reed Creek to Hwy.28)*	15	30	40	95	0-8	0-15

Under Alternative 14, use levels are unlikely to exceed these capacities because of boating use because except on a rare weekend day. Based on existing backcountry use levels, these are likely to be infrequent in the near future.

4. Biophysical Attributes Affecting Recreation Experiences

a. Campsites

Same as Alternative 3.

b. Trails

Same as Alternative 8.

5. Monitoring and Adaptive Management

Same as Alternative 8.

6. Recreation ORV

Same as Alternative 3.

7. Cumulative Effects

Same as Alternative 2.

3.2.2 BIOLOGY ORV

3.2.2a FISHERIES

I. SUMMARY OF FINDINGS

As outlined in Chapter 2, the Biology ORV is divided into three components: fisheries, plants and wildlife. This section analyzes the effects of the alternatives on the fisheries component of the ORV which, at the time of designation, was mostly concerned about the existing and future trout fishery. As science and environmental analysis have improved since the river was designated, so, too have the regulatory and legislative mandates under which the US Forest Service manages the Chattooga River. Today, the agency manages the fisheries component of the Biology ORV not only under the Wild and Scenic Rivers Act and Wilderness Act, but also under several other mandates including the Endangered Species Act and the Forest and Rangeland Renewable Resources Planning Act as amended by the National Forest Management Act of 1976. The Region 8 Sensitive Species list was considered in the analysis along with state records from North Carolina, South Carolina and Georgia. Therefore, although the agency examines the effects of the alternatives on the Biology ORV in this section, this analysis also addresses potential impacts of the alternatives on Region 8 Sensitive aquatic species, Locally Rare aquatic species, Management Indicator Species (MIS) and Management Indicator Communities in the Chattooga River watershed. Potential impacts on aquatic species in this analysis are associated with physical trampling and scraping, sedimentation from trails and campsites and the removal of large woody debris (LWD). Currently, sediments are being contributed to the river and its tributaries mainly from roads, but also from campsites and trails associated with recreation use. There is also some unauthorized removal of LWD.

A. Fisheries Component of the Biology ORV

The Chattooga Wild and Scenic River contains both coldwater and warm-water fisheries. The coldwater fisheries and trout habitat are located above SC Highway 28 in the upper segment of the Chattooga WSR; the warm-water fisheries are located in the lower sections of the river. Trout stocking occurs periodically throughout the year and has been done since before the river was designated as wild and scenic. All alternatives would continue to protect and enhance the fisheries component of the Biology ORV of the Chattooga Wild and Scenic River.

B. Other Legislative and Regulatory Mandates

Current management standards and proposed alternatives provide for mitigating resource damage and minimizing erosion from campsites and trails in the watershed, thereby reducing any sediment impacts to aquatic species. There would be an overall net reduction in sediment when watershed improvement projects are implemented in the Chattooga River watershed (refer to Section 3.3.2 for discussion on sediment impacts). Therefore, indirect

sediment impacts to aquatic species are expected to be less than existing conditions with the implementation of watershed improvement projects. Current management standards and proposed alternatives also provide for LWD recruitment and retention.

There are no federally listed or proposed aquatic species within the analysis area. Under all alternatives, direct impacts may occur through mortality and injury from trampling and scraping by recreational users to individuals of Region 8 Sensitive aquatic species: *Cambarus chaugaensis*, *Beloneuria georgiana*, *Ophiogomphus edmundo, Macromia margarita* and *Alasmidonta varicosa*. Given the remote chance of these impacts targeting one particular species over time, the species occurrence ranges and the abundance of habitat across the species ranges; recreational use is not likely to cause a trend toward federal listing or a loss of viability. Under all alternatives, direct impacts may occur through mortality and injury from trampling and scraping by recreational users to individuals of Locally Rare aquatic species, MIS and Management Indicator Communities, but there should be no risk to aquatic population viability across the forests.

Under all alternatives, indirect impacts from sediment to Region 8 Sensitive aquatic species, Locally Rare aquatic species, MIS and Management Indicator Communities are expected to be less than existing conditions with the implementation of watershed improvement projects. Under all alternatives, there should be no indirect impacts from the loss of LWD to Region 8 Sensitive aquatic species, Locally Rare aquatic species, MIS and Management Indicator Communities.

Under all alternatives, there would be no adverse cumulative impacts to Region 8 Sensitive aquatic species or Locally Rare aquatic species and no risk to aquatic population viability across the Forests for MIS and Management Indicator Communities.

Under all alternatives, there is the potential for the spread of aquatic non-native invasive species (NNIS) plants, animals and diseases into the Chattooga River. As the number of forest visitors increases, there is the potential for the increased spread of NNIS.

II. Affected Environment

A. Condition at Time of Designation

The 1971 Designation Study describes the fisheries, including mileage estimates, and fishing opportunities by dividing the river and West Fork into five sections:

1. Headwaters to Bullpen Road Bridge (7.7 miles)

The Chattooga River and its tributaries above this point are excellent trout waters, comparing favorably with better streams in all three states.

2. Bullpen Road Bridge to Highway 28 (16.6 miles)

This section of stream is providing fair to good fishing for wild rainbow and brown trout, with brown trout the predominant species. Brook trout are present in most tributaries.

3. Highway 28 Bridge to Highway 76 Bridge (19.1 miles)

The Chattooga River in most of this section is considered marginal for trout, due to high water temperatures.

4. Highway 76 to Tugaloo Lake (7.8 miles)

This section of the main stream is the only portion not suitable for classification as a trout stream.

5. West Fork of the Chattooga River (7.3 miles)

The West Fork is a fairly large stream furnishing fairly good fishing for rainbow and brown trout in its lower reaches.

The Federal Register, Volume 41, Number 56 – Monday, March 22, 1976 (also known as 1976 Federal Register) not only includes formal descriptions of the wild and scenic river boundaries and classifications but also includes information on the fisheries:

> A native fishery will be encouraged. Fish stocking will be permitted at the Highway 28 Bridge, Burrells Ford, Bullpen Bridge, Long Bottom Ford on the river, and Warwoman and Overflow Bridges on the West Ford [sic].

B. 1996 ORV Report

The 1996 ORV Report evaluated changes in fisheries since designation. The report notes this is the southernmost range of natural trout habitat; the river is home to rainbow, brook and brown trout. Due to the variable water temperatures, trout fishing is best in the upper segment of the Chattooga River, while redeye bass and redbreast sunfish provide excellent fishing in the lower reaches.

C. Conditions as they Exist Today

Fish species include rainbow, brown and brook trout, as well as a diverse water fish community including darters, shiners, madtoms and chubs. The sensitive Oconee stream crayfish (*Cambarus chaugaensis*) and the sensitive brook floater (*Alasmidaonta varicosa*) are also present. The river provides premier trout fishing opportunities for anglers across the Southeast. River stocking that occurred at the time of designation continues today.

However, the stocking methods and locations have changed. Today, the West Fork and the main stem Chattooga River below the Ellicott Rock Wilderness are stocked with trout by helicopter every fall. Stocking also occurs periodically throughout the year by more traditional methods such as trucks.

As noted earlier, today the US Forest Service manages specific species and fisheries habitat in compliance with other legislation and regulations outside the WSRA and the Wilderness Act. Therefore, the species and habitat discussed in this analysis are not specifically part of the Biology ORV. However, overall the components analyzed in this analysis contribute to the protection and enhancement of the fisheries component of the Biology ORV as required by the WSRA.

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 impacts will be addressed from the private property boundary downstream to the Highway 28 Bridge. Cumulative impacts will be addressed for the entire Chattooga watershed above Tugaloo Lake.

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

No federally listed aquatic species occur in the Chattooga River or its tributaries. Five Region 8 Forest Sensitive aquatic species may occur in the watershed (see Table 3.2.1a-1). 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. *Ophiogomphus edmundo* was recently reported from the Chattooga River in the vicinity of Highway 76 (Abbott 2010).

Table 3.2.2a-1 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 NNF 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.

Species	Species Ranking				Forest	Habitat
Mountain river cruiser *Macromia margarita*	G3	GA-S1 NC-S2S3 SC-SNR		Sensitive	NNF CONF	Mountain, sometime Piedmont streams and rivers with high water quality, forested watersheds and silt deposits among rocks.
Edmund's snaketail *Ophiogomphus edmundo*	G1G2	GA-S1 NC-S1?		Sensitive	CONF NNF	Clear moderately flowing mountain streams and rivers with sand or gravel riffles.

Note: Global and state species ranking is defined in Table 3.1-10.

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 includes 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 SC Comprehensive Wildlife Conservation Strategy (Kohlsaat et al. 2005) designates the South Carolina Priority Species List. These species warrant conservation concern to maintain diversity in South Carolina waters. The species are ranked in priority as moderate, high and highest conservation priority. *Cambarus chaugaensis* and *Alasmidonta varicosa* are rated as highest conservation priority.

The 2004 Final Environmental Impact Statement (FEIS) for the Sumter National Forest Revised Land Resource Management Plan (RLRMP) addresses Aquatic Viability by watershed. The Chattooga River watershed was represented by two Region 8 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 US Forest Service may influence conditions in the watershed to keep the species well distributed. Therefore, the 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) notes that the population of *Alasmidonta varicosa* in the Chattooga River was the best in the Southeast; therefore, special conservation should be emphasized for this population. From Georgia through at least Maryland, this is the best extant population within this range (Alderman 2008). The majority of this population is located from the vicinity of Highway 28 and downstream in the Chattooga River, where recreational uses include fishing and boating.

There are documented occurrences in the Chattooga River watershed for four of the five Region 8 Forest Sensitive aquatic species. There are state natural heritage program EO records for *Cambarus chaugaensis* in North Carolina. Its range includes the Chattooga River watershed in North Carolina, South Carolina and Georgia and the Chauga River watershed in South Carolina, where it is most abundant (NatureServe 2011).

There are state natural heritage program EO records for *Alasmidonta varicosa* in the Chattooga River**.** *Alasmidonta varicosa* is located in the main channel from the vicinity of the Highway 28 bridge and downstream in South Carolina and Georgia. The mussel's range extends along the east coast from Georgia into Canada.

English (1990) sampled *Beloneuria georgiana* in the Chattooga River and two Georgia tributaries. *Beloneuria georgiana* is known from Georgia, North Carolina and Tennessee. *Ophiogomphus edmundo* was recently reported from the Chattooga River in the main channel of the river in the vicinity of the Highway 76 bridge (Abbott 2010). This species has also been reported from Georgia, North Carolina and Tennessee. *Macromia margarita* is not documented from the watershed, but occurs in adjacent watersheds in South and North Carolina. For this reason, and the likelihood of discovering more occurrences (NatureServe 2011), this species is included for analysis. *Macromia margarita* is documented from Alabama, Georgia, North Carolina, South Carolina, Tennessee and Virginia. In South Carolina, this species is documented from the Seneca River watershed in Pickens County. There is the possibility that these three aquatic insects occur in a wider range than is documented due to the lack of wide range sampling and the difficulty of identifying individuals at different life stages. English and Pike (2009) found the genus *Ophiogomphus* at seven sites in the Chattooga River watershed, but were unable to identify them to the species level.

Habitat descriptions for Region 8 Sensitive aquatic species are summarized in Table 3.2.2a-1. It is possible that *Cambarus chaugaensis*, *Beloneuria georgiana*, *Ophiogomphus edmundo* and *Macromia margarita* occur throughout the Chattooga River watershed. However, *Alasmidonta varicosa* is only known from the vicinity of Highway 28 bridge and downstream in the main channel of the Chattooga River.

2. 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 3.2.2a-2. 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 US Forest Service, South Carolina Department of Natural Resources (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).

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.

Table 3.2.2a-2 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		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		LR	NNF	Mountain rivers and creeks.
A caddisfly *Matrioptila jeanae*	G4	GA-SNR NC-S3		LR	NNF	Streams and rivers.
A caddisfly *Micrasema burksi*	G4G5	GA-SNR NC-S3		LR	NNF	Mountain streams.
A caddisfly *Micrasema sprulesi*	G5	NC-S3		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?		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		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	CS	LR	NNF	Clear rocky pools of headwaters, creeks and rivers.
Turquoise darter *Etheostoma inscriptum*	G4	GA-S4 NC-S1	CS	LR	NNF	Rocky riffles of large creeks and small to medium rivers.
Whitetail shiner *Cyprinella galactura*	G5	GA-S3S4 NC-S4	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	CS	LR	CONF	Pools and runs of cool usually clear creeks and small to medium rivers with gravel-rubble substrate.

3. Aquatic MIS and Management Indicator Communities

Table 3.2.2a-3 Aquatic MIS and Management Indicator 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 *Salvelinus fontinalis*, *Oncorhynchus mykiss*, *Salmo trutta* and *Rhinichthyes atratulus* populations across the Nantahala and Pisgah national forests have remained stable during the last 13 years (National Forests in North Carolina FY 2009 Monitoring and Evaluation report).

The Chattooga River and its tributaries contain cold to cool water aquatic communities from the headwaters to the downstream reaches. The aquatic community serves as a management indicator that is monitored to indicate the effects of management on riparian resources. Fish, crayfish, aquatic insects and mollusks are all components of the community. Tables 3.2.2a-4, 3.2.2a-5 and 3.2.2a-6 address the aquatic community and each table provides a list of aquatic species. Table 3.2.2a-4 lists fish species from surveys conducted in the Chattooga River watershed by the US Forest Service, SCDNR and GADNR.

Table 3.2.2a-4 Fish Species Sampled in the Chattooga WSR Watershed.

Scientific Name	Common Name
Catostomidae	**Suckers**
Catostomus commersoni	White sucker
Hypentelium nigricans	Northern hogsucker
Moxostoma collapsum	Notchlip redhorse
Scartomyzon rupiscartes	Striped jumprock
Centrarchidae	**Sunfishes**
Lepomis auritus	Redbreast sunfish
Lepomis macrochirus	Bluegill
Micropterus coosae	Redeye bass
Cottidae	**Sculpins**
Cottus bairdi	Smoky 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 insignis	Margined madtom
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). NatureServe has assigned a Global Rank of either G4 (apparently secure) or G5 (secure) to all of the fish species in the community.

The SC Comprehensive Wildlife Conservation Strategy (Kohlsaat et al. 2005) ranks *Micropterus coosae* as highest conservation priority; *Cottus bairdi* and *Etheostoma inscriptum* as high conservation priority; and *Moxostoma collapsum*, *Campostoma anomalum*, *Hybopsis rubrifrons*, *Luxilus coccogenis*, *Notropis leuciodus*, *Notropis spectrunculus*, *Rhinichthys atratulus*, *Rhinichthys cataractae*, *Ameiurus brunneus* and *Salvelinus fontinalis* as moderate conservation priority.

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

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 3.2-2a-5.

Table 3.2.2a-5 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.

The SC Comprehensive Wildlife Conservation Strategy (Kohlsaat et al. 2005) ranks *Cambarus chaugaensis* as highest conservation priority.

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) report finding a relic shell of *Elliptio complanata* in the Chattooga River (see Table 3.2.2a-6).

Table 3.2.2a-6 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.

The SC Comprehensive Wildlife Conservation Strategy (Kohlsaat et al. 2005) ranks *Alasmidonta varicosa* as highest conservation priority, and *Elliptio angustata*, *Elliptio complanata* and *Elliptio producta* as moderate conservation priority.

Alderman (2004) reports 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 *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 of the Highway 28 bridge.

Aquatic insect surveys were conducted in the Chattooga River from 1986-89 by English (1990), in 2007-08 by English and Pike (2009), and in 1994 by Weber and Isely (1995). Weber and Isely conclude that water quality in the Chattooga River basin was good to excellent using macroinvertebrates as biological indicators of water quality. Analysis of macroinvertebrate data in the English 1990 report indicates 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 the 1990 report were resampled in fall 2007 and 2008 (English and Pike 2009) and encompass sample sites from the headwaters downstream to just above Tugaloo Lake, including some tributaries. A comparison of the combined data from the 1990 and 2009 reports for both sampling periods in the entire watershed, indicates that the upper segment of the Chattooga WSR area had better water quality than the lower segment of the Chattooga WSR area and the tributaries. Taxa richness and diversity metrics in the 1990 report indicate better water quality throughout the watershed than in the 2009 report. This may be contributed to lower water discharges in 2007 than in 1989. When looking at differences among all watershed areas for both sampling periods, water quality was better in the tributaries during the 1990 report sampling period when compared to tributary water quality in the 2009 report sampling period; the upper segment of the Chattooga WSR had better water

quality than the lower section of the river in the 2009 report sampling period; and most of the watershed had excellent or very good water quality for both sampling periods. Of all the watershed areas sampled for the 2009 report, the upper segment of the Chattooga WSR area had the highest taxa richness, diversity and EPT Index indicating the best water quality. The biotic index indicates that the lower segment of the Chattooga WSR area had the poorest water quality.

4. 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 also benefited from the addition of wood to the stream. Monitoring of the treated stream showed a substantial increase in brook trout density and biomass and in aquatic insect density and diversity with an increase of pool habitat from ten percent to 38 percent of total stream area. There was also a 61 percent decrease in riffle fines resulting in more suitable spawning habitat.

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 segment of the Chattooga WSR, 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 3.2.2a-7); 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 3.2.2a-8). 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 3.2.2a-1). Also, the largest, most stable size class of LWD (size 4) was less than two percent of total LWD in each stream (Figure 3.2.2a-2).

Table 3.2.2a-7 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 3.2.2a-8 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 3.2.2a-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.

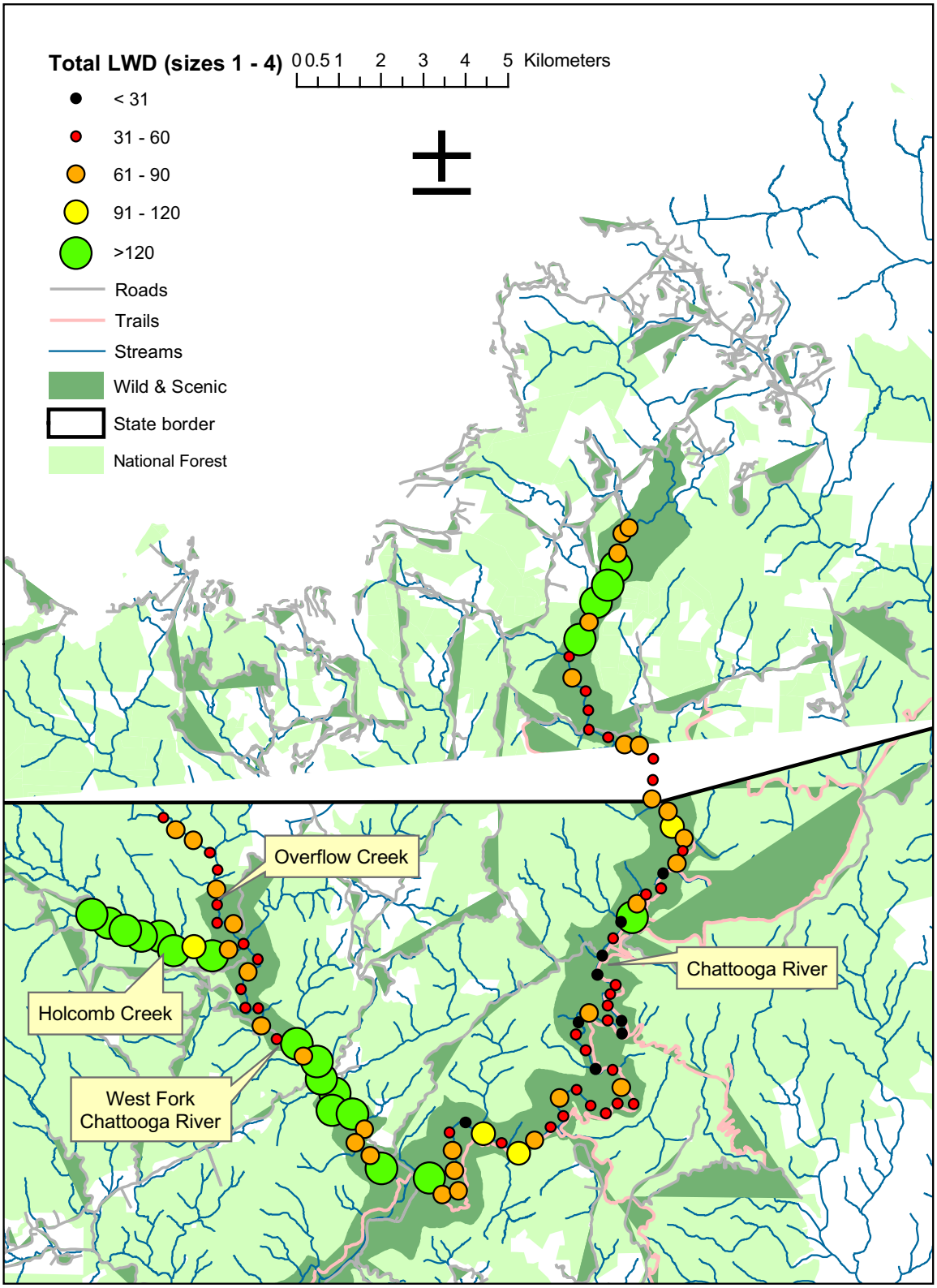
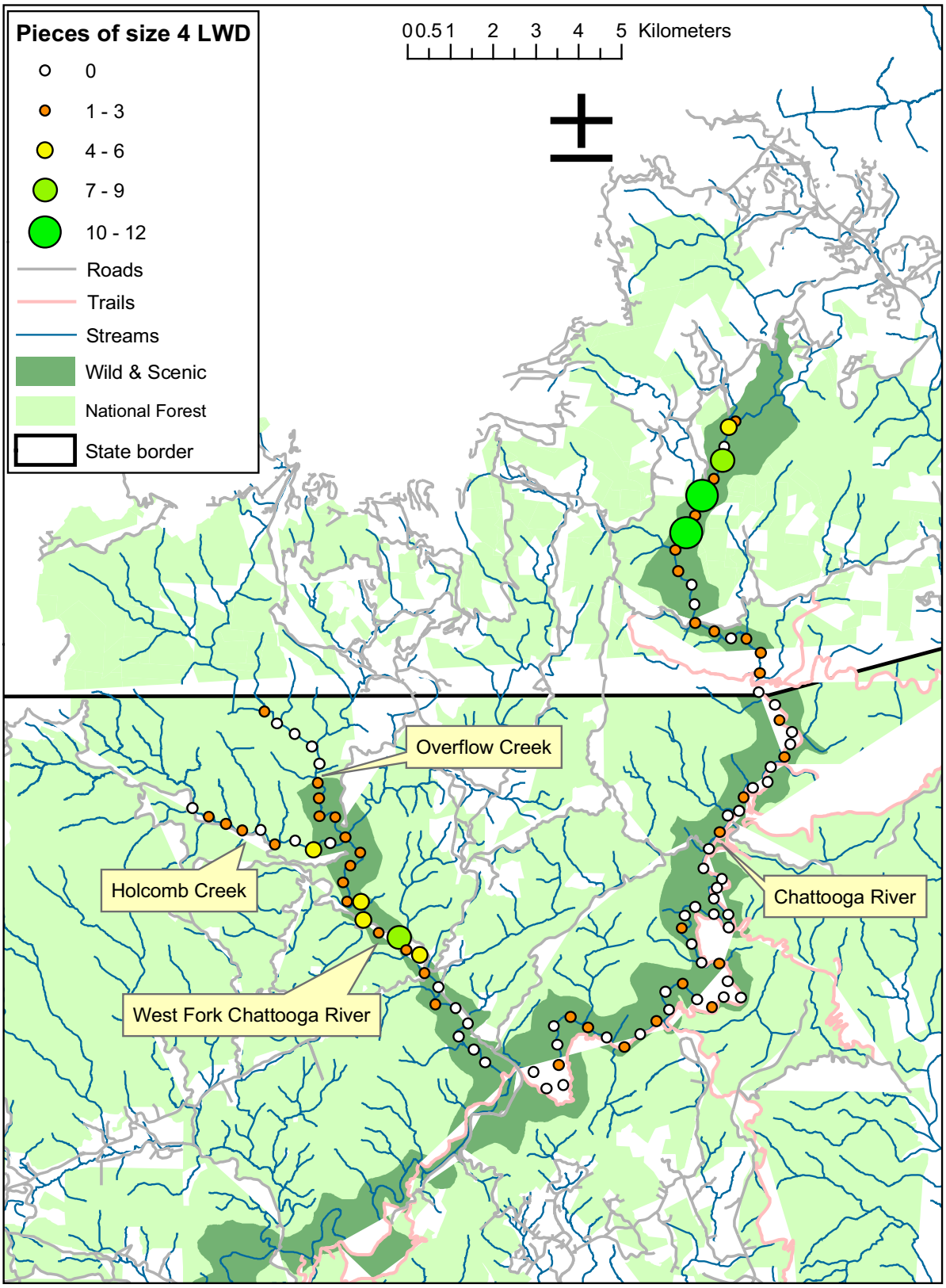


Figure 3.2.2a-2. Size 4 LWD (longer than five meters, greater than 50 cm diameter) counts from 500 m reaches in the Chattooga River watershed, November 2007. Figure modified from Roghair et al. (2008)



III. Existing Impacts to the Environment

When considering impacts to the fisheries component of the Biology ORV and other aquatic impacts, three important areas must be analyzed:

1) trampling, crushing or scraping of macroinvertebrates and eggs;
2) sediment; and
3) loss of large woody debris (LWD).

Activities that substantially impact these components can degrade the fisheries component of the Biology ORV.

A. Trampling, Crushing or Scraping of Macroinvertebrates and Eggs

Recreational use of the river may result in the physical trampling and equipment scraping of aquatic species, particularly those with slow mobility and those in early life stages. Direct impacts may occur through mortality or injury to individuals from trampling and scraping by recreational users.

B. Sediment

This analysis addresses proposed activities that may contribute sediments or otherwise impact aquatic habitat or species. Fine sediments can alter and reduce the quality of aquatic habitats and eliminate benthic macroinvertebrates or reduce their density and diversity. This in turn decreases a food source for some aquatic 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 use of these roads contributes to their erosion through heavy trafficking and by increasing the need for maintenance, both of which aggravate sedimentation. Van Lear (1995) also found that the wild and scenic corridor of the main stem 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 16 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 in the Affected Environment. The 2004 FEIS for the Sumter RLRMP 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). Current management for trails in all three forests provides standards to improve existing conditions

and reduce impacts to aquatic resources. Whittaker and Shelby (2007) also note that campsites within 20 feet of the river pose greater erosion risks. Current management in the 2004 Sumter RLRMP requires camping more than 50 feet from streams and that any campsites contributing sediments in the Chattahoochee and Nantahala national forests would be closed and rehabilitated.

C. Large Woody Debris

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. Overtime, recruitment of hemlock to the river will diminish. There is no other tree that will replace the aquatic habitat performance of hemlock within mountain stream systems.

During the 2007 LWD survey (Roghair et al. 2008), it was noted that LWD has been actively removed in the Chattooga River. This removal was primarily associated with dispersed campsites. LWD removal was also evident in Overflow Creek in Georgia, 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 boaters remove LWD 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 these sources and the 2007 LWD inventory show that LWD removal is likely where camping and boating are allowed. Under current management, LWD removal is permissible only in limited cases and is evaluated on a case-by-case basis by Forest Service personnel.

IV. Environmental Consequences

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

A. Determination of Effects Common to All Alternatives

There are no federally listed or proposed aquatic species within the analysis area. Direct impacts may occur through mortality and injury from trampling and scraping by recreational users to individuals of *these* Region 8 Sensitive aquatic species: *Cambarus chaugaensis*, *Beloneuria georgiana*, *Ophiogomphus edmundo, Macromia margarita* and *Alasmidonta varicosa*. Given the remote chance of these impacts targeting one particular species over time, the species occurrence ranges and the abundance of habitat across the species ranges; recreational use is not likely to cause a trend toward federal listing or a loss of viability. Direct impacts may occur through mortality and injury from trampling and scraping by recreational users to individuals of Locally Rare aquatic species (Table 3.2.2a-2), MIS (Table 3.2.2a-3) and Management Indicator Communities (tables 3.2.2a-3 through 3.2.2a-6), but there should be no risk to aquatic population viability across the forests.

Indirect impacts from sediment to Region 8 Sensitive aquatic species, Locally Rare aquatic species, MIS and Management Indicator Communities are expected to be less than existing conditions with the implementation of watershed improvement projects.

There should be no indirect impacts from the removal of LWD to Region 8 Sensitive aquatic species, Locally Rare aquatic species, MIS and Management Indicator Communities.

B. Alternative 1 – Direct and Indirect Effects

1. Trampling, Crushing or Scraping of Macroinvertebrates and Eggs

Physical trampling and scraping of aquatic species by recreational users may occur with a remote chance of targeting one particular species over time. However, activities in the water such as swimming, wading (while fishing for example) or climbing on rocks can disturb eggs, larva and insects attached to rocks and in the streambeds. These impacts can be more severe when trout are reproducing during October to May and at lower stream flows. Whittaker and Shelby (2007) note that optimal lower flows for fishing occur from about 100 cfs to 450 cfs. Lower flows and spring and summer seasons are also more conducive to other recreational users as well who want to wade or swim in the river. This results in more impacts to the fisheries than during higher flows and fall and winter seasons when recreational use is lower.

Furthermore, impacts from trampling, crushing and scraping are more concentrated in easily accessed reaches. Ease of access from the four frontcountry areas increases the potential for these types of impacts. The most susceptible to this type of impact are Nicholson Fields and the lower part of Rock Gorge below Big Bend Falls. Chattooga Cliffs and Ellicott Rock reaches are more remote, have steeper terrain and rock cliffs and long stretches of fast moving water. There are limited impacts to fisheries in these reaches because fewer people are likely to be found wading and swimming in the river. Generally speaking, current use is not having a measurable adverse impact on fisheries.

2. Sediment

Since designation, many roads have been closed by the US Forest Service in an effort to reduce sedimentation into the river. Still today, the US Forest Service is implementing projects to reduce sediment input into the Chattooga River. Sediment input from roads is expected to continue to decrease in the long term helping to improve water quality and the fisheries in the Chattooga River. Please refer to the water quality section in this report for more detailed information.

Under Alternative 1, current management standards provide for mitigating resource damage and minimizing erosion to the watershed. Trails and campsites contributing sediments would be improved and potential aquatic impacts minimized. Trail sediment impacts would be corrected under current management for each forest. 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 survey of the Chattooga River (Whittaker and Shelby 2007), it was determined that the majority of campsites are located in the SNF. There would be an overall net reduction in sediment with the implementation of watershed improvement projects in the Chattooga River watershed (refer to Section 3.3.2 for discussion on sediment impacts).

3. Large Woody Debris

The LWD inventory (*Inventory of Large Wood in the Upper Chattooga Watershed*, November 2007), referred to as Woody Inventory, notes that some woody material was being removed adjacent to some of the dispersed campsites. Mortality of Eastern hemlock trees is occurring from the Hemlock Woolly Adelgid along the river and tributaries of the Chattooga River. The report also notes that ample supplies of replacement woody debris are and would move into the stream system in the short and long term. Hemlock is an extremely durable wood and takes a long time to decompose and decades to move through the river system. In addition, LWD recruitment and retention in the watershed would be maintained with current LRMP direction for each forest throughout the watershed. Therefore, the impacts on LWD from current recreational activities are minor and not likely to have major impacts on fisheries in the short and long term.

4. All Reaches

Impacts outlined above are the same across all four reaches of the upper segment of the Chattooga WSR.

5. All Flows

Impacts to all four reaches outlined above remain the same, regardless of flow.

6. All Seasons

Impacts to all four reaches outlined above remain the same, regardless of season.

7. Biology ORV—Fisheries

This alternative would continue to protect and enhance the fisheries component of the Biology ORV.

C. Alternative 2 – Direct and Indirect Effects

1. Trampling, Crushing or Scraping of Macroinvertebrates and Eggs

A permit system would reduce impacts to fisheries by reducing the number of recreationists that could potentially disturb macroinvertebrates and aquatic eggs. Physical trampling and scraping of aquatic species by recreational users may occur with a remote chance of targeting one particular species over time. Overall the fisheries would be improved slightly under this alternative when compared to Alternative 1.

2. Sediment

a. Chattooga Cliffs

Under Alternative 2, trails and campsites contributing sediments would be improved and potential aquatic impacts minimized. Trail closure and new trail construction would be implemented to mitigate resource damage and minimize erosion, and therefore sediment contribution, to the river. Mitigation refers to no visible movement of sediment into waters and that trails and campsites are located off the stream bank. 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. 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; however it is likely that campsites within 50 feet of the river would contribute some sediments to the watershed. Impacts from campsites may be slightly greater than in Alternative 1 due to campsites being located within 50 feet of the river. The number of designated campsites would be limited to a total of four for both sides of the river per mile along the entire length of the Chattooga River under this alternative. Limiting campsites to a maximum of one per ¼ mile along the entire length of the upper segment of the Chattooga WSR

would decrease the total number of campsites on both sides of the upper river by 32%. However, in the Chattooga Cliffs Reach, the number of campsites could potentially increase by 86%.

b. Ellicott Rock

The impacts in this reach are the same as in the Chattooga Cliffs Reach, except that the number of campsites would decrease by 46%.

c. Rock Gorge

The impacts in this reach are the same as in the Chattooga Cliffs Reach, except the number of campsites would decrease by 53%. In addition, closing roadside parking at Burrells Ford Bridge may decrease some sediment input.

d. Nicholson Fields

The impacts in this reach are the same as in the Chattooga Cliffs Reach, except the number of campsites would decrease by 31%.

3. Large Woody Debris

LWD recruitment and retention would be maintained with current LRMP direction for each forest throughout the watershed.

4. All Reaches

The impacts outlined above apply to all river reaches.

5. All Flows

Impacts to all four reaches outlined above remain the same, regardless of flow.

6. All Seasons

Impacts to all four reaches outlined above remain the same, regardless of season.

7. Biology ORV—Fisheries

Overall fisheries would be improved slightly under this alternative compared to Alternative 1. Therefore, this alternative would continue to protect and enhance this component of the Biology ORV in the upper segment of the Chattooga WSR.

D. Alternative 3 – Direct and Indirect Effects

1. Trampling, Crushing or Scraping of Macroinvertebrates and Eggs

Physical trampling and scraping of aquatic species by recreational users may occur with a remote chance of targeting one particular species over time.

2. Sediment

Under Alternative 3, trails and campsites contributing sediments would be improved and potential aquatic impacts minimized. 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. 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. 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; however it is likely that campsites within 50 feet of the river would contribute some sediments to the watershed. Impacts from campsites may be slightly greater than in Alternative 1 due to campsites being located within 50 feet of the river. In addition, there is no limit to the number of campsites along the river. Improvements would be modest since existing sediment from campsites and trails is a very minor component to overall sources of sediment input.

3. Large Woody Debris

LWD recruitment and retention would be maintained throughout the watershed. There would be no LWD removal without agency approval (as in current management) and no removal to accommodate recreation within the river or stream banks. Improvements would be modest since the LWD component in the river is expected to increase in the future with dying hemlock. The additional protection of LWD would result in site-specific improvements over Alternative 1.

4. All Reaches

The above impacts remain the same for all four river reaches.

E. All Flows

The above impacts remain the same for all flows.

F. All Seasons

Impacts to all four reaches outlined above remain the same, regardless of season.

G. Biology ORV—Fisheries

Overall fisheries would be improved slightly under this alternative compared to Alternative 1. Therefore, this alternative would continue to protect and enhance this component of the Biology ORV in the upper segment of the Chattooga WSR

E. Alternative 8 – Direct and Indirect Effects

1. Trampling, Crushing or Scraping of Macroinvertebrates and Eggs

Impacts from trampling, crushing and scraping from all recreational users that wade, swim or boat are more concentrated in easily accessed reaches. Ease of access from the four frontcountry areas increases the potential for these types of impacts. The most susceptible to this type of impact are Nicholson Fields Reach and the lower part of Rock Gorge Reach below Big Bend Falls. Chattooga Cliffs and Ellicott Rock reaches are more remote, have steeper terrain, rock cliffs and longer stretches of fast moving water. Overall the fisheries would be improved slightly when compared to Alternative 1. Physical trampling and scraping of aquatic species by recreational users may occur with a remote chance of targeting one particular species over time.

2. Sediment

Under Alternative 8, trails and campsites contributing sediments would be improved and potential aquatic impacts minimized. 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. 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. 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; however it is likely that campsites within 50 feet of the river would contribute some sediment to the watershed. Impacts from campsites may be slightly greater than in Alternative 1 due to campsites being located within 50 feet of the river. In addition, there is no limit to the number of campsites along the river.

Alternative 8 proposes boating on the main stem of the Chattooga River for 21.6 miles from the confluence of Green Creek in North Carolina to Highway 28 Bridge in South Carolina at all flows for 12 months of the year. Four designated access trails would be constructed or designated as boat put-ins and take-outs. Erosion and sedimentation may

increase at designated access points with increased use and dragged equipment. In addition, portage trails would be created, increasing the potential for sediment input along the entire length of the river. However, sediment reductions from improved management actions and the introduction of a new user group under this alternative are expected to have minor impacts on fisheries.

3. Large Woody Debris

LWD recruitment and retention would be maintained throughout the watershed. There would be no LWD removal without agency approval (as in current management) and no removal to accommodate recreation. With the addition of boating in this alternative, there is an increased potential for the loss of LWD under this alternative. However, the Chattooga River tributaries are not included for boating under Alternative 8; therefore trails would not be created with this use 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.

4. All Reaches

The above impacts remain the same for all four river reaches.

5. All Flows

The above impacts remain the same for all flows.

6. All Seasons

The above impacts remain the same for all seasons.

7. Biology ORV—Fisheries

Overall fisheries would be improved slightly under this alternative compared to Alternative 1. Therefore, this alternative would continue to protect and enhance this component of the Biology ORV in the upper segment of the Chattooga WSR.

F. Alternative 11 – Direct and Indirect Effects

1. Trampling, Crushing or Scraping of Macroinvertebrates and Eggs

With the addition of boating, there is more potential for trampling, crushing and scraping of aquatic organisms. The impacts would be less than Alternative 8 since the higher flow requirements translate into fewer boating days on the river which reduces the potential of boating impacts to aquatic organisms.

Impacts from trampling, crushing, and scraping from all recreational users that wade, swim or boat are more concentrated in easily accessed reaches. Ease of access from the four frontcountry areas increases the potential for these types of impacts. The most susceptible to this type of impact are Nicholson Fields Reach and the lower part of the Rock Gorge Reach below Big Bend Falls. The Chattooga Cliffs and Ellicott Rock reaches are more remote, have steeper terrain, rock cliffs and longer stretches of faster moving water. Physical trampling and scraping of aquatic species by recreational users may occur with a remote chance of targeting one particular species over time. Overall the fisheries would be improved slightly when compared to Alternative 1.

2. Sediment

Under Alternative 11, trails and campsites contributing sediments would be improved and potential aquatic impacts minimized. 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. 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. 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; however it is likely that campsites within 50 feet of the river would contribute some sediments to the watershed. Impacts from campsites may be slightly greater than in Alternative 1 due to campsites being located within 50 feet of the river. In addition, there is no limit to the number of campsites along the river.

Alternative 11 proposes boating on the main stem of the Chattooga River for 21.6 miles from the confluence of Green Creek in North Carolina to Highway 28 Bridge in South Carolina at flows at or above 450 cfs for 12 months of the year. Four designated access trails would be constructed or designated as boat put-ins and take-outs. Erosion and sedimentation may increase at designated access points with increased use and dragged equipment. In addition, portage trails would be created increasing the potential for sediment input along the entire length of the river.

3. Large Woody Debris

LWD recruitment and retention would be maintained throughout the watershed. However, with the addition of boating in this alternative, there is an increased potential for the loss of LWD under this alternative. There would be no LWD removal without agency approval (as in current management) and no removal to accommodate recreation. In addition, monitoring would also be used to assess impacts on aquatic habitat from any loss of LWD ultimately affecting the quality of the fisheries component of the Biologic ORV.

The Chattooga River tributaries are not included for boating under Alternative 11; therefore trails would not be created with this use 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.

4. All Reaches

The above impacts remain the same for all river reaches.

5. All Flows

The above impacts remain the same for all flows. Impacts to aquatic resources are not dependent on flow levels.

6. All Seasons

The above impacts remain the same for all seasons.

7. Biology ORV—Fisheries

Overall fisheries would be improved slightly under this alternative compared to Alternative 1. Therefore, this alternative would continue to protect and enhance this component of the Biology ORV in the upper segment of the Chattooga WSR.

G. Alternative 12 – Direct and Indirect Effects

1. Trampling, Crushing or Scraping of Macroinvertebrates and Eggs

Impacts from trampling, crushing and scraping from recreational users that wade, swim or boat are more concentrated in easily accessed reaches. Ease of access from the four frontcountry areas increases the potential for adverse effects. The most susceptible to this type of impact are Nicholson Fields Reach and the lower part of Rock Gorge Reach below Big Bend Falls. Chattooga Cliffs and Ellicott Rock reaches are more remote, have steeper terrain, rock cliffs and longer stretches of faster moving water. Physical trampling and scraping of aquatic species by recreational users may occur with a remote chance of targeting one particular species over time.

2. Sediment

Under Alternative 12, trails and campsites contributing sediments would be improved and potential aquatic impacts minimized. 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. 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. 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; however it is likely that campsites within 50 feet of the river would contribute some sediments to the watershed. Impacts from campsites may be slightly greater than in Alternative 1 due to campsites being located within 50 feet of the river. In addition, there is no limit to the number of campsites along the river.

Alternative 12 proposes boating on the main stem of the Chattooga River in two reaches during consecutive time frames. Boating would be allowed for 10.6 miles from the confluence of Green Creek in North Carolina to Burrells Ford Bridge in South Carolina from December 1 to January 15 and for 7.2 miles from Burrells Ford Bridge to Lick Log Creek at all flows from January 16 to March 1. Five designated access trails would be constructed or designated as boat put-ins and take-outs. Erosion and sedimentation may increase at designated access points with increased use and dragged equipment. In addition, portage trails would be created increasing the potential for sediment input along over three-fourths the length of the river.

Sediment impacts from recreational activities are low when compared with other chronic sources such as from roads. Therefore, sediment reductions from improved management actions and the introduction of a new user group under this alternative are expected to have minor impacts on fisheries.

3. Large Woody Debris

LWD recruitment and retention would be maintained throughout the watershed. There would be no LWD removal without agency approval (as in current management) and no removal to accommodate recreation. However, because of the addition of boating, there is an increased potential for the loss of LWD in over three-fourths the length of the river under this alternative.

The Chattooga River tributaries are not included for boating under Alternative 12; therefore trails would not be created with this use 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.

4. All Reaches

The above impacts remain the same for all river reaches.

Nicholson Fields Reach
The above trail, camping and physical trampling and scraping impacts remain the same for the Nicholson Fields reach. Boating in the "Delayed Harvest" area would not be permitted. Therefore, there would be no new access points or portage trails within this reach. In addition, the potential for the loss of LWD decreases in this reach. This would protect the fisheries in this section of the river by maintaining current conditions.

5. All Flows

The above impacts remain the same for all flows.

6. All Seasons

The above impacts remain the same for all seasons.

7. Biology ORV—Fisheries

Overall the fisheries would be improved slightly when compared to Alternative 1. Therefore, this alternative would continue to protect and enhance this component of the Biology ORV in the upper segment of the Chattooga WSR.

H. Alternative 13 – Direct and Indirect Effects

1. Trampling, Crushing or Scraping of Macroinvertebrates and Eggs

Impacts from trampling, crushing and scraping from all recreational users that wade, swim or boat are more concentrated in easily accessed reaches. Ease of access from the four frontcountry areas increases the potential for these types of impacts. The most susceptible to this type of impact are Nicholson Fields Reach and the lower part of Rock Gorge Reach below Big Bend Falls. Chattooga Cliffs and Ellicott Rock reaches are more remote, have steeper terrain, rock cliffs and longer stretches of faster moving water. Physical trampling and scraping of aquatic species by recreational users may occur with a remote chance of targeting one particular species over time. Overall the fisheries would be improved slightly when compared to Alternative 1.

2. Sediment

Under Alternative 13, trails and campsites contributing sediments would be improved and potential aquatic impacts minimized. 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. 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. 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; however it is likely that campsites within 50 feet of the river would contribute some sediments to the watershed. Impacts from campsites may be slightly greater than in Alternative 1 due to campsites being located within 50 feet of the river. In addition, there is no limit to the number of campsites along the river.

Alternative 13 proposes boating on the main stem of the Chattooga River for 17.8 miles from the confluence of Green Creek in North Carolina to the confluence of Lick Log Creek in South Carolina at flows at or above 350 cfs for 3 months of the year. Three designated access trails would be constructed or designated as boat put-ins and take-outs. Erosion and sedimentation may increase at designated access points with increased use and dragged equipment. In addition, portage trails would be created increasing the potential for sediment input along over three-fourths the length of the river.

An additional boater put-in site and connector trail in the upper portion of Chattooga Cliffs Reach would introduce another point for erosion and sedimentation into the river. However, the trail would be designed and located to minimize erosion and sedimentation into the river. Sediment impacts from recreational activities are low when compared with other chronic sources such as from roads. Therefore, sediment reductions from improved

management actions and the introduction of a new user group under this alternative are expected to have minor impacts on fisheries.

3. Large Woody Debris

LWD recruitment and retention would be maintained throughout the watershed. There would be no LWD removal without agency approval (as in current management) and no removal to accommodate recreation. Because boating would be allowed in this alternative, there is an increased potential for the loss of LWD in over three-fourths the length of the river under this alternative. Monitoring would also be used to assess impacts on aquatic habitat from any loss of LWD ultimately affecting the quality of the fisheries component of the Biologic ORV.

The Chattooga River tributaries are not included for boating under Alternative 13; therefore trails would not be created with this use 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.

4. Reaches

The above impacts remain the same for the Chattooga Cliffs, Ellicott Rock and Rock Gorge reaches.

Nicholson Fields Reach

The above trail, camping and physical trampling and scraping impacts remain the same for the Nicholson Fields reach. Boating in the "Delayed Harvest" area would not be permitted. Therefore, there would be no new access points or portage trails within this reach. In addition, the potential for the loss of LWD decreases in this reach. This would protect the fisheries in this section of the river by maintaining current conditions.

5. All Flows

The above impacts remain the same for all flows. Impacts to aquatic resources are not dependent on flow levels.

6. All Seasons

Impacts to all four reaches outlined above remain the same, regardless of season.

7. Biology ORV—Fisheries

Overall fisheries would be improved slightly under this alternative compared to Alternative 1. Therefore, this alternative would continue to protect and enhance this component of the Biology ORV in the upper segment of the Chattooga WSR.

I. Alternative 14 – Direct and Indirect Effects

1. Trampling, Crushing or Scraping of Macroinvertebrates and Eggs

Impacts from trampling, crushing and scraping from all recreational users that wade, swim or boat are more concentrated in easily accessed reaches. Ease of access from the four frontcountry areas increases the potential for these types of impacts. The most susceptible to this type of impact are the Nicholson Fields Reach and the lower part of the Rock Gorge Reach below Big Bend Falls. Chattooga Cliffs and Ellicott Rock reaches are more remote, have steeper terrain, rock cliffs and longer stretches of faster moving water. Physical trampling and scraping of aquatic species by recreational users may occur with a remote chance of targeting one particular species over time.

With the addition of boating, there is more potential for trampling, crushing and scraping of aquatic organisms. The impacts would be less than Alternative 8 since the higher flow requirements translate into fewer boating days on the river which reduces the potential of boating impacts to aquatic organisms.

2. Sediment

Under Alternative 14, trails and campsites contributing sediments would be improved and potential aquatic impacts minimized. 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. 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. 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; however it is likely that campsites within 50 feet of the river would contribute some sediments to the watershed. Impacts from campsites may be slightly greater than in Alternative 1 due to campsites being located within 50 feet of the river. In addition, there is no limit to the number of campsites along the river.

An additional boater put-in site and connector trail in the upper portion of Chattooga Cliffs Reach would introduce another point for erosion and sedimentation into the river. However, the trail would be designed and located to minimize erosion and sedimentation into the river. Sediment impacts from recreational activities are low when compared with other chronic sources such as from roads. Therefore, sediment reductions from improved management actions and the introduction of a new user group under this alternative are expected to have minor impacts on fisheries.

Alternative 14 proposes boating on the main stem of the Chattooga River for 21.6 miles from the confluence of Green Creek in North Carolina to Highway 28 Bridge in South

Carolina at flows at or above 350 cfs for 12 months of the year. Four designated access trails would be constructed or designated as boat put-ins and take-outs. Erosion and sedimentation may increase at designated access points with increased use and dragged equipment. In addition, portage trails would be created increasing the potential for sediment input along the entire length of the river.

3. Large Woody Debris

The additional protection of LWD would result in site-specific improvements over Alternative 1 but the largest benefit would come from the natural input of woody material from dead hemlock in the short and long term. In addition, monitoring would also be used to assess impacts on aquatic habitat from any loss of LWD ultimately affecting the quality of the fisheries component of the Biologic ORV.

LWD recruitment and retention would be maintained throughout the watershed. There would be no LWD removal without agency approval (as in current management) and no removal to accommodate recreation. However, with the addition of boating in this alternative, there is an increased potential for the loss of LWD under this alternative.

The Chattooga River tributaries are not included for boating under Alternative 14; therefore trails would not be created with this use 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.

4. All Reaches

The above impacts remain the same for all river reaches.

5. All Flows

The above impacts remain the same for all flows. Impacts to aquatic resources are not dependent on flows.

6. All Seasons

The above impacts remain the same for all seasons.

7. Biology ORV—Fisheries

Overall fisheries would be improved slightly under this alternative compared to Alternative 1. Therefore, this alternative would continue to protect and enhance this component of the Biology ORV in the upper segment of the Chattooga WSR.

J. 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 Region 8 Sensitive species is that they are potentially at risk from sediment in the Chattooga River watershed; however, the US 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 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 *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), in 2007-08 by English and Pike (2009), and in 1994 by Weber and Isely (1995). Weber and Isely concluded that water quality in the Chattooga River basin was good to excellent using macroinvertebrates as biological indicators of water quality. Analysis of macroinvertebrate data in the English 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 the 1990 report were resampled in fall 2007 and 2008 (English and Pike 2009) and encompass sample sites from the headwaters downstream to just above Tugaloo Lake, including some tributaries. A comparison of the combined data from the 1990 and 2009 reports for both sampling periods in the entire watershed, indicated that the upper segment of the Chattooga WSR area had better water quality than the lower segment of the Chattooga WSR area and the tributaries. Taxa richness and diversity metrics in the 1990 report indicate better water quality throughout the watershed than in the 2009 report. This may be contributed to lower water discharges in 2007 than in 1989. When looking at differences among all watershed areas for both sampling periods, water quality was better in the tributaries during the 1990 report sampling period when compared to tributary water quality in the 2009 report sampling period; the upper segment of the Chattooga WSR had better water quality than the lower section of the river in the 2009 report sampling period; and most of the watershed had excellent or very good water quality for both sampling periods. Of all the watershed areas sampled for the 2009 report, the upper segment of the Chattooga WSR area had the highest taxa richness, diversity and EPT Index indicating the best water quality. The biotic index indicated that the lower segment of the Chattooga WSR area had the poorest water quality.

Cumulative impacts pertain to the entire Chattooga River watershed from Tugaloo Reservoir upstream into the headwaters. Refer to Table 3.1-7 for a complete list of past, present and reasonably foreseeable projects. The trails, campsites and erosion points within 100 feet of the river and its tributaries are most likely contributing sediments and reducing 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. Present ongoing aquatic related activities include brook trout restoration and habitat enhancement. 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 and retention would be maintained with current LRMP direction for each forest. LWD retention monitoring is included under alternatives 8 11, 12, 13 and 14 and in Appendix G of this EA.

LRMP directions and standards are designed to minimize adverse impacts from any of these activities. There would 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. Sediment input is expected to be less than existing conditions with the implementation of watershed improvement projects. Refer to Section 3.4.2 Water and Riparian Corridor Cumulative Effects for discussion on sediment impacts.

Recreational use of the river may result in the physical trampling and equipment scraping of aquatic species, particularly those with slow mobility and those in early life stages. Direct impacts may occur through mortality or injury to individuals from trampling and scraping by recreational users. Given the remote chance of these impacts targeting one particular species over time and the abundance of habitat within the watershed; it is unlikely that cumulative impacts would occur from recreational use. In addition, there are records for three of the five Region 8 Sensitive aquatic species in the lower section of the Chattooga River downstream of Highway 28, where recreational uses include fishing and boating. These include *Beloneuria georgiana* (English 1990), *Ophiogomphus edmundo* (Abbott 2010) and *Alasmidonta varicosa* (Alderman 2008). Alderman (2008) noted that the *Alasmidonta varicosa* population in the Chattooga River is the best extant population within this range from Georgia through at least Maryland. Alderman (2004) also stated that the *Alasmidonta varicosa* population in the Chattooga River is reproducing and viable. The majority of this population is located from the vicinity of Highway 28 and downstream in the Chattooga River.

There is the potential for spreading or introducing 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 recreational 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 Region 8 Sensitive aquatic species (Table 3.2.2a-1) or Locally Rare aquatic species (Table 3.2.2a-2) and no risk to aquatic population viability across the forests for MIS (Table 3.2.2a-3) and Management Indicator Communities (Table 3.2.2a-4 through 3.2.2a-6) under any of the alternatives with the implementation of watershed improvement projects.

All of the alternatives would continue to protect and enhance this component of the Biology ORV in the Chattooga WSR Corridor.

3.2.2b WILDLIFE

I. SUMMARY OF FINDINGS

The Chattooga River watershed has a geology and climate which is unique in the Southern Appalachians. As outlined in the wildlife component of the Biology ORV in the 1971 Designation Study Report and the 1996 ORV Report, more than 130 species either occur or have the potential to occur in Chattooga River Watershed. However, because the proposed alternatives primarily relate to user-created disturbances, several species known to occur in the analysis area were not analyzed in detail because it was determined they would have no direct, indirect or cumulative effect on these species. These species represented six major classes of animals which include birds, butterflies, mammals, moths, reptiles and spiders.

Nine PETS and Locally Rare wildlife species were identified as having potential or as being known to occur in the analysis area including:

1. Southern Appalachian salamander (sensitive);
2. green salamander (Locally Rare);
3. dark glyph (Locally Rare);
4. pink glyph(Locally Rare);
5. blue-footed lancetooth (Locally Rare);
6. dwarf proud globe (Locally Rare);
7. lamellate supercoil (Locally Rare);
8. open supercoil (Locally Rare); and
9. Appalachian gloss (Locally Rare).

Generally speaking, impacts to species would be reduced by management actions that limit the number of campsites and trails under any of the alternatives. In addition, the inaccessibility of the area where these species are found limits the potential for impacts. Although some individuals could be impacted, the viability of any species is unlikely to be impacted under any alternative.

The national forests use management indicator species (MIS) as a tool to identify specialized habitats, formulate habitat objectives and establish standards and guidelines to ensure that the national forests provide a variety of habitats for wildlife, fish and plants. MIS are used to address issues related to biological diversity, as well as management of wildlife and fish for commercial, recreational or aesthetic values or uses.

The species evaluated here that are mentioned directly in the 1996 and 1971 reports include: black bear, white-tailed deer, ovenbird, pine warbler, Acadian flycatcher, hooded warbler, scarlet tanager and Eastern wild turkey. Also included in the 1996 report is a list of habitats that are considered critical to the wildlife component of the Biology ORV including: large contiguous

forest interior, hard mast forest, pine /pine–oak forest, mid–late successional riparian forests, and mid–late successional mesic forests. All alternatives are unlikely to alter habitat.

Effects on species are expected to be minimal. Overall, Alternative 2 would provide the most protection to rare terrestrial wildlife species because it would restrict recreation use more than any other alternative. Alternatives 1 and 3 would restrict recreation use (no boating above Highway 28), not quite as much as Alternative 2 but more than the rest of the alternatives. Therefore, alternatives 1 and 3 also would provide a high level of protection to rare terrestrial species.

Of the alternatives that allow additional boating on the upper segment of the Chattooga WSR, Alternative 12 would provide the greatest protection to rare terrestrial wildlife species because of the following: it limits boating to the winter months (when most terrestrial wildlife species are less active and not breeding); it provides the shortest season for boating in the most biologically sensitive areas of the river (Chattooga Cliffs and Ellicott Rock reaches); it would also restrict group size and trail and camping. Conversely, although Alternative 8 is very similar to the other alternatives with respect to group size, trail management and camping management, this alternative would allow the most boating and therefore has the potential to cause the highest level of additional human-related disturbances in the upper segment of the Chattooga WSR. Therefore, it would provide the least amount of protection to rare terrestrial wildlife species.

Table 3.3.2b-1provides a qualitative comparison of the protection level of all alternatives on rare terrestrial wildlife species.

Table 3.2.2b-1 Comparison of the Level of Protection of All Alternatives on Rare Terrestrial Wildlife Species.

Alt.	Group Size Mgmt	Boating Mgmt	Trail Mgmt	Camping Mgmt	Overall Protection to Species
2	Yes – Entire Corridor	No Boating	Same or Less Trails	Less Camping (reservations only)	1 = greatest
3	Yes – Entire Corridor	No Boating	Same or Less Trails	Same or Less Camping	2
1	Yes – In Wilderness or for Commercial Use	No Boating	Same or More Trails	Same or More Camping	3
12	Yes – Entire Corridor	9/14* in CC and ER reaches; 12/17 in RG reach. All Reaches (with restrictions); Winter Months only	Same or Less Trails	Same or Less Camping	4
13	Yes – Entire Corridor	11/21 in All reaches except Nicholson Fields; Winter Months only	Same or Less Trails	Same or Less Camping	5
11	Yes – Entire Corridor	15/35 in All reaches; Year Round	Same or Less Trails	Same or Less Camping	6
14	Yes – Entire Corridor	32/66 in All reaches; Year round	Same or Less Trails	Same or Less Camping	7
8	Yes – Throughout Corridor	63/99 in CC,ER and RG reaches: 97/118 in NF reach; All reaches; Year round	Same or Less Trails	Same or Less Camping	8 = least

*Note: Approximate days with boating opportunities displayed as mean daily / peak flows.

All alternatives would continue to protect and enhance the wildlife component of the Biology ORV of the Chattooga Wild and Scenic River.

A. Condition at Time of Designation

The 1971 Study Report describes the Chattooga wildlife as:

> varied and serves different interests. Game animals provide hunting, and these, plus the non-game animals, are also available for scientific study. The Highlands Biological Station at Highlands, N.C. considers the Chattooga River area a rich study area and one of the last remaining primitive river environments in the Southeast. The many species of birds provide ample opportunity for nature photography and bird watching.

The 1971 Study Report discusses opportunities for hunting and notes "the terrain immediately adjacent to river is generally rugged and steep and is somewhat unproductive in terms of animal numbers produced but offers a challenging type of big game hunting." Only two areas within the Chattooga River drainage are considered "suitable for small game management. These include the flat bottomlands in the vicinity of Highway 28 Bridge and the old fields on the extreme headwaters near Cashiers."

Common game species and their habitats within the Chattooga River drainage that are described in the 1971 Study Report include: deer, bear, turkey, grouse, squirrel, rabbit, quail and raccoon. Deer and bear are reported as scarce throughout the drainage. Turkey are reported as "present in huntable numbers…but no areas contain them in sufficient numbers to provide top notch hunting." Grouse hunting "ranges from fair to excellent, but habitat…is only fair in most areas due to a lack of openings in the forest canopy." Good squirrel hunting is "available in scattered oak-hickory stands throughout the drainage." Rabbit and quail hunting is "incidental due to a lack of farmland cultivation." Raccoon hunting is "popular in all three States and is good near farmlands adjacent to the Chattooga."

The 1971 Study Report also notes that waterfowl "are migratory birds and occasionally are present in huntable numbers…Beaver, muskrat, mink, fox, bobcat, and opossum are all present along the Chattooga River drainage in numbers high enough that local people occasionally trap or hunt them for sport or fur."

The 1971 Study Report also briefly mentions some uncommon species found in the Chattooga River drainage:

> Several species of small mammals reach the southern limit of their natural range in the Chattooga River. Animals like the masked shrew and woodland jumping mouse are more commonly found at higher latitudes. Some species of salamanders, a small-lizard-type, are found only in the general area of the Chattooga River and its tributaries.

The 1971 Study Report also discusses poisonous insects and reptiles commonly found in the Chattooga River drainage:

> Potentially dangerous insects and snakes normally encountered in this area include the following: Timber Rattlesnake, Copperhead, Yellow Jackets, Hornets, Honeybees, Stinging Caterpillars (various species). These insects and snakes are encountered only occasionally and are considered a natural part of the environment. They usually bite or sting only when threatened and seldom or never build up in numbers to dangerous proportions…No measures should be used to control them."

B. 1996 ORV Report

The 1996 ORV Report updated information from the 1971 Study Report and notes that deer are present in all sections even though habitat is not ideal. The 1971 Study Report stated that bear were uncommon, but the 1996 ORV Report notes current studies indicate "bears are much more common than previously thought in this area." Habitat is fair for turkey because "of the lack of openings in the forest canopy. Grouse can be found, but are declining in numbers. Squirrel, rabbit, quail, raccoon, waterfowl, as well as several other game species are present within the corridor."

Nongame species were not discussed in depth in the 1971 Study Report. The 1996 ORV Report remarks that since 1971, "several studies have been conducted which increase the knowledge available for the entire watershed. Over 150 investigations of birds, fish, mammals, reptiles and amphibians are known to have been conducted." The 1996 ORV Report further clarifies that "the Chattooga Project initiated research on mollusks, small mammals, reptiles and amphibians…There are several wildlife species within the Chattooga watershed that are considered sensitive species by Federal and state agencies."

C. Conditions as They Exist Today

The geology and climate in the Chattooga River watershed is unique in the Southern Appalachians; therefore the area 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 unique features are mostly associated with the upper portion of the watershed; for this reason, approximately 70% of all rare species known or with the potential to occur in the Chattooga River watershed are restricted to the upper portion of the watershed (above Highway 28 bridge).

II. Affected Environment

A. Rare Species

The Chattooga River watershed has a geology and climate which is unique in the Southern Appalachians, and therefore provides suitable habitats for several wildlife species listed as state rare or 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 (see Table 3.2.2b-2). 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 unique features are mostly associated with the upper portion of the watershed and, for this reason, approximately 70% of all rare species known or with the potential to occur in the Chattooga River watershed are restricted to the upper portion (above Hwy. 28).

Table 3.2.2b-2. Comparison of Natural Communities' Abundance within the Chattooga River watershed, and the Upper (north of U.S. 28) and Lower (south of U.S. 28) Wild and Scenic Corridor.

Natural Communities	Acres	% in Watershed	Upper Wild & Scenic Corridor (Ac)	% Upper Corridor	Lower WSR Corridor (Ac)	% Lower Corridor
High Elevation Red Oak Forest	1990	1%	23	0.3%	0	0%
Montane Oak-Hickory Forest	10892	6%	156	2%	0	0%
Montane White Oak Forest	2046	1%	13	0.2%	0	0%
White Pine/Heath Forest	17328	9%	1331	19%	436	2%
Mesic Oak-Hickory Forest	37729	20%	636	9%	4916	25%
Table Mountain Pine-Oak/Heath Forest	298	0.2%	0	0%	0	0%
Pitch Pine-Oak/Heath Forest	17687	9%	955	14%	2257	12%
acidic cove forest	6518	3%	423	6%	2323	12%
Eastern Hemlock/ rhododendron maximum Forest	18302	10%	842	12%	92	0.5%
Alluvial Forest	1789	1%	156	2%	628	3%
Chestnut Oak/Northern Red Oak/ rhododendron	5244	3%	528	7%	367	2%
Chestnut Oak/Scarlet Oak/Heath Forest	12656	7%	604	9%	187	1%
Dry Oak-Hickory Forest	18718	10%	1048	15%	976	5%
Shortleaf Pine-Southern Red Oak-Blackjack Oak Forest	14106	7%	9	0.1%	1099	6%
Shortleaf Pine-Southern Red Oak Forest	19890	11%	141	2%	5721	29%
Heath Bald	565	0.3%	0	0%	0	0%
Swamp Forest/Bog	1165	1%	0	0%	0	0%
Rock Outcrops	234	0.1%	0	0%	0	0%
Urban	223	0.1%	0	0%	0	0%
Water	1585	1%	182	3%	496	3%
Totals	**188965**		**7047**		**19498**	

Fifteen rare species are known to occur in the Chattooga River watershed (see Table 3.2.2b-3). Two of these species, the Eastern small footed bat and the salamander, also have been documented within the upper segment of the Chattooga WSR Corridor. An additional 19 species, although not documented, have the potential to occur within the Chattooga River watershed, the Chattooga WSR Corridor or both (see Table 3.2.2b-4).

Table 3.2.2b-3 Chattahoochee (CONF), Nantahala (NNF) and Sumter (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 Chattooga above the West Fork–North Fork confluence as well as all the tributaries of the West Fork Chattooga. The lower watershed includes all tributaries which drain into the North Fork Chattooga below the West Fork–North Fork confluence.
2 = LR = Locally Rare; S = Sensitive; TSA = Threatened – Similarity of Appearance.

Table 3.2.2b-4 CONF, NNF and SNF Rare Wildlife Species with the 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 Chattooga above the West Fork–North Fork confluence as well as all the tributaries of the West Fork Chattooga. Lower watershed includes all tributaries which drain into the North Fork Chattooga below the West Fork–North Fork confluence.
2 = LR = Locally Rare; S = Sensitive; TSA = Threatened – Similarity of Appearance.

All rare species lists and information were compiled by: (1) consulting 14 years of U.S. Forest Service (USFS) plant and animal inventory records; (2) consulting Georgia, North Carolina and South Carolina Natural Heritage Program (NHP) element occurrence records (EORs); (3) consultation with other federal, state and 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 sources in the References Cited section in this EA.

Initially, all rare wildlife species which are listed on the Chattahoochee–Oconee National Forest (CONF), Nantahala National Forest (NNF) and the Sumter National Forest (SNF) were considered in this analysis. This initial list did not include some Piedmont species and Ridge and Valley species which are included on the CONF and SNF lists, but do not occur

in the southern Blue Ridge subsection. This initial list included 105 PETS and Locally Rare wildlife species (Table 3.2.2b-5).

Table 3.2.2b-5 CONF, NNF and SNF Threatened, Endangered, Sensitive and Locally Rare Wildlife Species List and Project-level Analysis Information.

TYPE	SCIENTIFIC NAME	COMMON NAME	HABITAT/RANGE	FOREST	LISTING	ANALYZED/ REASON[1]
Mammal	*Glaucomys sabrinus coloratus*	Carolina Northern FlyingSquirrel	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 NC and adjacent TN)	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
Amphibian	*Urspelerpes brucei*	Patch-nosed Salamander	Small, first-order streams in southern Blue Ridge Escarpment. Only known from Stephens County, GA and southern Oconee County, SC.	CONF SNF	S	No / 3
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

TYPE	SCIENTIFIC NAME	COMMON NAME	HABITAT/RANGE	FOREST	LISTING	ANALYZED/ REASON[1]
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**
Grasshopper	*Melanoplus divergens*	Divergent Melanoplus	Glades and balds, 1800-4717 feet	NNF	S	No / 4
Grasshopper	*Melanoplus serrulatus*	Serrulate Melanoplus	Valleys and lower slopes, Nantahala Mountains	NNF	S	No / 3
Grasshopper	*Scudderia septentrionalis*	Northern Bush Katydid	Woodlands	NNF	S	No / 4
Grasshopper	*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 NC mntns)**	**NNF**	**S**	**No / 2**

TYPE	SCIENTIFIC NAME	COMMON NAME	HABITAT/RANGE	FOREST	LISTING	ANALYZED/ REASON[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 semi-permanent woodland ponds; forages in adjacent woods**	**NNF**	**LR**	**No / 2**
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
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

TYPE	SCIENTIFIC NAME	COMMON NAME	HABITAT/RANGE	FOREST	LISTING	ANALYZED/ REASON[1]
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**
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

TYPE	SCIENTIFIC NAME	COMMON NAME	HABITAT/RANGE	FOREST	LISTING	ANALYZED/ REASON[1]
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**	**No / 2**
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**	**No / 2**
Reptile	***Pituophis m. melanoleucus***	**Northern Pine Snake**	**Dry and/or sandy pine/oak uplands**	**CONF**	**LR**	**No / 2**
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**	**No / 2**
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**

TYPE	SCIENTIFIC NAME	COMMON NAME	HABITAT/RANGE	FOREST	LISTING	ANALYZED/ REASON[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
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 detailed project–level effects analysis.
2 = Dropped—Suitable habitat for the species occurs in the analysis area, but this proposal does not include management actions that would affect this species or its habitat.
3 = Dropped—The analysis area is outside the Known or Suspected Range of the Species (only includes nesting range for birds); therefore, species is dropped from further analysis.
4 = Dropped—Within the Chattooga River Watershed, 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. Species highlighted in "bold" are those species either known to or with the potential to occur in the analysis area.

From this list, 96 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; the species being considered extirpated; or the species would not be affected by the proposed action or any of the alternatives.

Since these alternatives primarily relate to user-created disturbances, several species known to occur in the analysis area were "dropped" from detailed analysis because it was determined that the alternatives would have no direct, indirect or cumulative effect on these species. These "dropped" species represented six major classes of animals, which include birds, butterflies, mammals, moths, reptiles and spiders. The birds and mammals, including the Woodland Jumping Mouse and the Masked Shrew that were specifically mentioned in the 1971 Study report, were dropped from the list because they are very mobile and easily able to adjust to human-related disturbances by fleeing or relocating. The mere presence of humans within their habitats is not thought to be particularly disturbing to these species. All of the dropped birds and mammals roost and nest either in trees, abandoned buildings or in rock crevices, and therefore would not be affected by any of the alternatives in this analysis. The butterflies and moths were dropped from the list because they are also 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 likely would not be affected by one or more of the proposed alternatives.

The major animal classes which are analyzed in detail in this analysis 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 such as trampling; and/or the species' habitat is sensitive and easily disturbed from human-related disturbances such as trampling. The species that meet one or more of these criteria are within the amphibian group and the terrestrial gastropod group.

Nine PETS and Locally Rare wildlife species were identified as having potential or as being known to occur in the analysis area, i.e. suitable habitat, and could be impacted by the proposed action or one or more of the alternatives (Table 3.2.2b-6). These species will be considered in the detailed analysis for this project.

Table 3.2.2b-6 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	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
Amphibian	*Aneides aeneus*	Green Salamander	Damp, shaded crevices of cliffs or rock outcrops in deciduous forests (southern forests)	CONF 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

B. Sensitive and Locally Rare Wildlife Species Analyzed

1. Southern Appalachian Salamander *(Plethodon teyahalee)*

The Southern Appalachian salamander's range is limited to the Blue Ridge physiographic province of southwestern NC (west of French Broad River) and immediately adjacent TN, GA and SC. Within this range, this species' habitat includes moist forests at all

elevations. NatureServe documents this species' habitat to include birch-beech-hemlock forests with witch hazel and rhododendron understory. Special habitat factors for this species include burrowing in soil and fallen logs and debris. This species is listed as a Regional Forester's Sensitive Species on the CONF, NNF and SNF. It is Globally Ranked (G-Rank) as G3 (vulnerable) and State Ranked (S-Rank) as S2 (imperiled), S3? (vulnerable) and SNR (not ranked) in GA, NC and SC, respectively.

There are no documented occurrences of this species within the upper corridor. Eight documented occurrences within the upper watershed on the NNF and two documented occurrences in the upper watershed on the CONF exist. There are approximately 1,000 documented occurrences of this species outside of the Chattooga watershed in other areas of the NNF where this species is thought to be most secure. It can be conservatively estimated that this section of upper corridor provides approximately 2,057 acres (29% of whole) of suitable habitat for this species (see Table 3.2.2b-2). These habitats include mesic oak–hickory forest, Eastern hemlock/rhododendron maximum forest, acidic cove and alluvial forest.

2. Green Salamander *(Aneides aeneus)*

The green salamander's range primarily encompasses the Appalachian region, extending from extreme southwestern PA to northern AL, with a disjunct occurrence in NC, SC and northeast GA. Within this range, this species inhabits damp cervices in shaded rock outcrops and ledges. It also occurs beneath loose bark and in cracks in standing or fallen trees and sometimes in or under logs on the ground. This species is listed as locally rare on the CONF and NNF and is ranked as G3G4 and S2, S2 and S1 (critically imperiled) in GA, NC and SC, respectively.

Thirty documented occurrences of this species within the Chattooga River watershed exist, two of which are documented within the upper wild and scenic corridor on the NNF. Based on current mapping, it is impossible to say exactly how much suitable habitat occurs within the upper corridor, but it is reasonable to assume that suitable habitat is certainly present since two documented occurrences already exist.

3. Dark Glyph *(Glyphyalinia junaluskana)*

The dark glyph's range is limited to the southern Blue Ridge Mountains in GA, NC and TN. Within this range, the species is specifically mapped only in NC in Cherokee, Macon, Graham and Swain counties. This species inhabits moist pockets of leaves in cove hardwood forests and upland woods. The Dark Glyph is listed as locally rare on the NNF and is ranked as G2 (imperiled) and S2, S2 and SNR in NC, TN and GA, respectively.

Two documented occurrences of this species on the NNF exist, both of which are outside of the Chattooga River watershed. However, based on the general habitat description for this species, it can be assumed that a minimum of approximately 1,421 acres of suitable

habitat occur within the analysis area. This habitat includes acidic cove forest, Eastern hemlock/rhododendron maximum forest and alluvial forest.

4. Pink Glyph *(Glyphyalinia pentadelphia)*

The pink glyph's range is limited to the southern Blue Ridge Mountains in GA, NC and TN. Within this range, the species is only specifically mapped in NC in Cherokee, Clay, Macon, Graham and Swain counties. This species inhabits moist pockets of leaves in upland woods. The pink glyph is listed as locally rare on the NNF and is ranked as G2 (imperiled) and S2 (imperiled) S2 and SNR (not ranked) in NC, TN and GA, respectively.

Four documented occurrences of this species on the NNF exist, all of which are outside the Chattooga River watershed. However, based on the general habitat description for this species, it can be assumed that a minimum of approximately 1,421 acres of suitable habitat occur within the analysis area. This habitat includes acidic cove forest, Eastern hemlock/rhododendron maximum forest and alluvial forest.

5. Blue-footed Lancetooth *(Haplotrema kendeighi)*

The blue-footed lancetooth's range is limited to the southern Blue Ridge Mountains in NC and TN. Within this range, the species generally is mapped only in Macon and Swain counties, NC. This species inhabits leaf litter on mountainsides usually above 2000 feet. The blue-footed lancetooth is listed as locally rare on the NNF and is ranked as G2 (imperiled) and S1S2 (critically imperiled) and S3 in NC and TN, respectively.

Documented site-specific occurrences of this species on the NNF do not exist. However, as mentioned above, two historical records exist of this species mapped in Macon and Swain counties, NC. Based on the general habitat description for this species, it can be assumed that this species could potentially occur in most habitats which occur above 2000 ft. elevation in the upper corridor.

6. Dwarf Proud Globe *(Patera clarki)*

The dwarf proud globe's range is limited to the southern Blue Ridge Mountains in NC. Within this range, the species has been mapped to generally occur in Cherokee, Clay, Graham, Jackson, Macon and Swain counties. This species inhabits leaf litter in cove hardwood forests. This species is listed as locally rare on the NNF and is ranked as G3/S2.

Only one site specific record of this species on the NNF exists. This occurrence is mapped within Jackson County, outside the Chattooga River watershed. Additional obscure or undatable records of this species occurring in the other abovementioned counties exist, but unfortunately, no site-specific records exist. However, based on the general habitat description for this species, it can be assumed that a minimum of

approximately 1,265 acres of suitable habitat occur within the analysis area. This habitat includes acidic cove forest and Eastern hemlock/rhododendron maximum forest.

7. Lamellate Supercoil *(Paravitrea lamellidens)*

The lamellate supercoil's range is restricted primarily to the southern Blue Ridge Mountains of NC and TN; however, a disjunct population is also documented in Maine. Within this range, the species has been mapped in NC to generally occur in Cherokee, Graham, Haywood, Macon, Swain and Yancey counties. This species inhabits leaf litter and under rocks in cove hardwood forests. This species is listed as locally rare on the NNF and is ranked as G2 and S2, S2 and SNR in NC, TN and ME, respectively.

Thirteen site specific records of this species on the NNF currently exist, none of which are within the Chattooga River watershed. However, based on the general habitat description for this species, it can be assumed that a minimum of approximately 1,265 acres of suitable habitat occur within the analysis area. This habitat includes acidic cove forest and Eastern hemlock/ rhododendron maximum forest.

8. Open Supercoil *(Paravitrea umbilicaris)*

The open supercoil's range includes portions of AL, GA, NC and TN. Within this range, this species has only been specifically mapped in NC to generally occur in Cherokee, Graham and Macon counties. This species inhabits cove hardwood forests with rocky slopes. It is listed as locally rare on the NNF and is ranked as G2 and SNR, SNR, S2 and S3 in Al, GA, NC and TN, respectively.

There are currently two site-specific records of this species on the NNF, none of which are within the Chattooga River watershed. However, based on the general habitat description for this species, it can be assumed that a minimum of approximately 1,265 acres of suitable habitat occurs within the analysis area. This habitat includes acidic cove forest and Eastern hemlock / rhododendron maximum forest.

9. Appalachian Gloss *(Zonitoides patuloides)*

The Appalachian gloss's range includes portions of GA, NC, SC and TN. Within this range, this species has only been specifically mapped in NC to generally occur in Macon and Swain counties. This species inhabits deep leaf litter in cove hardwood forests. It is listed as locally rare on the NNF and is ranked as G3 and SNR, S2, SNR and S2S3 in GA, NC, SC and TN, respectively.

There are currently no documented site-specific occurrences of this species on the NNF. However, obscure or undatable records of this species do exist for Macon and Swain counties, NC. Based on the general habitat description for this species, it can be assumed that a minimum of approximately 1,265 acres of suitable habitat occur within the analysis area. This habitat includes acidic cove forest and Eastern hemlock/rhododendron maximum forest.

C. Management Indicator Species

To provide for a diversity of wildlife, fish and plant habitats, the national forests use MIS as a tool for identifying specialized habitats, formulating habitat objectives and establishing standards and guidelines for management. MIS are used to address issues related to biological diversity, as well as management of wildlife and fish for commercial, recreational or aesthetic values or uses. The species evaluated in this section are either mentioned directly in the 1996 ORV Report or the habitat they represent is considered critical to the wildlife component of the Biology ORV. The habitat represented includes: large contiguous forest interior; hard mast forest; pine/pine–oak forest; mid–late successional riparian forests; and mid–late successional mesic forests.

The CONF, NNF and SNF have a total of 20 MIS. These species and their important habitat components are listed in Table 3.2.2b-7. Of these species, only those that are indicators of important habitat components which might be directly or indirectly affected by one or more of the proposed alternatives will be analyzed in detail. Specifically, only those MIS which are indicators of the following important habitat components 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. Those species that will not be analyzed further will be dropped 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 would not be affected by one or more of the proposed alternatives.

Table 3.2.2b-7 CONF, NNF and SNF Management Indicator Species (MIS) List and Project-level Analysis Information.

TYPE	COMMON NAME	IMPORTANT HABITAT COMPONENT	FOREST	PROJECT LEVEL ANALYSIS / REASON[1]
Mammal	Black Bear	Hardmast Forest, Early Successional Forest, Large Contiguous Forest Interior with Low Disturbance	CONF NNF SNF	Yes / 1
Mammal	White-tailed Deer	Hardmast Forest, Early Successional Forest	CONF NNF	Yes / 1
Bird	Pileated Woodpecker	Standing Dead Trees (Snags)	CONF NNF SNF	No / 2
Bird	Ovenbird	Large Contiguous Deciduous Forest Interior	CONF NNF	Yes / 1
Bird	Eastern Towhee	Early Successional Forest	NNF	No / 2
Bird	Pine Warbler	Pine / Pine – Oak Forest	CONF NNF SNF	Yes / 1
Bird	Ruffed Grouse	Early Successional Forest	NNF	No / 2
Bird	Acadian Flycatcher	Mid – Late Successional Riparian Forests	CONF NNF SNF	Yes / 1
Bird	Hooded Warbler	Mid – Late Successional Mesic Forests	CONF SNF	Yes / 1
Bird	Scarlet Tanager	Hardmast Forest	CONF SNF	Yes / 1
Bird	Brown-headed Nuthatch	Pine Woodlands	SNF	No / 2
Bird	Prairie Warbler	Early Successional Forest	CONF SNF	No / 2
Bird	Swainson's Warbler	Early Successional Riparian Forest	CONF SNF	No / 3
Bird	Field Sparrow	Woodland, Savanna and Grassland Habitat	CONF SNF	No / 2
Bird	American Woodcock	Early Successionl Riparian Forest	SNF	No / 2
Bird	Bobwhite Quail	Early Successional Forest, Woodland, Savanna and Grassland Habitat	SNF	No / 2
Bird	Eastern Wild Turkey	General Forest Habitat	SNF	Yes / 1
Bird	Red-cockaded Woodpecker	Longleaf Pine Woodland / Savanna	CONF	No / 3
Bird	Wood Thrush	Forest Interior	CONF	No / 3
Bird	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.

1. Black Bear

The black bear is used as an MIS on all three national forests within this analysis area. This species was selected as an MIS to help indicate the effects of management in meeting public demand as a hunted species. In the Southern Appalachians, important habitat elements for black bears are habitat diversity, den site availability, availability of hard mast and habitat remoteness (USDA Forest Service 2004a).

Black bear populations in the Southern Appalachians have been increasing steadily for the past 25 years and are currently described as "stable to slightly increasing" for the three states included in this analysis. The most recent monitoring report for the CONF (2006) states "most suitable habitat in the mountains of Georgia is presently occupied with bears."

Habitat "remoteness" is the most important element of the black bear's habitat which might be affected by one or more of the proposed alternatives. Black bears generally seek habitat remoteness because of the lack of human disturbances associated with these areas. Currently, this habitat element is adequately protected under Alternative 1.

Although black bears are occasionally disturbed by the occasional hiker or angler within the upper segment of the Chattooga WSR Corridor, this area and the surrounding watershed generally provides optimal "remoteness" for this species, especially when compared to other areas across the three national forests. Alternatives1, 2 and 3 could potentially enhance "habitat remoteness" for this species. However, alternatives 8,11,12,13 and 14 would likely diminish the habitat remoteness element because they would allow a new use – boating – which would allow visitors in the upper segment of the Chattooga WSR, particularly in areas which typically receive infrequent visitors. Although alternatives 8,11,12,13 and 14 would not necessarily affect the population trend of this species (through direct mortality), it could displace individual black bears and cause them to move to other more "urban" environments which could eventually lead to other wildlife management problems such as additional nuisance animals' calls, etc. In conclusion, worst case scenario for this species, alternatives 8,11,12,13 and 14 could displace individuals of this species because of increased human traffic within currently suitable habitat. However, it is not likely that increased human traffic would affect the overall forest(s)–wide population trend for this species (stable to slightly increasing).

2. White-tailed Deer

The white-tailed deer is used as an MIS on the NNF and CONF. This species was selected as an MIS to help indicate the effects of management in meeting public demand as a hunted species. Deer require a mixture of forest/successional stage habitats to meet their year-round habitat needs. Key requirements include: the interspersion of mature, mast-producing stands during fall and winter; early successional forest to provide browse and soft mast; and high quality permanent openings (USDA Forest Service 2004a).

Currently, deer populations on the CONF are considered stable. This population trend is similar on the NNF and SNF. 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 would maintain the white-tailed deer's population trend across the forests as stable.

3. Ovenbird

The ovenbird is used as an MIS on the NNF and CONF. This species is used as an MIS to help indicate the effects of management on species associated with mature interior forest habitats. The ovenbird requires large, contiguous, mature forests for successful breeding. It is commonly found in mature mesic deciduous forests. Typical forested communities where ovenbirds breed include oak-hickory and oak-pine forests.

Overall, the U.S. Geological Survey (USGS) Breeding Bird Survey (*The North American Breeding Bird Survey, Results and Analysis 1966 - 2009. Version 3.23.2011* USGS Patuxent Wildlife Research Center*, Laurel, MD*) indicates a stable to slightly increasing trend for this species from 1966 to 2004. The population trend for this species on the CONF is stable, whereas it is slightly decreasing on the NNF. Forest management requires the retention of large tracts (100 to 885 hectares) and relatively closed canopies (La Sorte, et al. 2007). Since the alternatives in this analysis would not increase or decrease the desired habitat attributes for this species, the abovementioned population trend for this species would not be affected by any of the alternatives.

4. Pine Warbler

The pine warbler is used as an MIS on all three national forests included in this analysis. This species is used as an MIS to help indicate the effects of management on species associated with yellow pine and pine-oak forests. 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).

Overall, the USGS Breeding Bird Survey indicates a positive trend for this species. Population trends on the three national forests included in this analysis are described as stable to slightly increasing. Forest management for the pine warbler centers on the retaining mature pine trees with sparse understory maintained by prescribed burning (La Sorte, et al. 2007). Since the alternatives in this analysis would not increase or decrease the desired habitat attributes for this species, the abovementioned population trend for this species would not be affected by any alternative.

5. Acadian Flycatcher

The Acadian flycatcher is used as an MIS on all three national forests included in this analysis. This species is used as an MIS to help indicate the effects of management on species associated with mid-to-late successional riparian forest conditions. Breeding habitat for this species is mature mesic deciduous forests, often near streams (La Sorte, et al. 2007).

Overall, the USGS Breeding Bird Survey indicates a relatively stable trend for this species. Population trends on the three national forests included in this analysis are described as stable to increasing. Habitat management includes maintaining relatively undisturbed, mature, deciduous forests in riparian areas and coves within larger blocks of mature forest (La Sorte, et al. 2007). Since the alternatives in this analysis would not increase or decrease the desired habitat attributes for this species, the abovementioned population trend for this species would not be affected by any alternative.

6. Hooded Warbler

The hooded warbler is used as an MIS on the CONF and SNF. This species is used as an MIS to help indicate the effects of management on mature mesic hardwood forests, with special focus on the presence of canopy gaps and structural diversity. 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).

Overall, the USGS Breeding Bird Survey indicates a stable trend for this species. Population trends for this species on the CONF and SNF are stable to slightly increasing. Management for this species may entail creating canopy gaps where they are absent and maintaining a shrub layer (La Sorte, et al. 2007). Since the alternatives in this analysis would not increase or decrease the desired habitat attributes for this species, the abovementioned population trend for this species would not be affected by any alternative.

7. Scarlet Tanager

The scarlet tanager is used as an MIS on the CONF and SNF. This species is used as an MIS to help indicate the effects of management on species associated with mature upland oak communities. The scarlet tanager prefers large blocks of mature forest, especially where oaks are common, but also may occur in young successional woodlands (La Sorte, et al. 2007).

Overall, the USGS Breeding Bird Survey indicates a stable trend for this species. Population trends for this species on the CONF and SNF are stable to increasing. Management emphasis for this species centers on maintaining large forest tracts and creating open canopies or canopy gaps (La Sorte, et al. 2007). Since the alternatives in

this analysis would not increase or decrease the desired habitat attributes for this species, the abovementioned population trend for this species would not be affected by any alternative.

8. Eastern Wild Turkey

The Eastern wild turkey is used as an MIS on the SNF. This species is used as an MIS because it is a game species in high demand and because of its association with both open, fire-maintained habitat and mature hardwood forests. In the south, wild turkey use 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).

Overall, the USGS Breeding Bird Survey indicates a positive trend for this species. Population trends for this species on the SNF are stable. Habitat management centers on maintaining mature bottomland hardwood forest, open upland forest maintained with fire and scattered openings dominated by herbaceous cover (La Sorte, et al. 2007). Since the alternatives in this analysis would not increase or decrease the desired habitat attributes for this species, the abovementioned population trend for this species would not be affected by any alternative.

III. Existing Impacts to the Environment

In this analysis, Alternative 1 is used as the baseline or existing condition to establish a means of comparison and analysis between all alternatives. Currently, terrestrial wildlife species are being adequately protected within the upper corridor. Generally, alternative 1 protects these species from human-related disturbances and habitat damage by limiting group size within the wilderness. Trails close to the river are most likely to potentially affect suitable habitat for these species. Species analyzed could be directly or indirectly affected by human-related disturbances, but the impact is thought to be minimal due to the inaccessibility of this area on foot and a limited amount of user groups allowed in the area.

Only those aspects of each alternative which may have an effect on rare wildlife are analyzed. Generally, aspects of each alternative which may have an effect on rare wildlife include: group size (i.e., user density), boating management, trail management and camping management. Although boating is not currently allowed for in the upper segment of the Chattooga WSR, other uses, such as camping, hiking, fishing and hunting are allowed, and are currently affecting the environment, primarily by creating a web of user-created foot trails and dispersed camping sites, both of which allow for sediment input into the river, and disturb the local terrestrial plant and animal populations.

For the purpose of this analysis, the effects of each alternative on rare wildlife species are 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, would be further analyzed at the project level. Conversely, it is also assumed that some user-created actions and potential rare wildlife effects may result from some of the alternatives, without the ability or foresight to conduct site specific analysis. An example of this type of scenario would include portaging around newly established obstacles, such as log jams, since it would be impossible to determine when and where these might occur and thus when and where the immediate need would arise to portage around these obstacles. However, monitoring and eventual designation of portage trails by the agency would mitigate the effects of such trails.

For the purposes of this analysis, the upper segment of the Chattooga WSR Corridor will be the analysis boundary used to analyze the potential direct and indirect effects each alternative may have on rare species. The upper WSR Corridor was chosen as the direct and indirect effects analysis area boundary because any potential wildlife effects associated with the eight alternatives in this analysis would likely occur in this area. Currently, there are two known occurrences of rare wildlife species within the upper corridor (see Table 3.2.2b-3).

The cumulative effects analysis area will also be consistent with the upper segment of the Chattooga WSR Corridor. The cumulative effects analysis is a means of analysis in which the direct and indirect effects of these alternatives on rare species can be weighed against the effects of past, present and reasonably foreseeable future actions. This is done to determine if these alternatives, when combined with other actions in the analysis area, might cause a cumulative effect on populations of rare terrestrial wildlife species.

IV. Environmental Consequences

A. Proposed, Endangered, Threatened, Sensitive (PETS) and Locally Rare Terrestrial Wildlife Species

1. Alternative 1 – Direct and Indirect Effects

Currently, terrestrial wildlife species are being adequately protected within the upper corridor. Generally, this alternative protects these species from human-related disturbances and habitat damage by limiting group size within the wilderness. Large groups, especially when camping, are more likely to have a “larger” footprint on sensitive habitats and wildlife species in any given area. Trails within 100 feet of the river are most likely to potentially affect suitable habitat for these species. Trail management in the upper corridor would remain static or the current trail system may increase in the future. Campsite creation may also increase in the future. It is assumed several campsites would be decommissioned and then 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 assumed to be the case since any new actions must adhere to project level NEPA analysis including impacts on rare and sensitive species. Under this alternative, species analyzed could be directly or indirectly affected by human-related disturbances, but the impact is thought to be minimal due to

the inaccessibility of this area on foot, and a restricted amount of user groups allowed within the area. Consideration of river reach, flow levels and season are not applicable to Alternative 1.

This alternative would continue to protect and enhance this component of the Biology ORV in the upper segment of the Chattooga WSR.

2. Alternative 1 - Cumulative Effects

Past, present and reasonably foreseeable future actions within the analysis area include activities such as hiking, fishing, trail relocation, campsite relocation and erosion control (see Table 3.1-6 for a list of past, present and reasonably foreseeable management activities). These actions, when combined with the effects of this alternative, would not have a negative cumulative effect on sensitive and rare terrestrial wildlife species. In fact, trail relocation, campsite relocation and erosion control, which would be designed to reduce human user impacts, would most likely have a positive cumulative effect on sensitive and rare terrestrial wildlife species which are known to or could occur within the analysis area.

This alternative would continue to protect and enhance this component of the Biology ORV in the Chattooga River corridor.

3. Alternative 2 – Direct and Indirect Effects

Alternative 2 provides the most protection to terrestrial wildlife species by establishing a permit system, reducing the number of campsites and closing some trails. It would inevitably minimize human-related disturbances and impacts in the upper corridor, thus protecting species and their habitat. Under this alternative, some of the abovementioned sensitive and rare species analyzed in this proposal could be directly or indirectly affected by ongoing human-related disturbances, but the impact is thought to be minimal due to the inaccessibility of this area on foot, and a restricted amount of user groups allowed within the area.

Consideration of river reach, flow levels and season are not applicable to Alternative 2.

This alternative would continue to protect and enhance this component of the Biology ORV in the upper segment of the Chattooga WSR.

4. Alternative 2 - Cumulative Effects

Past, present and reasonably foreseeable future actions within the analysis area include activities such as hiking, fishing, trail relocation, campsite relocation and erosion control (see Table 3.1-6 for a list of past, present and reasonably foreseeable management

activities). These actions, when combined with the effects of this alternative, would not have a negative cumulative effect on sensitive and rare terrestrial wildlife species. In fact, trail relocation, campsite relocation and erosion control, which would be designed to reduce user impacts, would most likely have a positive cumulative effect on sensitive and rare terrestrial wildlife species which are known to or could occur within the analysis area.

This alternative would continue to protect and enhance this component of the Biology ORV in the Chattooga River corridor.

5. Alternative 3 – Direct and Indirect Effects

Alternative 3 is generally more protective than Alternative 1, but slightly less than Alternative 2 which reduces campsite density. This alternative would reduce human-related disturbances and impacts in the upper corridor, thus protecting species and their habitat. Under this alternative, some of the above-mentioned species analyzed in this proposal could be directly or indirectly affected by recreational user disturbances. However, the impact is thought to be minimal due to the inaccessibility of this area on foot and a restricted number of user groups allowed within the area.
This alternative would continue to protect and enhance this component of the Biology ORV in the upper segment of the Chattooga WSR.

Consideration of river reach, flow levels and season are not applicable to Alternative 3.

6. Alternative 3 - Cumulative Effects

Past, present and reasonably foreseeable future actions within the analysis area include activities such as hiking, fishing, trail relocation, campsite relocation and erosion control (see Table 3.1-6 for a list of past, present and reasonably foreseeable management activities). These actions, when combined with the effects of this alternative, would not have a negative cumulative effect on sensitive and rare terrestrial wildlife species. In fact, trail relocation, campsite relocation and erosion control, which would be designed to reduce user impacts, would most likely have a positive cumulative effect on sensitive and rare terrestrial wildlife species which are known to or could occur within the analysis area.

This alternative would continue to protect and enhance this component of the Biology ORV in the Chattooga River corridor.

7. Alternative 8 – Direct and Indirect Effects

Potential direct and indirect effects to rare and sensitive terrestrial species from this alternative include the addition of a new recreational user group (boaters). The potential impact would be from trampling of vegetation and sensitive habitat through the creation of portage trails and new access trails as well as increased vegetation disturbance through creation of new play (swimming, resting, lunch) sites. It is assumed that some wildlife individuals may be directly or indirectly affected by recreational users under this alternative. However, because rare and sensitive species 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.)

a. Reaches

Chattooga Cliffs and Ellicott Rock reaches have the highest likelihood for sensitive and rare terrestrial species occurrences, thus would be the most susceptible to impacts from user disturbances.

b. Flows

Boating at 225 cfs and below would likely allow for the most potential user impacts due to the increased need for low water portage trails.

c. Season

Boating during the spring and summer seasons would likely allow for the most potential human user impacts since sensitive and rare terrestrial wildlife species are often moving and most vulnerable during these times.

d. Biology ORV –Wildlife Component

This alternative would continue to protect and enhance this component of the Biology ORV in the upper segment of the Chattooga WSR.

8. Alternative 8 - Cumulative Effects

Past, present and reasonably foreseeable future actions within the analysis area include activities such as hiking, fishing, boating, trail relocation, campsite relocation and erosion control (see Table 3.1-6 for a list of past, present and reasonably foreseeable management activities). As mentioned above, although some individuals may be directly or indirectly affected by this alternative, it is unlikely the effects of this alternative, when combined with past, present and reasonably foreseeable future actions within the analysis area, would have a negative cumulative effect on sensitive and rare terrestrial wildlife species.

This alternative would continue to protect and enhance this component of the Biology ORV in the Chattooga River corridor.

9. Alternative 11 – Direct and Indirect Effects

Potential direct and indirect effects to rare and sensitive terrestrial species from this alternative include the addition of a new recreational user group (boaters). The potential impact would be from trampling of vegetation and sensitive habitat through the creation of portage trails and new access trails and increased vegetation disturbance through creation of new play (swimming, resting, lunch) sites. It is assumed that some wildlife individuals may be directly or indirectly affected by recreational users under this alternative. However, because rare and sensitive species 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.)

a. Reaches

Chattooga Cliffs and Ellicott Rock have the highest likelihood for sensitive and rare terrestrial species occurrences, thus are the most susceptible to impacts from forest-user disturbances.

b. Flows

Flows of 450 cfs and above would minimize the need for low-water portage trails, thus minimizing sensitive and rare terrestrial wildlife impacts.

c. Seasons

Boating during the spring and summer seasons would likely allow for the most potential user impacts since sensitive and rare terrestrial wildlife species are often moving and most vulnerable during these times.

d. Biology ORV –Wildlife Component

This alternative would continue to protect and enhance this component of the Biology ORV in the upper segment of the Chattooga WSR.

10. Alternative 11 - Cumulative Effects

Past, present and reasonably foreseeable future actions within the analysis area include activities such as hiking, fishing, boating, trail relocation, campsite relocation and erosion control (see Table 3.1-6 for a list of past, present and reasonably foreseeable management activities). As mentioned above, although some individuals may be directly or indirectly affected by this alternative, it is unlikely the effects of this alternative, when combined with past, present and reasonably foreseeable future actions within the analysis area, would have a negative cumulative effect on sensitive and rare terrestrial wildlife species. This alternative would continue to protect and enhance this component of the Biology ORV in the Chattooga River corridor.

11. Alternative 12 – Direct and Indirect Effects

Potential direct and indirect effects to rare and sensitive terrestrial species from this alternative include the addition of a new recreational user group (boaters). The potential impact would be from trampling of vegetation and sensitive habitat through the creation of portage trails and new access trails and increased vegetation disturbance through creation of new "play" (swimming, resting, lunch) sites. It is assumed that some wildlife individuals may be directly or indirectly affected by recreational users under this alternative. However, because rare and sensitive species 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.)

a. Reach

Chattooga Cliffs and Ellicott Rock reaches have the highest likelihood for sensitive and rare terrestrial species occurrences, thus are the most susceptible to impacts from forest-user disturbances. This alternative further protects these reaches by staggering boating seasons within these reaches, thus minimizing human user impacts.

b. Flows

Water flows at 225 cfs and below would likely have the greatest potential for recreational user impacts due to the increased need for low water portage trails. Impacts would decrease at increasing flows.

c. Season

Boating during the winter months would provide the greatest protection to rare and sensitive wildlife species, as many of these species are not moving during the winter months.

d. Biology ORV—Wildlife Component

This alternative would continue to protect and enhance this component of the Biology ORV in the upper segment of the Chattooga WSR.

12. Alternative 12 - Cumulative Effects

Past, present and reasonably foreseeable future actions within the analysis area include activities such as hiking, fishing, boating, trail relocation, campsite relocation and erosion control (see Table 3.1-6 for a list of past, present and reasonably foreseeable management activities). As mentioned above, although some individuals may be directly or indirectly affected by this alternative, it is unlikely the effects of this alternative, when combined with past, present and reasonably foreseeable future actions within the analysis area, would have a negative cumulative effect on sensitive and rare terrestrial wildlife species.

This alternative would continue to protect and enhance this component of the Biology ORV in the Chattooga River corridor.

13. Alternative 13 – Direct and Indirect Effects

Of all the boating alternatives, this alternative is the second most protective of sensitive and rare wildlife species because it regulates boating by flow, season and reach. This alternative affords slightly less protection than Alternative 12 because it does not provide additional restrictions while boating in the most biologically sensitive reaches - the Chattooga Cliffs or Ellicott Rock reaches.

Potential direct and indirect effects to rare and sensitive terrestrial species from this alternative include the addition of a new recreational user group (boaters). The potential impact would be from trampling of vegetation and sensitive habitat through the creation of portage trails and new access trails and increased vegetation disturbance through creation of new “play” (swimming, resting, lunch) sites. It is assumed that some wildlife individuals may be directly or indirectly affected by recreational users under this alternative. However, because rare and sensitive species 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.)

a. Reach

Chattooga Cliffs and Ellicott Rock reaches have the highest likelihood for sensitive and rare terrestrial species occurrences, thus are the most susceptible to impacts from user disturbances.

b. Flows

Allowing boating at 350 cfs and above would minimize the need for low water portage trails, thus minimizing sensitive and rare terrestrial wildlife impacts.

c. Season

Allowing boating only during the winter months would provide the greatest protection to sensitive and rare wildlife species, as many of these species are not moving during the winter months.

d. Biology ORV—Wildlife Component

Alternative 12 would continue to protect and enhance this component of the Biology ORV in the upper segment of the Chattooga WSR.

14. Alternative 13 - Cumulative Effects

Past, present and reasonably foreseeable future actions within the analysis area include activities such as hiking, fishing, boating, trail relocation, campsite relocation and erosion control (see Table 3.1-6 for a list of past, present and reasonably foreseeable management activities). As mentioned above, although some individuals may be directly or indirectly affected by this alternative, it is unlikely the effects of this alternative, when combined with past, present and reasonably foreseeable future actions within the analysis area, would have a negative cumulative effect on sensitive and rare terrestrial wildlife species.

This alternative would continue to protect and enhance this component of the Biology ORV in the Chattooga River corridor.

15. Alternative 14 – Direct and Indirect Effects

Of all the boating alternatives, this alternative is the second least restrictive in terms of protecting rare and sensitive wildlife species, because this alternative does not regulate the season of boating or the reach allowed for boating.

Potential direct and indirect effects to rare and sensitive terrestrial species from this alternative include the addition of a new recreational user group (boaters). The potential impact would be from trampling of vegetation and sensitive habitat through the creation of portage trails and new access trails and increased vegetation disturbance through creation of new play (swimming, resting, lunch) sites. It is assumed that some wildlife individuals may be directly or indirectly affected by recreational users under this alternative. However, because rare and sensitive species 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.)

a. Reach

The Chattooga Cliffs and Ellicott Rock reaches have the highest likelihood for sensitive and rare terrestrial species occurrences, thus are the most susceptible to impacts from user disturbances.

b. Flows

Allowing boating at 350 cfs and above would minimize the need for low-water portage trails, thus minimizing sensitive and rare terrestrial wildlife impacts.

c. Season

Allowing boating during the spring and summer seasons would likely allow for the most potential user impacts since sensitive and rare terrestrial wildlife species are often moving and most vulnerable during these times.

d. Biology ORV—Wildlife Component

Alternative 13 would continue to protect and enhance this component of the Biology ORV in the upper segment of the Chattooga WSR.

16. Alternative 14 - Cumulative Effects

Past, present and reasonably foreseeable future actions within the analysis area include activities such as hiking, fishing, boating, trail relocation, campsite relocation and erosion control (see Table 3.1-6 for a list of past, present and reasonably foreseeable management activities). As mentioned above, although some individuals may be directly or indirectly affected by this alternative, it is unlikely the effects of this alternative, when combined with past, present and reasonably foreseeable future actions within the analysis area, would have a negative cumulative effect on sensitive and rare terrestrial wildlife species.

This alternative would continue to protect and enhance this component of the Biology ORV in the Chattooga River corridor.

B. Management Indicator Species

1. Direct and Indirect Effects of Alternatives 1, 2 and 3 on the Black Bear

The black bear is used as an MIS on all three national forests within this analysis area. This species was selected as an MIS to help indicate the effects of management in meeting public demand as a hunted species. In the Southern Appalachians, important habitat elements for black bears are habitat diversity, den site availability, availability of hard mast and habitat remoteness (USDA Forest Service 2004a).

Black bear populations in the Southern Appalachians have been increasing steadily for the past 25 years and are currently described as “stable to slightly increasing” for the three states included in this analysis. The most recent monitoring report for the CONF (2006) states “most suitable habitat in the mountains of Georgia is presently occupied with bears.”

Habitat “remoteness” is the most important element of the black bear’s habitat which might be affected by one or more of the proposed alternatives. Black bears generally seek habitat remoteness because of the lack of human disturbances associated with these areas. Currently, this habitat element is adequately protected under these alternatives.

Although black bears are occasionally disturbed by the occasional hiker or angler within the upper segment of the Chattooga WSR Corridor, this area and the surrounding watershed generally provides optimal “remoteness” for this species, especially when compared to other areas across the three national forests.

These alternatives could potentially enhance “habitat remoteness” for this species. Therefore, this component of the Biology ORV would continue to be protected and enhanced.

2. Cumulative Effects of Alternatives 1, 2 and 3 on the Black Bear

Past, present and reasonably foreseeable projects that may be or are beneficial to black bear includes prescribed burning, road closures, dispersed site closure, woodland habitat creation and other vegetation management activities that promote healthy forests. These projects enhance habitat components especially those associated with habitat remoteness (namely the close of roads and some dispersed camp sites). None of the other projects listed in Table 3.1-6 have measureable impacts on bears. These alternatives when added to other ongoing projects would not substantially impact black bear habitat. Therefore, this alternative would continue to protect and enhance this component of the Biology ORV in the Chattooga River corridor.

3. Direct and Indirect Effects Alternatives 8, 11, 12, 13 and 14 on the Black Bear

These alternatives would likely diminish the habitat remoteness element, because they would allow for a new use within the river corridor – boating – which would serve as a pathway for allowing visitors access into the upper segment of the Chattooga WSR in areas which typically receive infrequent visitors. Although the alternatives would not necessarily affect the population trend of this species (through direct mortality), it could very well displace individuals of this species and cause them to move to other more "urban" environments which could eventually lead to other wildlife management problems in the future, such as additional nuisance animals calls, etc. The alternatives could displace individuals of this species because of increased human traffic within currently suitable habitat. However, it is not likely increased human traffic would affect the overall forest(s) – wide population trend for this species (stable to slightly increasing). Therefore, this component of the Biology ORV would continue to be protected and enhanced.

4. Cumulative Effects of Alternatives 8, 11, 12, 13 and 14 on the Black Bear

Past, present and reasonably foreseeable projects that may be or are beneficial to black bear includes prescribed burning, road closures, dispersed site closure, woodland habitat creation and other vegetation management activities that promote healthy forests. These projects enhance habitat components especially those associated with habitat remoteness (namely the close of roads and some dispersed camp sites). None of the other projects listed in Table 3.1-6 have measureable impacts on bears. These alternatives when added to other ongoing projects would not substantially impact black bear habitat. Therefore, this component of the Biology ORV would continue to be protected and enhanced.

5. Direct and Indirect Effects of all Alternatives on Other MIS

a. White-tailed Deer

The white-tailed deer is used as an MIS on the NNF and CONF. This species was selected as an MIS to help indicate the effects of management in meeting public demand as a hunted species. Deer require a mixture of forest/successional stage habitats to meet their year-round habitat needs. Key requirements include: the interspersion of mature, mast-producing stands during fall and winter; early successional forest to provide browse and soft mast; and high quality permanent openings (USDA Forest Service 2004a).

Currently, deer populations on the CONF are considered stable. This population trend is also similar on the NNF and SNF. 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.
All alternatives would maintain the white-tailed deer's population trend across the forests as stable because all habitat requirements for the species are being provided. Therefore, this component of the Biology ORV would continue to be protected and enhanced.

b. Ovenbird

The ovenbird is used as an MIS on the NNF and CONF. This species is used as an MIS to help indicate the effects of management on species associated with mature interior forest habitats. The ovenbird requires large, contiguous, mature forests for successful breeding. It is commonly found in mature mesic deciduous forests. Typical forested communities where ovenbirds breed include oak-hickory and oak-pine forests.

Overall, the U.S. Geological Survey (USGS) Breeding Bird Survey (*The North American Breeding Bird Survey, Results and Analysis 1966 - 2009. Version 3.23.2011* USGS Patuxent Wildlife Research Center*, Laurel, MD*) indicates a stable to slightly increasing trend for this species from 1966 to 2004. The population trend for this species on the CONF is stable, whereas it is slightly decreasing on the NNF. Forest management requires the retention of large tracts (100 to 885 ha) and relatively closed canopies (La Sorte, et al. 2007).

The population trend for this species would not be affected since the alternatives in this analysis would not increase or decrease the desired habitat attributes for this species. Therefore, the wildlife component of the Biology ORV would be protected and enhanced.

c. Pine Warbler

The pine warbler is used as an MIS on all three national forests included in this analysis. This species is used as an MIS to help indicate the effects of management on species associated with yellow pine and pine-oak forests. 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).

Overall, the USGS Breeding Bird Survey indicates a positive trend for this species. Population trends on the three national forests included in this analysis are described as stable to slightly increasing. Forest management for this species centers on the retaining mature pine trees with sparse understory maintained by prescribed burning (La Sorte, et al. 2007).

Since the alternatives in this analysis would not increase or decrease the desired habitat attributes for this species, the abovementioned population trend for this species would not be affected by any alternative. Therefore, this component of the Biology ORV would continue to be protected and enhanced.

d. Acadian Flycatcher

The Acadian flycatcher is used as an MIS on all three national forests included in this analysis. This species is used as an MIS to help indicate the effects of management on species associated with mid-to-late successional riparian forest conditions. Breeding habitat for this species is mature mesic deciduous forests, often near streams (La Sorte, et al. 2007).

Overall, the USGS Breeding Bird Survey indicates a relatively stable trend for this species. Population trends on the three national forests included in this analysis are described as stable to increasing. Habitat management includes maintaining relatively undisturbed, mature, deciduous forests in riparian areas and coves within larger blocks of mature forest (La Sorte, et al. 2007).

Since the alternatives in this analysis would not increase or decrease the desired habitat attributes for this species, the abovementioned population trend for this species would not be affected by any alternative. Therefore, this component of the Biology ORV would continue to be protected and enhanced.

e. Hooded Warbler

The hooded warbler is used as an MIS on the CONF and SNF. This species is used as an MIS to help indicate the effects of management on mature mesic hardwood forests, with special focus on the presence of canopy gaps and structural diversity. 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).

Overall, the USGS Breeding Bird Survey indicates a stable trend for this species. Population trends for this species on the CONF and SNF are stable to slightly increasing. Management for this species may entail creating canopy gaps where they are absent and maintaining a shrub layer (La Sorte, et al. 2007).

Since the alternatives in this analysis would not increase or decrease the desired habitat attributes for this species, the abovementioned population trend for this species would not be affected by any alternative. Therefore, this component of the Biology ORV would continue to be protected and enhanced.

f. Scarlet Tanager

The scarlet tanager is used as an MIS on the CONF and SNF. This species is used as an MIS to help indicate the effects of management on species associated with mature upland oak communities. The scarlet tanager prefers large blocks of mature forest, especially where oaks are common, but also may occur in young successional woodlands (La Sorte, et al. 2007).
Overall, the USGS Breeding Bird Survey indicates a stable trend for this species. Population trends for this species on the CONF and SNF are stable to increasing. Management emphasis for this species centers on maintaining large forest tracts and creating open canopies or canopy gaps (La Sorte, et al. 2007 Since the alternatives in this analysis would not increase or decrease the desired habitat attributes for this species, the abovementioned population trend for this species would not be affected by any alternative. Therefore, this component of the Biology ORV would continue to be protected and enhanced.

g. Eastern Wild Turkey

The Eastern wild turkey is used as an MIS on the SNF. This species is used as an MIS because it is a game species in high demand and because of its association with both open, fire-maintained habitat and mature hardwood forests. In the south, wild turkey use 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).

Overall, the USGS Breeding Bird Survey indicates a positive trend for this species. Population trends for this species on the SNF are stable. Habitat management centers on maintaining mature bottomland hardwood forest, open upland forest maintained with fire, and scattered openings dominated by herbaceous cover (La Sorte, et al. 2007).

Since the alternatives in this analysis would not increase or decrease the desired habitat attributes for this species, the abovementioned population trend for this species would

not be affected by any alternative. Therefore, this component of the Biology ORV would continue to be protected and enhanced.

h. Cumulative Effects of All Alternatives on Other MIS

Past, present and reasonably foreseeable projects that may be or are beneficial to white-tailed deer, pine warbler, hooded warbler, scarlet tanager and turkey include prescribed burning, woodland habitat creation and other vegetation management activities that promote healthy forests. These projects enhance habitat components for these species. None of the other projects listed in Table 3.1-7 have measureable impacts on these species. These alternatives when added to other ongoing projects would not substantially impact these species.

The important habitat component for ovenbirds and Acadian flycatcher is negatively impacted by woodland creation. However, the amount of woodland habitat created is not substantial when compared with the amount of large contiguous deciduous forest interior habitat available in the Chattooga watershed (see Table 3.4.2-13). Since none of the alternative alter habitat either in the corridor or in the watershed, there would be no adverse impacts on this species. Therefore, this component of the Biology ORV would continue to be protected and enhanced in the Chattooga WSR Corridor.

3.2.2c BOTANY

The analysis of vegetation in the Chattooga WSR Corridor is divided into two sections. The first section addresses the effects of the alternatives on the botany components of the Biology ORV (Southern Appalachian Endemics, Spray Cliff Communities and Old Growth Communities). The second section, Vegetation, addresses three categories of species that currently occur in the Chattooga River watershed: proposed, endangered, threatened, sensitive (PETS) and locally rare species; ecological communities; and Management Indicator Species (MIS). Some species that are addressed in the first section are also addressed in the second because they are not only species within the botany component of the Biology ORV, but also species that are PETS, ecological communities or MIS.

I. Summary of Findings

Periodic studies and surveys have been done over the years to better understand the diversity of species and habitats that have been found in the river corridor since the river was designated.

Impacts to the botany component of the Biology ORV are tied to current and proposed recreational impacts that disturb species or reduce the quality of unique habitats. The various alternatives propose ways to manage current users to reduce adverse impacts associated with campsites, trails and cutting of woody material. In addition, alternatives are considered on the effects from adding recreational boating. Various management strategies are evaluated including season, reach and flow restrictions to reduce adverse impacts.

The botany component of the Biology ORV is composed of the Southern Appalachian endemics, spray cliff communities and old growth forests. Potential effects on these values from the proposed alternatives would be primarily due to trampling of plants by recreation users and secondarily due to the introduction of additional non-native invasive plant species. Impacts from existing use are identified. Affects to the different species or communities vary by alternative.

All the designated plant species are Southern Appalachian endemics. They were considered rare when botanical values were designated. They include liverworts, rock gnome lichen, Blue Ridge bindweed, Fraser's loosestrife, Manhart's sedge, Biltmore's sedge, pink shell azaleas, mountain camellia, Oconee bells and divided leaf ragwort. Four species would be unaffected by any of the alternatives. Another four species may potentially be affected by all eight alternatives. Two species, Manhart's sedge and mountain camellia, would be affected by all alternatives except for alternatives 2 and 3.

Spray cliff plant communities occur on vertical to gently sloping rock faces that are constantly wet from the spray of waterfalls. They are inherently rare and dominated by mosses, liverworts and algae with vascular herbs having substantially less cover. No comprehensive spray cliff community assessment has been completed across the Chattooga WSR Corridor. However, the most extensive floristic survey of spray cliffs within the Chattooga River watershed was

conducted in 1995 (Zartman and Pittillo 1995). Thirty spray cliff communities were identified across all three national forests in the Chattooga River watershed. None were found in the upper segment of the Chattooga WSR Corridor but in adjacent areas. They were considered to be inaccessible and unlikely to be impacted by any of the alternatives.

A comprehensive old growth assessment was completed in the Chattooga River watershed in 1995 (Carlson 1995). Of the 4,578 acres of old growth in the Chattooga Watershed identified in the 1995 report, 564 acres were located within the upper segment of the Chattooga WSR Corridor. The alternatives would not impact old growth.

While direct and indirect effects from the alternatives may contribute to a reduction in the size of certain botanical values, none of the alternatives are anticipated to result in the loss from the corridor of any existing species or community.

All alternatives would continue to protect and enhance the botany component of the Biology ORV of the Chattooga Wild and Scenic River.

II. Affected Environment

A. Southern Appalachian Endemics

Several plant species were identified as part of the Biology ORV when the Wild and Scenic Chattooga River was designated. All the listed species were Southern Appalachian endemics that were rare at the time of designation. It is uncertain when the other plant species associated with the Biology ORV were first identified. The 1971 Study Report did not mention all the botanical species or groups that were mentioned later in the 1996 Chattooga River ORV assessment. Table 3.2.2c-1 lists the ten plant species or groups associated with the ORV and their habitats.

Table 3.2.2c-1 Plant Species Associated with the Biology ORV for the Chattooga Wild and Scenic River Corridor.

Species	Federal Rank	State Rank	Forest List (Sites)*	Chattooga WSR (Sites)	Range and Habitat
Pink Shell Azalea *Rhododendron vaseyi*	G3	S3 (NC)	NNF (15)	0	NC endemic present at the southern edge of its range in the Chattooga River watershed. Occurs in high elevations from closed canopy Northern Hardwood forests to partially open areas including seeps, boulder fields, meadows, and Southern Appalachian bogs.
Divided Leaf Ragwort *Packera millefolium*	G2	S2 (NC) S1 (GA) S2 (SC)	NNF (6) CONF (1)	1	Southern Appalachian endemic (NC, SC, and GA). Occurs in High Elevation Granitic Dome and Montane Cedar Woodland.
Fraser's loosestrife *Lysimachia fraseri*	G3	S2 (NC) S1S2 (GA) S3 (SC)	NNF (35) CONF (9) SNF (50)	6	Mountains of NC, SC and TN. Habitats include Acidic Cove Forest, Oak-Hickory Forest, wet rock outcrops, and river rocky shoals and islands.
Blue Ridge Bindweed *Calystegia catesbeiana ssp. sericata*	G3	S3 (NC) S1? (GA) SNR (SC)	CONF(12)	4	Carolinas and GA to the FL panhandle. Habitats are all early seral from meadows, openings in Oak-Hickory Forest, roadside edges to open rock outcrops.
Biltmore Sedge *Carex biltmoreana*	G3	S3 (NC) S1 (GA) S1 (SC)	NNF (13) SNF (1)	3	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 High Elevation Granitic Dome.
Manhart's Sedge *Carex manhartii*	G3G4	S3 (NC) S2S3 (GA) S2 (SC)	NNF (65) CONF (6)	6	Northern GA and eastern TN to southwestern VA and southern WV. Habitats include mesic areas ranging from Rich Cove Forest to Oak-Hickory Forest.
Mountain Camellia *Stewartia ovata*	G4	S2(NC) S3 (GA) S2 (SC)	NNF (7) CONF (2)	6	Virginia and Kentucky south to Mississippi and Florida. Habitat primarily riparian and alluvial forest, often densely covered with *Rhododendron maximum*.
Oconee Bells *Shortia galacifolia var. galacifolia*	G2G3T2T3	S2 (NC) S1 (GA) S2 (SC)	NNF (1) CONF (1?) SNF (4)	0	Narrow range of five counties on the Blue Ridge Escarpment in NC, SC, and Ga. Habitat streamside typically under dense *Rhododendron* shade.
Rock Gnome Lichen *Gymnoderma lineare*	G2	S2 (NC) S1 (GA) S1 (SC)	NNF (13) CONF (1)	3	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	N/A	N/A	N/A	N/A	Known to be diverse across the Chattooga River watershed but no comprehensive survey has been conducted.

* National Forests: NNF = Nantahala National Forest, CONF = Chattahoochee National Forest, SNF = Sumter National Forest. Number of sites listed for the respective national forest if the species is present and tracked as rare.

Other botanical values that were mentioned in the wild and scenic corridor were spray cliff communities and old growth forest.

B. Spray Cliff Communities

Southern Appalachian Blue Ridge spray cliffs are vertical to gently sloping rock faces that are constantly wet from the spray of waterfalls (NatureServe 2011, Schafale and Weakley 1990). Given these characteristics, they are inherently rare. The global rank is G2. These communities are found within southwestern North Carolina, northwestern South Carolina, northeastern Georgia and west of the escarpment in eastern Tennessee (NatureServe 2011). It is best developed within the Blue Ridge Escarpment region across NC, SC and GA. This community is dominated by mosses, liverworts and algae with vascular herbs having substantially less cover. Most associated species require a constantly moist substrate and high relative humidity. Sheltered site characteristics result only in rare freezes. Rare bryophytes, disjunct from tropical or subtropical regions, are able to persist within this community given the relatively constant temperature and high humidity. Deeply sheltered grottoes are often associated with spray cliff communities. These dark environs provide suitable habitat for other unusual or rare plants.

C. Old Growth Communities

No old growth inventory was documented at the time of wild and scenic designation. The most comprehensive old growth assessment was completed across the Chattooga River watershed in 1995 (Carlson 1995). Old growth was defined as principally plant communities dominated by trees more than 150 years of age and with little to no signs of human disturbance. A total of 110 stands, consisting of 4,578 acres, were identified as existing old growth across all three national forests in the Chattooga River watershed. While old growth conditions were identified across all forest types, the vast majority, around two-thirds, were in submesic oak, which often was dominated by chestnut oak (*Quercus prinus*).

D. Condition at the time of designation

The 1971 Designation Study describes the Chattooga as being in a mostly forested condition. More specifically, it characterizes the nature of the Chattooga vegetation as:

> a continuum, in which forest elements merge, shift and can only be recognized as constituting distinctive types…Several rare plants occur along the Chattooga. Mountain camellia is found in abundance along Dicks Creek. The rare Shortia plant is found along Reed Creek and just above Burrells Ford. These areas, described first by pioneer botanist William Bartram, are still rich in botanical rarities including many species of wild orchids, fern, ground pine, lilies, trilliums and violets.

E. 1996 ORV Report

Knowledge of rare species has increased since designation due to some inventories to assess resources within the Chattooga River drainage. Two reports completed in 1995 include an inventory of spray cliff communities and an assessment of old growth. This additional information was used to evaluate the botanical values of the Chattooga WSR in the 1996 ORV analysis which identified several rare plant species. The rarest species within the Chattooga River are the Southern Appalachian endemics, which include liverworts, the rock gnome lichen, Blue Ridge bindweed, Fraser's loosestrife, Manhart's sedge, Biltmore's sedge, pink shell azalea and divided leaf ragwort. The 1996 analysis reports that additional populations of mountain camellia were found whereas no changes were found in the Oconee bell population. An old growth assessment found approximately 1,300 acres of old-growth forest communities. Common plant associations include Canadian hemlock-tulip poplar/great rhododendron/hard-leaf foam flower and shortleaf pine-southern red oak or chestnut oak/sourwood/hillside blueberry and tag alder-yellowroot. Forest overstories appear to be changing from oak and pine toward less fire-tolerant species, such as red maple, white pine, hemlock and rhododendron. Localized recreation use has caused some damage to plant communities, but many plant communities are disturbance oriented and recover from trampling. Spray cliff communities are very fragile ecosystems and could be impacted by visitor use.

III. Existing Impacts to the Environment/Conditions as They Exist Today

A. Southern Appalachian Endemics

The Southern Appalachian endemics—pink-shell azalea, Biltmore sedge, divided-leaf ragwort and Oconee bells—are unaffected because they do not occur in the WSR Corridor or because they are in locations unlikely to be impacted by recreational users (they occur on very steep slopes or vertical rock outcrops). Two other species—Fraser's loosestrife and, Blue Ridge bindweed—are persisting in the WSR and have had minor impacts from recreational use or occur in an area unlikely to be used by current recreationists. Finally, rock gnome lichen, an endangered species, has no impacts to the new subpopulation because of its location under a rock shelf. The other population of the endangered plant is partially impacted by trampling by current recreational users.

B. Spray Cliff Communities

Spray cliff communities are not impacted because they are not located within the WSR Corridor.

C. Old Growth Communities

The old growth communities are located in a remote section of the corridor and are unlikely to be affects by people walking through the areas.

IV. Environmental Consequences

Affects to the different species or communities vary by alternative (Table 3.2.2c-2). Four species would be unaffected by any of the alternatives. Another four species may potentially be affected by all eight alternatives. Two species, Manhart's sedge and mountain camellia, would be affected by all alternatives except for alternatives 2 and 3.

Table 3.2.2c-2 Alternatives that May Have Direct or Indirect Effects on the Botany Component of the Biology ORV

Species Common Name or Type	Forest Status	1	2	3	8	11	12	13	14	Effects
Pink Shell Azalea	Sensitive	N	N	N	N	N	N	N	N	Not present in the W&S corridor
Divided Leaf Ragwort	Sensitive	N	N	N	N	N	N	N	N	Inaccessible to recreationists
Fraser's Loosestrife	Sensitive	Y	Y	Y	Y	Y	Y	Y	Y	Impacted on islands
Blue Ridge Bindweed	Locally Rare	Y	Y	Y	Y	Y	Y	Y	Y	Impacted by trail closures
Biltmore Sedge	Sensitive	N	N	N	N	N	N	N	N	Inaccessible to recreationists
Manhart's Sedge	Locally Rare	Y	N	N	Y	Y	Y	Y	Y	Impacted by portage trails, campsites
Mountain Camellia	Locally Rare	Y	N	N	Y	Y	Y	Y	Y	Impacted by campsites, portage trails
Oconee Bells	Sensitive	N	N	N	N	N	N	N	N	Not present in the W&S corridor
Rock Gnome Lichen	Endangered	M	M	M	M	M	M	M	M	"Not likely to adversely affect"*
Rare Liverworts	Various	Y	Y	Y	Y	Y	Y	Y	Y	Impacted by campsites, portage trails, hikers, fishermen in river
Spray Cliff Communities	Not applicable	N	N	N	N	N	N	N	N	Mostly unvisited in the corridor
Old growth Communities	Not applicable	N	N	N	N	N	N	N	N	Unaffected in the corridor

N=No. Y=Yes. M=May

A. All Alternatives – Direct and Indirect Effects

1. Pink-Shell Azalea – *Rhododendron vaseyi*

The species does not occur within the wild and scenic corridor and is unlikely to be located there. There would be no effects from any of the alternatives.

2. Biltmore Sedge – *Carex biltmoreana*

All three separate populations occur 20 to 500 feet upslope on vertical to steep rock outcrops either within the Chattooga Cliffs Reach or the Rock Gorge Reach. No impacts have been noted from existing use at these sites. Due to the steep terrain it is highly doubtful current recreation users and boaters would be tempted to visit and possibly

impact individuals. For that reason, this species would not be impacted by any of the alternatives.

3. Divided-leaf Ragwort - *Packera millefolium*

Access for recreationists under alternatives 1-3 is provided by hiking down the Chattooga River Trail by the area where the species is found in the Chattooga cliffs reach. It is unlikely that boaters would be hiking by this spot since it is below their put-in spot. All five of the boating alternatives in the Chattooga Cliffs Reach would float by this area of the river with *Packera millefolium* upslope. Given the steep terrain to access the population, it is doubtful any recreationists under any of the alternatives would visit the site. No direct or indirect effects are expected from any of the alternatives.

4. Oconee Bells – *Shortia galacifolia var. galacifolia*

There were no known occurrences of Oconee bells in the wild and scenic corridor in 1996. No occurrences have been documented within the wild and scenic corridor since the previous review in 1996. It is uncertain if this showy early blooming ground cover will ever be located within the wild and scenic corridor, since the vast majority of its existing populations occur in the river drainages east of the Chattooga River. No direct or indirect effects are expected from any of the alternatives.

5. Spray Cliff Communities

Several spray cliffs were visited during the 2007 botanical survey; however, they were located just outside the upper segment of the Chattooga WSR Corridor and were not easily accessible by any existing trail nor were they visible from the main stem of the Chattooga River. No direct or indirect effects are expected from any of the alternatives.

6. Old Growth Communities

All alternatives would allow recreational activities within and along representative old growth stands. Alternatives 8, 11 and 14 would allow boating along the greatest concentration of old growth stands. However, none of the boating alternatives would impact old growth forests since they are principally in the most inaccessible portions of the wild and scenic corridor. The death of Eastern hemlocks within mesic old growth stands is the single most important impact affecting some of these older communities. Many of the hemlocks have already died in the corridor, including hemlocks within the old growth stands. None of the alternatives would change this condition nor affect old growth habitats within the wild and scenic corridor. No direct or indirect effects are expected from any of the alternatives.

7. Reach, Flow and Season

These rare species and communities are unaffected by changes in flows and season. Surveys have identified the locations of species and communities by reach. No direct or indirect effects are expected from any of the alternatives.

The alternatives would continue to protect and enhance this component of the Biology ORV in the upper segment of the Chattooga WSR.

B. Cumulative Effects

Past, present and reasonably foreseeable activities listed in Table 3.1-7, when added to any of the alternatives, would not have any impact on rare species, spray cliff or old growth communities. For *Rhododendron vaseyi, Carex biltmoreana, Packera millefolium and Shortia galacifolia var. galacifolia*, there would be no impact from any of the alternatives.

The alternatives would continue to protect and enhance the botany component of the Biology ORV in the entire Chattooga Wild and Scenic River.

C. All Alternatives – Direct and Indirect Effects

1. Fraser's Loosestrife - *Lysimachia fraseri*

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 that favor compacted soils may increase and displace rare species on islands where *Lysimachia fraseri* has been documented.

One Fraser's loosestrife population was first recorded in 1998 along an alluvial island on the Georgia side of the river approximately one mile downstream of Ellicott Rock. It was relocated in 2007 dispersed amongst varying densities of hazel alder, *Alnus serrulata*. This site is currently receiving some visitation from existing recreationists. This large alluvial area is a natural flat resting site for potential boaters and desirable to visit for hikers/anglers traversing the Chattooga River. Most of the *Lysimachia fraseri* individuals are removed from the riverside and dispersed amongst the alder. For that reason it is doubtful there would be any impact to the population or the species from any of the boating or non-boating alternatives within the upper wild and scenic corridor. There could be occasional trampling impacts in the alluvial area from recreation visitors to those more accessible plants. Based on the potential number of days with boating opportunities by boating alternative which would potentially allow the greatest number of island visitors, Alternative 8 would create a greater risk to Fraser's loosestrife than Alternative 14, followed by alternatives 11, 13 and 12. All the alternatives could impact individuals of *Lysimachia fraseri*, but none are likely to result in viability concerns across the NNF, CONF or SNF.

2. Blue Ridge Bindweed – *Calystegia catesbeiana ssp. sericata*

Blue Ridge bindweed is persisting with the present recreation and road usage, including periodic trail and road maintenance, within the wild and scenic corridor. Alternatives 1-3 would continue to have minor impacts to the species. Introducing a new user group under alternatives 8, 11, 12, 13 and 14 would not change the current disturbance rate for any existing populations. There may be impacts to some individual vines; however, all the populations should continue to persist. All the alternatives may impact individuals of *Calystegia catesbiana ssp. sericata* on the CONF but would not result in the loss of populations for this species on the CONF.

3. Rock Gnome Lichen - *Gymnoderma lineare*

There are no measurable direct impacts from any current recreational usage within the two *Gymnoderma lineare* populations, including the new subpopulation along the main stem Chattooga River, in the wild and scenic corridor. Potential direct effects to the *Gymnoderma lineare* subpopulation along the Chattooga River from the alternatives include continued trampling by anglers, hikers, campers, etc. traversing the river near Fowler Creek, scraping of rocks by boats traversing the river at different flows and portaging around log jams which are anticipated to increase with the decline and natural falling of Eastern hemlock (from hemlock wooly adelgid). All the boating alternatives would allow boating along the population on the bank of the Chattooga River.

The location of the new subpopulation along the Chattooga River bank is partially protected under a narrow rock shelf. The physical features of the site probably have and would continue to discourage access by anglers as well as any visitation from boaters when floating this section of the river. There is no hiking trail within the vicinity of this site nor is there any trail proposed for this area. The site is not flat enough to allow a rest opportunity for boaters. If adjacent Eastern hemlocks fell across the river at this site, resulting in a possible portage, the natural area to traverse would be the flatter western bank where the species does not occur. No direct effects are expected from any of the alternatives.

Potential indirect effects to the *Gymnoderma lineare* subpopulation from this recreational proposal are unknown. Given the relative remoteness of the site and the physical characteristics discouraging any stops by boaters it is doubtful there would be increased visitation to this site if boating is allowed. Nevertheless, an indirect effect that may occur, regardless of the proposed recreational activity, is denser shading from dead hemlock trees that fall directly above and overtop the existing subpopulation. It is unknown how much shade tolerance this lichen has. However, most occupied sites have a moderate amount of light. Sites with *Gymnoderma lineare* on more exposed southern or western exposures often occur in areas with low light levels (USFWS 1997). As such it is suspected a subpopulation decline could result from a nearby fallen tree.

During a site visit in October 2007 with USFWS personnel (Asheville, NC and Columbia, SC offices) it was determined, based on the previous discussion points, that any increased recreational activity associated with the proposed project may affect but is not likely to adversely affect *Gymnoderma lineare*. It was also determined that periodic monitoring of the subpopulation along the main stem of the river should be implemented to ensure that no impacts occur from implementation of any of the alternatives.

All the alternatives may affect, but are not likely to adversely affect, *Gymnoderma lineare* in North Carolina. The alternatives would have no effect on *Gymnoderma lineare* in South Carolina and Georgia.

4. Rare Liverworts

Ten Regional Forester's sensitive liverwort species, *Acrobolbus ciliatus, Cephalozia macrostachya ssp. australis, Lejeunea blomquistii, Lophocolea appalachiana, Marsupella emarginata var. latiloba, Plagiochila austinii, Plagiochila caduciloba, Plagiochila sharpii, Plagiochila sullivantii var. sullivantii* and *Radula sullivantii* have been recently or previously located within the existing or proposed activity area and could have individuals impacted by all the alternatives.

As previously stated, trampling impacts from recreationists would vary by rare liverwort species depending on their micro-site. None of the alternatives would completely eliminate trampling risks although they vary by potential impacts. In addition to the existing use, the five boating alternatives could increase negative impacts to the rare bryophytes if a large number of portage trails are required to get by fallen hemlock log stringers or log jams. These impacts are anticipated to be greater in the uppermost portion of the corridor because the river width is less, hemlocks are dense (a large portion of them are dead) and rare liverwort habitat is more suitable.

All boating alternatives would allow floating to take place near where the liverworts are found thus posing a greater risk to the species than the non-boating alternatives. Alternative 8 poses the greatest potential for negative impacts to liverworts since it is the least restrictive and has no season or flow limitations. Alternatives 14, 11, 13 and 12 respectively would have fewer impacts since potentially they would allow fewer boaters due to season or flow restrictions. Of the non-boating alternatives, 2 and 3 take a more active approach in designating all campsites and trails, closing redundant and eroding trails. None of the alternatives would completely eliminate potential direct effects to rare liverworts in the river. The risk is least for Alternative 2 since it proposes more restrictions. The no-action alternative potentially allows the third least impacts to rare liverworts since it allows the existing camping and trails use.

All the boating alternatives are not likely to cause any viability concerns on the NNF, CONF or the SNF with implementation of the monitoring plan to determine the presence of the rarest liverworts for the first two years and potentially thereafter. If unacceptable recreational impacts are detected, corrective actions would be implemented. Alternatives

1, 2 and 3 are not expected to result in viability concerns for any of these sensitive liverwort species.

One locally rare liverwort species, *Chiloscyphus muricatus,* on the NNF could be impacted by all the alternatives. Alternatives 1, 2 and 3 are not expected to result in loss of any *Chiloscyphus muricatus* populations. All the boating alternatives may impact individuals of *Chiloscyphus muricatus* but are not likely to cause the elimination of populations on the NNF with implementation of the monitoring plan.

5. Reach

The individual species would be affected differently by reach. For Fraser's loosestrife, Blue Ridge bindweed and rock gnome lichen they would only be potentially affected within the Chattooga Cliffs Reach. The rare liverworts only occur within the three uppermost reaches although they are not distributed evenly.

While both Chattooga Cliff and Ellicott Rock reaches have 11 rare liverworts they differ in the number of populations or subpopulations, with 20 in the Chattooga Cliff Reach and 31 in the Ellicott Rock Reach. The fewest number of species (four) and populations (6) occur within the Rock Gorge Reach. Assuming that more potential days with boating opportunities means more boaters, Alternative 8 would create a greater risk to all these rare species. This potential impact risk diminishes from alternatives 14 to 11 to 13 to 12.

6. Flow and Season

It is uncertain how flows could impact these species. High flows might encourage vegetative propagation, particularly for a rhizomatous species such as *Lysimachia fraseri*. Season may play a role in the number of species that potentially could be affected by existing use. During winter, fewer species would be impacted both as a result of less visitors and the dormancy of some (one sensitive and five locally rare) of the vascular species.

The alternatives would continue to protect and enhance this component of the Biology ORV in the upper segment of the Chattooga WSR.

D. All Alternatives - Cumulative Effects

The cumulative effects from past, present and future actions on these rare plant species are not anticipated to result in the loss of any existing species in the corridor with implementation of any alternative.

The alternatives would continue to protect and enhance this component of the Biology ORV in the entire Chattooga Wild and Scenic River.

E. Alternative 1 – Direct and Indirect Effects

Manhart's Sedge - *Carex manhartii* and Mountain Camellia - *Stewartia ovata*

Trampling is causing removal of some plants that are found associated with poorly located campsites and along user-created trails. The no-action alternative potentially allows the greatest impact to these two species since it does not address the current impacts from existing campsites.

1. Reaches

The two species have the potential to be impacted by trampling given their location in respective reaches. Manhart's sedge has been located within Chattooga Cliffs, Ellicott Rock and Rock Gorge reaches. Mountain camellia is only known from the Chattooga Cliffs Reach.

2. Flows and Seasons

Neither flow rate nor season should affect either of these species.

3. Biology ORV—Botany Component

The alternative would continue to protect and enhance this component of the Biology ORV in the upper segment of the Chattooga WSR.

F. Alternatives 2 and 3 – Direct and Indirect Effects

Manhart's Sedge - *Carex manhartii* and Mountain Camellia - *Stewartia ovata*

Alternatives 2 and 3 designate all campsites and trails, close redundant and eroding trails and establish capacities for backcountry users. As such, potential negative impacts would be eliminated for this sedge and shrub.

1. Reaches

The two species have the potential to be impacted by trampling given their location in respective reaches. Manhart's sedge has been located within Chattooga Cliff, Ellicott Rock and Rock Gorge reaches. Mountain camellia is only known from the Chattooga Cliff reach.

2. Flows and Seasons

Neither flow rate nor different season should affect either of these species.

3. Biology ORV—Botany Component

The alternatives would continue to protect and enhance this component of the Biology ORV in the upper segment of the Chattooga WSR.

G. Alternatives 8, 11, 12, 13 and 14 – Direct and Indirect Effects

Manhart's Sedge - *Carex manhartii and* Mountain Camellia - *Stewartia ovata*

Like alternatives 2 and 3, alternatives 8 and 11, 12, 13 and14 designate all campsites and trails, close redundant and eroding trails and establish capacities for backcountry users. The boating alternatives could increase trampling and could potentially impact the two species within a few flat sites where logically a boater might stop to rest. It is uncertain if this poses a great risk but would be potentially greater than alternatives 2 and 3.

1. Reaches

The two species have the potential to be impacted by trampling given their location in respective reaches. Manhart's sedge has been located within the Chattooga Cliffs, Ellicott Rock and Rock Gorge reaches. Mountain camellia is only known from the Chattooga Cliff Reach. Each species would potentially be affected by all boating alternatives however; none are expected to eliminate any population from the Chattooga River. By comparing boating alternatives by the number of potential boaters by reach, alternative 8 would create a greater risk to all these rare species compared to alternative 14. This potential impact risk diminishes from alternatives 11 to 13 to 12.

2. Flows and Seasons

Neither flows nor different season should affect either of these species.

3. Biology ORV—Botany Component

The alternatives would continue to protect and enhance this component of the Biology ORV in the upper segment of the Chattooga WSR.

H. All Alternatives - Cumulative Effects

Manhart's Sedge - *Carex manhartii* and Mountain Camellia - *Stewartia ovata*

Cumulative effects from existing past, present and future actions to the two rare species affected by these alternatives do not differ with any of the alternatives. The effects on either Manhart's sedge or mountain camellia are not anticipated to result in the loss of either species in the corridor with implementation of any alternative.

Alternative 1 and all the boating alternatives may impact individuals of *Carex manhartii* or *Stewartia ovata* on the CONF, but would not result in the loss of populations for either species on the CONF. Alternatives 2 and 3 would have no impact on individuals of *Carex manhartii* or *Stewartia ovata*.

The alternatives would continue to protect and enhance this component of the Biology ORV in the entire Chattooga Wild and Scenic River.

3.2.3 SCENERY ORV

I. Summary of Findings

All action alternatives propose a limit on or reduction in parking, elimination of unsustainable campsites and trails and prohibition on cutting large woody debris to accommodate recreation, all of which serve to reduce impacts to scenery resources and aesthetic values. In addition, various management strategies in the alternatives that allow additional boating in the Chattooga WSR Corridor are evaluated including season, reach and flow restrictions to reduce adverse impacts. With its reduction in roadside parking, limits on campsite density, and new user permit system, effects to scenery would be minimized with Alternative 2. All other alternatives would have varying degrees of scenery impacts depending on allowed use levels and river miles open to boating; more use would result in greater impacts.

All alternatives would continue to protect and enhance the Scenery ORV of the Chattooga Wild and Scenic River.

II. Affected Environment

A. Condition at the time of designation

The 1971 Designation Study describes the scenery along the Chattooga River as follows:

> The beauty of the rapids and scenery of the Chattooga drainage is unsurpassed in the Southeastern United States. The river begins as a sparkling mountain rivulet cascading down the lush green, heavily-forested sides of the Blue Ridge and continues between high ridges through the deeply entrenched Chattooga River Gorge. The first 5 ½ miles of the Chattooga include several waterfalls and some of the most spectacular long range vistas on the whole river. The river here is small and fast, dropping through densely forested slopes, with an occasional glimpse of farms and summer homes. The next 16 miles are through generally inaccessible country. The river follows a narrow tortuous route over numerous rapids, cascading around boulders and through self-cut rock flumes and intermittent quiet, deep pools. Most of this section is narrowly contained in a deep, fast descending gorge between high ridges. In the whole 16 miles, only two narrow Forest Service roads break out of dense forest to span the river. The river drops out of the Chattooga Gorge and for the next six miles flows quietly by fields, farms and homes. The West Fork joins the River here, and these two streams provide easy canoeing water through an area of pastoral development.

> Steep forested slopes on either side of the river give a sense of seclusion to anyone on the river…The river constantly curves and meanders and there are good views of the surrounding ridges…The seasons of the year affect color, texture and character of the vegetation…The river itself provides a constantly changing scene. It follows a varying route over raging rapids, around enormous boulders and twisting rock-choked channels, and through narrow cliff-enclosed, deep pools…On the slower stretches, sounds other than that of water can be heard and attention is drawn away from the river course. Smooth water reflects images of plants along the bank as well as clouds, sky and ridges. Slow water allows the surroundings to be seen and enjoyed, provides relaxation after the last rapids, and gives time to prepare for the next rapids. Near Highway 28, two long sections of slow, smooth water occur on the River and West Fork.

When the river was designated, sections of it were classified as wild, scenic, or recreation. The classifications specify the amount of allowable development within a section. Generally, "Wild" sections are inaccessible by road, have a natural-appearing character, and dramatic natural beauty. "Scenic" sections include road crossings, bridges and developed recreation sites; though these sections have high quality scenery, they contain obvious signs of human modification. "Recreation" sections may have major road crossings, large bridges, roads paralleling the river, more intense recreation development, or tracts of private land with development within the corridor. The scenic character of "Recreation" sections may include frequently seen human modifications and, although still visually distinctive, represent the lowest level of scenic quality among the three classifications.

B. 1996 ORV Report

The 1996 ORV report found that scenery continued to be "an important part of the experience. The scenery along the Chattooga River is exceptional." The 1996 ORV report concludes:

> The outstanding scenery values are still present in the corridor. Studies done since 1971 confirm that the scenery and the natural environment are primary to the experience that people seek when coming to a National Wild and Scenic River.

C. Conditions as They Exist Today

Scenery remains largely unchanged since the time of designation. Active timber harvest cutting has not taken place in the corridor and opening maintenance continues in the area of Nicholson Fields close to Highway 28 to enhance the pastoral scene. However, changes to the vegetation have been occurring. Eastern hemlock trees are dying from Hemlock Wooly Adelgid (HWA) an insect native to East Asia. These trees are found primarily along the main part of the river and tributaries within the corridor. Eventually all of the hemlocks will succumb to this pest and other vegetation will take its place. White pine and rhododendron will likely become the dominant vegetation in these areas.

Major access to the upper segment of the Chattooga WSR continues at four frontcountry areas that were in place before the river was designated: Grimshawes/Sliding Rock Bridge Area; Bullpen Road Bridge Area; Burrells Ford Bridge Area and the Highway 28 bridge Area. These four areas continue to provide views of the canyon and the variety of colors and textures of vegetation associated with the varying seasons. Fall color changes in the canyon are particularly dramatic and draw many visitors to the area. Since designation, many roads leading to the river have been closed. However, two Forest Service roads and bridges (Bullpen Road Bridge and Burrells Ford Bridge) that span the river are still in place today.

III. Existing Impacts to the Environment

Currently, scenery impacts within the river corridor come from soil compaction, erosion and vegetation damage associated with dispersed camping and user-created trails; human waste and trash accumulation; and erosion associated with undesignated roadside parking. Recreational users have negatively impacted vegetation near campsites, along trails and at access points down to the river. This has been quantified in the 2007 biological assessment as bare ground, area cleared of vegetation and number of erosion points by river reach, probably because the number of campsites and trails in some areas exceeds forest plan direction. Litter is also present at camps and trails in all the river reaches. Generally speaking, some campsites are too close to the river. Some existing roadside parking has become eroded and unattractive. Vegetation loss and erosion from these campsites and trails, when combined with litter and some impacts from roadside parking, detract from the natural scenery and the sense of seclusion one feels when recreating in the area. Management actions are needed to trails and campsites to bring them into compliance with current forest plan direction to meet desired conditions for this area.

In addition, the large woody debris (LWD) inventory (November 2007) (Woody Inventory) indicates that some logs have been cut near user-created campsites probably for firewood by current users. This may detract from the aesthetics of the naturally appearing landscape, particularly in the Ellicott Rock Wilderness.

IV. Environmental Consequences

A. Alternatives 1, 2, 3, 8, 11, 12, 13 and 14 – Direct and Indirect Effects

1. Eastern Hemlock

In all alternatives, mortality of Eastern hemlocks would continue to impact seclusion afforded by this vegetation along the river. Over time, other vegetation will reoccupy the sites, once again increasing the sense of seclusion. The varieties and seasonal colors provided by different vegetation (especially hardwoods) at different times of the year will be only slightly altered by hemlock loss.

2. Views of the Surrounding Area

Management actions in any of the alternatives would not affect views of surrounding ridges and forested slopes. In addition, the many rapids, whitewater, shoals, boulders, cliffs and long smooth stretches of slower water above Highway 28 on the river itself would remain unchanged.

B. Alternatives 3, 8, 11, 12, 13 and 14 – Direct and Indirect Effects

Management Actions related to Campsites, Trails, Capacities and Monitoring

These alternatives would reduce impacts to scenery more than current management through proposed campsite limits, trail management, new capacity levels and monitoring. These actions would help to minimize use-related impacts as future demand increases and could result in less overall scenery impact than current conditions. Because the total number of trails and campsites would decrease over time and campsites, trails, bare ground and cleared areas would be stabilized and restored in these alternatives, the sense of seclusion forest visitors might feel in the corridor would be improved and biophysical impacts would be less than current conditions. More intensive management would likely result in less trash along trails and in campsites.

C. Alternatives 8, 11, 12, 13 and 14 – Direct and Indirect Effects

1. Large Woody Debris

The addition of boating in the upper segment of the Chattooga WSR could increase the potential for unauthorized large woody debris removal (LWD). Cut marks on log debris may tarnish the aesthetics of the natural-appearing landscape; particularly in the Ellicott Rock Wilderness. However, the amount of cutting and the degree to which it would impact scenery is difficult to predict.

Educating the public, consistent new management direction on the three forests coupled with enforcement measures would minimize recreation impacts. Annual monitoring for the first two years followed by periodic monitoring of the condition of LWD would also give an indication of the effectiveness of this direction and any impacts from recreational users. This would lead to improvement of the naturally appearing landscape and an increased sense of seclusion Information obtained from monitoring to determine the need for portage trails, could also be used to monitor impacts from existing and new users cutting LWD.

2. Boater Put In and Connector Trail at the Green Creek Confluence

Also, an additional boater put-in site and connector trail in the upper portion of the Chattooga Cliffs Reach at the Green Creek confluence has the potential to impact vegetation and introduce another point where litter would be present. This would reduce the sense of seclusion and detract from the aesthetics and unspoiled nature in this area. However, the trail would be properly designed to minimize adverse impacts to resources especially scenery and aesthetic values.

D. Alternative 1 – Direct and Indirect Effects

1. Campsites, Trails and Roadside Parking

In this alternative, current management direction for each respective national forest would continue. None of the three forest plans have campsite density restrictions or limit camping to designated sites in the WSR Corridor. Instead, forest plans generally only prohibit camping within certain proximity of riparian areas and require mitigation of resource damage. As a result, some campsites and trails are unsustainable as evidenced by loss of vegetation and erosion. In addition, 2007 inventories of litter indicate that all river reaches receive a lot of visitor use. Vegetation loss and erosion from campsites and trails, as well as litter from recreationists detract from the natural scenery and the sense of seclusion one feels when recreating in the area. Also, some existing roadside parking has become eroded and unattractive.

As forest plan direction is implemented, non-sustainable campsites and trails would be closed and rehabilitated, although some new sites could appear to replace them, each of which would have its share of connecting user trails, vegetation damage, fire rings, soil compaction, erosion, human waste and trash accumulation. In addition, existing effects from roadside parking would be expected to continue.

2. Large Woody Debris (LWD)

The Woody Inventory indicates that some logs have been cut near dispersed campsites probably for firewood by current users. This may impair the aesthetics of the naturally appearing landscape, particularly in Ellicott Rock Wilderness. These effects would continue under Alternative 1.

3. Reach, Flows and Season

Potential scenery impacts in this alternative do not vary by reach, flow or season.

4. Scenery ORV

When fully implemented, existing impacts to scenery from campsites would continue to detract from the scenic quality in the upper segment of the Chattooga WSR. However, with adherence to forest plan standards and guidelines, Alternative 1 would continue to protect and enhance the Scenery ORV in the upper segment of the Chattooga WSR.

E. Alternative 2 – Direct and Indirect Effects

1. Campsites and Trails

New management actions regarding reducing parking capacity at Burrells Ford, establishing a permit system for all users and reducing trails and campsite density would reduce use-related erosion, vegetation damage and soil compaction that currently results in bare ground; all of these actions would contribute to restoring a natural-appearing landscape. These actions also would enhance opportunities for solitude that would improve the visitors' sense of seclusion in the backcountry. In addition, these management actions would lead to vegetation recovery that also would contribute to restoring a natural-appearing landscape and an increased sense of seclusion. Though management of human waste or trash accumulation is not specifically addressed in this alternative, reducing overall use would minimize aesthetic impairment associated with these impacts.

2. Large Woody Debris

The Woody Inventory indicates that some logs have been cut near dispersed campsites probably for firewood by current users. This may impair the aesthetics of the naturally appearing landscape, particularly in Ellicott Rock Wilderness. Educating the public, consistent new standards on the three forests coupled with enforcement measures would minimize LWD loss in the long term. This would lead to vegetation recovery, improvement of the naturally appearing landscape and an increased sense of seclusion when compared with current management.

3. Reach, Flows and Season

Potential scenery impacts in this alternative do not vary by reach, flow, or season.

4. Scenery ORV

Alternative 2 would have the least impact to scenic quality and would actually enhance scenic conditions to a greater extent than any other alternative. The sense of seclusion forest visitors might feel in the corridor would be improved more than current management; biophysical impacts under Alternative 2 would be less than Alternative 1. Therefore, Alternative 2 would continue to protect and enhance the Scenery ORV in the upper segment of the Chattooga WSR.

F. Alternative 3 – Direct, Indirect and Cumulative Effects

1. Campsites and Trails

See "B. Alternatives 3, 8, 11, 12, 13 and 14 – Direct and Indirect Effects."

2. Large Woody Debris

The Woody Inventory indicates that some logs have been cut near dispersed campsites probably for firewood by current users. This may impair the aesthetics of the naturally appearing landscape, particularly in Ellicott Rock Wilderness. Educating the public, consistent new standards on the three forests coupled with enforcement measures would minimize LWD loss in the long term. This would lead to vegetation recovery, improvement of the naturally appearing landscape and an increased sense of seclusion when compared with current management.

3. Reach, Flows and Season

Potential scenery impacts in this alternative do not vary by reach, flow, or season.

4. Scenery ORV

The sense of seclusion forest visitors might feel in the corridor would be improved more than current management; biophysical impacts under Alternative 3 would be less than Alternative 1. Therefore, Alternative 3 would continue to protect and enhance the Scenery ORV in the upper segment of the Chattooga WSR.

G. Alternative 8– Direct and Indirect Effects

1. Campsites and Trails

See "B. Alternatives 3, 8, 11, 12, 13 and 14 – Direct and Indirect Effects."

2. Large Woody Debris

See "C. Alternatives 8, 11, 12, 13 and 14 – Direct and Indirect Effects."

3. Boating

The introduction of a new recreational user group (boaters) would impact vegetation and has the potential to diminish the sense of seclusion in the corridor. This new user group would likely create a small number of portage and attraction site trails, litter proportional to their numbers and boat markings on rocks (Whittaker and Shelby 2007).

The potential for portage trails is greatest under this alternative since boating would occur year-round without flow, season or reach restrictions. Portage trails would likely be needed along some narrower sections of the river corridor to get around woody debris obstacles. The Chattooga Cliffs Reach is the most likely place for portage trails (Whittaker and Shelby 2007). Also, this is the only boating alternative that allows the use of rafts for up to four people. Whittaker and Shelby (2007) state that "log hazards are more problematic for rafters than kayakers," further increasing the likelihood of portage trail needs and associated vegetation impacts.

Portage trails identified by managers and constructed to specification would minimize scenery impacts. However, some user-created portage trails may appear with no authorization or review by managers, which could result in scenery impacts from soil compaction and/or erosion. As a result, monitoring portage trails in the Chattooga Cliffs Reach and periodically assessing woody debris condition is vital for tracking the level of recreational impact to resources. This would help managers determine if additional measures are needed to protect the aesthetics and unspoiled nature component of the ORV.

In addition, allowing boating on the upper segment of the river would provide additional means of accessing remote sections of river, such as those designated as "Wild." This new use may increase overall use in the corridor, which could increase scenery impacts

from portage and access trails. Generally, increased use would also result in more scenery impacts from human waste and trash accumulation; especially in those remote river segments.

Boating may also introduce another new impact to scenery: boat markings on rocks. Lower water flows expose more rocks and boulders to scraping by boats. The amount of marking and the degree to which it would impact scenery is difficult to predict given new materials being used in the manufacturing of boats and kayaks. Sometimes, as a hard-shell kayak hits river rocks, a mark the same color as the boat may 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 lower flows, these residual boat markings may be visible to forest visitors when the rock face is several feet above the water level. Certain rocks would be struck repeatedly because of their location in the river channel. Therefore, higher use levels may result in more heavily scarred rocks with multi-colored streaks. These impacts could impair the aesthetics of the natural appearing landscape. However, it is important to note that boat markings on rocks were considered a minor concern from the Whittaker and Shelby (2007) report.

4. Reaches

Chattooga Cliffs, Ellicott Rock and Rock Gorge

Scenic quality in Chattooga Cliffs, Ellicott Rock, and Rock Gorge reaches may decline in this alternative due to increased use by allowing boating access to remote river sections classified as “Wild.” There would be no notable difference in potential scenery impacts for the Nicholson Fields reach.

5. Flows

Boating at different flows could create boat markings at multiple levels and locations on rocks. Impacts would occur at all flows that provide opportunities for boating, but would be most visible at low flows as markings are exposed above water level.

6. Seasons

The potential scenery impacts in this alternative do not vary by season, but would be visible in any season regardless of when they occurred.

7. Scenery ORV

Although this alternative has the potential to affect scenery more than any of the other action alternatives, when considered in the context of the entire Chattooga WSR, this alternative would continue to protect and enhance the Scenery ORV.

H. Alternative 11 – Direct and Indirect Effects

1. Campsites and Trails

See "B. Alternatives 3, 8, 11, 12, 13 and 14 – Direct and Indirect Effects."

2. Large Woody Debris

See "C. Alternatives 8, 11, 12, 13 and 14 – Direct and Indirect Effects."

3. Boating

The addition of a new recreational user group (boaters) would impact vegetation and has the potential to diminish the sense of seclusion. This new user group would likely create a small number of portage and attraction site trails, litter proportional to their numbers and boat markings on rocks (Whittaker and Shelby 2007). The impacts to vegetation from boaters are less than those in Alternative 8 because establishing a minimum flow level would reduce their time in the corridor.

Boating would provide additional means of accessing remote sections of river, such as those designated as "Wild." This new use may increase overall use in the corridor, which could increase scenery impacts from portage and access trails. Generally, increased use would also result in more scenery impacts from human waste and trash accumulation; especially in those remote river segments.

Portage trails would likely be needed along some narrower sections of the river corridor in order to get around woody debris obstacles. The Chattooga Cliffs Reach is the most likely place for portage trails (Whittaker and Shelby 2007). The need for portage trails is lower with this alternative than Alternative 8 because rafts are not allowed ("log hazards are more problematic for rafters than kayakers," Whittaker and Shelby 2007).

Portage trails identified by managers and constructed to specification would minimize scenery impacts. However, it is possible that user-created portage trails may appear with no authorization or review by managers, which could result in scenery impacts from soil compaction and/or erosion.

If longer reaches of river are open to boating or have higher use levels, there may be a greater degree of scenery impact. Alternative 11 offers boating in all river segments

above Highway 28 but restricts boaters to flows above 450 cfs. These flows would limit the number of days of boating opportunities more than alternatives 9 or 14.

4. Reaches

Chattooga Cliffs, Ellicott Rock and Rock Gorge

Scenic quality in Chattooga Cliffs, Ellicott Rock, and Rock Gorge reaches may decline in this alternative due to increased use by allowing boating access to remote river sections classified as "Wild." There would be no notable difference in potential scenery impacts for the Nicholson Fields Reach.

4. Flows

Boating at high CFS flows could create boat markings at multiple levels and locations on rocks. Impacts would occur at all flows with opportunities for boating, but would be most visible at low flows as markings are exposed above water level.

4. Season

The potential scenery impacts in this alternative do not vary by season, but would be visible in any season regardless of when they occurred.

5. Scenery ORV

This alternative would continue to protect and enhance the Scenery ORV in the upper segment of the Chattooga WSR.

I. Alternative 12 – Direct and Indirect Effects

1. Campsites and Trails

See "B. Alternatives 3, 8, 11, 12, 13 and 14 – Direct and Indirect Effects."

2. Large Woody Debris

See "C. Alternatives 8, 11, 12, 13 and 14 – Direct and Indirect Effects."

3. Boating

Alternative 12 (as well as Alternative 13) offers fewer river miles than other boating alternatives and fewer days with boating opportunities than Alternatives 8 and 14; therefore potentially lower use-levels by boaters when compared to other alternatives.

Allowing boating would provide additional means of accessing remote sections of river, such as those designated as "Wild." This new use may increase overall use in the corridor, which could increase scenery impacts from portage and access trails.

The need for portage trails is lower with this alternative than Alternative 8 because rafts are not allowed ("log hazards are more problematic for rafters than kayakers" [Whittaker and Shelby 2007]). Portage trails identified by managers and constructed to specification would minimize scenery impacts. However, user-created portage trails may appear with no authorization or review by managers, which could result in scenery impacts from soil compaction and/or erosion. Generally, increased use would also result in more scenery impacts from human waste and trash accumulation; especially in those remote river segments.

4. Reach

Chattooga Cliffs, Ellicott Rock and Rock Gorge

Scenic quality in Chattooga Cliffs, Ellicott Rock and Rock Gorge reaches may decline in this alternative due to increased use by allowing boating access to remote river sections classified as "Wild." There would be no notable difference in potential scenery impacts for the Nicholson Fields reach.

Also, the addition of a new recreational user group (boaters) in Chattooga Cliffs, Ellicott Rock and Rock Gorge reaches would impact vegetation and has the potential to diminish the sense of seclusion in the corridor. This new user group would likely create a small number of portage and attraction site trails, litter proportional to their numbers and boat markings on rocks (Whittaker and Shelby 2007). Portage trails would likely be needed along some narrower sections of the river corridor in order to get around woody debris obstacles. The Chattooga Cliffs Reach is the most likely place for portage trails (Whittaker and Shelby 2007).

5. Flows

Boating at all flows could create boat markings at multiple levels and locations on rocks. Impacts would occur at all flows with opportunities for boating, but would be most visible at low flows as markings are exposed above water level.

6. Season

The potential scenery impacts in this alternative do not vary by season, but would be visible in any season regardless of when they occurred. The impacts to vegetation from boaters are reduced from Alternative 8 because boating is restricted to the winter season.

7. Scenery ORV

Management actions under this alternative may improve scenic quality within the WSR Corridor. Therefore, this alternative would continue to protect and enhance the Scenery ORV in the upper segment of the Chattooga WSR.

J. Alternative 13 – Direct and Indirect Effects

1. Campsites and Trails

See "B. Alternatives 3, 8, 11, 12, 13 and 14 – Direct and Indirect Effects."

2. Large Woody Debris

See "C. Alternatives 8, 11, 12, 13 and 14 – Direct and Indirect Effects."

3. Boating

Management actions under this alternative may improve scenic quality within the WSR Corridor. However, boating would provide additional means of accessing remote sections of river, such as those designated as "Wild." This new use may increase overall use in the corridor, which could increase scenery impacts from portage and access trails.

The potential for portage trails is the same as Alternative 12 since boating is only permitted in the Chattooga Cliffs, Ellicott Rock and Rock Gorge reaches. However, there is a seasonal limit and a minimum flow level of 350 cfs or greater. Less time to boat and less area to boat in would reduce potential portage trails. Portage trails identified by managers and constructed to specification would minimize scenery impacts. However, user-created portage trails may appear with no authorization or review by managers, which could result in scenery impacts from soil compaction and/or erosion. Generally, increased use would also result in more scenery impacts from human waste and trash accumulation; especially in those remote river segments. The need for portage trails is lower with this alternative than Alternative 8 because rafts are not allowed ("log hazards are more problematic for rafters than kayakers" [Whittaker and Shelby] 2007).

The addition of a new recreational user group (boaters) would impact vegetation and has the potential to diminish the sense of seclusion and the aesthetics and unspoiled nature

component of the ORV in the corridor. This new user group would likely create a small number of portage and attraction site trails, litter proportional to their numbers and boat markings on rocks (Whittaker and Shelby 2007). Alternatives 12 and 13 have fewer river miles than other boating alternatives, and fewer days with boating opportunities than Alternatives 8 and 14; thus potentially lower user-levels.

Monitoring portage trails in the Chattooga Cliffs Reach and periodic assessment of LWD condition would help track the level of recreational impact to resources to see if additional measures are needed to protect the aesthetics and unspoiled nature component of the ORV.

4. Reaches

Chattooga Cliffs, Ellicott Rock and Rock Gorge

Scenic quality in Chattooga Cliffs, Ellicott Rock, and Rock Gorge reaches may decline in this alternative due to increased use by allowing boating access to remote river sections classified as "Wild." There would be no notable difference in potential scenery impacts for the Nicholson Fields Reach.

Portage trails would likely be needed along some narrower sections of the river corridor in order to get around woody debris obstacles. The Chattooga Cliffs Reach is the most likely place for portage trails (Whittaker and Shelby 2007).

5. Flows

Boating at high CFS flows could create boat markings at multiple levels and locations on rocks. Impacts would occur at all flows with opportunities for boating, but would be most visible at low flows as markings are exposed above water level.

6. Seasons

The potential scenery impacts in this alternative do not vary by season, but would be visible in any season regardless of when they occurred. For non-boating recreation users, impacts to vegetation would be greater in the spring and summer and lowest in the fall and winter. The impacts to vegetation from boaters are reduced from Alternative 8 because boating is restricted to the winter season.

7. Scenery ORV

Management actions under this alternative may improve scenic quality within the WSR Corridor. Therefore, this alternative would continue to protect and enhance the Scenery ORV in the upper segment of the Chattooga WSR.

J. Alternative 14 – Direct and Indirect Effects

1. Campsites and Trails

See "B. Alternatives 3, 8, 11, 12, 13 and 14 – Direct and Indirect Effects."

2. Large Woody Debris

See "C. Alternatives 8, 11, 12, 13 and 14 – Direct and Indirect Effects."

3. Boating

Management actions under this alternative may improve scenic quality within the WSR Corridor. However, boating would provide additional means of accessing remote sections of river, such as those designated as "Wild." This new use may increase overall use in the corridor, which could increase scenery impacts from portage and access trails.

The need for portage trails is lower with this alternative than Alternative 8 because rafts are not allowed ("log hazards are more problematic for rafters than kayakers" [Whittaker and Shelby 2007]). Portage trails identified by managers and constructed to specification would minimize scenery impacts. However, user-created portage trails may appear with no authorization or review by managers, which could result in scenery impacts from soil compaction and/or erosion. Generally, increased use would also result in more scenery impacts from human waste and trash accumulation; especially in those remote river segments.

The addition of a new recreational user group (boaters) would impact vegetation and has the potential to diminish the sense of seclusion. This new user group would likely create a small number of portage and attraction site trails, litter proportional to their numbers and boat markings on rocks (Whittaker and Shelby 2007).

Because longer reaches of river are open to boating, this could lead to higher use-levels and potentially a greater degree of scenery impact.

4. Reaches

Chattooga Cliffs, Ellicott Rock and Rock Gorge

Scenic quality in Chattooga Cliffs, Ellicott Rock, and Rock Gorge reaches may decline in this alternative due to increased use by allowing boating access to remote river sections classified as "Wild." There would be no notable difference in potential scenery impacts for the Nicholson Fields reach.

Portage trails would likely be needed along some narrower sections of the river corridor to get around LWD obstacles. The Chattooga Cliffs Reach is the most likely place for portage trails (Whittaker and Shelby 2007).

5. Flows

Boating at higher flows could create boat markings at multiple levels and locations on rocks. Impacts would occur at all flows with boating opportunities, but would be most visible at low flows as markings are exposed above water level.

6. Seasons

The potential scenery impacts in this alternative do not vary by season, but would be visible in any season regardless of when they occurred.

7. Scenery ORV

Management actions under this alternative may improve scenic quality within the WSR Corridor. Therefore, this alternative would continue to protect and enhance the Scenery ORV in the upper segment of the Chattooga WSR.

K. All Alternatives – Cumulative Effects

Past, present and future projects in the entire watershed include the use of prescribed fire, woodland habitat establishment, invasive plant eradication, restoration of bogs and other forest health improvement projects. These activities would add to the diversity of habitat in the watershed and reduce hazardous fuel loadings. In addition, improving the health and diversity of forest vegetation would reduce the chances of catastrophic insect and disease damage that could impact the corridor and scenery values. Activities in or near the corridor include road closures, trail reroutes, trail construction and reconstruction and dispersed camp site closure. Activities in the corridor itself are aimed at reducing erosion and sedimentation from roads, trails and campsites.

These activities would cumulatively increase the sense of seclusion to visitors. Most prescribed burning for vegetation management within the watershed would cumulatively help create a mosaic pattern of understory conditions that would add diversity to the landscape view. There would be no long-term cumulative adverse effects to scenery as lush vegetation and pastoral scenes would remain largely unchanged for both the short and long term with implementation of the various projects throughout the watershed.

The US Forest Service is currently proposing to restore buildings on the Russell Farmstead grounds in partnership with the Oconee Heritage Center as part of the Southern Appalachian Farmstead. A 30-car parking area is included in that proposal which is intended to provide parking for visitors. It would be located about 0.5 miles south of the SC Highway 28 bridge. The proposed project falls within a section of the Chattooga River corridor that is classified as recreation and is in a section of the river that has a pastoral setting of fields, farms and homes. This project would not adversely impact the Scenery ORV in this section of the upper segment of the Chattooga WSR because this area was recognized as providing this type of scenery setting – “The river drops out of the Chattooga River Gorge and quietly flows by fields, farms, and homes” (1971 Designation Study).

The proposed four to eight car parking lot off County Line Trail is not within the Chattooga Wild and Scenic river corridor.

No other past, present or foreseeable future actions would measurably contribute cumulative impacts to scenic resources in the Chattooga WSR Corridor. All alternatives would continue to protect and enhance the Scenery ORV in the Chattooga River.

3.2.4 HISTORY ORV

I. Summary of Findings

This section analyzes effects of the alternatives on known heritage resources in the upper segment of the Chattooga WSR Corridor, including nine identified heritage resource sites. Few additional sites have been discovered since the Chattooga River was designated as wild and scenic. Results from the excavations at Chattooga Town indicate that this site is eligible for the NRHP. This site has regional significance and contributes to the outstanding historic (heritage) rating for the Chattooga River.

Activities resulting in ground disturbance (hiking and camping) have the most potential to cause impacts to heritage resources. Areas where disturbance was identified around campsites and trails near major river access points were examined for heritage resources by a Forest Service archaeologist to determine if any heritage resources are being affected by current management or would be affected by the action alternatives. Management of the river corridor has not resulted in additional impacts to sites known to be potentially eligible for the National Register of Historic Places (NRHP). Known sites would be avoided and surveys would be completed prior to site-specific projects being implemented on national forest system lands.

All alternatives would protect and enhance the History ORV in the upper segment of the Chattooga WSR.

II. Affected Environment

A. Condition at the time of designation

The 1971 Designation Study describes historic sites of interest on and near the Chattooga River that caused the river to eventually be designated as wild and scenic. Section B of the 1971 Designation Study describes the historic features of the Chattooga WSR Corridor as including historic Cherokee towns, Indian trails, early historic settlement, the Black Diamond Railroad, splash dams, historic ferries and historically named natural features including rapids, waterfalls and cliffs.

B. 1996 ORV Report

The 1996 ORV report includes the following:

> Very little systematic archeological survey has been completed in the river corridor. A total of 38 archeological sites have been recorded within the corridor. These include 15 prehistoric sites, 15 historic or farmstead sites, a railroad embankment, 2 historic cemeteries, a nineteenth century minerals prospecting pit, and a rock shelter. Ellicott Rock, Thrifts Ferry, the Winchester Cemetery, several

> historic houses and other identified sites have not been recorded…Approximately one-half of these sites are considered potentially eligible for the National Register of Historic Places…More archeological evaluation is needed on the other sites to determine if they are eligible.

C. Conditions as they exist today

The following is a description of the History ORV developed for the Sumter RLRMP.

> 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.

Heritage resources information for the river corridor was examined to obtain an accurate current condition and description of the history ORVs. There are 43 archaeological or heritage sites recorded in the wild and scenic river corridor, including ten prehistoric Native American open sites, one prehistoric rock shelter, 17 historic period farm or house sites, two farm or house sites with prehistoric components, four historic cemeteries, three historic mines, a 19th century railroad earthwork, the Chattooga School, the location of a dugout canoe (since removed), a Civilian Conservation Corps constructed bridge, a historic boundary monument and one site of undetermined cultural period. These recorded sites are tangible representatives of the Heritage ORV's history and points of interest described in the 1971 Designation Study and 1996 ORV Report.

The river corridor contains evidence of use dating back several thousand years. For most of that time, the wild and scenic river remained forested and undeveloped. The existing condition retains that undeveloped character. The most intensive Native American use was by the Cherokee Indians in the late prehistoric and early historic periods. The Chattooga Town site and four other Cherokee sites are recorded in the corridor. The Chattooga Town site is eligible for the National Register of Historic Places.

Historic settlement and use of the river began in the early 1800s with small farms established in broader river bottoms, minerals prospecting logging, and roads established crossing the river at major fords. The Blue Ridge Railroad was left incomplete near the river and the Chattooga School and cemeteries were constructed. Settlement of the river corridor diminished in the 20th century as people abandoned small farms. Two historic

period sites, the Russell House and Ellicott Rock are on the National Register of Historic Places. The Bullpen Road Bridge also is eligible. Heritage resource sites have been identified in the upper segment of the Chattooga WSR, including a portion of Chattooga Town upstream from the Highway 28 bridge, Ellicott Rock and the Bullpen Road Bridge.

Very little heritage resource inventory has been completed for the upper segment of the Chattooga WSR. Inventories of areas in the national forests outside the river corridor have identified use beginning in the prehistoric Paleoindian Period (10,000 B.C.) and continuing to the present (Benson 2006; Wynn et al. 1994). Table 3.2.4-1 describes the known heritage resource sites.

Table 3.2.4-1 Known Heritage Resources on the Upper segment of the Chattooga WSR

Resource	State	Type	Culture Period	N. Register Historic Places
Bullpen Road Bridge	NC	CCC steel truss bridge	early 20th century	eligible
Bullpen 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 segment of the Chattooga WSR (Benson 2006; Wynn et al. 1994). 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 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 and traditional cultural properties may be present.

III. Existing Impacts to the Environment

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 segment of the Chattooga WSR Corridor were taken into account. Existing biophysical impacts likely to disturb archaeological sites were located, mapped and measured by the US 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 are at river access points, campsites and on trails. Disturbances directly related to boating would 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 containing biophysical impacts or ground disturbance were identified during biophysical monitoring in the visitor capacity analysis for the upper segment of the Chattooga WSR. Identified impacted areas around campsites 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 are being affected by current users. Examination of campsites, trails and heavily used areas at several points along the river found no heritage resources being disturbed by current uses. Most camps near the river are covered by recent alluvium which has buried any earlier or older heritage resources. Ground disturbance at existing campsites is shallow and limited to small areas. Most designated and user-created trails are in areas of low probability for the presence of archaeological sites.

Areas where disturbance was identified around campsites 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 to determine if any heritage resources are being affected by current users.
The Eastern Band of Cherokee Indians was consulted to identify heritage resources of importance to them.

IV. Environmental Consequences

Closure or rehabilitation of user-created trails and campsites would reduce ongoing erosion problems. Newly designated trails and campsites would require additional inventory and analysis of heritage resources before any ground-disturbing activities would occur. All alternatives avoid impacts to known heritage resources. Use of designated campsites and designated trails would avoid potential impacts to heritage resources.

A. Reach

The amount of current ground disturbance differs by river reach. Ground disturbance from current users is least in the Chattooga Cliffs Reach which contains few campsites. User-created campsites are most prevalent in the Ellicott Rock and Rock Gorge Reaches. The Nicholson Fields Reach contains more user-created trails near the river than other reaches. Based on current inventories, no heritage sites are being impacted by these user-created trails and campsites. The steep topography found in the corridor along the upper segment of the Chattooga WSR, particularly in the Chattooga Cliffs and Ellicott Rock reaches, had limited use by Native Americans or early European settlers.

B. Flows

It anticipated that recreation use (angling, boating, swimming, etc.) at different flows would not lead to any additional effects to heritage resources.

C. Season

Season has limited potential to affect heritage resources. While ground-disturbing activities that result from increased hiking and camping occur during the spring, summer and fall, limited or no impacts to heritage resources are anticipated.

D. Alternative 1 - Direct and Indirect Effects

Based on current inventories, no heritage sites are being impacted by user-created trails and campsites. Under this alternative, enforcement of current standards would close and rehabilitate many user-created campsites and trails. The closed campsites may be replaced with new user-created campsites further away from the river that could include ground disturbance and possibly affect unknown heritage resources. Therefore, this alternative would continue to protect and enhance the History ORV in the upper segment of the Chattooga WSR.

E. Alternative 2 -Direct and Indirect Effects

Under this alternative, biophysical effects and potential damage to unknown archaeological sites due to trails and camping would be less than current management. Closure of

redundant trails and many user-created campgrounds would lessen ground disturbance that could affect heritage resources. Group and campground size limits would lessen biophysical effects. The effects of designated trails and campgrounds on heritage resources would be analyzed on a site-specific basis prior to any new construction. Closure of user-created campsites with designated campsite spacing at least ¼ mile apart would reduce the amount of campsites along sections of the Ellicott Rock, Rock Gorge and Nicholson Field reaches. Therefore, this alternative would continue to protect and enhance the History ORV in the upper segment of the Chattooga WSR.

F. Alternative 3 -Direct and Indirect Effects

Under this alternative biophysical effects and potential damage to unknown archeological sites due to trails and camping would be lessened. Closure of redundant trails and many user-created campgrounds would lessen ground disturbance that could affect heritage resources. Limitations on group and campground size would lessen biophysical effects. Designated trails and campgrounds would be inventoried for any heritage resources prior to any new construction. Therefore, this alternative would continue to protect and enhance the History ORV in the upper segment of the Chattooga WSR.

G. Alternatives 8, 11, 12, 13 and 14 -Direct and Indirect Effects

Biophysical effects of boating on the upper segment of the Chattooga WSR would be largely restricted to the river, put in and take out points, and areas immediately adjacent to the river that have been scoured and disturbed by the river and contain few heritage resources. Boating put in and/or take out points are at established points of access to the river and are at the boundaries between reaches. Use of existing access points (Bullpen Road Bridge, Burrells Ford, Lick Log Creek, Highway 28 parking lot), would not affect any heritage resources. A trail is planned specifically for boaters to access the river at Green Creek in the northern portion of the Chattooga Cliffs Reach. The trail and access point would be inventoried for heritage resources prior to construction and any adverse effects to historic properties would be avoided. Portages on all reaches of the upper segment of the Chattooga WSR are on bedrock or disturbed soils next to the river that contain no heritage resources. Therefore, this alternative would continue to protect and enhance the History ORV in the upper segment of the Chattooga WSR.

H. All Alternatives - Cumulative Effects

Past, present, and reasonably foresee management activities would have little or no effect on heritage resources. Any new designated campsites, trails, parking areas or other ground-disturbing projects would be evaluated for potential effects to historic properties before a decision is made. Appropriate consultation would be completed with the SHPO and federally recognized tribes. Inventories for heritage resources are completed as part of the decision-making process, so no cumulative impacts to heritage resources are anticipated.

The Russell House was destroyed by fire in 1988 after the historic site (38OC106) was placed on the National Register of Historic Places. The remaining farm buildings have continued to deteriorate. The US Forest Service is currently proposing to restore these buildings and protect the site as the Southern Appalachian Farmstead (SAF) living history project in partnership with the Oconee Heritage Center (OHC). This proposed project has completed NEPA scoping and is now undergoing effects analysis prior to a decision being made and a special-use permit being issued to the OHC for the operation of the SAF. Implementation of the SAF proposal would help preserve an historic site within the Wild and Scenic Chattooga River corridor.

All of the alternatives would continue to protect and enhance the History ORV for the Chattooga WSR Corridor based on review by the SHPO, consultation with Native American tribes and reviews by US Forest Service archaeologists.

3.2.5 GEOLOGY ORV

I. Summary of Findings

Management and recreational activities in the corridor have not changed any of the outstanding geologic values since the river was designated in 1974. The geologic processes that shaped the narrow rocky gorges are unaltered by human activities.

All alternatives would continue to protect and enhance the Geology ORV of the Chattooga Wild and Scenic River.

II. Affected Environment

A. Condition at Time of Designation

Section B of the 1971 Designation Study describes the Chattooga River and the geology that caused the river to eventually be designated as a wild and scenic river:

> The massive face of the Southeastern Blue Ridge Escarpment is divided by a number of beautiful gorges representing millions of years of carving by waterborne sands and millions of years of high rainfall. The Chattooga, flowing for a major portion of its length through one of these gorges, is less developed than any of the other rivers of the Escarpment Region. The Chattooga River is entrenched by steep rocky, forested slopes that plunge into deep, narrow gorges. The river flows through the steepest, most pronounced portion of the Chattooga Gorge in its first 20 miles, averaging over 84 feet drop per mile. The next 33 miles to Tugaloo Reservoir is through wider, more gentle mountains with an average drop of 22 feet per mile.

B. 1996 ORV Report

The 1996 ORV Report includes additional information on the Geology ORV:

> Most rivers with the Southern Blue Ridge drain into the Gulf of Mexico via the New, Tennessee, and Coosa River rivers. But the Chattooga River drains into the Atlantic. Another remarkable geomorphological feature discussed in the draft report from the Chattooga Team is that the Chattooga River, Tallulah River, and Chauga River most likely at one time flowed into the Chattahoochee River, but the Tugaloo River (formed by the confluence of the Chattooga River and the Tallulah River) captured those rivers from the Chattahoochee.

> A stream capture of this magnitude is unusual in the region. Geologists attribute this stream capture to geologic structures, namely joint sets, foliation, and compositional layering.

C. Conditions as they Exist Today

The geological and geomorphological values are still unaltered today.

The rocks and geologic structure found within the watershed indicate periods of mountain building, continental rifting, erosion, sedimentation and metamorphism over millions of years.

III. Existing Impacts to the Environment

Human activities that have the potential to influence or alter geologic processes can include land uses (agriculture, grazing, forestry, water impoundments and urbanization), consumptive uses (groundwater withdraw, oil and gas production and mining) and infrastructure development (bridges, roads, etc.).

The major threat to the Chattooga, future dams, was addressed during wild and scenic designation in 1974. Land uses have stayed relatively constant since designation with a majority of the watershed forested and in federal ownership (refer to Table 3.4.2-4 for existing land uses). No consumptive uses are occurring in the corridor. Infrastructure activities have maintained the status quo by replacing bridges across the river that existed before the river was designated. Road access to the river has been reduced since designation.

IV. Environmental Consequences

A. Alternative 1 - Direct, Indirect and Cumulative Effects

There are no impacts to the Geology ORV under this alternative on the upper segment of the Chattooga WSR or the entire Chattooga Wild and Scenic River.

Past, present and foreseeable projects listed in Table 3.1-6 would have no cumulative effects to geological and geomorphological processes.

This alternative would continue to protect and enhance the Geology ORV in the entire Chattooga Wild and Scenic River.

B. Action Alternatives - Direct, Indirect and Cumulative Effects

Impacts to the Geology ORV would not be expected from any of the action alternatives since land uses are not expected to change, no consumptive uses are proposed and further infrastructure development is unlikely given the extensive federal ownership in the drainage and river corridor. Past, present and foreseeable projects listed in Table 3.1-6 would have no cumulative impacts to geological and geomorphological processes.

All action alternatives would continue to protect and enhance the Geology ORV in the entire Chattooga WSR.

3.3 OTHER RIVER VALUES

3.3.1 FREE-FLOWING CONDITION

The Wild and Scenic Rivers Act (WSRA) requires that the managing agency preserve the free flowing condition and protect the water quality of designated rivers. This section analyzes the effects of all alternatives on the river's free flowing condition and water quality.

Section 16 (a) of the WSRA defines "free-flowing" as "existing or flowing in natural condition without impoundment, diversion, straightening, rip-rapping, or other modification of the waterway." As required by the WSRA, at the time of designation, the Chattooga River was flowing in its natural condition without impoundment from Cashiers Lake south to Tugaloo Lake.

I. SUMMARY OF FINDINGS

None of the alternatives would impact the free-flowing condition of the Chattooga WSR.

II. AFFECTED ENVIRONMENT

There are currently no impacts to the natural flows of the Chattooga River for its entire length.

III. EXISTING IMPACTS TO THE ENVIRONMENT

The free-flowing condition of the Chattooga River is unchanged.

IV. ENVIRONMENTAL CONSEQUENCES

A. All Alternatives - Direct, Indirect, and Cumulative Effects

Section 7 of the Wild and Scenic Rivers Act is applied if a project requires construction within the bed or banks of the designated river. Examples of water resource projects include dams, fish habitat structures or boat ramps. No water resources projects are proposed in any alternative; therefore, none would affect the free-flowing condition of the Chattooga Wild and Scenic River.

All alternatives and past, present and foreseeable projects (listed in Table 3.1-6) are not water resources projects; therefore, the free-flowing conditions of the upper segment of the Chattooga WSR and the entire Wild and Scenic Chattooga River would be preserved.

3.3.2 WATER QUALITY

The 1976 Federal Register outlines some of the administrative responsibilities of the state and local governments. On page 11853, the Federal Register states the following:

> Each State has a Water Quality agency charged with setting water quality standards and pollution prevention programs. Even though the Chattooga is an interstate river, the State Water Quality classification varies between states. These standards are, however, adequate to protect the aesthetics of the area and health of the users.

I. SUMMARY OF FINDINGS

The states of Georgia, North Carolina and South Carolina all have responsibility for monitoring water quality in the Chattooga River. Under the Clean Water Act, each state is required to publish a 305(b) monitoring report that summarizes water quality conditions. If a stream does not have high enough water quality to meet its designated beneficial uses, it is listed as not supporting or impaired based on the presence of certain pollutants. Streams that are not supporting their designated beneficial uses are added to the state's 303(d) list of impaired streams.

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

Sediment is one of the pollutants of concern in the Chattooga River. In 1999, the Chattooga watershed was selected to participate in the Large Scale Watershed Restoration Program by the US Forest Service national office. The goal was to restore watershed conditions on both public and private lands. This followed other earlier efforts to reduce sediment in the river. Numerous projects have been implemented over the years to reduce sediment input to the watershed. The success of this effort is seen in the 2010 303(d) listings for the Chattooga River which indicates that the river is not impaired by sediment.

The U.S. Environmental Protection Agency (EPA) has determined that Stekoa Creek (a primary tributary to the Chattooga River and one of its main tributaries) is impaired due to excessive levels of fecal coliform and impacts to biota (macroinvertebrate community). It is also estimated that pollutant levels frequently exceed swimming/contact standards. Some of this impairment is due to sewage discharge from the town of Clayton, GA and has been recognized as a problem since the late 1970s. However, the 1976 Federal Register noted that high water quality existed above the confluence of Stekoa Creek with the Chattooga River including the upper segment of the Chattooga WSR.

II. Affected Environment

A. Condition at the Time of Designation

The Chattooga WSR's water quality was identified as a concern in the 1971 Designation Study in a summary of the Clemson Water Quality Study completed by Dr. Gordon Howard:

> Dr. Howard's study indicated that the West Fork and the river down to Highway 28 were free of human waste. The river from State Highway 28 to U.S. Highway 76 recorded a small level of pollutants (MPN-20/100 ml.), but well within the limits for primary contact waters. Below U.S. Highway 76, fecal coliform counts increased measurably (MPM 230-289/100 ml.), to above primary contact standards. The study indicated that Stekoa Creek might be a possible source of pollution into the main river, and suggested further sampling would be desirable.

The 1976 Federal Register noted that high water quality was occurring above Stekoa Creek, which includes the upper segment of the Chattooga WSR. Some water quality problems were occurring from sewage discharge from the town of Clayton, GA into Stekoa Creek. This area is below the SC Highway 28 Bridge.

B. 1996 ORV Report

The 1996 ORV Report describes changes in water quality since the 1974 designation:

> The water quality related to point source pollution on the Chattooga River has improved since the 1970s. There has been a general increase in nonpoint source pollution due to increased roads, development and recreational use within the watershed. The primary water quality concerns within the Chattooga watershed are sediment, fecal coliform levels, and temperature…Some parts of the Chattooga River has impaired water quality for recreational use from elevated fecal coliform and impaired aquatic habitat from sediment. Stekoa and Big Creeks in Georgia are the primary contributors of this pollution. Whetstone Creek is also identified as having elevated pollutants, well above other tributaries. Impacts from sediment were found in most streams throughout the drainage, and are partly due to natural conditions and past land uses.

In the 1971 Designation Study, the 1976 Federal Register and the 1996 ORV Report, Stekoa Creek is mentioned as causing water quality problems primarily due to elevated

levels of fecal coliform. Stekoa Creek is downstream of the SC Highway 28 Bridge and is not impacting the water quality of the upper segment of the Chattooga WSR.

Since designation, several primitive roads have been closed, including three US Forest Service roads that crossed the river at Earl's Ford, Sandy Ford and Warwoman Ford. These past efforts to close roads benefitted water quality. The use of "best management practices" improved water quality too. However, intense recreation use, cattle damage and residential developments contributed sediment.

III. Existing Impacts to the Environment

A. Conditions as They Exist Today

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. Table 3.3.2-1 provides a listing of current state designations. The predominant beneficial use for the Chattooga and its tributaries is fishing, with waters designated as primary trout waters above Big Bend Falls. Below Big Bend Falls, there is a cool to warm temperature transition resulting in changes to the trout community.

Under the Clean Water Act, each state is required to publish a 305(b) monitoring report that summarizes water quality conditions for state waters. If a stream does not have high enough water quality to meet its designated beneficial uses, it is listed as not supporting or impaired based on the presence of certain pollutants. Streams that are not supporting their designated beneficial uses are added to the state's 303(d) list of impaired streams. When a stream is added to the 303(d) list, a total maximum daily load (TMDL) document is often produced that outlines the levels of pollutant loading that allow the stream segment or water body to support its designated beneficial uses. Each state has a different agency responsible for producing the 305(b) report. The South Carolina Department of Health and Environmental Control, the Georgia Environmental Protection Division and the North Carolina Division of Water Quality are the state agencies with responsibility for the Chattooga River Watershed.

Table 3.3.2-1 State Water Classifications and Water Quality Standards

State	Segment	Classification	Standard
Georgia	Chattooga River from Georgia – North Carolina state line to Tugaloo Reservoir	Wild and Scenic	There shall be no alteration of natural water quality from any source.
	West Fork Chattooga from confluence of Overflow Creek and Clear Creek to confluence with Chattooga River (7.3 mi.)	Wild and Scenic	There shall be no alteration of natural water quality from any source.
North Carolina	Chattooga River from source to North Carolina – Georgia state line	Outstanding Resource Waters (ORW)	Water quality conditions shall clearly maintain and protect the outstanding resource values. The following undesignated tributaries to the Chattooga R. shall comply with the same ORW standards: see below (*)
South Carolina	Chattooga River from confluence with Opossum Creek to Tugaloo River	Freshwater	Turbidity not to exceed 50 NTU provided existing uses are maintained. See SC State Standards for further information
	That portion of the River from North Carolina line to its confluence with Opossum Creek	Outstanding Resource Waters	Water Quality conditions shall be maintained and protected to the extent of the Department's statutory authority. Numeric and narrative criteria for Class ORW shall be those applicable to the classification of the water body immediately prior to reclassification to class ORW, including consideration of natural conditions.

*note: the following NC tributaries shall comply with the same Outstanding Resource Waters standards: North and South Fowler creeks, Green and Norton Mill creeks, Cane Creek, Ammons Branch, Glade Creek and associated tributaries. Source: GA EPD; SC DHEC; NC DWQ.

B. Chattooga Watershed and Total Maximum Daily Loads (TMDLs)

A TMDL specifies the maximum amount of a pollutant that a water body can receive and still meet water quality standards. It also allocates pollutant loadings among point and nonpoint pollutant sources. In 1996, the EPA entered into a settlement agreement with plaintiffs, Sierra Club et al., concerning TMDLs for Georgia. Sediment is one of the pollutants of concern that is highlighted throughout Georgia's settlement agreement. As part of the settlement agreement, EPA completed a water quality assessment for all lands in the Chattooga Watershed. 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 also were sampled, but results were forwarded to the appropriate state water quality agency for any further action. EPA only added impaired streams to the 1998 Georgia 303(d) list because of the GA settlement agreement requirements.

In Georgia, eight stream reaches in the Chattooga Watershed were placed on the 303(d) list in 1998 and 2000 due to "excessive sedimentation," "habitat" or "biota" impairment. A TMDL was developed to address these parameters in 2001, and currently these streams are no longer on the Georgia 303(d) list for sediment as the cause of impairment.

In 1999, the Chattooga Watershed was selected to participate in the Large Scale Watershed Restoration Program by the US Forest Service national office. The goal of this five-year program was to restore watershed conditions on both public and private lands for large watersheds, and further to create a community-based restoration process that could be expanded beyond the initial thirteen demonstration watersheds. This project followed previous Chattooga River Watershed projects including US Forest Service Chattooga River Watershed (CRW) Ecosystem Management Demonstration Project (1993–1995) and EPA's TMDL Settlement Agreement for GA (1996–1999). The issue of sediment (excessive sedimentation or aquatic habitat degradation) was recognized by both these earlier projects; the Large Scale Watershed Restoration Project (LSWRP) implemented on-the-ground projects in all three states to address sediment problems and related effects. Table 3.3.2-2 summarizes the LSWRP improvements through the year 2002. These projects have improved water quality and aquatic habitats throughout the watershed, but the issue of excessive sedimentation requires continued attention by all landowners or land managers in the Chattooga Watershed.

Table 3.3.2-2 Summary of Restoration Actions

Restoration Action	Total (unit)
Trails Rehabilitated	150 miles
Roads Rehabilitated	81 miles
Heavy Road Maintenance	319 miles
Illegal ATV Trails Re-vegetated	80 acres
Recreation Sites Rehabilitated (camp sites)	23 sites
County Roads Rehabilitated using Wyden Amendment	24 miles
Streambank Stabilization	1,250 feet

As of the 2010 303(d) listings for all three states, sediment is not the cause for listing. All streams in the Chattooga River watershed in North Carolina are currently supporting designated beneficial uses, although in 1998 Norton Mill Creek was impaired by sediment. By the following reporting cycle in 2000, Norton Mill Creek was removed. In South Carolina, all streams are also supporting designated beneficial uses. Several streams in Georgia are presently on the state's 303(d) list for fecal coliform bacteria and impacts to biota, specifically the macroinvertebrate community.

C. Sediment

Sediment is the primary pollutant of concern in forested watersheds in the Southeast (Coats and Miller, 1981). Fine sediments (<2 mm in diameter) such as silts and sand are a natural part of streams in this region; however, an excess of stored sediment in stream substrate is detrimental to aquatic habitat. Excess fine sediment in stream systems fills interstitial space between larger rocks and reduces the amount of available fish and macroinvertebrate habitat. Fine sediments also reduce oxygen circulation in reeds and increase difficulty for aquatic organism emergence from substrate materials. Fine sediment enters the fluvial system when moving water erodes detached soils. Fine sediment is detrimental to habitat when the amount of sediment entering the fluvial system is not transported through the

system under a normal flow regime. Many of the streams in the Chattooga River Watershed have excess stored sediment from past land management activities as well as the high erosive potential of micaceous soils in the region.

Unpaved dirt and gravel roads are the primary contributors to stream sedimentation in the Chattooga River Watershed (Van Lear et al., 1995). In this same report, 2.6 percent of sediment was attributed to recreation uses. However, the data collection for this report did not specifically focus on pinpointing sediment from trails and campsites, and did not estimate what portion of the road use and impacts were related to recreation use. Further, it is expected that recreation use has increased since the data collection for this report. Impacts to water quality in the Chattooga Watershed are likely higher than cited in this paper as a result of increased use and the management of impacts from these uses can improve water quality in the Chattooga watershed.

A more detailed analysis of sediment is presented later Section 3.4.2.

D. Fecal Coliform and Biota

Fecal coliform is a detriment to water quality in some tributaries of the Chattooga River but not of concern in the entire watershed. Fecal coliform is a water quality indicator of pollution associated with warm-blooded animals, including humans. Fecal material deposited on the landscape may get into solution during storm events and may move to streams if not absorbed within filter strips or filtered through soil. Table 3.3.2-3 lists all of the streams in the Chattooga watershed that are impaired for fecal coliform and for having an impacted macroinvertebrate community. Impairment for an impacted macroinvertebrate community was determined by benthic macroinvertebrate bio-assessments based on several factors (a multi-metric index).
Water bodies were determined not to be supporting use designation if the narrative rankings were “Poor” or “Very Poor.”

Table 3.3.2-3 Fecal Coliform and Biota Impacted Impaired Streams in the Chattooga Watershed

Creek Name	Cause of Impairment	State
Warwoman Creek	FC, Bio M	Georgia
Stekoa Creek	FC, Bio M	Georgia
Tallulah River	FC	Georgia
Scott Creek	FC, Bio M	Georgia
Saddle Gap Creek	FC, Bio M	Georgia
Chechero Creek	FC, Bio M	Georgia
She Creek	FC, Bio M	Georgia
Roach Mill Creek	Bio M	Georgia
Pool Creek	Bio M	Georgia
Law Ground Creek	Bio M	Georgia

Note: FC=fecal coliform, Bio M= biota impacted macroinvertebrate community
Georgia’s 2010 Integrated 305(b) and 303(d) list)

The US Forest Service has intermittently monitored fecal coliform in the Stekoa Creek sub-watershed since the early 1970s. From 1993–1995, the US Forest Service worked

with commercial whitewater rafting outfitters and citizen groups to address the fecal coliform issue during the Ecosystem Management Project. During this project, Stekoa Creek and other Chattooga River tributaries were sampled to locate any coliform problems throughout the watershed. Fecal coliform data from lower Stekoa Creek displayed a water quality trend that regularly exceeded standards for safe swimming or contact. Fecal coliform levels in the Chattooga River, near the Stekoa Creek confluence, were also estimated to frequently exceed swimming/contact standards. Based on these data and past sampling efforts throughout the Chattooga River Watershed, fecal coliform impacts to the lower segment of the Chattooga WSR are primarily the result of the Stekoa Creek coliform impairment.

IV. Environmental Consequences

E. Direct, Indirect and Cumulative Effects for All Alternatives

The Federal Register, Vol.47, No. 173, September 7, 1982, Notice includes the final revised guidelines for Eligibility, Classification and Management of River areas. To meet the classification of a Wild River, one criterion is "Waters unpolluted." From the Federal Register Notice for a Wild River designation:

> The water quality of a wild river will meet or exceed Federal criteria or federally approved state standards for aesthetics, for propagation of fish and wildlife normally adapted to the habitat of the stream, and for primary contact recreation except where exceeded by natural conditions.

Impacts to water quality would come from potential increases in sediment from erosion is discussed in further detail in the Water and Riparian section discussion and analysis.

A detailed discussion of the effects of the different alternatives to aquatic organisms is described in Section 3.2.2a Biology ORV—Fisheries. Impacts to aquatic habitats would primarily result from potential increases in sediment from erosion. See Section 3.2.2a for additional discussion on aquatic habitat impacts. The effects write-up concludes:

> Under all alternatives, there would be no adverse cumulative impacts to Region 8 Sensitive aquatic species or Locally Rare aquatic species and no risk to aquatic population viability across the Forests for MIS and Management Indicator Communities.

Federal/state water quality standards have been established on all interstate portions of the river. These standards protect the aesthetics of the area and the health of the users. Detailed analysis on aquatic species and habitat concludes that the proposed alternatives would maintain habitat suitable for "the propagation of fish and wildlife normally adapted to the habitat of the stream." Based on these findings, the water quality of the

Chattooga Wild and Scenic River would continue to meet the eligibility criteria for the "Wild River" designation and meet the non-degradation and enhancement policy.

Past, present and reasonably foreseeable projects listed in Table 3.1-6 in the watershed that would likely reduce cumulative sediment impacts in the watershed and corridor include trail reroutes/reconstruction, culvert replacements across tributary streams to the Chattooga River, road reconstruction/repaving and system road maintenance. When combined with any of the proposed alternatives, there would be a reduction in sediment into the Chattooga River in both the short and long term. Other projects, namely vegetation management activities including prescribed burning, woodland habitat restoration, loblolly pine removal and native species restoration and thinnings would have short term adverse effects by adding some sediment to streams. Following state best management practices for water quality would also help reduce sediment input to streams from these and other projects. Project design features should limit any potential sediment entering the Chattooga River. It is anticipated that the water quality of the Chattooga River would continue to meet state water quality standards sufficient for aesthetics, primary contact recreation, and propagation of native aquatic species. Based on these findings, foreseeable activities meet the non-degradation and enhancement policy for water quality.

3.4 OTHER PHYSICAL RESOURCES

3.4.1 SOILS

I. Summary of Findings

Impacts to soils are associated with trails, campsites, parking areas, roads and potential portaging needs in the upper segment of the Chattooga WSR Corridor. The primary impacts are expected to be associated with erosion and compaction. Erosion and sediment originating from user-created trails and campsites, as well as areas with chronic erosion, are minor when compared to the chief contributors such as existing roads, bridges and parking lots (VanLear 1995). Similarly, impacts from a new use, boating, and connected actions would also be minor.

Over time, under current management, implementation of forest standards and best management practices (BMPs) would reduce existing levels of soil erosion and compaction. However, these improvements may be slowed by a continuing increase in overall use. Alternatives 2-14 would reduce impacts to soils by closing and rehabilitating problematic campsites and closing or mitigating damaged trails. Alternative 2 is expected to prevent further impacts and would provide the greatest reduction in impacts to the soil resource. The boating alternatives all have the potential for site-specific, designated portage trails around log jams in the river; of these, Alternative 12 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.

II. Affected Environment

The analysis area consists of national forest system lands within the Wild and Scenic Chattooga River (Chattooga WSR) Corridor from Grimshawes Bridge downstream to the Highway 28 bridge. This corridor is one quarter mile wide on each side of the Chattooga River and covers national forest and private land in North Carolina, South Carolina and Georgia. There are many soil types within the corridor that differ because of parent material, geology, slope, slope position and aspect. Soils vary in soil structure, horizon depths, texture and permeability due to the different conditions in which they form. These soil characteristics determine soil series and their relativity to soil productivity, erodibility and stability.

Soils within the Chattooga WSR Corridor are generally well drained, but have a wide range of slope and landform conditions from nearly level to extremely steep slopes with local inclusions of cliffs and falls. The relatively flat to gently sloping areas are characteristic of the relatively narrow floodplains and terraces. Side slopes range from gentle to steep sloping areas, with mostly narrow and irregular ridgetops. Many of the ridge top and upper side-slope soils are formed from residual materials weathered from gneiss, schist rock and granite. In the mountains, many of these soils tend to be more stable depending on the physical make up, width of ridge and slope. Soils on steep upper slopes may be less developed, shallow and more eroded due to gravity and/or washing and past activities. These soils are highly to severely erodible if exposed.

Soils that have a very high content of mica are considered to be micaceous soil types. They erode easily because they lack clay to bond the soil materials together and generally exist in unstable conditions. The Fannin and Chandler soil series make up a higher percentage of the soils in the corridor. They are considered micaceous when 40% of the soil by weight is made up of mica flakes. High levels of mica tend to be present throughout the river corridor and tend to be very prominent near the South Carolina/North Carolina border. Approximately 45.51% of the soils in the corridor are micaceous soils.

The upland soils are located on gently sloping to very steep ridges and side slopes. Most of the soils have a high enough level of clay to be stable on gently sloping terrain. Campsites, trails and parking lots are suitable on upland areas with gentle slopes, but direct connections of them to streams should be avoided or mitigated. Campsites, trails and parking lots can expose and compact soils and damage trees, so mitigation is needed when they are located within the riparian corridor. The Saluda soil series is shallow with gravely rock materials below 15 inches. Rock outcrops are also found within the Saluda mapping unit. Approximately 43.4% of the soils in the corridor are uplands with high enough clay content to minimize the impacts of erosion and disturbance on gentle slopes.

Soil types that developed from gravity transported materials from higher slopes and then accumulated on lower side-slopes or foot-slopes of hills or mountains are referred to as colluvial soils. They are a large mass of soil materials or rock fragments deposited from steep slopes onto relatively flat slopes, often located at the base of the slope in a cove near stream terraces and floodplains. These colluvial soils are very unstable and sensitive to ground disturbance. Approximately 4.95% of the area is prone to slippage and slumpage of a hillside. These soils are sensitive to ground-disturbing activities due to their severely erosive and unstable nature. Many of these soils are especially susceptible to failure from vegetation removal, added concentrated flow from other activities, altering the toe slope support, changes in hydrology or severe storm events that follow some form of severe vegetative disturbance (fire, wind, etc.).

Alluvial floodplain soils are formed from sediments that were transported and deposited from flowing water streams. Soils within the Chattooga River floodplain are generally stable when undisturbed, but are susceptible to compaction and/or erosion. These soils are sensitive to ground-disturbing activities due to their severely erosive nature on slopes or areas with concentrated flow. Under wet soil conditions, these soils may rut, making control of water and erosion difficult. Alluvial soils make up approximately 2.54% of the corridor.

For this analysis, soils are grouped by similar characteristics (see Table 3.4.1-1). These ratings are based on bare soil conditions subjected to rainfall. Any of the soils subjected to concentrated flow will normally have a high (H) rating. The ratings are listed as low (L), moderate (M) and high (H). Group 1 consists of micaceous soils which include the Cashiers, Chandler, Fannin, Porters and Sylva series. Soils in Group 2 developed in colluvial material and include the Brevard, Cullasaja, Tuckasegee, Whiteside and Tusquitee series. Group 3 is the alluvial soils and consists of the Toccoa and Transylvania series. Group 4 is the upland and hillside stable soils

with local gentle inclusions and consists of Chestnut, Edneyville, Cleveland, Haysville, Edneytown, Evard, Plott, Walhalla, Saluda (shallow soils) and Rock Outcrops.
The aforementioned soils have various levels of sensitivity to impacts from trails, campsites and parking areas. Table 3.4.1-1 lists each activity (trails, campsites, parking lots and roadside parking) and rates its potential effects (erosion, soil stability, compaction and displacement) to the soil resource. The following assumptions are used:

- Trails and campsites are located on grades of less than 12%, 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, except for a small paved portion at Bullpen, and roadside parking is managed with erosion control and stormwater mitigations installed and functioning.

Table 3.4.1-1 Soil Ratings for Trails, Campsites, Parking Lots and Roadside Parking

Group	Trails	Campsites	Parking Lots	Roadside Parking
1	H	H	H	H
2	H	H	H	H
3	M	M	M	M
4	L-M	L	L-M	M

L=low effects, generally acceptable but some mitigation may be needed; M=medium effects, mitigation likely needed; H=high effects, difficult to mitigate, avoid if possible.

III. Existing Impacts to the Environment

Existing sources of soil disturbance include designated and user-created trails and campsites, parking lots, trailheads, roads and wildlife openings. Erosion is occurring along the entire trail system, on roads, at parking areas, at identified erosion sites, at access points and at all campsites 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 segment of the Chattooga WSR Corridor. Due to soil types and slope, some sediment enters the Chattooga River from river access points. Many of the campsites occur in flat areas; therefore, erosion is not much of an issue. Campsites and trails located on slopes in close proximity to a water source are of more concern. 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 chief contributors of erosion and sediment in the Chattooga drainage (Van Lear 1995).

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.
- *User-created 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.

Data on existing campsites and trails in the upper corridor and the associated erosion points for each reach are displayed in tables 3.1-3, 3.1-4 and 3.1-6 in Section 3.1. The following discussion provides additional descriptions of existing soils-related conditions in each reach.

A. River Reaches

The Chattooga River corridor is divided into seven stream reaches for analysis of direct and indirect effects. Starting at the northern most end of the corridor they are: Chattooga Cliffs Reach; Ellicott Rock Reach; Rock Gorge Reach; Nicholson Fields Reach; South Carolina Highway 28 (SC Hwy 28) to US Hwy 76 Reach; US Hwy 76 to Tugaloo Lake Reach; and West Fork Reach. Cumulative effects are analyzed on the entire river corridor and the Chattooga River drainage.

1. Chattooga Cliffs Reach

Trails that occur in close proximity to the stream bank (within 20 feet) and those that lead directly into the water are chronic sources for eroded soil to enter into the river.

Most of the trails within this reach are occurring in the riparian corridor. This area (which includes floodplains) is usually wetter than surrounding areas and supports riparian vegetation. In addition, on user-created trails on a gradient without water controls (dips, water-bars, reverse grades, lead-outs, etc.), water will have a tendency to travel down the trail causing increased soil erosion.

Trails or campsites that had current or past erosion activity were noted as erosion points during the biophysical field review. Only three points were noted in this reach. Soil erosion from these points is minimal when compared to the total number of trails and campsites in this reach.

Four campsites were evaluated during the biophysical inventory of the area. The data indicates that these sites are approximately 50 feet from the river and vary from 450 square feet to 900 square feet in size with exposed bare earth ranging from 100 to 900 square feet.

Highway 1107 crosses the Chattooga River at a spot known as Grimshawes Bridge. This access point to the river is a small Forest Service tract surrounded by private land and contains two parking lots that are graveled and maintained. The river above Grimshawes Bridge is dominated by fine sediment particulates that suggest active erosion sources exist from the eight square mile drainage area.

The Chattooga Cliffs Reach contains designated and user-created trails and campsites, parking lots/trailheads, roads and private lands. Some of these facilities are located within 25 feet of the river in floodplains and on steep slopes. In general, the greatest potential for soil entering directly into the river is on areas within 25 feet of the river or on the river bank that have limited to no vegetation or root systems to trap sediment.

There are 1.7 miles of designated trails and 0.3 miles of user-created trails within 100 feet of the river. Designated trails have been constructed with proper grades with adequate water control structures on slopes that are not too steep. If designated trails are located within 25 feet of the river they are generally designed where adequate vegetation and a good root system is present to minimize soil loss and prevent it from entering the river. Conversely, user-created trails are not planned or designed and are often located with steep grades and on steep slopes. No water control structures are used to remove the water off the trail to prevent soil erosion. The trails are not maintained and are without a vegetative cover. Sediment deposits can flow directly into the river from some of the user-created trails within 25 feet of the river or on the river bank.

There are four user-created campsites within 100 feet of the 5.29 miles of river in the analysis area. The campsite spacing on the average is 0.8 campsites per mile within the reach. This section of the corridor is comprised of steep slopes and poor access, so it does not offer the opportunity of developing campsites next to the river without extensive soil erosion. The four designated parking lots/trailheads are also within 100 feet of the river. Two graveled roads cross the river (Hwy. 1107 at Grimshawes Bridge and Hwy. 1178 at Bullpen Bridge). Parking lots are located at the intersection next to the river and roads.

The erosion sites in this reach are mostly small but some are long and narrow and go down a steep grade directly into the river. In the past, they were used as access points to the river or were old campsites.

A large percentage of private forested lands exist and there is no agriculture or other ground disturbing activities known in this reach that are causing erosion.

2. Ellicott Rock Reach

This reach contains designated and user-created trails, campsites and roads. The micaceous material in the soils (more erosive material) decreases and the river gradient is not as steep. In general, the floodplains and terraces become locally wider, and colluvial soils, such as the Brevard, are found on several locations. Also, the landscape has more floodplains and river terraces which allows for more camping opportunities. In some instances, river terraces may be preferred because they are further from the river, but in other circumstances the best sites are within the floodplain. There are 2.6 miles of designated trails, 1.2 miles of user-created trails and 17 erosion sites within this reach. There are 39 user-created campsites located within 100 feet of the 5.34 miles of river. The campsite spacing on the average is 7.3 per mile. Two graveled roads cross the river in this reach (Hwy. 1178 at Bullpen and Hwy. 708/646 at Burrells Ford Bridge). All land in this reach is designated wilderness.

Seventeen active erosion points (main causal agent were recorded as trails, campsites and stream banks mostly) were documented during the biophysical field review. The sizes of the erosion points ranged from 18 to 450 square feet and are small when compared with the other reaches. All areas produce some level of soil movement with some potential of soil particles reaching the stream. Soil productivity is impaired on all areas with no vegetative cover.

Thirty-nine campsites were found during the biophysical inventory. Data indicate that most campsites are within 50 feet of the river with four sites within 20 feet. Cleared vegetation areas at campsites ranged in size from 370 square feet to 11,775 square feet and an exposed bare earth area ranging in size from 100 to 370 square feet. There are 39 user-created campsites within 50 feet of the river that lack proper design and are not maintained. All 39 campsites are user-created and are on locations with no design techniques or maintenance. Some are on steeper slopes with no vegetative cover and some are located too close to the river.

Parking lots and trailheads occur at the Burrells Ford Bridge and at Bullpen Road Bridge and at another spot up the road but still within the river corridor. The entire reach is in federal ownership and is managed by the US Forest Service. All of these parking lots are graveled, except for a small paved portion at Bullpen. The parking lots in the corridor adjacent to the river provide the greatest potential for off-site soil movement. Soil materials from ditch lines in roads and parking lots produce the highest level of sediment in streams.

Burrells Ford Road has been the focus of much concern because it is a chronic source of sediment to tributaries and the Chattooga River itself. Ditch lines are unarmored and the

road is very steep with a fine particle gravel surface. Water is able to gain sufficient velocity to cause road surface and ditch line erosion into the river.

3. Rock Gorge Reach

The soils, landscape and slopes in this reach are different than the Ellicott Rock and Chattooga Cliffs reaches. The floodplains and terraces are broader and colluvial soils, such as Brevard, are found on several locations. This reach contains designated trails, user-created trails, campsites and a gravel road (Hwy. 708/646 at Burrells Ford Bridge). There is no private land within this reach.

About 6,400 feet of both user-created and designated trails are within 20 feet of the river corridor. Within 100 feet of the river, there are about 32,500 feet of trails, 12,500 feet of which are user created.

Forty-four active erosion points (main causal agents were recorded as trails and stream banks mostly) were documented during the biophysical field review ranging from 10 to 200 square feet in size. Erosion points are indicative of problems associated with uncontrolled camping and user-created trails, especially on top of or near the stream river bank. The size of the erosion points ranged from 10 to 200 square feet

Fifty-seven user-created campsites were found within 100 feet of the river during the biophysical inventory; 15 of these were within 20 feet of the river. In addition, designated camping spots are found at Burrells Ford Campground on the Sumter National Forest.

Data indicate that most dispersed campsites are within 100 feet of the river; 15 sites are within 20 feet. Campsites with a cleared vegetation area vary from small to large (100 square feet to 9,750 square feet) and had exposed bare earth area ranging in size from 10 to 3,400 square feet.

The Burrells Ford Campground has roads and short access trails from campsites to the river's edge. The campground is slightly sloping and there is evidence of erosion at some of the roads and campsites. Vegetation is broken along the river bank reflecting recreation use impacts. Most areas are not actively eroding but there is likely soil movement into the river during high storm events. Stream banks are stable.

4. Nicholson Fields Reach

The soils in this reach are similar to the ones in the Rock Gorge Reach; however, the floodplains and terraces are wider. Colluvial soils, such as the Brevard, are found on several locations. There are 22 user-created campsites located within 100 feet of the river with an average of 5.8 per mile. Also, Hwy. 28 crosses the river at the lower end. There is no private land within the corridor in this reach.

About 3,200 feet of user-created trails are within 20 feet of the river corridor. There are about 36,000 feet of trails within 100 feet of the river, about 31,200 feet of which are user-created trails.

Erosion points are indicative of problems associated with uncontrolled camping and user-created trails, especially on top of or near the stream bank. Twenty-seven active erosion points were documented during the biophysical field review with the main causal agent being user-created trails and eroding riverbanks. The size of the erosion points ranged up to 400 square feet. The data indicate a substantial number of erosion sites are occurring on the riverbank which may be an indication of past recreational user impacts.

Twenty-two dispersed campsites were found within the Chattooga River corridor during the biophysical inventory. Data indicate that most user-created campsites are within 100 feet of the river; six sites are within 20 feet. Campsites with a cleared vegetation area vary from 100 square feet to 3,000 square feet and an exposed bare earth area ranging in size from 5 to 1,200 square feet. Six campsites are in poor locations and would need a site-specific analysis of suitability to minimize impacts to the soil resource.

Graveled parking lots and trailheads occur at the Highway 28 bridge and at other points along Highway 28. The entire reach is in federal ownership and is managed by the US Forest Service. All of the parking lots are graveled. The parking lots in the corridor adjacent to the river provide the greatest potential for off-site soil movement because of their association with trailheads and trails that provide direct access to the river.

5. SC Highway 28 to US Highway 76 Reach

The size of the river, floodplains and terraces are much larger below the confluence with the West Fork Chattooga River, Warwoman Creek and other contributing tributaries. The resulting soils, landscape, slope and river gradient are different from the reaches above Highway 28. This reach includes 5.4 miles of designated trails, 8.3 miles of user-created trails, 69 campsites and 72 erosion sites. South Carolina highways 28 and 76 cross the river. The number of miles of road within the corridor increases substantially in this reach. There is a small of amount of private land within the corridor in this reach.

6. US Highway 76 to Tugaloo Lake Reach

The river, floodplains and terraces continue to grow larger as the drainage area increases, and with additional flow from the Stekoa Creek subwatershed and other tributary confluences. The resulting soils, landscape, slope and river gradients are different. There are 0.2 miles of designated trails, 1.2 miles of user-created trails, 15 campsites and 11 erosion sites. The only road that crosses the river in this reach is the upper portion of US Hwy. 76. There is no private land within the corridor in this reach.

7. West Fork Reach

There are no designated trails in this reach, 3.2 miles of user-created trails, 14 campsites and eight erosion sites. Also SC Hwy. 28 crosses the river; a Forest Service road and county road are within the river corridor in this reach. There is no private land within the corridor in this reach.

8. Summary

A total of seven reaches are analyzed in the corridor for cumulative effects. In all seven reaches there are: 14.6 miles of designated trails, 22.5 miles of user-created trails within 100 feet of the river, 228 campsites, 182 erosion sites and 36 parking/trailheads close to or within the corridor. There are four primary highways, one Forest Service road and a county road within the corridor. The entire Chattooga River drainage is analyzed in the cumulative effects.

B. Seasons

Impacts to soils vary during the seasons. During the winter season, soils are usually moist for a longer duration and are subject to freeze/thaw processes than at other times during the year. These conditions make soils more sensitive to compaction and displacement. Soils that are finer in texture such as the silts and clays are more compacted than the sandy soils. An increase in the number of users, combined with more frequent use, increases soil compaction and displacement on the trail tread during the winter. Erosion and sediment would also increase from exposed soils during the winter due to an increase of rainfall and runoff.

Generally, during the spring, soil moisture begins to decrease when plants start to absorb water from the soil. Spring can be a time of intense precipitation and runoff which causes erosion and sediment to occur in areas with bare soil. These precipitation events can also lead to high soil moisture which can cause soils to compact and displace more easily. Periods of high soil moisture content during the spring are not as long as the winter period.

In the summer, soil moisture is usually low but localized thunderstorms create some intense rain events which can cause bare soil areas to erode. Overall, soils are more impacted during the summer months because this is the season with the most recreation use. The fall months are generally the driest months of the year and soils are generally impacted the least during this period than any other time of year. Leaf fall occurs this time of year which decreases rainfall impact and erosion by covering bare soil with a litter layer. The litter layer maybe removed from the soil surface in high use areas or areas on steep slopes after a heavy rain event. Effects to soils are minimized the longer the litter layer stays on bare soil areas.

C. Flows

In general, precipitation events and/or seasonal conditions lead to increased water flow which usually leads to higher soil moisture when soils are more likely to compact and displace. Impacts to soils would increase when recreation use occurs during these periods of high flow.

During flood stage and bank full events, flow volume would directly impact soils that are adjacent to the river. Erosion occurs from water flowing over trails and campsites that are devoid of vegetation and have bare soil exposed from repeated recreation use.

IV. Environmental Consequences

A. All Alternatives—Direct and Indirect Effects

Unless otherwise stated, the following effects from existing recreational user groups are common to all alternatives. The effects of adding a new user group, boaters, is analyzed in each alternative that allows additional boating opportunities on the Chattooga River (above Hwy. 28).

1. Seasons

Adverse soil effects would be reduced throughout the year because users would have to stay on designated trails and in designated campsites. Closing unsustainable campsites and trails would lead to recovery of vegetation in critical riparian areas and along the riverbank. This would reduce current recreational impacts that are causing soil erosion and compaction. Over all, recreation use during the different seasons would cause minimal soil disturbance.

2. Flows

Impacts to soils would increase in this alternative when recreation use occurs during these periods of high flow. Closing unsustainable campsites and user-created trails would protect sensitive areas by stabilizing vegetation and allowing water to seep into the ground before flowing directly into the river. However, over all, impacts to soils from recreational use occurring at different flow levels would be minimal.

B. Alternatives 2, 3, 8, 11, 12, 13 and 14—Direct and Indirect Effects

Unless otherwise stated, the following effects from existing recreational user groups are common to alternatives 2, 3, 8, 11, 12, 13 and 14. The effects of adding a new user group, boaters, is analyzed in each alternative that allows additional boating opportunities on the Chattooga River (above Hwy. 28).

1. Reaches: Chattooga Cliffs, Ellicott Rock, Rock Gorge and Nicholson Fields

Management of trails, camping and parking lots in this alternative would affect the soil resource. Designated trails would receive periodic maintenance. This would protect the trail tread and reduce erosion by getting water off the trail. Closing and rerouting poorly located user-created trails would reduce chronic erosion, especially from those located directly on top of stream banks and in riparian areas. It would also 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 improve bank stability and reduce erosion. The roots from trees, shrubs and grasses would begin to recover and would help hold the bank together. There would also be less chance for accelerated erosion during flooding in riparian areas. New or rerouted trails would cause disturbance by removing the litter and organic layer and compacting soil within the new trail tread area. However, new or rerouted trails would be placed in better locations and would cause minimal disturbance.

Closing and rehabilitating campsites, especially those located on top of the stream bank or in riparian areas or those with direct access to the river would reduce impacts to the soil resource. There would be a substantial reduction in soil erosion, compaction and disturbance. Designated fire ring locations would contain soil sterilization from excessive heat to one location. Closure signs would help protect campsites that have been rehabilitated and would hasten the recovery of vegetation. Closing and rehabilitating unsustainable campsites closest to the river would allow stream bank vegetation to recover and would reduce direct erosion into the river. Reducing and rehabilitating campsites in the riparian area would aid in a quicker recovery. Confining users to designated campsites that are properly designed and hardened would result in reduced use and reduced impacts to soils. Campsite occupant restrictions in each reach would aid in reducing the campsite size and use per site. This would decrease the effects to the soil resources within and around the campsite by minimizing loss of vegetation and the amount of traffic on the ground which can expose soil to erosion. A litter layer would develop on bare soil areas overtime which would lead to reduced overland water flow and help in rebuilding soils. It would also help in reducing erosion when flooding occurs.

Parking lots direct water across the surface either into a ditch line or into vegetated areas. Soil erosion takes place at the areas of concentrated flow. Fine particles from gravel surfacing materials would also be contained in runoff and can enter areas of concentrated flow. This concentrated water flow could provide a sediment source to the river via the trails or road ditches. The Burrells Ford and Bullpen parking lots provide the greatest potential for off-site soil movement because of their proximity to the river. The other parking lots associated with these stream reaches are outside the River Corridor and are a substantial distance away. There potential for erosion with adverse effects on the river would appear to be low. It is unlikely that the parking lots would cause any substantial soil erosion in the area if normal road maintenance procedures are followed. Maintenance

activities that include water control structures at the parking lot and on trails would drain water off in small amounts onto vegetative areas before it can develop enough energy to cause erosion.

Roadside parking within ¼ mile of Burrells Ford Bridge would cause some soil erosion that would be directly input to the Chattooga River as sediment. Road maintenance would reduce this adverse impact.

Campsite reservations would not be required; therefore, campsites may be used on a more regular basis. Constant use would compact the soils within the area of the campsite more rapidly. However, effects on soils would be minimal since all campsites would be designated and unsustainable campsites would be closed and rehabilitated.

C. Alternative 1—Direct and Indirect Effects

The biophysical assessment indicates that the number of campsites and trails in some areas exceed current forest plan direction. Generally speaking, campsites are too close to the river and some campsites and trails are unsustainable as evidenced by loss of vegetation and erosion. Also, the density of trails and campsites per mile of river indicate that management actions are needed to bring them into compliance with current forest plan direction to meet desired conditions for the area. Closing user-created trails and designating others that are sustainable for the long term is likely. At the same time, efforts would focus on closing campsites close to the river. These actions would protect soils while still allowing recreation to occur.

1. Reaches

Overall, implementation of current forest plan standards, BMPs and/or similar soil and water conservation practices designed to limit erosion, sediment and water quality impacts would reduce the current adverse effects to soils from existing user-created and designated trails, campsites and parking areas in each reach.

Trails that occur in close proximity to the stream bank (within 20 feet) and those that lead directly into the water are chronic sources for eroded soil to enter into the river. Hiking on the trails can lead to soil displacement, erosion and compaction to the soil surface. This can cause localized erosion that exposes roots of vegetation which can lead to a loss in vegetation along the trail. The root systems of this vegetation hold soil and the stream bank in place. Stream banks can weaken or erode at a rate faster than normal if this vegetation is gone or in a declining state. Erosion is more likely during high river flows or intense rainstorms. Erosion can continue for long periods of time unless corrective actions are taken.

In addition, user-created trails on a gradient without water controls (dips, water-bars, reverse grades, lead-outs, etc.), have a tendency to direct water down the trail causing

increased soil erosion. Over time, compaction and erosion leads to entrenchment of the trail. These trails can also transport soil particles directly to the river or deposit eroded material in depressions or small ephemeral channels. Periodic flooding of the riparian areas or high energy, concentrated flows from trails can then transport soil directly into the river. Soil compaction and disturbance combined with site-erosion can lead to declining vegetation conditions. When this is combined with periodic flooding (especially in the floodplain), it can eventually lead to accelerated erosion in areas of heavy trail concentration.

Designated trails require periodic maintenance to minimize adverse effects from soil compaction, soil displacement, soil erosion and other disturbance activities. All of the disturbance activities would have a negative impact on soil productivity. Periodic monitoring of these trails may lead to relocation or upgrading design or maintenance on portions of them that are causing resource damage.

Soil disturbance and compaction usually occur at campsites that are used over and over again. Disturbance to vegetation that exposes the soil to erosion is the most critical factor. Data indicate that some sites are completely devoid of any ground vegetation. Therefore, they are likely to be a long-term erosion source and health of vegetation in vicinity of trail and campsite is in question due to compaction and use levels. Erosion in some instances is slowed by vegetation surrounding the site with only a portion making its way to the river as sediment. Sediment delivery is most likely to take place during storm events or flooding in the riparian areas along the river. If these sites are somewhat elevated it may provide some protection but any sloping campsite also provides a greater chance for erosion than if it were flat.

Soil disturbance and compaction combined with erosion, exposes roots of vegetation leaving them susceptible to damage. This leads to vegetation die-back or decline and the site, expanding in size over time. As sites deteriorate, they become less attractive; therefore, the potential exists for other sites to be created, existing areas to be enlarged as deteriorated areas are abandoned, and erosion to be continued if mitigation measures are not used. With extended periods of non-use, some sites might be rehabilitated or restored to levels that they could again be reused for a period of time.

Parking lots direct water across the surface either into a ditch line or into vegetated areas. Soil erosion takes place at the areas of concentrated flow. Fine particles from gravel and surfacing materials would also be contained in runoff and can enter areas of concentrated flow. This concentrated water flow could provide a sediment source to the river via the trails or road ditches. The Burrells Ford and Bullpen parking lots provide the greatest potential for off-site soil movement because of their proximity to the river. The other parking lots associated with these stream reaches are outside the River Corridor and are a

substantial distance away where the potential for erosion with adverse effects on the river would appear to be low. It is unlikely that the parking lots would cause any substantial soil erosion in the area if normal road maintenance procedures are followed. Maintenance activities that include water control structures at the parking lot and on trails would drain water off in small amounts onto vegetative areas before it can develop enough energy to cause erosion.

The following information is relative to a particular reach.

a. Chattooga Cliffs

Many of the trails in this area are less of a concern because they are farther back from the edge of the river and eroded soil tends to be trapped by ground litter and vegetation. However, the soil is more easily disturbed and compacted by foot traffic because these areas have finer textured soils and are usually moist. Soil erosion from these points is minimal given the total number of trails and campsites in this reach (one campsite and 1,660 feet of trail within 20 feet of the river).

b. Ellicott Rock

Without site-specific analysis, it is unclear how many sites would be closed on the Nantahala and Chattahoochee national forests. On the Sumter National Forest the standard is clear that all sites within 50 feet of the river would be closed. There are four campsites and 2,613 feet of trail within 20 feet of the river.

c. Rock Gorge

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.

Without site-specific analysis, it is unclear how many sites would be closed on the Chattahoochee National Forest to correct resource damage. On the Sumter National Forest the standard is clear, that all sites within 50 feet of the river would be closed. There are 15 campsites and 2,901 feet of trail within 20 feet of the river.

Roadside parking within ¼ mile of Burrells Ford Bridge would cause some soil erosion that would be directly input to the Chattooga River as sediment. Road maintenance would reduce this adverse impact.

d. Nicholson Fields

Impacts to the soil resources from user-created and designated trails, campsites, trail heads and parking areas are also very similar. The data indicate a substantial number of

erosion sites are occurring on the stream bank which may be an indication of past recreational user impacts.

Without site-specific analysis, it is unclear how many sites would be closed on the Chattahoochee National Forests but emphasis is on meeting desired conditions for this area and correcting resource damage. On the Sumter National Forest the standard is clear, that all sites within 50 feet of the river would be closed. There are six campsites and 3,170 feet of trail within 20 feet of the river.

Closing unsustainable campsites and user-created trails would protect sensitive areas by stabilizing vegetation and allowing water to seep into the ground before flowing directly into the river.

2. Flows

Over all, impacts to soils from recreational use occurring at different flow levels would be minimal.

D. Alternative 2—Direct and Indirect Effects

1. All Reaches

Management of trails, camping and parking lots in this alternative would affect the soil resource. Designated trails would receive periodic maintenance. This would protect the trail tread and reduce erosion by getting water off the trail. Closing and rerouting poorly located user-created trails would reduce chronic erosion, especially from those located directly on top of stream banks and in riparian areas. It would also 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 improve bank stability and reduce erosion. The roots from trees, shrubs and grasses would begin to recover and would help hold the bank together. There would also be less chance for accelerated erosion during flooding in riparian areas. New or rerouted trails would cause disturbance by removing the litter and organic layer and compacting soil within the new

trail tread area. However, new or rerouted trails would be placed in better locations and would cause minimal disturbance.

Closing and rehabilitating campsites, especially those located on top of the stream bank or in riparian areas or those with direct access to the river would reduce impacts to the soil resource. There would be a substantial reduction in soil erosion, compaction and disturbance. Designated fire ring locations would contain soil sterilization from excessive heat to one location. Closure signs would help protect campsites that have been rehabilitated and would hasten the recovery of vegetation. Closing and rehabilitating unsustainable campsites closest to the river would allow stream bank vegetation to recover and would reduce direct erosion into the river. Reducing and rehabilitating campsites in the riparian area would aid in a quicker recovery. Confining users to designated campsites that are properly designed and hardened would result in reduced use and reduced impacts to soils. Campsite occupant restrictions in each reach would aid in reducing the campsite size and use per site. This would decrease the effects to the soil resources within and around the campsite by minimizing loss of vegetation and the amount of traffic on the ground which can expose soil to erosion. A litter layer would develop on bare soil areas overtime which would lead to reduced overland water flow and help in rebuilding soils. It would also help in reducing erosion when flooding occurs.

Parking lots direct water across the surface either into a ditch line or into vegetated areas. Soil erosion takes place at the areas of concentrated flow. Fine particles from gravel surfacing materials would also be contained in runoff and can enter areas of concentrated flow. This concentrated water flow could provide a sediment source to the river via the trails or road ditches. The Burrells Ford and Bullpen parking lots provide the greatest potential for off-site soil movement because of their proximity to the river. The other parking lots associated with these stream reaches are outside the River Corridor and are a substantial distance away. There potential for erosion with adverse effects on the river would appear to be low. It is unlikely that the parking lots would cause any substantial soil erosion in the area if normal road maintenance procedures are followed. Maintenance activities that include water control structures at the parking lot and on trails would drain water off in small amounts onto vegetative areas before it can develop enough energy to cause erosion.

When compared to current management, requiring campsite reservations and confining users to designated campsites that are properly designed and hardened would result in reduced use and reduced impacts to soils. In addition, campsite reservation system would likely reduce the potential for the creation of unauthorized campsites.

Eliminating roadside parking within ¼ mile of Burrells Ford Bridge would prevent damage to road ditch lines, cross-drain structures and roadside vegetation. This alternative would reduce soil erosion that would be directly input to the Chattooga River as sediment.

The following information is relative to a particular reach.

2. Chattooga Cliffs

Currently, campsite density in this reach is less than what is outlined in Alternative 2. Requiring reservations for campsites and maintaining current campsite density would result in less soil erosion than under current management. However, if the number of campsites in this reach were allowed to grow to one every ¼ mile, then impacts to soil would be more than current management.

E. Alternative 3 – Direct and Indirect Effects

1. All Reaches, Flows and Seasons

a. Effects of Existing Users

See "Effects Common to Alternatives 3, 8, 11, 12, 13 and 14."

F. Alternative 8 – Direct and Indirect Effects

1. All Reaches

a. Effects of Existing Users

See "Effects Common to Alternatives 3, 8, 11, 12, 13 and 14."

b. Effects from Adding Boaters

Effects to soils from activities associated with boating include creation of portage trails and increased use on existing trails. Designated portage trails may occur under this alternative in all river reaches. Since all four reaches are available for boating, levels of recreational use and number of portage trails increase proportionately, so would the potential for soil disturbance.

Proper location of designated portage trails rather than allowing user-created portage trails would minimize impacts to areas susceptible to soil erosion. The degree of disturbance within the trail tread would depend on the amount of use and maintenance level. Portage trails would have less time to recover from disturbance because of elevated use levels and more persons (up to four) per raft.

Certain reaches can have obstacles due to physical attributes such as narrow places that catch debris. These obstacles would require portage at some point in time during certain flows. Portage trail numbers and lengths would be directly correlated to flow levels, raft size (up to 4 person limit), woody debris obstructions and obstacles such as protruding

bed rock in the river. Portage trails are more likely with rafters than kayakers because of the need to get around obstructions in the river (Whittaker and Shelby 2007). Boating is allowed year-round with unlimited opportunities which increase the disturbance on portage trails. Ongoing hemlock decline and felling of trees into the river is expected to increase the need for portage trails.

2. All Flows

a. Effects of Existing Users

See "Effects Common to Alternatives 3, 8, 11, 12, 13 and 14."

b. Effects from Adding Boaters

Because adequate flow levels would be determined by Mother Nature, more boat trips would likely occur and more portage trails would likely be needed if boating occurred during low water flows. This increase in use would create more soil impacts from portage trail use. The locations and lengths of trails would change as woody debris moved through the river system and as flow levels changed. Floating in the lower flow ranges would increase the number of portages around obstacles in the river. Portage trails that are created at the lower flows would be under the water at higher flows which would cause those trails to become more eroded. However, over all Impacts to soils from recreational use occurring at different flow levels would be minimal.

3. All Seasons

a. Effects of Existing Users

See "Effects Common to Alternatives 3, 8, 11, 12, 13 and 14."

b. Effects from Adding Boaters

Under this alternative there is a potential for the use levels to increase throughout the river corridor. An increase in use levels also increases the potential for soil disturbance. Areas that are repeatedly used during each season have less time to recover. There is a greater potential for erosion and sedimentation to occur and compaction to be prolonged. However, over all recreation use during the different seasons would cause minimal soil disturbance.

G. Alternative 11 – Direct and Indirect Effects

1. Reaches

a. Effects of Existing Users (All Reaches)

See "Effects Common to Alternatives 3, 8, 11, 12, 13 and 14."

b. Effects from Adding Boaters (All Reaches)

Designated portage trails may occur under this alternative as boating would be allowed on all river reaches. Effects to soils from activities associated with boating include creation of portage trails and increased use on existing trails. Since all four reaches are available for boating, levels of recreational use and number of portage trails increase proportionately, so would the potential for soil disturbance.

Proper location of designated portage trails rather than allowing user-created portage trails would minimize impacts to areas susceptible to soil erosion. The degree of disturbance within the trail tread would depend on the amount of use and maintenance level. Portage trails would have less time to recover from disturbance because of elevated use levels.

Certain reaches can have obstacles due to physical attributes such as narrow places that catch debris. These obstacles would require portage at some point in time during certain flows. Portage trail numbers and lengths would be directly correlated to flow levels, woody debris obstructions and obstacles such as protruding bed rock in the river. Boating is allowed year-round which increase the disturbance on portage trails. Ongoing hemlock decline and felling of trees into the river is expected to increase the need for portage trails. Effects to soils are less than alternative 8 because a minimum flow level is established. This reduces the number of days in a year in which boating could take place

2. Flows

a. Effects of Existing Users (All Flows)

See "Effects Common to All Alternatives."

b. Effects from Adding Boaters (Flows of 450 cfs and Higher)

Because boating is allowed at flows of 450 cfs and greater in this alternative, there would be minimal need for portage trails and therefore, there would be minimal impact on the soil resource. Many of the obstacles that would require portage around under lower flows would be under water at this flow. Therefore, it is likely that very few portage trails would be needed. As a result, the potential for soil disturbance would be minimal under this alternative. Under this alternative soil impacts along portage trails may be alleviated during the period when flows are lower than the required flow for boating.

3. Seasons

a. Effects of Existing Users (Year Round)

See "Effects Common to All Alternatives."

b. Effects from Adding Boaters (Year Round)

Recreational boating use levels would increase during the winter and spring seasons under this alternative when soil moisture is normally at its highest. However, use levels are expected to be low during this time of year therefore, soil impacts would be minimal. The required flows for boating do not occur very often during the summer and fall seasons. Therefore, if any portage trails were created, they should recover during periods of no boating activity. Over all, recreation use during the different seasons would cause minimal soil disturbance.

H. Alternative 12 – Direct and Indirect Effects

1. Reach

a. Effects of Existing Users (All Reaches)

See "Effects Common to Alternatives 3, 8, 11, 12, 13 and 14."

b. Effects from Adding Boaters (Chattooga Cliffs, Ellicott Rock and Rock Gorge Reaches)

Boating under this alternative is allowed in the Chattooga Cliffs and Ellicott Rock and Rock Gorge reaches. Effects to soils from activities associated with boating include the potential creation of portage trails and increased use on existing trails. Dividing the use period in these reaches minimizes soil disturbance by dispersing use.

Proper location of designated portage trails rather than allowing user-created portage trails would minimize impacts to areas susceptible to soil erosion. The degree of

disturbance within the trail tread would depend on the amount of use and maintenance level. Under this alternative, soils and vegetation along portage trails would only be disturbed during a short period of time during the winter season allowing most of the year for vegetation to recover from the disturbance.
.
The upper two reaches have the highest likelihood for obstacles due to physical attributes such as narrow places that catch debris. Ongoing hemlock decline and felling of trees into the river is expected to increase the need for portage trails in these reaches. These obstacles would require portage at some point in time during certain flows. Portage trail numbers and lengths would be directly correlated to flow levels, woody debris obstructions and obstacles such as protruding bed rock in the river. Soil disturbance should be minimal from boating under this alternative since there would be a short period of time that the upper three reaches can be boated. These dates are also during the lowest use period for other recreational users.

2. Flows

a. Effects of Existing Users (All Flows)

See "Effects Common to All Alternatives."

b. Effects from Adding Boaters (All Flows)

It is likely that more boating use would occur in the mid range of flows (225-449 cfs). Floating in the lower flow ranges would increase the number of portages around obstacles in the river. Portage trails that are created at the lower flows would be under the water at higher flows which would cause those trails to become more eroded.

3. Seasons

a. Effects of Existing Users (Year Round)

b. Effects from Adding Boaters (Winter)

Recreation use levels would increase during the winter under this alternative when soil moisture is normally at its highest. Restricting boating use to only the winter season allows for the portage trails to have a recovery period. Disturbed areas would likely revegetate during the spring, summer, and fall seasons, which would reduce erosion potential. Compacted areas would not recover as rapidly.

I. Alternative 13 – Direct and Indirect Effects

1. Reach

a. Effects of Existing Users (All Reaches)

See "Effects Common to Alternatives 3, 8, 11, 12, 13 and 14."

b. Effects from Adding Boaters (Chattooga Cliffs, Ellicott Rock and Rock Gorge Reaches)

Effects to soils from activities associated with boating include creation of portage trails and increased use on existing trails. The lower portion of the Nicholson Fields reach from Lick Log Creek to the Highway 28 Bridge boat launch would not be disturbed since boating is not allowed.

Certain reaches can have obstacles due to physical attributes such as narrow places that catch debris. These obstacles would require portage at some point in time during certain flows. Portage trail numbers and lengths would be directly correlated to flow levels, raft size and type, woody debris obstructions and obstacles such as protruding bed rock in the river. Ongoing hemlock decline and felling of trees into the river is expected to increase the need for portage trails.

Proper location of designated portage trails rather than allowing user-created portage trails would minimize impacts to areas susceptible to soil erosion. The degree of disturbance within the trail tread would depend on the amount of use and maintenance level. Under this alternative, soils and vegetation along portage trails would have approximately nine months to recover from disturbance.

2. Flows

a. Effects of Existing Users (All Flows)

See "Effects Common to All Alternatives."

b. Effects from Adding Boaters (350 cfs and higher)

Boating in the mid flow ranges (350-450 cfs) would require boaters to portage around obstacles in the river. The number of portages should be minimal under these flows therefore; the potential for soil disturbance to occur under these conditions is minimized. Impact to soils along portage trails may be alleviated during the period when flows are lower than the required flow for boating.

3. Seasons

a. Effects of Existing Users (Year Round)

See "Effects Common to All Alternatives."

b. Effects from Adding Boaters (Winter)

Recreation use levels would increase during the winter and spring seasons under this alternative when soil moisture is normally at its highest. Allowing boating on the upper segment of the Chattooga WSR only during the winter would allow the portage trails to have a recovery period. Disturbed areas would likely revegetate during the spring, summer and fall, which would reduce erosion potential. Compacted areas would not recover as rapidly.

J. Alternative 14 – Direct and Indirect Effects

1. Reach

a. Effects of Existing Users (All Reaches)

See "Effects Common to Alternatives 3, 8, 11, 12, 13 and 14."

b. Effects from Adding Boaters (All Reaches)

Effects to soils from activities associated with boating include creation of portage trails and increased use on existing trails. Since all four reaches are available for boating, levels of recreational use and number of portage trails increase proportionately, so would the potential for soil disturbance.

Proper location of designated portage trails rather than allowing user-created portage trails would minimize impacts to areas susceptible to soil erosion. The degree of disturbance within the trail tread would depend on the amount of use and maintenance level. Portage trails would have less time to recover from disturbance because of elevated use levels.

Certain reaches can have obstacles due to physical attributes such as narrow places that catch debris. These obstacles would require portage at some point in time during certain flows. Portage trail numbers and lengths would be directly correlated to flow levels, woody debris obstructions and obstacles such as protruding bed rock in the river. Boating is allowed year-round which increase the disturbance on portage trails. Ongoing hemlock decline and felling of trees into the river is expected to increase the need for portage trails.

Boating under this alternative is restricted to 350 cfs or higher. This indicates that there would be minimal need of portage trails and therefore, there would be minimal impact on the soil resource.

2. Flows

a. Effects of Existing Users (All Flows)

See "Effects Common to All Alternatives."

b. Effects from Adding Boaters (350 cfs and higher)

Boating in the mid flow ranges (350-450 cfs) would require boaters to portage around obstacles in the river. The number of portages should be minimal under these flows therefore; the potential for soil disturbance to occur under these conditions is minimized. Impact to soils along portage trails may be alleviated during the period when flows are lower than the required flow for boating.

3. Seasons

a. Effects of Existing Users (Year Round)

See "Effects Common to All Alternatives."

b. Effects from Adding Boaters (Year Round)

Recreational boating use levels would occur more during the winter and spring seasons than in the summer and fall seasons. Impacts to soils are more likely to occur during the winter and spring. Areas that are repeatedly used during each season have less time to recover. This allows for a greater potential for erosion and sedimentation to occur and compaction to be prolonged.

K. Cumulative Effects for All Alternatives

Cumulative effects from soil erosion were assessed for the entire Chattooga Wild and Scenic River Corridor and at the 5th level watershed scale. Past, present, and reasonably foreseeable projects as identified in Table 3.1-6 were considered in the analysis. The time scale for consideration of effects from past activities is the last five years. Variations for soil erosion, compaction, disturbance and overall productivity among any of the alternatives are not measurably different at the river corridor or Chattooga Watershed Scale.

1. Chattooga River Corridor

The Wild and Scenic River Corridor consists of seven stream reaches identified in Table 3.4.1-2.

Table 3.4.1-2 Acres and Miles in the Chattooga Wild and Scenic River Corridor by Stream Reach

Reach	Acres	Miles*
Chattooga Cliffs	1,918	5.29
Ellicott Rock	1,751	5.34
Rock Gorge	1,838	7.35
Nicholson Fields	1,828	3.8
SC Hwy 28/US Hwy 76	6,044	20.08
US Hwy 76/Tugaloo Lake	1,579	5.66
West Fork	1,755	5.65
Total	**16,713**	**53.17**

*Miles were derived from GIS analysis.

Up to 80 percent (VanLear et al. 1995) of soil erosion comes from the 43 miles of existing roads, bridges and parking lots that enter and cross the Chattooga River Corridor. Road maintenance activities that blade road surfaces and clean ditch lines have a tendency to cause erosion unless armoring has been done and there are an adequate number of cross-drains.

The following information in Table 3.4.1-3 depicts the cover class information for the Chattooga River corridor as a whole.

Table 3.4.1-3 Land Cover in the Chattooga Wild and Scenic River Corridor

Land Cover	Acres
Deciduous Forest	7,923
Developed	342
Evergreen Forest	6,166
Hay/pasture	25
Herbaceous	28
Mixed Forest	2,066
Open Water	74
Shrub/scrub	18
Woody wetlands	73
Total	16,714

The information indicates that a majority of the corridor is forested or covered with vegetation that would reduce cumulative erosion effects in the corridor. Only pasture fields and developed areas (a little over two percent of the corridor) would be expected to be chronic sources of erosion in addition to roads which were not delineated.

Site-disturbing recreational activities include camping, boating, fishing, site-seeing, and hiking that utilizes roads, parking lots, trail heads, trails, and campsites. Most of this activity takes place on the three national forests though there is some recreation use occurring on private lands. Activities associated with recreation management include road, parking lot/trailhead and trail maintenance. These activities are aimed at reducing resource impacts associated with water run-off and subsequent erosion. They help decrease soil erosion overall in the corridor. User-created trails and dispersed campsites typically have no maintenance to reduce or prevent erosion.
User-created trails and campsites along with identified chronic erosion points are a minor source of erosion in the corridor when considered in context with other soil erosion sources, particularly that coming from existing roads. Vegetation cleared and bare soil exposed to erosion as a result of camping totals about 7.5 and 2.3 acres, respectively.

The biophysical assessment has identified impacts from user-created trails and campsites that are exceeding acceptable resource impacts. Implementation of current forest plan direction or new direction as proposed under any of the alternatives would result in a number of campsites being closed and rehabilitated. Approximately 84 sites could be closed on just the Sumter National Forest alone with adherence to current forest plan direction and additional sites would be closed within 20 feet of the river on all forests. All alternatives would close trails that are not sustainable and erosion points would be rehabilitated, thus reducing adverse affects on soils in the corridor.

2. Chattooga Drainage

The Chattooga watershed is approximately 180,000 in size with about 67 percent in federal ownership and managed by the US Forest Service. The majority of the watershed is forested and forest management is taking place on all three national forests within the drainage, though activities are a very small portion of the total forest environment.

Again, as within the river corridor, roads and road maintenance activities are the chief contributor to erosion and sediment input within the drainage when compared to other activities taking place.

Reductions in erosion are likely under all alternatives with improved recreation management, but it still would be minor when placed in context with contributions made from existing roads.

3.4.2 WATER AND RIPARIAN CORRIDOR

I. 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. Some trails and campsites also may be sediment sources; however, sediment inputs from trails and campsites are very minor. Recreation management proposed in the alternatives would likely result in an overall reduction in sedimentation from existing trails and campsites. User-created trails and campsites that are unsustainable would be closed. Only designated campsites and trails would be allowed in alternatives 2, 3, 8, 11, 12, 13 and 14; trails and campsites that do not meet forest standards would be closed in Alternative 1. Caps on the number of frontcountry (groups at one time) and backcountry (groups per day) users would limit long-term recreation use in alternatives 2, 3, 8, 11, 12, 13 and 14. Overall, the impact is not likely to be great from any of the alternatives; however, the potential impacts vary by alternative.

Alternatives 2 and 3 continue the existing mix of current uses but management actions would reduce impacts to soil and water resources. Alternatives 8-14 allow boating. To accommodate boating, put-ins and take-outs would be designated and some hardening may be needed to limit soil erosion and sedimentation. Alternatives 8-14 would lead to increased boating in the river corridor. Portage trails would be designated as needed. None of the alternatives are likely to create unacceptable direct, indirect or cumulative increases in sediment across the Chattooga watershed. In fact, each alternative would have a positive cumulative effect on water quality and riparian resources in both the upper segment of the Chattooga WSR and the larger Chattooga River watershed at Tugaloo Lake.

Mitigation measures would be used to minimize the direct and indirect effects for these alternatives.. 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.

Activities or requirements within each alternative would further contribute to reducing 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 damage. 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. Again, each alternative would have a positive effect on water

quality and riparian resources in both the upper segment of the Chattooga WSR and the larger Chattooga River watershed at Tugaloo Lake.

II. Affected Environment

Historical land disturbances during the period when many lands in the eastern U.S. were first cleared have 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 segment of the Chattooga WSR watershed has legacy sediment and in-stream sediment present from all these sources.

Table 3.4.2-1 Trend in Forested Conditions in the Upper segment of the Chattooga WSR to the Entire Watershed tor 1992 and 2001

Watershed	1992 Forested Acres/Percent	2001 Forested Acres/Percent
Upper segment of the Chattooga WSR (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 segment of the Chattooga WSR watershed is in good condition. The Van Lear et al. (1995) study indicates that sediment concentrations in the upper segment of the Chattooga WSR 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.

Sediment calculations at Burrells Ford amount to about 0.4 parts per million based on completed biophysical inventories of existing designated and user-created trails, bare ground and areas cleared of vegetation. The level of sedimentation from these sources would not be detectable in the water.

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 pools. The Wild and Scenic Chattooga River (Chattooga WSR) 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 that is sensitive to disturbance and susceptible to erosion. When exposed to the elements, disturbed areas can become chronic sediment sources.

A. Water Resources

Table 3.4.2-2 displays total miles of stream, summarized by order, for both the entire Chattooga River watershed and the upper segment of the Chattooga WSR Corridor area.

Table 3.4.2-2 Stream Mileage within the Chattooga Watershed and Upper segment of the Chattooga WSR Corridor Summarized by Stream Order

Stream Order	Watershed Miles	Upper segment of the Chattooga WSR Corridor Miles
1	1,814	75
2	642	24
3	299	7
4	156	3
5	94	2
6	54	22
7	29	0

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

B. 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.

C. Water Quality

The Chattooga River and its tributaries have various classifications that are 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 also are 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 ORW. Beneficial uses for the Chattooga River include primary contact recreation (swimming on a frequent or organized basis), fishing, wildlife and aquatic life which include natural trout propagation and survival of stocked trout.

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 due to past land management activities and 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. Overall recreation participation rates in all activities are increasing except hunting (Whittaker and Shelby 2007). 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's water quality is not high enough to meet its designated beneficial uses, it is listed as partially supporting or not supporting based on the presence of certain pollutants. Streams under these two listings are added to the 303d list of impaired streams. As part of the Georgia Total Maximum Daily Load (TMDL) settlement agreement, the U.S. Environmental Protection Agency (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 also were 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 segment of the Chattooga WSR Corridor are East Fork, Norton Mill Creek, Fowler Creek and Ammons Branch. Table 3.4.2-3 describes the beneficial use status and pollutants of concern for these stream reaches.

Table 3.4.2-3 Upper segment of the Chattooga WSR Stream Reaches of Concern

State	Stream	Use Support Status	Pollutant of Concern
SC	East Fork Chattooga River (downstream of fish hatchery)	Partial support	Unknown
NC	Norton Mill Creek (already 303d listed)	Partial support	Unknown
NC	Fowler Creek (downstream of Cashiers)	Not supporting	Excessive sedimentation
NC	Ammons Branch	Full support-watch list	Increased sediment

Source: US EPA, 1999.

E. Hemlock Woolly Adelgid (HWA)

Eastern hemlock (*Tsuga canadensis)* is 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% of existing hemlock is forecast to be dead within five to ten years.

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

With the loss of hemlock, the species composition and age structure of riparian stands will change. The number of canopy gaps and light availability to the forest floor will increase. 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 with a rhododendron 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. A greater hydrologic impact may occur in areas currently dominated by hemlock in riparian areas.

Recent research from the USDA 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).

F. 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, as well as more stream velocity and depth to move woody debris. Therefore, 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 also can 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 flows, 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 may cause erosion that can result in sedimentation into the stream channel.

From a physical perspective, the primary effect of LWD removal is the alteration of channel morphology. The LWD inventory (*Inventory of Large Wood in the Upper Chattooga Watershed*, November 2007) (Woody Inventory) indicates that some logs have been cut often near dispersed camping areas. In general, the effects of LWD removal are site specific and the consequences are highly variable, depending on the size of the channel, 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.

In the expert boating reconnaissance, log jams 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 segment of the Chattooga WSR and lead to the need to designate portage trails.

In November 2007, USDA Forest Service personnel conducted an inventory of dead and down LWD in the upper segment of the Chattooga WSR, West Fork Chattooga and two tributaries of the West Fork Chattooga (Overflow and Holcomb Creeks). Crews counted all wood larger than one meter long and ten 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 3.4.2-4 displays results of this recent inventory (Dolloff et al. 2008).

Table 3.4.2-4 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	4,171	205
West fork Chattooga	Confluence with main stem Chattooga	6.0	2,154	357
Holcomb Creek	Three Forks	2.7	1,446	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.

III. Existing Impacts to the Environment

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 increases 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.

A. 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 3.4.2-1 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 3.4.2-1 Data on the Size and Number of Existing Campsites on the Upper segment of the Chattooga WSR

Reach	# of Campsites	# of Campsites within 20 ft. of the river	# of Campsites/ 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.

B. Designated and User-Created Trails

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

User-created trails are 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 also can cause erosion and sedimentation when they are poorly maintained and receive high use.

Table 3.4.2-2 displays the number of miles of existing designated and user-created trails in the upper segment of the Chattooga WSR 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 3.4.2-2 Summary of Existing Trail Information for the Entire Upper segment of the Chattooga WSR Corridor (All Reaches and for a Distance of One Quarter 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

IV. Environmental Consequences

Alternative 1 is considered the baseline for comparing direct, indirect and cumulative effects of the alternatives. Table 3.4.2-3 summarizes current plan direction for each of the three national forests for best management practices (BMPs).

Table 3.4.2-3 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 BMPs, 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 diverse 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 likely would result in little change in riparian conditions on private lands within the foreseeable future. On NFS lands, the reasonably foreseeable future actions include prescribed burning, vegetation management, stream rehabilitation, continued road maintenance/use, trail maintenance/use and developed and dispersed recreation. Table 3.4.2-4 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 3.4.2-4 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

Table 3.2-6 displays existing trail mileage and erosion problems for the lower segment of the Chattooga WSR and the West Fork. Tables 3.4.2-5 and 3.4.2-6 summarize additional trail information and the extent of erosion associated with existing trails in close proximity to the lower segment of the Chattooga WSR and the West Fork.

Table 3.4.2-5 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 3.4.2-6 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

A. Alternative 1—Direct and Indirect Effects

1. Reach

a. Chattooga Cliffs

Because trails and campsites would be brought to meet desired conditions for the area and user-created trails would be either designated or decommissioned, depending on access needs, impacts to water quality would be expected to decrease slightly from existing condition. Guided by the Nantahala Forest Plan standard to prevent visible sediment from entering streams, sources of erosion of the existing network of roads, trails and camping areas would be addressed on a case-by-case basis. Rehabilitation and closing of sites would be implemented where uses create resource damage. Large woody debris (LWD) would be managed to meet the forest plan standard. Hemlock mortality is anticipated to increase the amount of LWD in the riparian corridor as trees die and fall in and along the Chattooga River. Increased hemlock mortality could result in trees falling across hiking trails. As a result, new user-created trails could be created as hikers make a new path around the fallen trees. If these user-created trails occur in

the riparian area they could result in an increased risk of erosion and sedimentation. The redistribution of campsites, as well as decommissioning or designating user-created trails in this alternative, would reduce erosion and sedimentation overall.

b. Ellicott Rock

The Ellicott Rock Reach is almost entirely within the Ellicott Rock Wilderness; therefore, motorized trails and roads are not a concern in this reach. Existing non-motorized trails would be maintained to protect water quality. New construction would be expected to improve existing trail configuration and would be designed and constructed to protect water quality. On the Sumter and Chattahoochee national forests, all backcountry dispersed campsites would be at least 50 feet and 25 feet, respectively, from lakes and streams to protect riparian area. In all three states, where unacceptable resource damage is occurring campsites would be closed or rehabilitated.

Replacement campsites would likely be constructed further from the stream although not as many campsites would be constructed. LWD would be managed to meet the three forest plan standards. Hemlock mortality is anticipated to increase the amount of LWD in the riparian corridor as trees die and fall in and along the Chattooga River. Similar to the impacts in the Chattooga Cliffs, increased hemlock mortality could result in trees falling across hiking trails resulting in an increase in user-created trails in the riparian area and an increased risk of erosion and sedimentation. The redistribution of campsites, as well as decommissioning or designating user-created trails in this alternative, would reduce erosion and sedimentation overall.

c. Rock Gorge

The Rock Gorge Reach is downstream from the wilderness boundary. Trails would be maintained to protect water quality. New construction would be expected to improve existing trail configuration and would be designed and constructed to protect water quality. On the Sumter and Chattahoochee national forests all backcountry dispersed campsites would be at least 50 feet and 25 feet, respectively, from lakes and streams to protect riparian area. Where unacceptable resource damage is occurring campsites would be closed or rehabilitated. Replacement campsites would likely be constructed further from the stream although not as many campsites would be constructed. Hemlock mortality is anticipated to increase the amount of LWD in the riparian corridor as trees die and fall in and along the Chattooga River. Similar to the impacts in the Chattooga Cliffs and Ellicott Rock reaches, increased hemlock mortality could result in trees falling across hiking trails resulting in an increase in user-created trails in the riparian area and an increased risk of erosion and sedimentation. This redistribution of campsites, as well as decommissioning or designating user-created trails, would reduce erosion and sedimentation overall.

d. Nicholson Fields

Existing trails would be maintained to protect water quality. New construction would be expected to improve existing trail configuration and would be designed and constructed to protect water quality. On the Sumter and Chattahoochee national forests all backcountry dispersed campsites would be at least 50 feet and 25 feet, respectively, from lakes and streams to protect riparian area. Where unacceptable resource damage is occurring campsites would be closed or rehabilitated. Replacement campsites would likely be constructed further from the stream although not as many campsites would be constructed. Large woody debris (LWD) would be managed to meet the forest plan standards. Hemlock mortality is anticipated to increase the amount of LWD in the riparian corridor as trees die and fall in and along the Chattooga River. Like the other reaches, increased hemlock mortality could result in trees falling across hiking trails resulting in an increase in user-created trails in the riparian area and an increased risk of erosion and sedimentation. This redistribution of campsites, as well as decommissioning or designating user-created trails, would reduce erosion and sedimentation overall.

2. Flows

Potential impacts to water and the riparian corridor would not be expected to differ notably with changes in river discharge for this alternative.

3. Season

Potential impacts to water and the riparian corridor would not be expected to differ notably with changes in season for this alternative.

B. Alternative 2 – Direct and Indirect Effects

Relevant to water and riparian protection, Alternative 2 differs from Alternative 1 by reducing the parking footprint near Burrells Ford Bridge and campsites would be spaced at least ¼ mile apart. Similar to Alternative 1, user-created trails would be closed or added to the designated trail system.

1. Reach

a. Chattooga Cliffs

Alternative 2 would reduce the potential for sedimentation in this reach more than Alternative 1. Establishing designated trails only would eliminate user-created trails by either designating and properly maintaining them or decommissioning them. This reach currently has almost two miles of user-created trails, of which small portions occur within 100 feet of the river. This reach would see a reduction in sediment transported to the river from these trails. Trail rerouting would occur where necessary to correct

existing sedimentation problems on designated trails. New campsite restrictions likely would not impact this reach or change the current rate of erosion and sedimentation (Table 3.1-8). However, as site-specific projects are implemented on designated campsites, the agency would ensure that water quality is maintained or improved through the use of vegetative buffers, minimizing concentrated flow or hardening designated sites.

b. Ellicott Rock

Alternative 2 would reduce the potential for sedimentation in this reach more than Alternative 1. This reach currently has more than two miles of user-created trail, of which almost half occur within 100 feet of the river. This reach would see a reduction in sediment transported to the river from these trails because they would either be designated and properly maintained or decommissioned. In addition, trail rerouting would occur where necessary to correct existing problems on designated trails. New campsite restrictions, including designated campsites only, would alleviate some erosion and sedimentation as campsites, bare ground and cleared area would be rehabilitated (Table 3.1-8). 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 designated sites.

c. Rock Gorge

Alternative 2 would reduce the potential for sedimentation in this reach more than Alternative 1. This reach currently has the greatest length of user-created trail, but is second to the Nicholson Fields reach with regard to user-created trail within both 100 and 20 feet of the river. This reach would see a reduction in sediment transported to the river from these trails because they would either be designated and properly maintained or decommissioned. Also, trail rerouting would occur where necessary to correct existing problems on designated trails. This reach would benefit from closing roadside parking near the Burrells Ford Bridge. Areas not used for parking would be decommissioned and rehabilitated to vegetative cover resulting in a reduction in sediment from the site. New campsite restrictions, including designated campsites only, would alleviate some erosion and sedimentation as campsites, bare ground and cleared areas are rehabilitated (Table 3.1-8). 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 designated sites.

The limited designated parking within the watershed is a relatively minor sediment source compared to sediment from roads. Closing roadside parking near Burrells Ford Bridge with alternative 2 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. There would be less parking effects over time (erosion and sedimentation).

d. Nicholson Fields

Alternative 2 would reduce the potential for sedimentation in this reach more than Alternative 1. This reach currently has the greatest length of user-created trail within both 100 and 20 feet of the river; and therefore, would likely see the greatest positive impact from the proposed action. This reach would see a reduction in sediment transported to the river from these trails because they would either be designated and properly maintained or decommissioned. In addition, trail rerouting would occur where necessary to correct existing problems on designated trails. New campsite restrictions, including designated campsites only, would alleviate some erosion and sedimentation as campsites, bare ground and cleared areas are rehabilitated (Table 3.4.2-8). 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 designated sites.

Table 3.4.2-8 Estimated Number of Potential Campsites Closed and Ground Rehabilitated, Based on Campground Spacing (of at Least ¼ Mile Apart) 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.

2. Flows

Potential impacts to water and the riparian corridor would not be expected to differ notably with changes in river discharge for this alternative.

3. Season

Potential impacts to water and the riparian corridor would not be expected to differ notably with changes in season for this alternative.

C. Alternative 3 – Direct and Indirect Effects

Relevant to water quality and riparian protection, Alternative 3 differs from Alternative 1 by designating campsites but without a requirement that they be spaced at least one-quarter mile apart as proposed in Alternative 2. Similar to Alternative 1, user-created trails would be closed or added to the designated trail system.

1. Reach

a. Chattooga Cliffs

Closing user-created trails and campsites would reduce the amount of erosion and sedimentation entering the Chattooga River. Establishing designated trails would eliminate user-created trails by either designating and properly maintaining them or decommissioning them. This reach currently has almost two miles of user-created trail, of which small portions occur within 100 feet of the river. This reach would see a reduction in sediment transported to the river from these trails. Trail rerouting would occur where necessary to correct existing problems on designated trails.

New campsite restrictions would probably have little impact on this reach or change the current rate of erosion and sedimentation, because it has so few sites. Although Alternative 3 does not have a campsite density limit (as proposed in Alternative 2), it would result in more campsite closures and more rehabilitated ground disturbance in this reach than Alternative 1, but the same as Alternative 2. 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 designated sites.

a. Ellicott Rock

Closing and rehabilitating user-created trails and would reduce the amount of erosion and sedimentation entering the Chattooga River. Establishing designated trails only would eliminate user-created trails by either designating and properly maintaining them or decommissioning them. This reach currently has more than two miles of user-created trail, of which almost half occur within 100 feet of the river. This reach would see a reduction in sediment transported to the river from these trails. Trail rerouting would occur where necessary to correct existing problems on designated trails.

New campsite restrictions would alleviate some erosion and sedimentation as user-created campsites, bare ground and cleared area are rehabilitated. Although Alternative 3 does not have a campsite density limit (as proposed in Alternative 2), it would result in more campsite closures and more rehabilitated ground disturbance in this reach than Alternative 1, but fewer than Alternative 2. 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 designated sites.

c. Rock Gorge

Closing and rehabilitating user-created trails and would reduce the amount of erosion and sedimentation entering the Chattooga River. Establishing designated trails only would eliminate user-created trails by either designating and properly maintaining them or decommissioning them. This reach currently has the greatest length of user-created trail, but is second to the Nicholson Fields Reach with regard to user-created trail within both 100 and 20 feet of the river. This reach would see a reduction in sediment transported to the river from these trails. Trail rerouting would occur where necessary to correct existing problems on designated trails. This reach would not benefit from a reduction in parking area near the Burrells Ford Bridge as in Alternative 2. New campsite restrictions would alleviate some erosion and sedimentation as user-created campsites, bare ground and cleared area are rehabilitated. Although Alternative 3 does not have a campsite density limit (as proposed in Alternative 2), it would result in more campsite closures and more rehabilitated ground disturbance in this reach than Alternative 1, but fewer than Alternative 2. 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 designated sites.

d. Nicholson Fields

Closing and rehabilitating user-created trails and would reduce the amount of erosion and sedimentation entering the Chattooga River.. Establishing designated trails only would eliminate user-created trails by either designating and properly maintaining them or decommissioning them. This reach currently has the greatest length of user-created trail within both 100 and 20 feet of the river; and therefore, would likely see the greatest positive impact from the proposed action. Trail rerouting would occur where necessary to correct existing problems on designated trails. New campsite restrictions would alleviate some erosion and sedimentation as user-created campsites, bare ground and cleared areas are rehabilitated. Although Alternative 3 does not have a campsite density limit (as proposed in Alternative 2), it would result in more campsite closures and more rehabilitated ground disturbance in this reach than Alternative 1, but fewer than Alternative 2. 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 designated sites.

2. Flows

Potential impacts to water and the riparian corridor are not expected to differ notably with changes in river discharge for this alternative.

3. Season

Potential impacts to water and the riparian corridor are not expected to differ notably with changes in season for this alternative.

D. Alternative 8 – Direct and Indirect Effects

The alternatives that include the addition of boating on the river (alternatives 8, 11, 12, 13 and 14) increase the risk of sedimentation to the river because of a potential increase in disturbance to river banks and riparian areas. 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 segment of the Chattooga WSR watershed.

Alternative 8 manages user-created trails, campsites, large woody debris and parking the same as Alternative 3. Enforcement of forest plan standards would reduce soil erosion and sedimentation from existing levels. Alternative 8 designates campsites and closes unsustainable campsites. Generally kayakers do not carry camping equipment with them since the additional weight affects their ability to maneuver the rapids. People using a four-person raft could carry camping equipment and camp overnight though it is unlikely (Whittaker and Shelby 2007)

3. Reach

a. Chattooga Cliffs

User-created trails would be evaluated for potential designation where appropriate. This reach currently has almost two miles of user-created trail, of which small portions occur within 100 feet of the river. Closing these user-created trails, particularly those trails closest to the river, would improve water quality. Because of the introduction of boaters into the reach, some user-created portage trails would be evaluated for resource damage through monitoring and treated appropriately.

Also, the likelihood of new portage trails forming increases with boating use and is compounded by increases in LWD recruitment into the river. LWD additions to the river system will have a greater impact on this reach because of the river's relatively small size, compared to larger downstream reaches. Thus, more LWD will effectively span the channel, creating a greater need for scouting for portage around LWD barriers. The location of LWD barriers to boating could be a moving target from year to year as woody debris moves downstream in response to high flows. Thus, the proposed monitoring of use and associated impacts would be essential to maintain a dynamic designated trail system that adjusts to use patterns. Although portage trail needs would be assessed annually and designated where appropriate, this reach could still see an

increase in sediment transported to the river from the trail network compared to alternatives 1, 2 and 3.

Although Alternative 8 does not have a campsite density limit (as proposed in Alternative 2), it would result in more campsite closures and more rehabilitation of ground disturbance areas in this reach than Alternative 1.

This alternative stipulates that no LWD would be removed to accommodate recreation within the river or stream banks on the upper segment of the Chattooga WSR. Some amount of wood debris is likely removed from the stream channel currently (Woody Inventory), but it is assumed that the potential for unauthorized LWD removal increases under this alternative in sections of the upper segment of the Chattooga WSR opened to boating. It is assumed that boaters encounter more woody debris along a greater length of the river and their activity is more closely associated with and impacted by the presence of woody debris.

A designated boat put-in trail and spot would be constructed near the confluence of Green Creek. All put-ins and take-outs would be maintained to minimize sediment input to the river.

b. Ellicott Rock

User-created trails would become designated trails if they are located in the right spots and are sustainable, otherwise they would be decommissioned to reduce adverse resource impacts. This reach currently has more than two miles of user-created trail, of which almost half occur within 100 feet of the river. Closing these user-created trails, particularly those trails closest to the river, would improve water quality. Because of the introduction of boaters into the reach, some user-created trails would likely become designated portage trails. Unsustainable user-created trails would be decommissioned. Also, the likelihood of new portage trails forming increases with boating use and is compounded by increases in LWD recruitment into the river. Recruited large wood will have a greater impact on this reach because of the river's relatively small size, compared to larger downstream reaches. Thus, more LWD will effectively span the channel, creating a greater need for scouting for portage around LWD barriers. The location of LWD barriers to boating could be a moving target from year to year as woody debris moves downstream in response to high flows. Thus, the proposed monitoring of use and associated impacts would be essential to maintain a dynamic designated trail system that adjusts to use patterns. Although these user-created trails would be assessed annually and designated where appropriate, this reach could still see an increase in sediment transported to the river from the trail network compared to alternatives 1, 2 and 3.

Although Alternative 8 does not have a campsite density limit (as proposed in Alternative 2), it would result in more campsite closures and more rehabilitation of ground disturbance areas in this reach than Alternative 1.

This alternative stipulates that no LWD would be removed to accommodate recreation within the river or stream banks on the upper segment of the Chattooga WSR. Some amount of wood debris is likely removed from the stream channel currently (Woody Inventory), but it is assumed that the potential for unauthorized LWD removal increases under this alternative in sections of the upper segment of the Chattooga WSR opened to boating. It is assumed that boaters encounter more woody debris along a greater length of the river and their activity is more closely associated with and impacted by the presence of woody debris.

All put-ins and take-outs would be maintained to minimize sediment input to the river.

c. Rock Gorge

User-created trails would become designated trails if they are located in the right spots and are sustainable, otherwise they would be decommissioned to reduce adverse resource impacts. This reach currently has the greatest length of user-created trail, but is second to the Nicholson Fields reach with regard to user-created trail within both 100 and 20 feet of the river. Closing these user-created trails, particularly those trails closest to the river, would improve water quality. Because of the introduction of boaters into the reach, some user-created trails would likely become designated portage trails. Unsustainable user-created trails would be decommissioned. Also, the likelihood of new portage trails forming increases with boating use and is compounded by increases in LWD recruitment into the river. Large woody debris will have a lesser impact on this reach than upstream reaches as the river grows in size. Thus, less LWD will effectively span the channel, creating a lesser need for portage. The location of LWD barriers to boating could be a moving target from year to year as woody debris moves downstream in response to high flows. Thus, the proposed monitoring of use and associated impacts would be essential to maintain a dynamic designated trail system that adjusts to use patterns. Although these user-created trails would be assessed annually and designated where appropriate, this reach could still see an increase in sediment transported to the river from the trail network compared to alternatives 1, 2 and 3.

Although Alternative 8 does not have a campsite density limit (as proposed in Alternative 2), it would result in more campsite closures and more rehabilitation of ground disturbance areas in this reach than Alternative 1.

This alternative stipulates that no LWD would be removed to accommodate recreation within the river or stream banks on the upper segment of the Chattooga WSR. Some amount of wood debris is likely removed from the stream channel currently (Woody Inventory), but it is assumed that the potential for unauthorized LWD removal increases under this alternative in sections of the upper segment of the Chattooga WSR opened to

boating. It is assumed that boaters encounter more woody debris along a greater length of the river and their activity is more closely associated with and impacted by the presence of woody debris.

All put-ins and take-outs would be maintained to minimize sediment input to the river.

d. Nicholson Fields

User-created trails would become designated trails if they are located in the right spots and are sustainable, otherwise they would be decommissioned to reduce adverse resource impacts. This reach currently has the greatest length of user-created trail within both 100 and 20 feet of the river; and therefore, would likely see the greatest positive impact from the proposed action. Closing these user-created trails, particularly those trails closest to the river, would improve water quality. Because of the introduction of boaters into the reach, some user-created trails would likely become designated portage trails. Unsustainable user-created trails would be decommissioned. Also, the likelihood of new portage trails forming increases with boating use and is compounded by increases in LWD recruitment into the river.

Large woody debris will have a lesser impact on this reach than upstream reaches as the river grows in size. Thus, less LWD will effectively span the channel, creating a lesser need for portage in this reach. The location of LWD barriers to boating could be a moving target from year to year as woody debris moves downstream in response to high flows. Thus, the proposed monitoring of use and associated impacts would be essential to maintain a dynamic designated trail system that adjusts to use patterns. Although these user-created trails would be assessed annually and designated where appropriate, this reach could still see an increase in sediment transported to the river from the trail network compared to alternatives 1, 2 and 3.

Although Alternative 8 does not have a campsite density limit (as proposed in Alternative 2), it would result in more campsite closures and more rehabilitation of ground disturbance areas in this reach than Alternative 1.

This alternative stipulates that no LWD would be removed to accommodate recreation within the river or stream banks on the upper segment of the Chattooga WSR. Some amount of wood debris is likely removed from the stream channel currently (Woody Inventory), but it is assumed that the potential for unauthorized LWD removal increases under this alternative in sections of the upper segment of the Chattooga WSR opened to boating. It is assumed that boaters encounter more woody debris along a greater length of the river and their activity is more closely associated with and impacted by the presence of woody debris.

2. Flows

Potential impacts to water and the riparian corridor are not expected to differ notably with changes in river discharge for this alternative.

3. Season

Potential impacts to water and the riparian corridor are not expected to differ notably with changes in season for this alternative.

E. Alternative 11 – Direct and Indirect Effects

Relevant to water quality and riparian protection, Alternative 11 differs from Alternative 8 with flows of 450 cfs and above before boating can occur on the river. At flows of 450 cfs and higher, boaters would be provided opportunities for optimal standard and big water whitewater boating experiences in the Chattooga Cliffs, Ellicott Rock, Rock Gorge and Nicholson Fields reaches on an average of 15 or 35 days per year (mean daily flow or peak daily flow, respectively).

1. Reach

a. Chattooga Cliffs

User-created trails would become designated trails if they are located in the right spots and are sustainable, otherwise they would be decommissioned to reduce adverse resource impacts. This reach currently has almost two miles of user-created trail, of which small portions occur within 100 feet of the river. Because of the introduction of boaters into the reach, some user-created trails would likely become designated portage trails. At the 450 cfs and above river flow, increased use by boaters would have minimal resource impacts. The boating activity would still increase the risk of additional user-created trails forming, especially with the increase in LWD recruitment into the river. Large woody debris will have a greater impact on this reach because of the river's relatively small size, compared to downstream reaches. Thus, more LWD will effectively span the channel, creating a greater need for portage. Although portage trail needs would be assessed annually and designated where appropriate, this reach would still see an increase in sediment transported to the river from these trails compared to alternatives 1, 2 and 3, but a decrease from Alternative 8.

Although Alternative 11 does not have a campsite density limit (as proposed in Alternative 2), it would result in more campsite closures and more rehabilitated ground disturbance in this reach than Alternative 1.

This alternative stipulates that no LWD would be removed to accommodate recreation within the river or stream banks on the upper segment of the Chattooga WSR. However, the potential for unauthorized LWD removal increases in sections of the upper segment of the Chattooga WSR opened to boating.

A designated boat put-in trail and spot would be constructed near the confluence of Green Creek. All put-ins and take-outs would be maintained to minimize sediment input to the river.

b. Ellicott Rock

User-created trails would become designated trails if they are located in the right spots and are sustainable, otherwise they would be decommissioned to reduce adverse resource impacts. This reach currently has more than two miles of user-created trail, of which almost half occur within 100 feet of the river. Because of the introduction of boaters into the reach, some user-created trails would likely become designated portage trails. At the 450 cfs and above river flow, increased use by boaters would have minimal resource impacts. The boating activity would still increase the risk of additional user-created trails forming, especially with the increase in LWD recruitment into the river. Large woody debris will have a greater impact on this reach than downstream reaches because of the river's relatively small size. Thus, more LWD will effectively span the channel, creating a greater need for portage. Although portage trail needs would be assessed annually and designated where appropriate, this reach would still see an increase in sediment transported to the river from these trails compared to alternatives 1, 2 and 3, but a decrease from Alternative 8.

Although Alternative 11 does not have a campsite density limit (as proposed in Alternative 2), it would result in more campsite closures and more rehabilitated ground disturbance in this reach than Alternative 1.

This alternative stipulates that no LWD would be removed to accommodate recreation within the river or stream banks on the upper segment of the Chattooga WSR. However, the potential for unauthorized LWD removal increases in sections of the upper segment of the Chattooga WSR opened to boating.

All put-ins and take-outs would be maintained to minimize sediment input to the river.

c. Rock Gorge

User-created trails would become designated trails if they are located in the right spots and are sustainable, otherwise they would be decommissioned to reduce adverse resource impacts. This reach currently has the greatest length of user-created trail, but is second to the Nicholson Fields reach with regard to user-created trail within both 100 and 20 feet of the river. Because of the introduction of boaters into the reach, some user-created trails would likely become designated portage trails. At the 450 cfs and above river flow, increased use by boaters would have minimal resource impacts. The boating activity would still increase the risk of additional user-created trails forming, especially with the increase in LWD recruitment into the river. Large woody debris will have a lesser impact on this reach than upstream reaches as the river grows in size. Thus, less LWD will effectively span the channel, creating a lesser need for portage. Although portage trail needs would be assessed annually and designated where

appropriate, this reach would still see an increase in sediment transported to the river from these trails compared to alternatives 1, 2 and 3, but a decrease from Alternative 8.

Although Alternative 11 does not have a campsite density limit (as proposed in Alternative 2), it would result in more campsite closures and more rehabilitation of ground disturbance areas in this reach than Alternative 1.

This alternative stipulates that no LWD would be removed to accommodate recreation within the river or stream banks on the upper segment of the Chattooga WSR. However, the potential for unauthorized LWD removal increases in sections of the upper segment of the Chattooga WSR opened to boating.

All put-ins and take-outs would be maintained to minimize sediment input to the river.

d. Nicholson Fields

User-created trails would become designated trails if they are located in the right spots and are sustainable, otherwise they would be decommissioned to reduce adverse resource impacts. This reach currently has the greatest length of user-created trail within both 100 and 20 feet of the river; and therefore, would likely see the greatest positive impact from the proposed action. Because of the introduction of boaters into the reach, some user-created trails would likely become designated portage trails. At the 450 cfs and above river flow, increased use by boaters would have minimal resource impacts. The boating activity would still increase the risk of additional user-created trails forming, especially with the increase in LWD recruitment into the river. Large woody debris will have a lesser impact on this reach than upstream reaches as the river grows in size. Thus, less LWD will effectively span the channel, creating a lesser need for portage. Although portage trail needs would be assessed annually and designated where appropriate, this reach would still see an increase in sediment transported to the river from these trails compared to alternatives 1, 2 and 3, but a decrease from Alternative 8.

Although Alternative 11 does not have a campsite density limit (as proposed in Alternative 2), it would result in more campsite closures and more rehabilitated ground disturbance in this reach than Alternative 1.

This alternative stipulates that no LWD would be removed to accommodate recreation within the river or stream banks on the upper segment of the Chattooga WSR. However, the potential for unauthorized LWD removal increases in sections of the upper segment of the Chattooga WSR opened to boating.

All put-ins and take-outs would be maintained to minimize sediment input to the river.

2. Flows

Potential impacts to water and the riparian corridor are not expected to differ notably with changes in river discharge for this alternative.

3. Season

Potential impacts to water and the riparian corridor are not expected to differ notably with changes in season for this alternative.

F. Alternative 12 – Direct and Indirect Effects

Relative to the protection of water quality and the riparian corridor, Alternative 12 differs from alternatives 8 and 11 with a proposal for boating in the Chattooga Cliffs, Ellicott Rock and Rock Gorge Reaches only. The season for boating on the upper two reaches would be from December 1 to January 15 and on the Rock Gorge Reach from January 16 to March 1 at all flows. Boaters would be provided optimal standard and big water whitewater boating experiences.

1. Reach

a. Chattooga Cliffs

User-created trails would become designated trails if they are located in the right spots and are sustainable, otherwise they would be decommissioned to reduce adverse resource impacts. This reach currently has almost two miles of user-created trail, of which small portions occur within 100 feet of the river. Because of the introduction of boaters into the reach, some user-created trails would likely become designated portage trails. Increased use by boaters would have minimal resource impacts. The boating activity would still increase the risk of additional user-created trails forming, especially with the increase in LWD recruitment into the river. Large woody debris will have a greater impact on this reach because of the river's relatively small size, compared to downstream reaches. Thus, more LWD will effectively span the channel, creating a greater need for portage. Although portage trail needs would be assessed annually and designated where appropriate, this reach would still see an increase in sediment transported to the river from these trails compared to alternatives 1, 2 and 3, but a decrease from Alternative 8 and about the same from Alternative 11.

Although Alternative 12 does not have a campsite density limit (as proposed in Alternative 2), it would result in more campsite closures and more rehabilitated ground disturbance in this reach than Alternative 1.

This alternative stipulates that no LWD would be removed to accommodate recreation within the river or stream banks on the upper segment of the Chattooga WSR.

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

A designated boat put-in trail and spot would be constructed near the confluence of Green Creek. All put-ins and take-outs would be maintained to minimize sediment input to the river.

b. Ellicott Rock

User-created trails would become designated trails if they are located in the right spots and are sustainable, otherwise they would be decommissioned to reduce adverse resource impacts. This reach currently has more than two miles of user-created trail, of which almost half occur within 100 feet of the river. Because of the introduction of boaters into the reach, some user-created trails would likely become designated portage trails. Increased use by boaters would have minimal resource impacts. The boating activity would still increase the risk of additional user-created trails forming, especially with the increase in LWD recruitment into the river. Large woody debris will have a greater impact on this reach than downstream reaches because of the river's relatively small size. Thus, more LWD will effectively span the channel, creating a greater need for portage. Although portage trail needs would be assessed annually and designated where appropriate, this reach would still see an increase in sediment transported to the river from these trails compared to alternatives 1, 2 and 3, but a decrease from Alternative 8 and about the same from Alternative 11.

Although Alternative 12 does not have a campsite density limit (as proposed in Alternative 2), it would result in more campsite closures and more rehabilitated ground disturbance in this reach than Alternative 1.

This alternative stipulates that no LWD would be removed to accommodate recreation within the river or stream banks on the upper segment of the Chattooga WSR. However, the potential for unauthorized LWD removal increases in sections of the upper segment of the Chattooga WSR opened to boating.

All put-ins and take-outs would be maintained to minimize sediment input to the river.

c. Rock Gorge

User-created trails would become designated trails if they are located in the right spots and are sustainable, otherwise they would be decommissioned to reduce adverse resource impacts. This reach currently has the greatest length of user-created trail, but is second to the Nicholson Fields reach with regard to user-created trail within both 100 and 20 feet of the river. Closing these user-created trails, particularly those trails closest to the river, would improve water quality. Because of the introduction of boaters into the reach, some user-created trails would likely become designated portage trails. Unsustainable user-created trails would be decommissioned. Also, the likelihood of

new portage trails forming increases with boating use and is compounded by increases in LWD recruitment into the river. Large woody debris will have a lesser impact on this reach than upstream reaches as the river grows in size. Thus, less LWD will effectively span the channel, creating a lesser need for portage. The location of LWD barriers to boating could be a moving target from year to year as woody debris moves downstream in response to high flows. Thus, the proposed monitoring of use and associated impacts would be essential to maintain a dynamic designated trail system that adjusts to use patterns. Although these user-created trails would be assessed annually and designated where appropriate, this reach could still see an increase in sediment transported to the river from the trail network compared to alternatives 1, 2 and 3.

Although Alternative 11 does not have a campsite density limit (as proposed in Alternative 2), it would result in more campsite closures and more rehabilitation of ground disturbance areas in this reach than Alternative 1.

This alternative stipulates that no LWD would be removed to accommodate recreation within the river or stream banks on the upper segment of the Chattooga WSR. Some amount of wood debris is likely removed from the stream channel currently (Woody Inventory), but it is assumed that the potential for unauthorized LWD removal increases under this alternative in sections of the upper segment of the Chattooga WSR opened to boating. It is assumed that boaters encounter more woody debris along a greater length of the river and their activity is more closely associated with and impacted by the presence of woody debris.

All put-ins and take-outs would be maintained to minimize sediment input to the river.

d. Nicholson Fields

This alternative would reduce the potential for sedimentation in this reach. User-created trails would become designated trails if they are located in the right spots and are sustainable, otherwise they would be decommissioned to reduce adverse resource impacts. This reach currently has the greatest length of user-created trail within both 100 and 20 feet of the river; and therefore, would likely see the greatest positive impact from the proposed action. Trail rerouting would occur where necessary to correct existing problems on designated trails. New campsite restrictions would alleviate some erosion and sedimentation as user-created campsites, bare ground and cleared area are rehabilitated. Although Alternative 12 does not have a campsite density limit (as proposed in Alternative 2), it would result in more campsite closures and more rehabilitated ground disturbance in this reach than Alternative 1, but fewer than Alternative 2 and the same as Alternative 3, 8 and 11. 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.

2. Flows

Potential impacts to water and the riparian corridor are not expected to differ notably with changes in river discharge for this alternative.

3. Season

Potential impacts to water and the riparian corridor are not expected to differ notably with changes in season for this alternative.

G. Alternative 13 – Direct and Indirect Effects

Relative to the protection of water quality and riparian corridor, this alternative differs from Alternatives 8, 11 and 12 with a proposal for boating in the three reaches of Chattooga Cliffs, Ellicott Rock and Rock Gorge only, during flows at and above 350 cfs from December 1 to March 1. At flows of 350 cfs and higher, boaters would be provided optimal standard and big water whitewater boating opportunities in the Chattooga Cliffs, Ellicott Rock and the Rock Gorge reaches on an average of 11 or 21 days per year (mean daily flow or peak daily flow, respectively).

1. Reach

a. Chattooga Cliffs

User-created trails would become designated trails if they are located in the right spots and are sustainable, otherwise they would be decommissioned to reduce adverse resource impacts. This reach currently has almost two miles of user-created trail, of which small portions occur within 100 feet of the river. Because of the introduction of boaters into the reach, some user-created trails would likely become designated portage trails. Increased use by boaters would have minimal resource impacts. The boating activity would still increase the risk of additional user-created trails forming, especially with the increase in LWD recruitment into the river. Large woody debris will have a greater impact on this reach because of the river's relatively small size, compared to downstream reaches. Thus, more LWD will effectively span the channel, creating a greater need for portage. Although portage trail needs would be assessed annually and designated where appropriate, this reach would still see an increase in sediment transported to the river from these trails compared to alternatives 1, 2 and 3, but a decrease from Alternative 8 and about the same from 11 and 12.

Although Alternative 13 does not have a campsite density limit (as proposed in Alternative 2), it would result in more campsite closures and more rehabilitated ground disturbance in this reach than Alternative 1, but fewer than Alternative 2 and the same as Alternative 3, 8, 11 and 12.

This alternative stipulates that no LWD would be removed to accommodate recreation within the river or stream banks on the upper segment of the Chattooga WSR. However, the potential for unauthorized LWD removal increases in sections of the upper segment of the Chattooga WSR opened to boating.

A designated boat put-in trail and spot would be constructed near the confluence of Green Creek. All put-ins and take-outs would be maintained to minimize sediment input to the river.

b. Ellicott Rock

User-created trails would become designated trails if they are located in the right spots and are sustainable, otherwise they would be decommissioned to reduce adverse resource impacts. This reach currently has more than two miles of user-created trail, of which almost half occur within 100 feet of the river (tables 3.1-3 and 3.1-4). Because of the introduction of boaters into the reach, some user-created trails would likely become designated portage trails. Increased use by boaters would have minimal resource impacts. The boating activity would still increase the risk of additional user-created trails forming, especially with the increase in LWD recruitment into the river. Large woody debris will have a greater impact on this reach than downstream reaches because of the river's relatively small size. Thus, more LWD will effectively span the channel, creating a greater need for portage. Although portage trail needs would be assessed annually and designated where appropriate, this reach would still see an increase in sediment transported to the river from these trails compared to alternatives 1, 2 and 3, but a decrease from Alternative 8 and about the same from 11 and 12.

Although Alternative 13 does not have a campsite density limit (as proposed in Alternative 2), it would result in more campsite closures and more rehabilitated ground disturbance in this reach than Alternative 1, but fewer than Alternative 2 and the same as Alternative 3, 8, 11 and 12.

This alternative stipulates that no LWD would be removed to accommodate recreation within the river or stream banks on the upper segment of the Chattooga WSR. However, the potential for unauthorized LWD removal increases in sections of the upper segment of the Chattooga WSR opened to boating.

All put-ins and take-outs would be maintained to minimize sediment input to the river.

c. Rock Gorge

User-created trails would become designated trails if they are located in the right spots and are sustainable, otherwise they would be decommissioned to reduce adverse resource impacts. This reach currently has the greatest length of user-created trail, but is second to the Nicholson Fields reach with regard to user-created trail within both 100 and 25 feet of the. Because of the introduction of boaters into the reach, some user-

created trails would likely become designated portage trails. At the 350 cfs and above river flows, increased use by boaters would have minimal resource impacts. The boating activity would still increase the risk of additional user-created trails forming, especially with the increase in LWD recruitment into the river. Large woody debris will have a lesser impact on this reach than upstream reaches as the river grows in size. Thus, less LWD will effectively span the channel, creating a lesser need for portage. Although portage trail needs would be assessed annually and designated where appropriate, this reach would still see an increase in sediment transported to the river from these trails compared to alternatives 1, 2 and 3, but a decrease from Alternative 8 and about the same from 11 and 12.

Although Alternative 13 does not have a campsite density limit (as proposed in Alternative 2), it would result in more campsite closures and more rehabilitated ground disturbance in this reach than Alternative 1, but fewer than Alternative 2 and the same as Alternative 3, 8, 11 and 12. This alternative stipulates that no LWD would be removed to accommodate recreation within the river or stream banks on the upper segment of the Chattooga WSR. However, the potential for unauthorized LWD removal increases in sections of the upper segment of the Chattooga WSR opened to boating.

All put-ins and take-outs would be maintained to minimize sediment input to the river.

d. Nicholson Fields

This alternative would result in reducing the potential for sedimentation in this reach. User-created trails would become designated trails if they are located in the right spots and are sustainable, otherwise they would be decommissioned to reduce adverse resource impacts. This reach currently has the greatest length of user-created trail within both 100 and 20 feet of the river; and therefore, would likely see the greatest positive impact from the proposed action (tables 3.1-3 and 3.1-4). Trail rerouting would occur where necessary to correct existing problems on designated trails. New campsite restrictions would alleviate some erosion and sedimentation as user-created campsites, bare ground and cleared area are rehabilitated. Although Alternative 13 does not have a campsite density limit (as proposed in Alternative 2), it would result in more campsite closures and more rehabilitated ground disturbance in this reach than Alternative 1, but fewer than Alternative 2 and the same as Alternative 3, 8, 11 and 12. 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.

2. Flows

Potential impacts to water and the riparian corridor are not expected to differ notably with changes in river discharge for this alternative.

3. Season

Potential impacts to water and the riparian corridor are not expected to differ notably with changes in season for this alternative.

H. Alternative 14 – Direct and Indirect Effects

Relative to the protection of water quality and riparian corridor, Alternative 14 differs from Alternatives 8, 11, 12 and 13 with a proposal for boating in all four reaches, during flows at and above 350 cfs, year round. At flows of 350 cfs and higher, boaters would be provided optimal standard and big water whitewater boating opportunities in the Chattooga Cliffs, Ellicott Rock, Rock Gorge and Nicholson Fields reaches on an average of 32 or 66 days per year (mean daily flow to peak daily flow, respectively).

1. Reach

a. Chattooga Cliffs

User-created trails would become designated trails if they are located in the right spots and are sustainable, otherwise they would be decommissioned to reduce adverse resource impacts. This reach currently has almost two miles of user-created trail, of which small portions occur within 100 feet of the river. Because of the introduction of boaters into the reach, some user-created trails would likely become designated portage trails. The boating activity would still increase the risk of additional user-created trails forming, especially with the increase in LWD recruitment into the river. Large woody debris will have a greater impact on this reach because of the river's relatively small size, compared to downstream reaches. Thus, more LWD will effectively span the channel, creating a greater need for portage. Although portage trail needs would be assessed annually and designated where appropriate, this reach could still see an increase in sediment transported to the river from these trails compared to alternatives 1, 2, 3, 11, 12 and 13, but a decrease from Alternative 8

Although Alternative 14 does not have a campsite density limit (as proposed in Alternative 2), it would result in more campsite closures and more rehabilitated ground disturbance in this reach than Alternative 1, but fewer than Alternative 2 and the same as alternative 3, 8, 11, 12 and 13.

This alternative stipulates that no LWD would be removed to accommodate recreation within the river or stream banks on the upper segment of the Chattooga WSR.

However, the potential for unauthorized LWD removal increases in sections of the upper segment of the Chattooga WSR opened to boating. LWD is more likely to be removed under this alternative compared to alternatives 11 - 13.

A designated boat put-in trail and spot would be constructed near the confluence of Green Creek. All put-ins and take-outs would be maintained to minimize sediment input to the river.

b. Ellicott Rock

User-created trails would become designated trails if they are located in the right spots and are sustainable, otherwise they would be decommissioned to reduce adverse resource impacts. This reach currently has more than two miles of user-created trail, of which almost half occur within 100 feet of the river. Because of the introduction of boaters into the reach, some user-created trails would likely become designated portage trails. The boating activity would still increase the risk of additional user-created trails forming, especially with the increase in LWD recruitment into the river. Large woody debris will have a greater impact on this reach than downstream reaches because of the river's relatively small size. Thus, more LWD will effectively span the channel, creating a greater need for portage. Although portage trail needs would be assessed annually and designated where appropriate, this reach could still see an increase in sediment transported to the river from these trails compared to Alternatives 1, 2, 3, 11, 12 and 13, but a decrease from Alternative 8.

Although Alternative 14 does not have a campsite density limit (as proposed in Alternative 2), it would result in more campsite closures and more rehabilitated ground disturbance in this reach than Alternative 1, but fewer than Alternative 2 and the same as Alternative 3, 8, 11, 12 and 13.
This alternative stipulates that no LWD would be removed to accommodate recreation within the river or stream banks on the upper segment of the Chattooga WSR. However, the potential for unauthorized LWD removal increases in sections of the upper segment of the Chattooga WSR opened to boating. LWD is more likely to be removed under this alternative compared to alternatives 11-13.

All put-ins and take-outs would be maintained to minimize sediment input to the river.

c. Rock Gorge

User-created trails would become designated trails if they are located in the right spots and are sustainable, otherwise they would be decommissioned to reduce adverse resource impacts. This reach currently has the greatest length of user-created trail, but is second to the Nicholson Fields reach with regard to user-created trail within both 100 and 20 feet of the river. Because of the introduction of boaters into the reach, some user-created trails would likely become designated portage trails. The boating activity would still increase the risk of additional user-created trails forming, especially with the increase in LWD recruitment into the river. Large woody debris will have a lesser impact on this reach than upstream reaches as the river grows in size. Thus, less LWD will effectively span the channel, creating a lesser need for portage. Although portage trail needs would be assessed annually and designated where appropriate, this reach could still see an increase in sediment transported to the river from these trails compared to alternatives 1, 2, 3, 11, 12 and 13, but a decrease from Alternative 8.

Although Alternative 14 does not have a campsite density limit (as proposed in Alternative 2), it would result in more campsite closures and more rehabilitated ground disturbance in this reach than Alternative 1, but fewer than Alternative 2 and the same as Alternative 3, 8, 11, 12 and 13.

This alternative stipulates that no LWD would be removed to accommodate recreation within the river or stream banks on the upper segment of the Chattooga WSR. However, the potential for unauthorized LWD removal increases in sections of the upper segment of the Chattooga WSR opened to boating. LWD is more likely to be removed under this alternative compared to alternatives 11-13.

All put-ins and take-outs would be maintained to minimize sediment input to the river.

d. Nicholson Fields

The mitigation measures in Alternative 14 would reduce soil erosion and sedimentation. User-created trails would become designated trails if they are located in the right spots and are sustainable, otherwise they would be decommissioned to reduce adverse resource impacts. This reach currently has the greatest length of user-created trail within both 100 and 20 feet of the river; and therefore, would likely see the greatest positive impact from the proposed changes. Trail rerouting would occur where necessary to correct existing problems on designated trails. New campsite restrictions would alleviate some erosion and sedimentation as user-created campsites, bare ground and cleared area are rehabilitated.

The boating activity would still increase the risk of additional user-created trails forming, especially with the increase in LWD recruitment into the river. Large woody debris will have a lesser impact on this reach than upstream reaches since the river is

the widest through this lower reach. Thus, less LWD will effectively span the channel, creating a lesser need for portage. Although portage trail needs would be assessed annually and designated where appropriate, this reach could still see an increase in sediment transported to the river from these trails compared to Alternatives 1, 2, 3, 11, 12 and 13, but a decrease from Alternative 8.

Although Alternative 14 does not have a campsite density limit (as proposed in Alternative 2), it would result in more campsite closures and more rehabilitated ground disturbance in this reach than Alternative 1, but fewer than Alternative 2 and the same as Alternative 3, 8, 11, 12 and 13.

This alternative stipulates that no LWD would be removed to accommodate recreation within the river or stream banks on the upper segment of the Chattooga WSR. However, the potential for unauthorized LWD removal increases in sections of the upper segment of the Chattooga WSR opened to boating. LWD is more likely to be removed under this alternative compared to Alternatives 11 through 13.

All put-ins and take-outs would be maintained to minimize sediment input to the river

2. Flows

Potential impacts to water and the riparian corridor are not expected to differ notably with changes in river discharge for this alternative.

3. Season

Potential impacts to water and the riparian corridor are not expected to differ notably with changes in season for this alternative.

I. Alternatives 2, 3, 8, 11, 12, 13 and 14 – 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).

The current land use/cover for the entire watershed is mostly forested. In 2001, the upper segment of the Chattooga WSR watershed (located above the bridge crossing Highway 28) was approximately 94% forested while the entire Chattooga watershed was approximately 90% forested (Table 3.1-19). In 1992, the percentage of forested land cover was higher for both these areas. Table 3.1-13 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 3.1-7 displays past, present and reasonably foreseeable future actions within the Chattooga River watershed. In the past five years, prescribed burning has occurred on the three national forests. The primary ground disturbing activity associated with burning includes the construction of firelines. Firelines for burns often use 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).

Timber sale/vegetation management on the national forest in the watershed has occurred on all three national forests and projects are planned in the future as well. Primary ground disturbing activities that have the potential to cause soil erosion and sedimentation associated with timber harvests include Forest Service system road maintenance (as needed for logging access), temporary roads, skid trails and log landings. When possible, to reduce disturbance levels from these activities, decommissioned roads and skid trails are reused for access, unless the impacts would be greater than using a different route. These activities are typically short in duration with an estimated disturbance recovery period of three years (Dissmeyer and Stump 1978). The recovery period is short due to rapid growth of vegetation which protects the soil and reduces erosion. In addition, bare soils and concentrated water flows 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.

Road reconstruction has also taken place. 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 would 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 would be implemented to reduce sediment input to streams.

Table 3.4.2-8 indicates the total miles and road density for both the entire Chattooga watershed and the upper segment of the Chattooga WSR 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. Road maintenance activities help to reduce erosion and sedimentation by directing water onto vegetated areas to reduce erosion and sedimentation before it reaches streams. Normal maintenance activities include keeping ditches and culverts cleared of dirt and debris so that they function properly. This reduces the chances for erosion and sediment transport to streams.

Table 3.4.2-8 Road Density and Road Miles for the entire Chattooga Watershed and Upper segment of the Chattooga WSR Watershed

Watershed	Chattooga River Watershed	Upper segment of the Chattooga WSR 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 would 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 segment of the Chattooga WSR watershed is in overall good condition as a result of the high percentage of forested land cover and Forest Service and County efforts to mitigate sediment delivered from the road and trail networks. In addition, the upper segment of the Chattooga WSR 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 US 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 3.1-9 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 3.1-9 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

3.4.3 CLIMATE CHANGE

I. SUMMARY OF FINDINGS

Predicted climate changes impacts would occur regardless of the mix of recreation uses allowed on the Chattooga River. In the long-term these climate change predictions could affect the waterflow and hydrologic function of the Chattooga River watershed, which in turn would affect how the public uses the entire Chattooga Wild and Scenic River (Chattooga WSR). Some of the potential changes in recreation use patterns include the public using the Chattooga River more during the cooler seasons as air temperatures rise, going elsewhere to trout fish as water temperatures rise and going elsewhere for whitewater boating opportunities due to lower waterflows. The proposed changes in the administration of the Chattooga River Corridor would have extremely limited potential to release stored carbon, to affect carbon storage ability or to change greenhouse gas emissions. Adaptive management measures built into alternatives 2 - 14 give the three national forests flexibility to respond to changes in recreation use patterns within the upper segment of the Chattooga WSR Corridor.

II. AFFECTED ENVIRONMENT

On January 16, 2009 the Chief of the US Forest Service directed the national forests to consider climate change during project planning. National forests were directed to consider two types of climate change effects: The effect of climate change on a proposed project; and the effect of a proposed project on climate change.

The affected environment for climate change is twofold. First, climate change may affect the natural resources on the Chattooga WSR Corridor. In this case the affected environment of climate change is limited to the resources within the Chattooga WSR Corridor. Second, the proposed changes in the administration of the Chattooga River Corridor would have extremely limited potential to release stored carbon and to affect carbon storage ability. In this case the affected environment is global.

III. EXISTING IMPACTS TO THE ENVIRONMENT

A. Effects of Climate Change on the Chattooga WSR

The U.S. Global Changes Research Program published a 2009 report (USGCRP 2009) on climate changes on different regions in the U.S. Predictions for the Southeast incude: air temperature increases; sea level rise; changes in the timing, location and quantity of precipitation; and increased frequency of extreme weather events such as hurricanes, heat waves, droughts and floods. These predicted changes would affect renewable resources, aquatic and terrestrial ecosystems and agriculture, with implications for human health.

The Template for Assessing Climate Change Impacts and Management Options (TACCIMO) was used to assess differences among three general circulation models at three different emission scenarios for Jackson and Macon counites (NC); Rabun County

(GA); and Oconee County (SC). TACCIMO (USFS 2011) was used to create a report that summarizes the resulting climate change impacts. Climate change, especially climate change variability (droughts and floods), may alter hydrologic characteristics of watersheds with implications for wildlife, forest productivity and human use. This climate change variability may manifest in long-term and seasonal patterns in temperature that influence ecoystem health and function. These impacts result from both long-term warming and from shorter term fluctuations in seasonal temperature that may interrupt or alter temperature dependent ecosystem processes.

B. Effects of Recreation Management on Climate Change

Man-powered, outdoor recreation activities, such as kayaking, fishing, swimming, hiking and camping have limited potential to release stored carbon and to affect the carbon storage ability within the Chattooga WSR Corridor. The impacts to climate change from the changes in the administration of the Chattooga WSR are limited. Human greenhouse gas (GHG) emissions, primarily carbon dioxide emissions (CO_2), are the main source of accelerated climate change. In general terms, the proposed changes in recreation management would result in no change to the current trend for carbon storage or release.

IV. Environmental Consequences

Recreational opportunities are frequently climate and season dependent. Winter outdoor recreation and cold water fishing may be reduced while opportunities for warm weather activities may increase result from climate change. The historic quality and types of recreation unique to a particular location may also change (USFS 2011).

A. Effects of Climate Change on the Chattooga WSR

1. All Alternatives – Direct and Indirect Effects

Predicted climate changes would affect the waterflow and affect hydrologic function within the Chattooga WSR and its tributaries. Predicated variablity in rainfall patterns and increasing temperatures would affect not only outdoor recreation, but also natural resources. Morris and Walls (2009) predict the following impacts to outdoor recreation from climate change:

- Predicted changes in rainfall and snowfall would affect the quality and availability of recreational boating. Climate change predictions for the Southeastern United States include decreased water availability due to increased temperature and longer periods of time between rainfall events (USGCRP 2009). These changes would affect waterflows within the Chattooga River. The increased intensity of hurricanes would create extremes in waterflows. Conversely longer periods of time between rainfalls would lead to fewer days suitable for whitewater boating.

- Predicted warmer stream temperatures would reduce the current habitat of rainbow trout and other coldwater fisheries that are valued by anglers. Conversely, rising water temperatures could make North Carolina streams more hospitable for other trout species, like brook trout leading to population increases and potential benefits of up to $20 million per year. Meanwhile other studies show that brook trout have variable reactions to rising stream temperature and a 3.8 degree centigrade increase could result in an 82 percent loss of brook trout in North Carolina. Other models predict a maximum loss of 30%.

Morris and Walls (2009) report that climate change impacts could exacerbate current disturbances including drought, wildfire, insect infestations and extreme weather. Warmer summers predicted for the East will affect available soil moisture and affect net productivity. Insect populations are controlled by cold winter temperatures; warmer winters could lead to more insect outbreaks. Changes in rainfall patterns could affect hemlocks already weakened by adelgids. This increased tree mortality could affect the safety of recreationists and increase the amount of downed woody debris in the Chattooga River corridor. Increased tree mortality sets the stage for increased wildfires, which also affects outdoor recreation.

Potter, Hargrove and Koch (2009) note similar climate change impacts on Southern Appalachian forests. The authors report that climate change probably will threaten the viability of certain forest trees, which will be forced to adapt to new conditions or move to more favorable environments. Several tree species of Central and Southern Appalachian forests are at risk since they occur in limited high elevation ranges and/or are threatened by nonnative insects and diseases. The Carolina hemlock is one of these at-risk tree species that may not adapt to new climate conditions, which would ultimately result in population extirpation of the Carolina hemlock. Table Mountain pine and striped maple are less likely to experience range-wide extinction, but could experience elimination of the Central and Southern and Appalachian populations. These changes could result in more downed woody debris that would affect outdoor recreation by increasing fuel loads and log jams. These tree species would eventually be replaced by other species, which would adjust to the new conditions.

In the long-term these climate change predictions could affect how the public uses the upper segment of the Chattooga WSR Corridor. Adaptive management measures built into Alternatives 2 to 14 give the three national forests flexibility so they can respond to changes in recreation use patterns within the upper segment of the Chattooga WSR Corridor.

a. Reach

Current modeling is not sophiscated enough to make predictions of climate changes by reach other than what has already been described.

b. Flows

Predicted variation in waterflows and temperatures would affect not only the opportunities for trout fishing, but also the ability to float and swim. The predicted increase in stream temperatures would increase fishing opportunities for warm-water fisheries, such as bass or sunfish. More extreme intense storm events would result in dangerous flows for water-related recreation. Predicted droughts would lead to lower flows for longer periods of time and warmer stream temperatures.

c. Season

Predictions of warmer temperatures suggest outdoor recreation would increase during the cooler times of the year. However, outdoor recreation also would decrease in the summer months.

2. All Alternatives – Cumulative Effects

With the exception of prescribed burning, past, present and reasonably future projects are not sensitive to climate change impacts because of their limited timeframe. Climate change impacts would occur over a much longer period. Prescribed burn activities may occur earlier in the burn season and be of shorter duration due to warmer and drier conditions. Coordination among county, state and federal agencies could address the increasing stresses of drought, wildfire and flooding that would occur not only within the Chattooga WSR Corridor, but also in the surrounding counties of Jackson, Macon, Rabun and Oconee.

B. Effects of Recreation on Climate Change

1. All Alternatives – Direct and Indirect Effects

Predicted climate changes impacts would occur regardless of the mix of recreation uses under the different alternatives.

2. All Alternatives - Cumulative Effects

The proposed mix of recreation uses when viewed with other management activities within the Chattooga WSR would have limited potential to change carbon storage or increase greenhouse gas emissions. Management activities such as prescribed burning and thinning could offset some predicted climate change effects. Management activites could minimize drought effects by reducing stand densities, avoiding or reducing the

effects of wildfire events where they are not typical, managing the predicted increase for insect and disease outbreaks and accelerating natural succession by planting suitable tree species (USFS 2011).

3.5 VEGETATION

I. SUMMARY OF FINDINGS

The vegetation assessment analyzes impacts to the following plant groupings: 1) ecological communities; 2) Management Indicator Species (MIS); and 3) the proposed, endangered, threatened, sensitive (PETS) and locally rare plant species in the Chattooga River Corridor. Potential effects on vegetation from the proposed alternatives are due to primarily trampling of plants by recreation users and secondarily introducing 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 alternative. Recent studies have shown that existing users are already affecting vegetation along the corridor because of trampling and clearing vegetation around campsites; erosion and plants loss along user-created trails; damaged trees; and denuded banks at stream crossings. These same users also have the potential to damage rare species in sensitive settings along rock cliffs and gorges. Additional effects from boating, depending on use levels, could increase impacts such as trampling of streamside plants due to increased access and portage trails and scraping of vegetation on rocks at low flows.

The degree of direct and indirect effects on vegetation would 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. In the boating alternatives, increased visitation in remote areas in the two uppermost reaches could result in viability concerns for five sensitive and four locally rare plant species that have limited populations across the forest and small population sizes. However, with the required monitoring described in each alternative, potential impacts to vegetation would be reduced. While direct and indirect effects from the alternatives 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.

II. AFFECTED ENVIRONMENT

A. Ecological Communities

Table 3.5-1 lists the acreage managed by the three national forest units for the different ecological types present within the Chattooga watershed and the upper and lower wild and scenic corridor. This database shows that about 46 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 3.5-1 Comparison of Ecological Types on National Forest System Lands within the Chattooga River Watershed and the Upper and Lower Segment of the Chattooga WSR Corridor

Ecological Types	USFS Acres	Percent USFS	Upper Corridor (USFS Acres)	Percent Upper Corridor	Lower Corridor (USFS Ac)	Percent Lower Corridor
High Elevation Red Oak Forest	1,183	1%	23	0.4%	0	0%
Montane Oak-Hickory Forest	7,156	6%	155	2%	0	0%
Montane White Oak Forest	828	1%	13	0.2%	0	0%
White Pine/Heath Forest	14,127	11%	1,248	19%	361	4%
Mesic Oak-Hickory Forest	20,554	16%	636	10%	1,671	18%
table Mountain Pine-Oak/Heath Forest	168	0.1%	0	0%	0	0%
Pitch Pin-Oak/Heath Forest	13,561	11%	921	14%	710	8%
Acidic Cove Forest	4,951	4%	423	6%	1,735	18%
Eastern Hemlock/Rhododendron maximum Forest	14,005	11%	679	10%	24	0.3%
Alluvial Forest/Island/River Bar	1,217	0.2%	156	2.4%	573	6%
Chestnut Oak/Northern Red Oak/ Rhododendron	4,548	4%	486	7%	275	3%
Chestnut Oak/Scarlet Oak/Heath Forest	8,275	7%	490	7%	157	2%
Dry Oak-Hickory Forest	14,862	12%	1,032	16%	498	5%
Shortleaf Pine-Southern Red Oak-Blackjack Oak Forest	6,316	6%	9	0.1%	401	4%
Shortleaf Pine-Southern Red Oak Forest	13,531	11%	141	2%	2,773	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	126,291		6,531		9,444	

Acres are approximate

B. Management Indicator Species (MIS)

MIS serve as the system to monitor forest plan implementation and effects on diversity and population viability of all native and desirable non-native plants and animals. At the project scale, MIS are used to focus the effects of proposed activities on habitat types. When these effects are evaluated within a forest-wide context, it is determined whether or not any trends for MIS would change. An assessment of habitat changes linked to MIS is documented in this section. The Nantahala is the only forest in the Chattooga watershed to have MIS plants. Table 3.5-2 identifies the four plant MIS and the biological communities they represent.

Table 3.5-2 Biological Communities and Associated MIS for the Nantahala National Forest

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	Y - 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 (Chattooga Trail off Whiteside Cove Road); 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 Nantahala National Forest (NNF) MIS report**,** *"Management Indicator Species Habitat and Population Trends."* 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. The preferred habitat for American ginseng 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 2006). Populations are small because of annual harvest pressure and less suitable habitat with higher base content. Within the Chattooga River corridor, habitat is very limited since most sites have acidic soils with limited nutrients and are marginal for *Panax quinquefolius*.

C. 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, Chattahoochee-Oconee National Forest (CONF) or Sumter National Forest (SNF) were initially considered in this botanical analysis. Appendix E includes a listing of endangered, threatened, sensitive and locally rare species on the three national forests. Both the NNF and CONF 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.

There are 11 federally-listed (five threatened and six endangered), 138 sensitive and 242 locally rare plant species that occur or could occur on the three forests. Of these 391 plants, 112 (one endangered species, two threatened species, 50 sensitive species and 59 locally rare species) are known to occur on one of the three national forests where they are tracked as rare within the Chattooga River watershed (highlighted in bold in Appendix E). The three national forests, as well as the geopolitical boundaries, complicate the analysis for locally rare plants. There are 176 locally rare plant species with suitable habitat or occurrences on the NNF. Eighty-six are possible on the CONF. The SNF does not track any locally rare species. Only 19 of the 242 total locally rare species are tracked both within the NNF and the CONF. Fifty-one of the species listed by the CONF are known to occur in western North Carolina on the NNF but are not considered rare enough to formally track. These 51 species are generally at the southern edge of their range. Sixteen of these 48 species are also tracked as rare by the South Carolina Department of Natural Resources but not tracked as locally rare by the SNF. Four of these plants, *Carex manhartii, Carex scabrata Juncus gymnocarpus, Lygodium palmatum* and *Stewartia ovata*, are known to occur near the Chattooga River in the SNF. There is a single site for *Carex scabrata* located within the river corridor but not near the river. The species is located in shaded seeps in areas not heavily impacted by recreational users and would not be impacted by any of the alternatives. Other South Carolina rare plant species (*Boykinia aconitifolia, Krigia montana, Circaea lutetiana ssp. canadensis, Aristolochia macrophylla* and *Stachys tenuifolia var. latidens)* have either been documented on boulders in the Chattooga River or the adjacent floodplain in the SNF. The former two species appear to be locally common within the upper wild and scenic corridor and were observed frequently during the 2007 field survey. None of these five species will be analyzed further since they are not formally tracked by the SNF or the CONF.

North Carolina Natural Heritage Program Element Occurrence (EO) records, Georgia Nonngame 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 previously documented survey information. The plant survey was completed by a team of USFS botanists/ecologists (Robin Mackie from the SNF, David Danley from the Pisgah NF, Dr.Wilson Rankin from the NNF and Gary Kauffman from the National Forests in NC) and a botanical consultant, Dr. L. L. Gaddy, from mid-August to early October 2007. Much of the botanical field work concentrated on bryophytes in the river channel or the stream banks. The majority of the bryophyte specimens were sent to a liverwort specalist, Dr. Paul Davison at the University of North Alabama, or a moss expert, Dr. Allen Risk at Moorehead State University.

A geographic information system (GIS) 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 species within the proposed project area.

Based on these information sources, the potential affected rare species list for the upper segment of the Chattooga WSR project was filtered to derive those species with the greatest likelihood of occurrence. Species such as granitic dome goldenrod or Georgia aster were eliminated based on range information such as only occurring at higher elevations in the NC or GA mountains, or in the foothills or Piedmont at lower elevations in SC or GA (Appendix E). In addition, some species were eliminated if the project area is outside their current known range and searches in the project area did not locate any populations in potential habitat. For example lobed-barren strawberry is known from the lower portions of the Chattooga River up to approximately 1,400 feet elevation. The lowest elevation in the project area is 1,600 feet by the Highway 28 bridge. *Waldsteinia lobata* was excluded from further consideration given the slightly higher elevations, a separation of eight or more aerial miles from the nearest populations, and negative searches within portions of what appear to be suitable habitat.

Other species were excluded from further analysis because proper habitat did not occur within the proposed activity area. These habitats included Southern Appalachian Bogs, Swamp Forest Bogs, Rich Cove Forest, Pine-Oak/Heath Forest and various Oak-Hickory Forests. *Helonias bullata* was excluded for this reason since its preferred habitats, Southern Appalachian Bogs or wet pastures such as sites with mucky high organic content soils, did not occur within or near the proposed activity areas. The 2007 field survey confirmed these habitat observations.

Some 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. For instance *Schlotheimia lancifolia, 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 bryophytes typically occur on the bark of older deciduous trees and are unlikely to be impacted by any of the boating alternatives nor by any proposed trail reroutes since larger trees would probably not be cut for a new trail. Species such as *Hymeophyllum tayloriae*, *Pellia appalachiana*, *Platyhypnidium pringlei* and *Aneura maxima* are only known to occur in grottoes or near spray cliffs (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. Other rare plant species such as divided-leaf ragwort and Biltmore sedge 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.

A few of the more readily discernible species were eliminated since they were not located during the 2007 review. For instance *Riccardia jugata*, a thalloid liverwort, has not been located within any of the southern escarpment gorges since 1961 despite this and other surveys. There is a 20–year-old record of Fox Mountain sedge adjacent to the Chattooga River near the intersection of Chattooga trail and East Fork Trail. The sedge was not relocated during the 2007 field survey and the surrounding habitat, Acidic Cove Forest, did

not seem suitable. Dr. L.L. Gaddy, who previously documented the sedge, indicates the location is inaccurately mapped. He indicates it occurs within a Rich Cove Forest 0.5 miles east of the Chattooga River.

Some forest herbaceous species, such as *Monotropsis odorata*, *Carex woodii* and *Carex communis var. amplisquama* and *Isotria medeloides* proved more difficult to eliminate from potential effects from the alternatives. These species do not occur under dense *Rhododendron maximum* thickets which are present across the vast majority of the proposed activity area. However open understory portions of the analysis areas could not be completely excluded.
In particular suitable habitat for *Isotria medeloides* is incompletely known and problematic to eliminate from project review. *Isotria medeloides* also tends to occur in plant communities with three or more associated orchid species. Surveys for this species were intensified in areas with these conditions. For *Monotropsis odorata* and the two *Carex* species, visits were conducted in occupied habitat outside the activity area to determine if they could be eliminated. None of these plants were noted during the field survey. Also, no highly probable suitable habitat for these species was noted.

The final filtered list of species that occurs within the Chattooga River corridor which might be affected by one of the eight alternatives includes one federally endangered species, 13 sensitive species and 13 locally rare species. A current assessment of the existing condition for each of these species follows in the narrative.

D. Federally Listed Plants

Rock gnome lichen (*Gymnoderma lineare*) is a narrow Southern Appalachian endemic primarily occurring in the North Carolina mountains with peripheral populations in the mountains of Tennessee, Georgia and South Carolina (Weakley 2007). *Gymnoderma lineare* occurs on sloping to vertical rock faces with some seepage at higher elevations, generally above 5,000 feet. Typically it occurs on rock outcrops partially shaded by Spruce-fir Forests and occasionally with Northern Hardwood Forest. In the southern extent of its range, it occurs on partially shaded portions of rocky summits. The species also has been located on boulders within and adjacent to streams. Threats to the species include heavy recreational use from trampling, air pollution, logging resulting in modification of the local microclimate, and inappropriate collecting (USFWS 1995). Rock gnome lichen has a G2 global rank. This lichen was listed as federally endangered in the Federal Register in 1995 (USFWS 1995).

Within the Chattooga River watershed, *Gymnoderma lineare* is restricted to North Carolina, occurring on boulders within Scotsman Creek, Fowler Creek and a newly discovered site along the main stem Chattooga just upstream of the NC/SC/GA border. All the populations are within the wild and scenic corridor. 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.

E. Regionally Sensitive Plants

Table 3.5-3 describes the 14 regionally sensitive plant species that occur within the Chattooga River corridor and might be affected by the alternatives.

Table 3.5-3 Regionally Sensitive Plant Species in the Chattooga River Corridor that Could be Affected by any Alternative

Species	Species Ranking		Forest List (Occurrences)	Range and Habitat
	Global	State		
****Acrobolbus 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 (70+)	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 blomquistii*	G1G2	S1 (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	S1 (NC) S1 (SC)	NNF (7) CONF (1)	KY, TN and Carolinas. Typically occurs on shaded wet rocks or seeps.
**Fraser's loosestrife *Lysimachia fraseri*	G3	S2 (NC) S1S2 (GA) S3 (SC)	NNF (35) CONF (9) SNF (50)	Mountains of NC, SC, TN, and GA, disjunct to AI, 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)	NC and VT. Typically occurs within damp shaded rock outcrops.
Pellia appalachiana	G4	S1 (NC) SNR (GA) S1 (SC)	NNF (2)	Primarily Southern Appalachians ranging from AL to KY. Recent collections have indicated the species is more common. Habitat is moist shaded rocks near creeks and rivers and shaded rock houses.
****Plagiochila austinii*	G3	S1S2 (NC) SNR (GA)	NNF (5)	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 (SC)	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.

Species	Species Ranking		Forest List (Occurrences)	Range and Habitat
	Global	State		
**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.
**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 frequently collected rare liverwort in 2007 survey,

F. Locally Rare Plant Species

Table 3.5-4 describes the 13 locally rare species that occur within the Chattooga River corridor that might be affected by the alternatives.

Table 3.5-4. Locally Rare Plant Species in the Chattooga WSR Corridor that Could be Affected by any Alternative (*)

Species	Species Ranking		Forest List (Occurrences)	Range and Habitat
	Global	State		
Sword moss *Bryoxiphium norvegicum*	G5?	S1 (NC)	NNF (3)	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 catesbeiana ssp. Sericata*	G3	S3 (NC) S1 ?(GA) SNR (SC)	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, power lines, or trails.
**Manhart's sedge *Carex manhartii*	G3G4	S3 (NC) S2S3 (GA) S2 (SC)	CONF (6)	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 (4)	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 (4)	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) S3 (SC)	CONF (16)	Eastern PA south to eastern TN, northeastern GA, and northern SC. Abundant across escarpment gorges.
Kidneyleaf twayblade *Listera smallii*	G4	S4 (NC) S2 (GA) S1 (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) S3 (SC)	CONF (2)	MA west to MI south to KY, MS, and FL. Moist thickets, islands, and bogs.
Pohlia lescuriana	G4?	S1? (NC)	NNF (2)	Nova Scotia to WI south to NJ, TN and NC. Wet soil in open areas & on the banks of streams or ditches.
**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.

*The occurrences by individual forest are only listed for those forests that track the species as Locally Rare.
**Also considered in the botany component of the Biology ORV

III. Existing Impacts to the Environment

As previously indicated botanical field surveys were conducted from mid-August to early October 2007. Other field surveys for high quality Eastern hemlock forest were conducted in fall 2010. These surveys provide further information on vegetation distribution and condition. Recreation surveys have documented numerous areas of vegetation damage caused by current recreation use in the upper corridor. These impacts include trampling and clearing of vegetation around campsites, erosion and loss of plants along user-created trails, damaged trees, and denuded banks at stream crossings. Non-native invasive plants are scattered across the corridor with greater concentrations within disturbed areas and in sandbars adjacent to the river. The potential exists for damage to rare species in sensitive settings along riparian zones in the gorge but monitoring is insufficient to determine current impacts. High-use areas around bridges and popular front-country fishing and recreation locations are expected to continue to attract users that collectively will cause some impacts.

Very few intact Eastern hemlocks unaffected from hemlock wooly adelgid remain in the corridor. The vast majority are dead. This decline is expected to result in the complete loss of this ecosystem within the corridor. This has already and will continue to result in changes in species composition, structure and microclimate along with likely increases in downed trees and large woody debris (LWD) in the river. Downed logs that span the river create log jams that may necessitate portages for anglers and hikers who currently traverse the river. These portages can

create user-created trails and result in trampling of vegetation. There is no specific information on the number of log jams currently on the upper corridor, but increased woody debris is likely over the next few years.

Impacts are even more of a concern in the upper reaches of the corridor where rare plant species are more commonly found and there is a greater density of hemlocks. 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 as determined from an ecological classification completed in the mid-1990s. Hemlock-hardwood forests are dominated (50-75%) by Eastern hemlocks while acidic cove forests are typically dominated by a great diversity of hardwoods with Eastern hemlock as a minor canopy component. Table 3.5-5 shows the relative density and distribution of hemlocks among the primary reaches of the upper segment of the Chattooga WSR.

Table 3.5-5. Eastern Hemlock Forest Communities in the Four Reaches of the Upper segment of the Chattooga WSR

River Reach	River Segment	Hemlock-Hardwood (Percent Adjacent to River)	Acidic Cove (Percent Adjacent to River)
Chattooga Cliffs	Grimshawes Bridge south to Bullpen Road Bridge	86%	0%
Ellicott Rock	Bullpen Road Bridge south to Ellicott Rock	65%	0%
	Bullpen Road Bridge south to East Fork	59%	0.1%
	Bullpen Road 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%

American ginseng was located within the uppermost reach of the corridor along an access trail. However optimal suitable habitat for this species was determined not to be present within the river corridor.

IV. Environmental Consequences

The primary effects on vegetation from the proposed alternatives would be trampling of plants and increased introduction of NNIS.

For assessment purposes, the upper segment of the Chattooga WSR 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.

A. Ecological Communities

1. Alternative 1 - Direct and Indirect Effects

Alternative 1 is the current management approach and is considered the baseline or current condition for comparison among alternatives.

The primary impacts would be on riparian communities including Eastern hemlock-hardwoods, acidic cove, alluvial forest, alluvial island and rocky shoals.

Alternative 1 would not result in the loss of any plant community. The almost complete death of Eastern hemlock within the corridor from hemlock wooly adelgid will result in more species composition and structural changes than in any of the other plant communities. Eventually this community may more closely resemble acidic cove forest although the overstory canopy may be less dense depending on the ability of trees regenerating under the dense *Rhododendron maximum* shrub layer.

Another potential impact on ecological communities within the upper corridor would be the continued introduction of additional non-native invasive plant species from recreation users. Non-native invasive plant species were observed throughout the riparian areas of the river corridor, including *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. Recent review by personnel from all three forests indicates *Miscanthus sinensis* may be on the increase. While little baseline data is available, anecdotal information suggests greater spread within sandbars across the corridor. NNIS tend to be more frequent within riparian areas and increase with greater flood frequency (Brown and Peet 2003).

a. Reach

Current recreational use may be introducing new outbreaks or new invasive exotics to the riparian corridor. Any outbreaks should be limited to small selected areas such as islands in the river channel or dispersed camping sites. The spread and size of these potential outbreaks would be greater in open or partially open sites. Acidic cove forests and Eastern hemlock forests with dense *Rhododendron maximum* were found to have the lowest number of outbreaks of invasive plant species in an inventory completed across selected watersheds in the Nantahala and Pisgah national forests (G. Kauffman, personal observation). Although invasive exotics were located along all four reaches, a greater number of species and/or larger infestations were located within the Nicholson Fields Reach and the lower half of Chattooga Cliffs Reach. The reaches differ in the extent of Eastern hemlock-hardwood communities as displayed in Table 3.5-5. Eastern hemlocks are almost all completely dead within the river corridor in these two

uppermost reaches. The lower two reaches (Rock Gorge and Nicholson Fields) have very little Eastern hemlock-hardwood communities.

Current recreational users are not having any impacts on forest communities in these reaches.

b. Flows and Season

Lower flows and spring and summer seasons have more recreational users who want to hike, wade, backpack, camp or swim in the river. Also, lower flows are more conducive to certain types of recreational activities such as wading and fishing. For example, Whittaker and Shelby (2007) note that optimal lower flows for fishing occur from about 100 cfs to 450 cfs. Lower flows would make it easier to walk up and down the river bank. However, the timing of these recreational uses relative to flows and seasons would not result in the loss of any plant communities.

2. Alternative 1 - Cumulative Effects

Ground-disturbing activities, including timber harvest, road construction and prescribed burning, have the potential to introduce non-native invasive plants (see Table 3.1-7 for a list of past, present and reasonably foreseeable management activities).

The additional introductions of NNIS from recreation use in the upper segment of the Chattooga WSR would be additive to non-native introductions that occur as a result of other management activities as well as possible introductions in the river from private property upstream. Projects to remove NNIS would subtract from these additions. One specific project focusing on *Miscanthus sinensis* (an NNIS) may result in decreases in this species across the Chattooga River watershed. However, it is likely that a net increase in introductions of other NNIS would occur over time with this alternative.

Past, present and reasonably foreseeable impacts to riparian communities including Eastern hemlock-hardwoods, acidic cove, alluvial forest, alluvial island and rocky shoals are unlikely. Most projects are located outside of riparian communities.

3. Alternatives 2 and 3 - Direct and Indirect Effects

The primary impacts would be on riparian communities including Eastern hemlock-hardwoods, acidic cove, alluvial forest, alluvial island and rocky shoals.

Both alternatives 2 and 3 may result in fewer outbreaks of NNIS than Alternative 1since they propose to designate campsites and restrict the number of recreationists during the high-use season. Alternatives 2 and 3 would result in fewer new NNIS introductions and therefore would be less likely to have individual species increase as rapidly.

Neither of these two alternatives would result in loss of a plant community. The almost complete decline of hemlock from hemlock wooly adelgid within hemlock-hardwood forest is already occurring and will not be increased or decreased by either of these alternatives.

a. Reach

The reaches differ in the extent of Eastern hemlock-hardwood communities as displayed in Table 3.5-5. Eastern hemlocks are almost all completely dead within the river corridor in these two uppermost reaches; as stated above, management action in these alternatives will not increase or decrease the decline of Eastern hemlock.

b. Flows and Season

Lower flows and spring and summer seasons have more recreational users who want to hike, wade, backpack, camp or swim in the river. Also, lower flows are more conducive to certain types of recreational activities such as wading and fishing. For example, Whittaker and Shelby (2007) note that optimal lower flows for fishing occur from about 100 cfs to 450 cfs. Lower flows would make it easier to walk up and down the river bank. However, the timing of these recreational uses relative to flows and seasons would not result in the loss of any plant community.

4. Alternatives 2 and 3 - Cumulative Effects

Ground-disturbing activities, including timber harvest, road construction, and prescribed burning, have the potential to introduce non-native invasive plants (see Table 3.1-7). Past, present and reasonably foreseeable impacts to riparian communities including hemlock/ hardwoods, acidic cove, alluvial forest, alluvial island and rocky shoals are unlikely. Most projects are located outside of riparian communities.

The additional introductions of NNIS from recreation use in the upper segment of the Chattooga WSR would be additive to non-native introductions that occur as a result of other management activities as well as possible introductions in the river from private property upstream. Projects to remove NNIS would subtract from these additions. One specific project focusing on *Miscanthus sinensis* (an NNIS) may result in decreases in this species across the Chattooga River watershed. However, it is likely that a net increase in introductions of other NNIS would occur over time with either of these alternatives.

Past, present and reasonably foreseeable impacts to riparian communities including Eastern hemlock-hardwoods, acidic cove, alluvial forest, alluvial island, and rocky shoals are unlikely. Most projects are located outside of riparian communities.

5. Alternatives 8, 11, 12, 13 and 14 - Direct and Indirect Effects

The primary impacts would be on riparian communities including Eastern hemlock-hardwoods, acidic cove, alluvial forest, alluvial island and rocky shoals. None of the alternatives would result in loss of a plant community. The almost complete decline of hemlock from hemlock wooly adelgid within hemlock hardwood forest is already occurring and will not be increased or decreased by the alternatives.

Non-native invasive plant species (NNIS) were described in Alternative 1. The alternatives may result in fewer outbreaks since they propose to designate campsites and trails.

Alternatives that attract more users to the remote upper stretches of the river where there are more hemlocks and rare plant species increase the likelihood of portage needs and trampling of vegetation, although the degree of potential impacts varies by anticipated use levels. Monitoring to check for log jams and analyze and manage portage needs would help minimize effects under all the boating alternatives.

The additional influx of boaters or any additional recreation users within the upper portions of the Chattooga River has the potential for introducing new outbreaks or new invasive exotics to the riparian corridor. The five alternatives would vary in the potential risk of introducing NNIS. Based on the potential boating use with each alternative, Alternative 8 would create the greater risk followed by alternatives 14, 11, 13 and 12. 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. Acidic cove forests and Eastern hemlock forests with *Rhododendron maximum* were found to have the lowest number of outbreaks of invasive plant species in an inventory completed across selected watersheds in the Nantahala and Pisgah national forests (Gary Kauffman, Forest Service botanist in North Carolina, personal observation). Invasive species are not expected to increase dramatically as a result of boating.

None of the boating alternatives would result in loss of a plant community. The almost complete decline of hemlock from hemlock wooly adelgid within hemlock-hardwood forest is already occurring and will not be affected by any boating alternative.

a. Reach

The reaches differ in the extent of Eastern hemlock-hardwood communities as displayed in Table 3.5-5. Eastern hemlocks are almost all completely dead within the river corridor in the two uppermost reaches.

The boating alternatives differ where activities occur but, all the alternatives have a greater risk of introducing NNIS to Chattooga Cliffs, Ellicott Rock and Rock Gorge reaches since all allow use within these areas. Increases in NNIS in Alternative 12 are

restricted to potential impacts from current recreation users in the Nicholson Fields Reach since boating would not be allowed there.

b. Flow and Season

Lower flows and spring and summer seasons have more recreational users who want to hike, wade, backpack, camp or swim in the river. Also, lower flows are more conducive to certain types of recreational activities such as wading and fishing. For example, Whittaker and Shelby (2007) note that optimal lower flows for fishing occur from about 100 cfs to 450 cfs. Lower flows would make it easier to walk up and down the river bank. However, the timing of these recreational uses relative to flows and seasons would not result in the loss of Eastern hemlock-hardwood communities.

6. Alternatives 8, 11, 12, 13 and 14- Cumulative Effects

Ground-disturbing activities, including timber harvest, road construction and prescribed burning, have the potential to introduce non-native invasive plants (see Table 3.1-7 for a list of projects within the Chattooga watershed). Past, present and reasonably foreseeable impacts to riparian communities including Eastern hemlock/hardwoods, acidic cove, alluvial forest, alluvial island and rocky shoals are unlikely. Most projects are located outside of riparian communities.

The additional introductions of NNIS from recreation use in the upper segment of the Chattooga WSR would be additive to NNIS introductions that occur as a result of other management activities as well as possible introductions in the river from private property upstream. Projects to remove NNIS would subtract from these additions. One specific project focusing on *Miscanthus sinensis* (an NNIS) may result in decreases in this species across the Chattooga River watershed. However, it is likely that a net increase in introductions of other NNIS would occur over time.

B. Management Indicator Species

1. Alternative 1 - Direct and Indirect Effects

This alternative would not change the amount of suitable habitat for *Panax quinquefolius* within the Chattooga River corridor. Habitat for this species is not high quality for the corridor. American ginseng is more abundant in soils with higher nutrients and calcium content.

Ginseng was only located within an upland site in the Chattooga Cliffs Reach. While only a few individuals were located in somewhat marginal habitat, the Chattooga Cliffs Reach was more suited than any of the other three reaches surveyed in the riparian corridor. There are no impacts to this species from current recreation that varies as a

result of different river flows. The greatest likelihood for collection of this species is in the fall since it is more visible when it bears red fruits. Loss of the species from regular recreational users is less likely in the spring and summer. In the winter the plant would not be visible aboveground.

American ginseng is most impacted by commercial harvest of the roots. During the last several years there have been increases in harvest intensity as a consequence of either price increases or unemployment. By increasing foot traffic within an area, there is a greater likelihood of direct effects by collection of the roots, either during the legal harvest season or prior to the season.

The greatest likelihood of impacts to the small populations in the Chattooga Cliff Reach is anticipated from unpermitted opportunistic harvesters since this area is not a desirable area to collect ginseng. This alternative does not propose any new recreational use in the area; therefore any impacts to this species should be minimal.

2. Alternative 1 - Cumulative Effects

None of the past, present and reasonably forseeable actions should impact the forest-wide downward trend for American ginseng populations (see Table 3.1-7 for a list of past, present and reasonably foreseeable management activities). These impacts are primarily associated with commercial harvest.

3. Alternative 2 – Direct and Indirect Effects

This alternative would not result in any changes in the amount of suitable habitat for the species. The only reach that would be affected by this alternative is the Chattooga Cliffs Reach which has suitable habitat for American ginseng. There are no impacts to this species from current recreation that varies as a result of different river flows. The greatest likelihood for collection of this species is in the fall since it is more visible when it bears red fruits. Loss of the species from regular recreational users is less likely in spring and summer.

The restriction on groups per day in the backcountry would potentially reduce the number of hikers in the Chattooga Cliffs Reach which would reduce potential impacts to the species. By decreasing foot traffic within an area, there is a greater likelihood of decreasing direct impacts on this species from collection of the roots, either during the legal harvest season or prior to the season. The number of groups per day allowed in the Chattooga Cliffs Reach is slightly lower for Alternative 2 than Alternative 3; therefore, the risk to the plant is slightly lower. This alternative should result in fewer potential hikers than Alternative 1 which potentially reduces collection pressures on ginseng. The direct impacts on the plant are expected to be minimal.

4. Alternative 2 - Cumulative Effects

None of the past, present and reasonably foreseeable actions should impact the forest-wide downward trend for American ginseng populations (see Table 3.1-7 for a list of past, present and reasonably foreseeable management activities). These impacts are primarily associated with commercial harvest.

5. Alternatives 3, 12 and 13 – Direct and Indirect Effects

The only reach that would be affected by these alternatives is the Chattooga Cliffs Reach which has suitable habitat for American ginseng. The alternatives would not result in a change in the amount of suitable habitat for *Panax quinquefolius* within the Chattooga River corridor.

There are no impacts to this species from current recreation that varies as a result of different river flows. The greatest likelihood for collection of this species is in the fall since it is more visible when it bears red fruits. Loss of the species from recreational users is less likely in the spring and summer.

There would be no potential impacts to suitable habitat or the known population of ginseng from boaters under alternatives 12 and 13 because boating would not be allowed in the Chattooga Cliffs Reach during the growing season. The potential construction of a trail for boater access to the river in the vicinity of Green Creek would not impact American ginseng since the potential activity area is densely covered with *Rhododendron maximum* and provides no suitable habitat for American ginseng. Thus the expected number of groups per day under alternatives 12 and 13 within the Chattooga Cliffs Reach during the growing season should not differ from Alternative 3. The restriction on groups per day in the backcountry would potentially reduce the number of hikers along the Chattooga Cliffs Reach. By decreasing foot traffic within an area, there is a greater likelihood of decreasing direct impacts on this species from collection of the roots, either during the legal harvest season or prior to the season. This should result in fewer potential hikers than Alternative 1 which potentially reduces collection pressures on ginseng.

These three alternatives would allow slightly more groups per day in the Chattooga Cliffs Reach than Alternative 2. As such there would be a slightly greater amount of collection pressure. However, direct impacts on the plant are expected to be minimal.

6. Alternatives 3, 12 and 13 – Cumulative Effects

None of the past, present and reasonably forseeable actions should impact the forest-wide downward trend for American ginseng populations (see Table 3.1-7 for a list of past, present and reasonably foreseeable management activities). Impacts to this species forestwide are primarily associated with commercial harvest.

7. Alternatives 8, 11 and 14 – Direct and Indirect Effects

These alternatives would not change the amount of suitable habitat for *Panax quinquefolius* within the Chattooga River corridor. The only reach that would be affected by these alternatives is the Chattooga Cliffs Reach which has suitable habitat for American ginseng.

There are no impacts to this species from current recreation that varies as a result of different river flows. The greatest likelihood for collection of this species is in the fall since it is more visible when it bears red fruits. Loss of the species from recreational users is unlikely in the winter, spring and summer.

The limit on groups per day allowed in the backcountry would potentially reduce the number of hikers along the Chattooga Cliffs Reach. By decreasing foot traffic within an area, there is a greater likelihood of decreasing direct impacts on this species from collection of the roots, either during the legal harvest season or prior to the season. This should result in fewer hikers than Alternative 1 which potentially reduces collection pressures on ginseng. The direct impacts on the plant are expected to be minimal.

These alternatives would allow boating along the Chattooga River Reach and would increase the number of visitors within this reach. As previously stated the potential construction of a trail for boater access to the river in the vicinity of Green Creek would not affect American ginseng since the area has no suitable habitat for this species. The alternatives differ when use is allowed based on a minimum flow rate. As a result, the greatest number of boaters could result with implementation of Alternative 8 because it allows boating at any flow level. Under Alternative 14, there would be fewer total numbers of boaters (based on total number of days available for boating at 350 cfs and higher) and even fewer total numbers of boaters with a minimum flow rate of 450 cfs in Alternative 11.

All three alternatives have the potential for more boaters and, therefore, the potential for more collection pressure than the other alternatives. However, even if a few individuals near the trail were harvested when encountered, this impact would be minimal in comparison to the greater harvest intensity on the rest of the NNF. Any increased harvest within the Chattooga River corridor would also be inconsequential since the density of American ginseng here is considerably less in comparison to other watersheds across the NNF.

8. Alternatives 8, 11 and 14 - Cumulative Effects

None of the past, present and reasonably forseeable actions should impact the forest-wide downward trend for American ginseng populations (see Table 3.1-7 for a list of past, present and reasonably foreseeable management activities). Impacts to this species forestwide are primarily associated with commercial harvest.

C. PETS and Locally Rare Plants

Although there is an extensive list of rare plant species present within the vicinity of the upper segment of the Chattooga WSR, unacceptable impacts may not necessarily increase with increased use or addition of a new user group. The likelihood of direct effects varies due to microhabitat preferences, the susceptibility of individual plants to withstand scraping or trampling and population sizes. For instance, *Ephebe solida* is unlikely to be greatly impacted since it has larger populations and strongly adheres to submerged rocks. The two gametophyte ferns, *Trichomanes boschianum* and T. *petersii*, typically occur in protected grottoes on the bank's edge and the likelihood of trampling these two species from portaging and exploring by hikers, campers, anglers, etc. would be reduced compared to other rare species. Many of the liverwort species occur on more vertical rock surfaces and in shadier locations along the banks edge or underneath small overhanging boulders. These include many of the liverworts such as the four *Plagiochila* species and others such as *Acrobolbus ciliatus* and *Radula sullivantii.* The species most at risk from increased recreational use includes bryophytes such as *Lejeunea bloomquistii* which tend to occur on vertical rocks and in sunnier locations, as well as have small population sizes.

It is impossible to completely quantify the amount of impacts to populations of many of the bryophyte species since most were only identified after collecting specimens (approximately 1,000) and identifying them with a dissecting or compound microscope. Various identifications consisted of only small stems embedded in more common bryophytes. As such, it is anticipated that these population sizes are quite tiny and could be more vulnerable to impacts with increased use.

All users potentially could affect many of these 27 plant species. Potential direct and indirect effects to them from the eight alternatives include trampling from hikers, backpackers, anglers and others traversing 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 are also potential effects. Table 3.5-6 provides a crosswalk of potential impacts on rare species from each of the alternatives.

All alternatives are expected to have some level of effect on vegetation. These effects would vary based on the anticipated type, intensity and location of recreation uses. Opening certain sections of the upper segment of the Chattooga WSR to boaters could have increased negative impacts since these sections are more remote, are visited by hikers or anglers infrequently and have a much greater density of Eastern hemlocks in their adjacent forested community (see Appendix E) thereby greatly increasing the likelihood of portage needs. Impacts are expected to vary by individual rare species and may adversely affect species' persistence. However, the monitoring plan would include periodic assessment of critically rare species along with implementing corrective measures if unacceptable impacts from recreation are detected. This would minimize adverse impacts to these species.

Table 3.5-6. Direct or Indirect Effects on PETS and Rare Plants by Alternative (M=May; Y=Y; N=No)

Scientific Name	Forest Status	1	2	3	8	11	12	13	14	Effects
Gymnoderma lineare [1,2]	Endangered	M	M	M	M	M	M	M	M	Not likely to adversely affect
Acrobolbus ciliatus[2]	Sensitive	Y	Y	Y	Y	Y	Y	Y	Y	Impacts on rocks in river and river bank
Cephalozia macrostachya ssp. australis[2]	Sensitive	N	N	N	Y	Y	Y	Y	Y	Impacts on rocks in river and river bank
Hydrothyria venosa	Sensitive	N	N	N	Y	Y	Y	Y	Y	Impacts on rocks in river and river bank
Lejeunea blomquistii[2]	Sensitive	N	N	N	Y	Y	Y	Y	Y	Impacts on rocks in river and river bank
Lophocolea appalachiana[2]	Sensitive	N	N	N	Y	Y	Y	Y	Y	Impacts on rocks in river and river bank
Lysimachia fraseri	Sensitive	Y	Y	Y	Y	Y	Y	Y	Y	Impacted on islands
Marsupella emarginata var. latiloba[2]	Sensitive	N	N	N	Y	Y	Y	Y	Y	Impacts on rocks in river and river bank
Plagiochila austinii[2]	Sensitive	N	N	N	Y	Y	Y	Y	Y	Impacts on rocks in river and river bank
Plagiochila caduciloba	Sensitive	Y	Y	Y	Y	Y	Y	Y	Y	Impacts on rocks in river and river bank
Plagiochila sharpii[2]	Sensitive	Y	Y	Y	Y	Y	Y	Y	Y	Impacts on rocks in river and river bank
Plagiochila sullivantii var. sullivantii[2]	Sensitive	Y	Y	Y	Y	Y	Y	Y	Y	Impacts on rocks in river and river bank
Plagiomnium carolinianum	Sensitive	N	N	N	Y	Y	Y	Y	Y	Impacts on rocks in river and river bank
Radula sullivantii[2]	Sensitive	Y	Y	Y	Y	Y	Y	Y	Y	Impacts on rocks in river and river bank
Bryoxiphium norvegicum	Locally Rare	Y	Y	Y	Y	Y	Y	Y	Y	Impacts on rocks in river and river bank
Calystegia catesbiana var. sericata	Locally Rare	Y	Y	Y	Y	Y	Y	Y	Y	Impacted by trail closures
Carex manhartii	Locally Rare	Y	N	N	Y	Y	Y	Y	Y	Impacted by portage trails, campsites
Chiloscyphus muricatus	Locally Rare	Y	Y	Y	Y	Y	Y	Y	Y	Impacts on rocks in river and river bank
Ephebe solida	Locally Rare	N	N	N	Y	Y	Y	Y	Y	Minimal Impact
Homalia trichomanoides	Locally Rare	Y	Y	Y	Y	Y	Y	Y	Y	Impacts on rocks in river and river bank
Juncus gymnocarpus	Locally Rare	Y	Y	Y	Y	Y	Y	Y	Y	Impacted on islands
Listera smallii	Locally Rare	N	N	N	Y	Y	Y	Y	Y	Impacted by portage trails
Lygodium palmatum	Locally Rare	Y	N	N	Y	Y	Y	Y	Y	Impacted by campsites, portage trails
Pohlia lescuriana	Locally Rare	Y	Y	Y	Y	Y	Y	Y	Y	Impacts on rocks in river and river bank
Stewartia ovata	Locally Rare	Y	N	N	Y	Y	Y	Y	Y	Impacted by campsites, portage trails
Trichomanes boschianum	Locally Rare	Y	Y	Y	Y	Y	Y	Y	Y	Impacts on rocks in river and river bank
Trichomanes petersii	Locally Rare	Y	Y	Y	Y	Y	Y	Y	Y	Impacts on rocks in river and river bank

[1]All effects to this federally listed species are insignificant or discountable
[2]Also included in the botany component of the Biology ORV

1 Alternative 1 - Direct and Indirect Effects

Alternative 1 does have some direct and indirect effects to PETS and locally rare species associated with the current recreational uses (see Table 3.5-6). Direct effects include trampling and/or manipulation of the shrub and herb layers while creating campsites and user-created trails in the three forests, and vegetation damage while creating campfires on islands. Anglers, hikers and other 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 such as *Carex manhartii, Lygodium palmatum* or other rare species on the islands such as *Lysimachia fraseri* or *Juncus gymnocarpus*.

Recent decline and death of Eastern hemlock along the adjacent riparian forest have resulted in indirect effects to rare plant species within the corridor. These effects are primarily from crushing plants and modifying the microclimate, although the latter may be less evident within the deep gorge since the area is densely covered with the evergreen shrub, *Rhododendron maximum*. These effects may also be beneficial since some increased filtered light seems to have stimulated various bryophyte[5] species (Dr. Paul Davison, University of North Alabama bryology professor, personal communication). While effects on many individual rare bryophyte species are unknown, recent research in Eastern hemlock forests with substantial decline suggest the impact to bryophytes may not be as significant as anticipated (Cleavitt et al. 2008). Gains in bryophyte species richness were observed on bare soil although not to the extent as observed on downed woody debris and plots closer to streams (Cleavitt et al. 2008).

The total number of PETS and locally rare species that potentially could have some individuals impacted by existing use includes 18 of the 27 species. This includes the single federally listed lichen, *Gymnoderma lineare*, and six sensitive plants *Acrobolbus ciliatus, Lysimachia fraseri, Plagiochila caduciloba, Plagiochila sharpii, Plagiochila sullivantii var. sullivantii, and Radula sullivantii.* There are 11 locally rare species that could be affected, *Bryoxiphium norvegicum, Calystegia catesbiana var. sericata, Carex manhartii, Chiloscyphus muricatus, Homalia trichomanoides, Juncus gymnocarpus, Lygodium palmatum, Pohlia lescuriana, Stewartia ovata, Trichomanes boschianum* and *Trichomanes petersii.* None of the current or anticipated use is expected to eliminate any of the populations or subpopulations from the Chattooga River corridor. Species are persisting with the existing recreational use based on species collections during the 2007 survey, past surveys and in more difficult to reach microsites.

In the past ten-20 years, recreational use has increased on the trails and on the river within the wild and scenic corridor. This increased use has affected individual rare plants. Current recreational activities are anticipated to continue in the future in the most accessible portions of the river corridor.

a. Reach

The reaches differ in the number of rare species that could be impacted. Ellicott Rock Reach includes the greatest number of species (11) that could be impacted by existing use (see Table 3.5-7). Eight rare species could be impacted within the Chattooga Cliffs Reach, four in the Rock Gorge Reach and one in the Nicholson Fields Reach.

[5] Bryophytes are also considered in the botany component of the Biology ORV

Table 3.5-7. Number of Rare and PETS Species and Populations Potentially Affected by Alternative 1

Rare Species Category	Chattooga Cliffs (Species/populations)	Ellicott Rock (Species/populations)	Rock Gorge (Species/populations)	Nicholson Fields (Species/populations)
Federal	0/0	1/1	0/0	0/0
Sensitive	4/4	6/8	3/3	0/0
Locally Rare	4/4	4/4	1/1	1/1

b. Flows and Season

It is uncertain how flows could impact the rare species. The highest flows might encourage vegetative propagation, particularly for a rhizomatous species such as *Lysimachia fraseri*. Season may play a role in the number of species that could be potentially affected by existing use. During winter, fewer species would be impacted both as a result of less visitors and the dormancy of some (one sensitive and five locally rare) of the vascular species.

2. Alternative 1 - Cumulative Effects

The cumulative effects from past and future effects on PETS and 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 (see Table 3.5-6) (see Table 3.1-6 for a list of past, present and reasonably foreseeable management activities).

On private property in the corridor and the watershed, recent home development, road construction and reconstruction have contributed to the loss of suitable habitat for the forest-associated species and, to a lesser extent, to the river gorge-associated species. These cumulative effects associated with private property are expected to continue for the foreseeable future given the high land values across the watershed.

3. Alternatives 2 and 3 – Direct and Indirect Effects

Both of these alternatives reduce the amount of user impacts on species within the corridor. Establishing frontcountry and backcountry capacity limits and taking management actions related to trails and camping would reduce trampling and/or manipulation of the shrub and herb layers. By more carefully managing recreational use, neither would completely eliminate potential direct effects to rare bryophytes in the river; however, it should reduce the frequency of adverse impacts on species. Therefore, these alternatives would impact slightly fewer rare plant species (15) than Alternative 1 (see Table 3.5-6). Carefully designated campsites should eliminate potential existing impacts to three locally rare species, *Carex manhartii, Lygodium palmatum* and *Stewartia ovata*. Potentially the number of visitors should be greater with Alternative 3 although it is uncertain if the difference would result in a difference in impacts to rare plant species.

a. Reach

The reaches differ in the number of rare species that could be impacted by alternative activities. Ellicott Rock includes the greatest number of species (9) that could be impacted by existing use (Table 3.5-8). It differs from alternative 1 by not potentially impacting two additional locally rare species. There are eight rare species that could be impacted within Chattooga Cliffs reach, three species in the Rock Gorge reach, and one species in Nicholson Fields. Potential effects to three locally rare species in the two reaches would be eliminated by designating campsites. This would avoid impacts to these species.

Table 3.5-8. Number of Rare and PETS Species and Populations Potentially Affected by Alternatives 2 and 3

Rare Species Category	Chattooga Cliffs (Species/populations)	Ellicott Rock (Species/populations)	Rock Gorge (Species/populations)	Nicholson Fields (Species/populations)
Federal	0/0	1/1	0/0	0/0
Sensitive	4/4	6/8	3/3	0/0
Locally Rare	4/4	2/2	0/0	1/1

b. Flows and Season

It is uncertain how flows could impact the rare species. The highest flows might encourage vegetative propagation, particularly for a rhizomatous species such as *Lysimachia fraseri*. Season may play a role in the number of species that could be potentially affected by existing use. During winter fewer species would be impacted as a result of less visitors and the dormancy of some (one sensitive and five locally rare) of the vascular species.

4. Alternatives 2 and 3 - Cumulative Effects

The cumulative effects from past, present and reasonably foreseeable actions 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 (see tables 3.5-6 and 3.1-7 for a list of past, present and reasonably foreseeable management activities).

On private property in the corridor and the watershed, recent home development, road construction and reconstruction have contributed to the loss of suitable habitat for the forest-associated species and to a lesser extent to the river gorge-associated species. These cumulative effects associated with private property are expected to continue for the foreseeable future given the high land values across the watershed.

5. Alternatives 8, 11, 12, 13 and 14 – Direct and Indirect Effects

Establishing capacities and taking management actions related to trails and campsites, would reduce trampling and/or manipulation of the shrub and herb layers from current users in these alternatives more than Alternative 1. Neither would completely eliminate potential direct effects to rare bryophytes in the river; however, the frequency of adverse impacts on species should be reduced.

Trampling and disturbance to vegetation may be occur more often in accessible areas since there would be an more people using the river; they may also extend into the most inaccessible parts of the river. As a result, there could be direct effects of trampling or scouring individuals of additional rare species, including *Hydrothyria venosa*, *Cephalozia macrostachya* ssp. *australis*, *Lophocolea appalachiana*, *Plagiomnium carolinianum* and *Ephebe solida*. The most noteworthy effect of these alternatives is the need for portaging, particularly in the Chattooga Cliffs Reach where Eastern hemlocks are denser and trees are already dead. Logs that jut out or span the river can create obstructions that could force boaters to portage around the obstacle. In certain locations, this could lead to impacts (from trampling and crushing) to rare bryophytes and lichens that are adhered to rocks and boulders primarily on the river's edge. In addition, portaging could lead to trampling terrestrial herbaceous species, such as *Listera smallii, Carex manhartii*, and *Lygodium palmatum*.

Potential direct effects to species would be greatly diminished if portaging takes place in the middle of the river (between the river banks). Impacts to rare bryophytes and lichens are difficult to adequately assess in terms of timing and intensity since it is uncertain how quickly the dead trees will fall, where they will fall and how large the individual bryophyte populations are within potential portage areas. These five alternatives would vary in the potential risk of impacts to rare species, depending on the potential boating use; Alternative 8 would create the greater risk to rare species, followed by alternatives 14, 11, 13 and 12.

Based on potential portaging along currently inaccessible stretches of the river, the boating alternatives have viability concerns for the following sensitive species: *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. Locally rare species with forest distribution concerns include *Chiloscyphus muricatus*, *Homalia trichomanoides* and *Bryoxiphium norvegicum* for NNF and *Listera smallii* for CONF. All of these species have few populations (less than five) known across the respective forests. All documented populations are very small, typically consisting of less than 20 individuals or extending only over a few square centimeters. They all are limited within the Chattooga River watershed. Increased portaging in the more inaccessible areas could potentially eliminate these small populations.

The monitoring plan would assess the continued presence of critically rare plant species. Management actions would be taken if monitoring indicates adverse impacts from recreational activities to ensure no viability concerns develop for the five sensitive and four locally rare plant species.

a. Reach

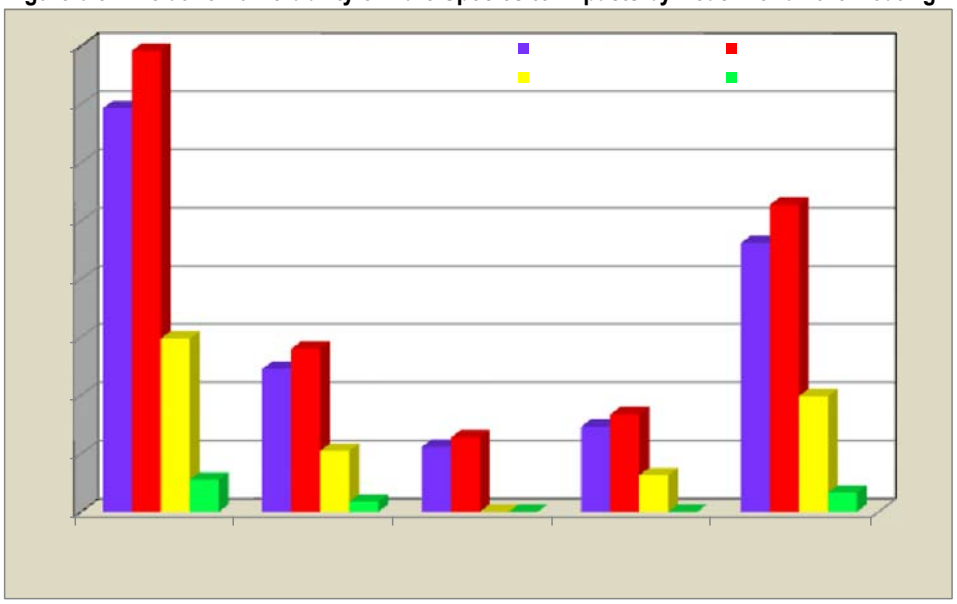
The number of rare plant species and subpopulations that could be impacted by the five boating alternatives varies by reach (see Table 3.5-9). The Ellicott Rock Reach has the greatest number of rare species (16), followed by the Chattooga Cliffs Reach (14), the Rock Gorge Reach (6) and the Nicholson Fields Reach (1).

Table 3.5-9. Number of Rare and PETS Species and Populations Potentially Affected by Alts. 8, 11, 12, 13 and 14

Rare Species Category	Chattooga Cliffs (Species/populations)	Ellicott Rock (Species/populations)	Rock Gorge (Species/populations)	Nicholson Fields (Species/populations)
Federal	0/0	1/1	0/0	0/0
Sensitive	9/16	8/27	4/6	0/0
Locally Rare	5/6	7/29	2/2	1/1

A coarse relative scale on the vulnerability to rare species by reach was determined by factoring in the rate of days with boating opportunities by the number of PETS and locally rare plant species subpopulations per reach (Figure 3.5-1). Based on this analysis for each respective reach, Alternative 8 would create a greater risk to rare species than Alternative 14, followed by alternatives 11, 13 and 12.

Figure 3.5-1 Relative Vulnerability of Rare Species to Impacts by Reach for all the Boating Alternatives



b. Flows and Season

It is uncertain how flows would impact rare species. The highest flows might encourage vegetative propagation, particularly for a rhizomatous species such as *Lysimachia fraseri*. Season may play a role in the number of species that could be affected by existing use. During winter, fewer species would be impacted because of less visitors and the dormancy of some vascular species (one sensitive and five locally rare).

6. Alternatives 8, 11, 12, 13 and 14 - Cumulative Effects

Cumulative effects from past, present and reasonably foreseeable actions to the rare species are the same across the 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 (see Table 3.1-7 for a list of past, present and reasonably foreseeable management activities). On private property in the corridor and the watershed, recent home development, road construction and reconstruction have contributed to the loss of suitable habitat for the forest-associated species and, to a lesser extent, for the river gorge-associated species. These cumulative effects are expected to continue for the foreseeable future given the high land values across the watershed.

The cumulative effects on rare plant species affected by the boating alternatives within the corridor are not anticipated to result in the loss of any existing species.

3.6 OTHER SOCIAL RESOURCES

3.6.1 HUMAN HEALTH AND SAFETY (SEARCH AND RESCUE)

I. SUMMARY OF FINDINGS

Recreational activities on the upper segment of the Chattooga WSR provide opportunities for challenge and risk that were considered by Congress considered when it designated the river wild and scenic in 1974. The river does not appear to be more or less hazardous when compared to similar rivers. Between five and ten search and rescue (SAR) operations would be needed annually as a result of people recreating in the river corridor, the majority of which likely would be related to water activities (boating, swimming, etc.). The number of accidents, fatalities and SAR would likely increase if boating is allowed in the upper segment of the Chattooga WSR. Some biophysical resources may be impacted as a result of emergency staff and equipment accessing the area. Some reaches have very limited access points with steep, rugged terrain. Pre-accident planning with equipment approval levels may be needed for Ellicott Rock Wilderness.

II. AFFECTED ENVIRONMENT

Recreating on national forest lands is not without risk, especially recreating close to or in rapidly flowing rivers such as the Chattooga. The Chattooga drops approximately 1,500 feet in elevation within the 21-mile section from Grimshawes Bridge downstream to the Highway 28 bridge. The river has an ever-changing bottom ranging from accumulations of sand and sediment to a rough and rocky bottom with a substantial distribution of large and irregularly shaped boulders within its banks. Down trees may also be present, particularly in the narrower sections of the upper reaches. The addition of large woody debris (LWD) from dying Eastern hemlock is likely to add to these risks. 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, all 39 fatalities on the Chattooga River have occurred 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 US 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, Web sites, permits and signs.

The following information on SAR impacts associated with potential boating on the upper segment of the Chattooga WSR is based on the report *Capacity and Conflict on the Upper Chattooga* by Whittaker and Shelby (2007).

- Specific characteristics of a river can substantially influence fatality rates. Fatality rates may be 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 segment of the Chattooga WSR 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 segment of the Chattooga WSR.

- 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 segment of the Chattooga WSR with limited road access, which presents some SAR response challenges. However, impacts from these responses have not been a substantial issue for management. About half of the lower segment of the Chattooga WSR 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 US 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 segment of the Chattooga WSR 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).

III. Existing Impacts to the Environment

The three national forests in 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 US Forest Service cooperates in search, rescue and recovery efforts with local sheriffs, SAR organizations, state natural resource agencies, outfitter/guide companies and others.

According to staff on the Andrew Pickens Ranger District, five to ten SAR operations are conducted each year associated with boaters on the lower segment of the Chattooga WSR. 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 generally are 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.

Whittaker and Shelby (2007) state that "three reaches have at least one Class V and several Class IV rapids, so boaters need appropriate skills and experience. The addition of large woody material from dying Hemlock is likely to add to these risks."

IV. Environmental Consequences

A. Alternative 1 – Direct, Indirect and Cumulative Effects

Despite consistent hiking, swimming and angling use on the upper segment of the Chattooga WSR for the last 20 years, no fatalities have been recorded above Highway 28; SAR responses are rare. In the short term, existing mixes of recreation uses would not change; therefore, SAR responses would remain about the same. Generally speaking, recreation use is increasing in almost all activities except hunting (Whittaker and Shelby 2007). In the long term, it is unlikely that fatalities would increase and the potential for a substantial increase in SAR responses is low.

Past, present and reasonably foreseeable activities in the river corridor aimed at reducing adverse impacts on natural resources and improving recreational experiences would likely draw more people to the area. In the long term, it is unlikely that fatalities would increase and the potential for a substantial increase in SAR responses is still considered low.

B. Alternative 2 – Direct, Indirect and Cumulative Effects

A permit system and reduced parking at Burrells Ford in Alternative 2 would likely cause a reduction in recreation use during high-use times from current levels. There may be some opportunities for use to grow in low-use seasons but substantial increases are not expected. Lower use levels, as well as designated trails and campsites, may make it easier to locate individuals and provide emergency services. In the long term, increased fatalities are unlikely and the potential for a substantial increase in SAR responses is low.

Past, present, and reasonably foreseeable activities in the river corridor aimed at reducing adverse impacts on natural resources and improving recreational experiences would likely draw more people to the area. In the long term, increased fatalities are unlikely and the potential for a substantial increase in SAR responses is still considered low.

C. Alternative 3 – Direct, Indirect and Cumulative Effects

Management actions in Alternative 3 are expected to cap recreation use at current levels during high-use times and allow limited growth during the fall, winter and spring; therefore, substantial increases are not expected. Designated trails and campsites may make it easier to locate individuals and provide emergency services. In the long term, increased fatalities and the potential for a substantial increase in SAR responses is low.

Past, present and reasonably foreseeable activities in the river corridor aimed at reducing adverse impacts on natural resources and improving recreational experiences would likely draw more people to the area. In the long term, increased fatalities are unlikely and the potential for a substantial increase in SAR responses is still considered low.

D. Alternatives 8, 11, 12, 13 and 14 – Direct, Indirect and Cumulative Effects

The Chattooga Cliffs Reach combined with the Ellicott Rock Reach to the junction of North Carolina and South Carolina have steep terrain, limited access and fast flowing water that make SAR difficult on the river. A portion of the Rock Gorge Reach (near Big Bend Falls) has some fast water, steep terrain and would also make SAR difficult. The Nicholson Fields Reach is much more accessible and water does not flow as swiftly, so completing SAR operations should not be difficult. Designated trails and campsites would make it easier to locate recreational users to provide emergency services.

Estimating the number and type of incidents (or the associated SAR impacts) that may occur if boating were allowed is challenging. However, some accidents, injuries and eventually a fatality would be anticipated. 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.

If SAR or body extraction efforts were required on the upper segment of the Chattooga WSR, there may be impacts related to staff and equipment accessing the scene. Ellicott Rock 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 North Carolina with similar constraints.

Past, present and reasonably foreseeable activities in the river corridor aimed at reducing adverse impacts on natural resources and improving recreational experiences would likely draw more people to the area. In the long term, increased fatalities are unlikely and the potential for a substantial increase in SAR responses is still considered low.

3.6.2 SOCIAL IMPACT ANALYSIS

I. SUMMARY OF FINDINGS

People live, vacation and retire in the four-county area of Jackson and Macon counties (NC), Rabun County (GA) and Oconee County (SC) in part due to the nearby natural amenities and the opportunities for outdoor recreation. The results of this analysis of Values, Beliefs and Attitudes (VBAs) show that many people move to this area because of the opportunities for adventure and outdoor challenge offered by the Wild and Scenic Chattooga River (Chattooga WSR). During the Limits of Acceptable Change (LAC) process, there was considerable public support for maintaining currents levels of opportunities to experience solitude and remoteness on the upper segment of the Chattooga WSR. People indicated that if they could not find opportunities for solitude and remoteness on the upper segment of the Chattooga WSR, they would go elsewhere to try to find a similar experience. A change in the mix of recreation uses on the upper segment of the Chattooga WSR could affect recreation use patterns, which in turn affects access for recreation users. Indirect impact could occur to businesses that depend on nature-based tourism. However, while some changes in outdoor recreation use patterns might occur and some local businesses may be impacted, the economic impacts would not be measurable at the county scale.

II. AFFECTED ENVIRONMENT

The US Forest Service Manual provides broad direction to provide "fair and equitable access to users". But what is "fair and equitable" has led to the considerable debate over the management of the Chattooga WSR. Oran (1996) defines equitable as "just, fair, and right for a particular situation." However, in order to determine what is "fair and equitable" access for all users, decision makers need a clear and concise understanding of the social and economic dynamics that led to the 1976 prohibition on boating above highway 28 and to the appeal in 2004 of the boating prohibition.

To study the social and economic dynamics that led to the boating prohibition and its appeal, a Social Impact Analysis (SIA) was completed in accordance with direction in Sections 30-34 of the US Forest Service Handbook (FSH) 1909.17. This SIA includes an assessment of Values, Beliefs and Attitudes from the public comments received from 2005 to 2009 and Socio-Economic information on the 4 counties surrounding the Chattooga WSR. The entire SIA is contained in Appendix F of this EA but some of the findings from the SIA are summarized below.

A. Zones of Influence: VBAs

The social dynamic that led to boat prohibition above Highway 28 is summarized below.

1. Social dynamics in the 1970s

Limited written documentation of the specific reasons for zoning the river 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 conflict "where floaters and fishermen use the same waters."

The assessment of VBAs tells a story of the early 1970s that is multifaceted and is more intricate than boaters versus anglers. There was a complex dynamic of locals versus outsiders, where a majority of the outsiders were boaters. Many locals felt that the river had been taken from them when the Chattooga River was designated as wild and scenic and jeep roads were closed. Some people expressed concerns about the asymmetric impacts of boating on angling, but there were also stories about other conflicts. However, the social dynamic that led to the boating prohibition has changed since the early 1970s.

2. Social Dynamics Today

When the 2004 Sumter Revised Land and Resource Management Plan (RLRMP) continued the prohibition on boating, American Whitewater appealed the decision. The US Forest Service's Washington Office issued a decision on the appeal in April 2005 that directed the three national forests managing the Chattooga WSR to complete a visitor capacity use analysis that considered non-commercial boating opportunities above the Hwy. 28 bridge and if needed amend the 2004 Revised Sumter Forest Plan based on that analysis.

The three national forests conducted several public meetings as part of the LAC process completed in the fall and winter of 2005-2006. During these meetings, the public identified existing recreation uses and concerns about the impact forest visitors are having on the upper segment of the Chattooga WSR. The biggest concerns the public identified include littering, trampled plants, disturbed wildlife as well as erosion and sedimentation from disturbed areas. For most users, the attraction to the upper segment of the Chattooga WSR is an overall experience and not just one particular recreation activity. Recreationists often indicate they participate in multiple activities. For instance, some people said that trout fishing is their primary activity, but they also included hiking, camping, swimming, meditation and bird-watching among their list of activities. These desired recreation experiences are listed in Section 3.2.1 Recreation of this Environmental Assessment (EA).

Information from the LAC process indicates that solitude is one of the most valued, if not *the* most valued quality of the backcountry experience in the upper segment of the Chattooga WSR Corridor. Solitude is also a component of the recreation ORV, as well as part of the Wilderness Act goal of "outstanding opportunities for solitude." The public indicated that these opportunities are not only highly valued in the backcountry, but also at the greatest risk of being lost. People expressed fear that overuse could lead to a loss of opportunities for solitude and remoteness. Some current users fear that providing additional boating on the Chattooga River (above Hwy. 28) would create overuse or have a ripple effect leading to the US Forest Service allowing other currently prohibited recreation uses.

B. Assessment of Values, Beliefs and Attitudes

Values, beliefs and attitudes (VBAs) are used to describe people's feelings, preferences and expectations of their relationship with national forest lands and how those lands are managed. Understanding VBAs can help forest managers develop alternatives to address those areas of importance to national forest users and residents of nearby communities. They also can help explain why various proposals are either favored or rejected by those users and residents.

Allen et al. (2009) notes that VBAs are closely linked concepts that can tell a story and, when all three concepts are linked together, each can explain the other. Allen et al. (2009) also note that VBAs are enduring and are not readily changed by Forest Service policy. However, VBAs *do* affect how people react to and feel about Forest Service recreation management. While VBAs do not rapidly change, behaviors may change very quickly. Changes in behaviors can occur due to a variety of reasons such as a change in income or health. For instance, a hunter may no longer go hunting due to health problems; however, that hunter still values the hunting experience.

The US Forest Service completed an assessment of Values, Beliefs and Attitudes from public comments that were received from 2005 to 2009 and those findings are summarized below. Many comments are emotionally charged resulting from a strong sense of attachment to the Chattooga WSR and the possibility that recreation opportunities may change. Some of these strong feelings have led to a social value conflict with the belief that boating is an incompatible recreation use on the upper segment. On the other hand, there are strong feelings of being denied equitable access to the upper segment without just cause.

1. Commonly Held VBAs

One of the common VBAs expressed by people, regardless of recreation activity, is a strong sense of attachment to the upper segment of the Chattooga WSR. They also expressed concerns that increased and uncontrolled recreation could affect this strong sense of attachment. Some commonly held VBAs among all recreation users, regardless of activity, include:

- Solitude, remoteness, pristine conditions and a wilderness experience are very important;
- The protection of the natural resource is paramount;
- Outside development could affect the pristine nature of the upper segment of the Chattooga WSR;
- The upper segment of the Chattooga WSR should be saved for future generations;
- The sense of solitude could be affected by uncontrolled recreation use; and
- People want to experience the upper segment of the Chattooga WSR with their families.

Some specific comments that capture these VBAs include:

- "There are few areas left in this USA that offer solitude and a wilderness experience as pure as the U. Chattooga area."
- "If the upper segment of the Chattooga WSR is opened to private recreational interests, it won't be long before the commercial interests will be granted equal rights."
- "I want those who come after me to discover, explore, enjoy, and leave for others the world that I have been privileged to know… armed with knowledge, we can and need to do all that we can to restore and maintain the balance of nature."

The following comments illustrate a sense of attachment and strong land ethic that many recreation users express for the upper segment of the Chattooga WSR:

- "There are many passionate pleas on both sides of this debate and it is obvious that they are driven by a deep love for the unique experience this corridor offers as well as a strong respect for the environment…We all have a common goal that essentially is not at odds. We want to enjoy what the Chattooga has to offer while preserving it for future generations."
- "My father introduced me to the streams of South Carolina and I have spent as much time as possible exploring them ever since."
- "Part of the reason I moved here to Rabun County is the Chattooga River and its wild and scenic status."

2. Hikers and Associated Uses VBAs (fishing, hiking, camping, hunting and backpacking)

Some current users expressed various beliefs about allowing boating on the upper segment of the Chattooga WSR:

- Overuse would occur and there would be an increase in trash and user impacts;
- People who are fishing and swimming are more negatively impacted by encounters with boaters than the boaters;
- Boaters have different values than other recreation users;
- There is an increased risk to the safety of children swimming in the river;
- There is a potential increase in law enforcement problems;
- Overuse could lead to a loss of solitude, remoteness, pristine conditions and wilderness-type experiences;
- Boaters have other rivers and places to kayak, raft and canoe; and
- Boating has impacted fishing and other recreation uses on the lower river; these problems would occur on the upper segment of the Chattooga WSR if boating were allowed.

The following comments from individuals capture these VBAs:

- "An earlier user that does not return because of unsatisfied enjoyment may not be included in a conflict study. I think this might be important when looking at the Chattooga. The lower Chattooga no longer has the capacity for fishing and angling during the peak seasons. There, user conflicts are dominated by the heavier users, commercial vs. private boaters. Unfortunately the original ORV of fishing has been effectively 'zoned' from the lower Chattooga due to overcrowding from boaters and U.S. Forest Service policy."
- "The children prefer June through August as they swim and play in the river and slide on the numerous 'sliding rocks' of this Section. My greatest fear on opening up Section 00 for kayaking is that not only will the safety of my children playing on this stretch be compromised, but that the very things that make this section so unique (peace and quiet, diversity of flora and fauna, true unspoiled wilderness) will be destroyed."
- "By allowing boaters access to the section of the Chattooga above Highway 28 bridge, the US Forest Service would destroy any backcountry fly fishing experience left on the river and would forever change the experiences that hikers and fisherman are able to enjoy."
- "Now I know it's not every one of them, but if you fish, you will have it happen to you. It's always the boaters. The boater can come down the river in total enjoyment. Trout fisherman goes to get away. One boat comes by and ruins his experience. I've saved a lot of money not having to pay a psychiatrist by going to the Chattooga River and being by myself. I feel expenses coming if we let this happen."

- "I am concerned that the wilderness setting may be compromised by allowing other recreation users in the area. I particularly feel that by allowing boating in through this area, there may be conflicts and destruction of tranquility that I desire in this area."
- "In fact, the US Forest Service has allowed the growth in boating to displace a lot of anglers on the lower river…Angling, as well, must be protected."
- "Sections II and III are managed to discourage fishing due to documented user conflicts between intense boat traffic and the fisher. Pre 1974 Stocking Points below Long Bottom are no longer stocked per request of the US Forest Service Management Plan."
- "Section one is primarily used by small groups and individuals fishing and hiking for the unique environment that exists in this area, which includes not having to move out of the pools while fishing to allow a caravan of rafts to pass through."

3. Boater, Canoeist and Kayaker VBAs

Boaters, canoeists and kayakers expressed various beliefs about the current zoning policy on the upper segment of the Chattooga WSR:

- They are denied equitable access;
- They are good stewards of the land; and
- Fishing and boating are compatible uses.

Comments that capture these concerns include:

- "The boating ban on the Chattooga River now in place for 30 years is unfair. I believe it is illegal and just plain wrong."
- "It's now a national issue that could shape the future of wild and scenic rivers and wilderness areas across the United States. I want to emphasize here the indisputable fact that the upper segment of the Chattooga WSR's normal flow regime will naturally segregate anglers and paddlers by time and space. In all other Southeastern streams with shared use, fly guys and paddle dippers manage to co-exist in the same streambed, sometimes with mildly cursory respect."
- "Boating can be part of healthy Chattooga headwaters."
- "I urge you to allow boating above the Hwy. 28 Bridge on the Chattooga River. It is a gem in the crown of this wild and scenic river, and kayakers should be allowed to enjoy the natural beauty of a pristine environment."

C. Zones of Influence: Socio-Economic

US Forest Service Handbook directs managers to consider the impacts to Socio-economic characteristics include lifestyle, social organization, population characteristics, land-use patterns and civil rights from all alternatives. These terms are defined in FSH 1909.17, Sections 30-34 and more detailed information can be found in Appendix F of this EA.

For the purposes of this section, the socio-economic zone of influence is the four-county area surrounding the upper segment of the Chattooga WSR. These four counties fall into three states: Rabun County in northwest Georgia, Oconee County in northeast South Carolina, and Macon and Jackson counties in southwest North Carolina (see Figure F-1 in Appendix F). This section examines socio-economic information from the 1970s, as well as information from county planning efforts.

1. Economic situation in the 1970s

- In the early 1970s the South Appalachian area, which included the corridor along the Chattooga, was economically depressed. The 1971 study report notes that Jackson, Macon, and Rabun counties were included in the Appalachian-depressed area. Oconee County, while not experiencing boom conditions, was not included. The1971 study report also states that the rugged country, with its limited development and physiographic, social and economic isolation were seen as reasons to designate the Chattooga as wild and scenic because designating the river would be "a drawing card to the general area" and would "focus attention on the many outstanding features in the Georgia-North Carolina-South Carolina mountain area." The designation of the Chattooga River as wild and scenic was intended to create jobs within the four-county area through increased tourism and outdoor recreation opportunities.

2. Economic Situation Today

The improved road system and the availability of information technologies, as well as the natural amenities in the four-county area surrounding the upper segment of the Chattooga WSR serve as a draw for retirees and have led to an increase in nature-based tourism, as well as increase in the number of vacation houses. The Southwestern Commission Council of Governments (SWCOG) focuses on regional planning in southwestern North Carolina. *T*he 2008 Comprehensive Economic Strategy developed by the SWCOG ***(***SWNCEDD 2009***)*** describes development pressures within the seven-county area of southwestern North Carolina that includes Jackson and Macon counties:

> Pressures to develop seem insatiable. A full 20% of the US population and four of the five fastest growing cities in the US are within a five hour drive. Atlanta, reportedly the fastest sprawling metropolis the earth has ever witnessed, is only two hours south. Unplanned growth threatens to overwhelm the region. Poor air quality and huge stream sediment loads are but two direct impacts. The spiraling financial costs of residential and commercial sprawl (public safety, solid waste, water and sewer, new schools) are growing geometrically, placing extreme pressures on local government budgets.

The 2008 SWCOG strategy also notes that both residents and tourists appreciate the natural amenities offered by the Chattooga WSR Corridor, travel and tourism are the major drivers in the growth of the retail/services sector in the seven-county area covered by the SCCOG.

III. Environmental Consequences

Direct, indirect and cumulative effects to the VBAs and Socio-economic conditions are described below.

A. Outside the Scope of Analysis

The following VBAs are not analyzed because they are outside the scope of this analysis:

- Outside development could affect the pristine nature of the upper segment of the Chattooga WSR.
- Boaters have other rivers and places to kayak, raft and canoe.

B. Analyzed Elsewhere in the EA

1. VBAs

The following VBAs are not addressed in this section because they are analyzed in Section 3.3.1 Recreation. There are discussions on social values conflicts, face to face conflicts, asymmetrical impacts resulting from encounters among the various recreationists and competition for a limited number of resources, such as parking. Alternatives 1-3, 8, 11, 12, 13 and 14 consider various boating options on the upper and lower segments of the Chattooga WSR. Therefore, these VBAs associated with allowing boating on the upper segment of the Chattooga WSR and the resulting environmental impacts are discussed in Chapter 3.

- People who are fishing and swimming are more negatively impacted by encounters with boaters than the boaters.
- There is an increased risk to the safety of their children swimming in the river.
- Boating has impacted fishing and other recreation uses on the lower river; these problems would occur on the upper segment of the Chattooga WSR if boating were allowed.
- People want to experience the upper segment of the Chattooga WSR with their families.
- Fishing and boating are compatible uses on the upper segment of the Chattooga WSR.
- Boaters have different values than other recreation users.
- Boaters are good stewards of the land.

The following VBAs are not addressed in this section. Analysis throughout Chapter 3 of this EA indicates that natural resources would be protected in all alternatives. Implementation of current forest standards in Alternative 1 would address these VBAs. Management actions in alternatives 2-14 that address camping, trails, large woody debris and capacity limits would protect the following VBAs (see sections 3.2, 3.3, 3.4, 3.5 and 3.7):

- The protection of the natural resource is paramount.
- The upper segment of the Chattooga WSR should be saved for future generations.

The following VBA is not addressed in this section because implementation information in Appendix B accounts for the potential need for an increase in law enforcement staffing.

- There is a potential increase in law enforcement problems.

Today, US Forest Service managers are faced again with the question of what is equitable access on the Chattooga WSR particularly above Highway 28. Can river managers provide additional boating opportunities on the upper segment and still provide fair and equitable access for all users? FSM 2354.41a – Distribution of Visitor Use directs decision-makers to consider the following guidance:

> When it becomes necessary to limit use, ensure that all potential users have a fair and equitable chance to obtain access to the river. Also ensure that the use-limiting system is within the administrative capabilities of the managing unit.

Key Issue 6 described in Chapter 1 pertains to equitable access on the upper segment of the Chattooga WSR and this issue is addressed by developing a range of alternatives that range from no changes in the current boating prohibition to allowing various increased boating opportunities, including boating the entire Chattooga WSR below the Green Creek put-in. Impacts to recreation users are addressed in the recreation section. Therefore, this VBA associated with allowing boating on the upper segment of the Chattooga WSR is addressed in the Recreation Section 3.2.1.

- Boaters are denied equitable access.

2. Social Organization

- Search and rescue: Impacts to search and rescue are analyzed in Section 3.3.3, Human Health and Safety.

- An influx of people with different values can lead to stress among existing residents and conflicts with newcomers: This aspect of social organization is analyzed in the Recreation Section 3.2.1.

C. Direct and Indirect Effects Common to All Alternatives

1. Lifestyle

Businesses not related to recreation use on the Chattooga River would not be impacted by management actions in these alternatives. No changes in the policy for evaluating special-use permits are proposed. The existing special use permits for rafting and boating would continue on the lower segment of Chattooga WSR. No commercial boating is proposed as part of any alternative.

2. Population Characteristics

Demographics or migration patterns would not be affected by any alternative.

3. Land-use Patterns

County zoning regulations that would affect the location, density or type of land use would not change under any alternative.

4. Civil Rights

Accessibility would not be impacted by any of the alternatives. Recreation management is compliant with the Outdoor Recreation Accessibility Standards so no disproportionate impacts to forest visitors with physical impairments would occur. In addition, no disproportionate impacts to women, minorities, people living below poverty level or forest visitors in general (consumers) are anticipated with any alternative.

5. Social Organization

Families as a whole would not be impacted by any of the alternatives. While some families may agree or disagree with the alternatives, or change their use patterns because of an alternative, the social organization of family would not be impacted. Under any of the proposed alternatives, city/county/state governments would continue to function as they do now. There would be no changes in schools, community services, housing options or most public services (water, sewer, trash pickup, etc.) as a result of the

proposed alternatives. Wildfire response and patrols of recreation areas by city, county or state responders are not expected to change in the alternatives.

D. Direct and Indirect Effects Analyzed

1. VBAs

The recreation with its analysis of capacity and conflict is closely tied to the effects of VBAs. Highlights from the recreation section are summarized here. For additional discussion on these topics, see Section 3.2.1 Recreation.

2. Solitude

Opportunities for solitude vary by alternative. Alternative 1 does not set capacity limits. Capacity limits in alternatives 2, 3, 8, 11, 12, 13 and 14, and the resulting encounters would either maintain or increase opportunities for solitude and therefore address, the following commonly held VBAs (see Section 3.2.1 Recreation and Section 3.7 Wilderness):

- Solitude, remoteness, pristine conditions and a wilderness experience are very important.
- The sense of solitude could be affected by uncontrolled recreation use.

3. Overuse

Measures to address concerns about overuse are incorporated either into existing forest plan in Alternative1 and measures have been incorporated into the action alternatives. In addition to the measures to limit recreation, the allowable recreation activities vary by alternative. Alternatives 1-3 continue the current zoning of the Chattooga WSR. Alternative 8, 11, 12, 13 and 14 consider modifying the current zoning of the Chattooga WSR by allowing various levels of whitewater boating on the upper segment. These proposed changes in the zoning would introduce another recreation use into the upper segment. Management actions in alternatives 2, 3, 8, 11, 12, 13 and 14 that control the number of visitors, as well as actions related to parking lot size, campsites and trails, would protect the following VBAs, but the level of protection varies. (see Section 3.1 Physical Resources, Section 3.2 Biological Resources and Section 3.3 Social Resources):

- *Overuse would occur and there would be an increase in trash and user impacts; and,*
- *Overuse could lead to a loss of solitude, remoteness, pristine conditions and wilderness type experiences.*

4. Lifestyle

Businesses related to recreation use on the Chattooga River could be impacted by management actions in these alternatives. Recreation use patterns would change and locally available jobs and local tourism industry could be affected, depending on the alternative. Changes in recreation use patterns could change traditions and customs. Therefore, the lifestyle variables of: Patterns of work and leisure; Local job opportunities and/or nature-based tourism; and Customs and traditions are analyzed in this section.

E. Alternative 1 – Direct and Indirect Effects

1. VBAs

For additional discussion on recreation impacts, see Section 3.2.1 Recreation.

a. Solitude

In the short term, existing opportunities for solitude and remoteness, a wilderness experience and ways to experience the upper segment of the Chattooga WSR with families would not change. In the long term, future recreation trends indicate these opportunities could be impacted because this alternative does not cap use (except in the North Carolina portion of the Ellicott Rock Wilderness). In Alternative 1, the current mix of recreation use would stay the same under current forest plan guidelines. Routine planning efforts would periodically assess opportunities for solitude and remoteness to determine if action is needed to protect them.

b. Overuse

Parking lot surveys completed in 2007 indicate that existing parking lot capacity meets current demand except at occasional peak season weekends. Projections of recreation use indicate that current parking lot capacities would meet demand for most of the year in the short-term. Routine planning efforts periodically assess conditions to determine if additional management actions are needed.

Implementation of current forest plan guidelines would close and rehabilitate unsustainable trails and dispersed campsites. Guidelines on management of trails and dispersed campsites vary among the three forest plans guidelines (See Table 2.2.1 in Chapter 2). Implementation of these forest plan guidelines would be viewed as positive by local residents or vacationers who would see the area as being more pristine and an added value to their lifestyle.

2. Lifestyles

a. Patterns of work and leisure

Because Alternative 1 does not allow additional boating opportunities on the Chattooga River, no changes in leisure activities or the available mix of outdoor recreation opportunities would occur in the short term. In the long-term, recreation use would be allowed to grow until current parking areas are filled. Any additional parking would need to be approved on a site-specific basis. No immediate changes in recreation use patterns or lifestyles would occur. The mix of recreation uses and its impact on the upper segment of the Chattooga WSR's resources would be considered during routine planning efforts.

b. Local job opportunities and/or nature-based tourism

No changes to local job opportunities and/or nature-based tourism would occur under current management. Nationwide trends suggest that increased recreation use would bring more visitors to the Chattooga WSR, particularly those interested in nature photography (Cordell 2010a, b and c). This trend would benefit businesses that provide nature-based services. Because some people retire where they enjoy vacationing, increased numbers of tourists could lead to people either retiring to or building vacation homes in the area.

3. Customs and traditions

Because Alternative 1 does not allow additional boating opportunities on the Chattooga River, existing customs and traditions of recreating on the upper segment of the Chattooga WSR while having a boat-free experience would not change.

F. Alternative 2 – Direct and Indirect Effects

1. VBAs

For additional discussion on recreation impacts, see Section 3.2.1 Recreation.

a. Solitude

This alternative would provide the greatest increase in opportunities for solitude, remoteness and a wilderness experience compared to the other alternatives. The ways to experience the upper segment of the Chattooga WSR with families would not change in the frontcountry. No permits are proposed for frontcountry recreation. In Alternative 2, the current mix of recreation uses would stay the same, but permits for backcountry recreation and camping reservations would limit the number of visitors and enhance the natural appearing landscape.

b. Overuse

Parking lot surveys completed in 2007 indicate that existing parking lot capacity meets current demand except at occasional peak season weekends. The management of parking lots, trails and campsites in Alternatives 2, 3, 8, and 11 to 14 would limit the number of visitors; this may be viewed as positive by local residents or vacationers who would see the area as being more pristine and an added value for their lifestyle. However, Alternative 2 requires permits for backcountry use and reservations for campsites. These management actions would restrict visitor's behaviors, but may be seen as a plus for some, since Alternative 2 provides more opportunities for solitude than Alternatives 3, 8, and 11 to 14.

2. Lifestyles

a. Patterns of work and leisure

The permit system, required campsite reservations and closed roadside parking at Burrells Ford in Alternative 2 could lead to changes in recreation use patterns. In the short term, as well as the long term, some existing users may be turned away and need to recreate elsewhere or during another time of the year if they are unable to get a permit, campsite reservation or parking space at Burrells Ford.

b. Local job opportunities and/or nature-based tourism

The existing mix of recreation opportunities would remain under Alternative 2. Therefore, there would be very minor impacts to locally available jobs and the local tourism industry. During peak season if some visitors were forced to recreate elsewhere, then it might affect local businesses, whether or not they offer fishing or boating supplies. These negative impacts likely would not be measureable at the county or state level. Parking lot surveys completed in 2007 indicate that existing parking lot capacity meets current demand except at peak seasons. The management of parking lots and campsites would limit the number of visitors; this may be viewed as positive by local residents or vacationers who would see the area as being more pristine and an added value for their lifestyle.

c. Customs and traditions

The permit system, required campsite reservations and closed roadside parking at Burrells Ford in Alternative 2 could lead to changes in recreation use patterns. In the short term, as well as the long term, some existing users may be turned away and need to recreate elsewhere or during another time of the year if they are unable to get a

permit, campsite reservation or parking space at Burrells Ford. This could change some current customs and traditions on the upper segment of the Chattooga WSR if existing users are unable to obtain a permit or a campsite reservation. However, those who do obtain a permit would still be afforded a boat-free experience while recreating on the upper segment of the Chattooga WSR.

G. Alternative 3 – Direct and Indirect Effects

1. VBAs

For additional discussion on recreation impacts, see Section 3.2.1 Recreation.

a. Solitude

Opportunities for solitude, remoteness and a wilderness experience would be maintained as capacities are designed to maintain backcountry recreation use in the high use season. The ways to experience the upper segment of the Chattooga WSR with families would not change in the frontcountry, but parking may become limiting as recreation use grows. In Alternative 3, the current mix of recreation uses would remain the same, since Alternative 3 does not change the current zoning on the Chattooga WSR.

b. Overuse

Parking lot surveys completed in 2007 indicate that existing parking lot capacity meets current demand except at occasional peak season weekends. The management of parking lots, trails and campsites in alternatives 2, 3, 8, and 11 to 14would limit the number of visitors; this may be viewed as positive by local residents or vacationers who would see the area as being more pristine and an added value for their lifestyle. If monitoring indicates that demand is approaching capacity, adaptive management measures may be needed. Indirect measures would involve techniques to distribute use. However, if indirect measures are ineffective, then direct measures may be needed and may require permits and reservations for campsites. These management actions would restrict visitor's behaviors, but may be seen as a plus for some, since these measures would maintain opportunities for solitude.

2. Lifestyles

a. Patterns of work and leisure

The existing mix of recreation opportunities would remain under Alternative 3. Therefore, there would be very minor impacts to locally available jobs and the local tourism industry. During peak season if some visitors were forced to recreate elsewhere, then it might affect local businesses, whether or not they offer fishing or

boating supplies. These negative impacts likely would not be measureable at the county or state level.

b. Local job opportunities and/or nature-based tourism

The existing mix of recreation opportunities would remain under Alternative 3. Therefore, there would be very minor impacts to locally available jobs and the local tourism industry. During peak season if some visitors were forced to recreate elsewhere, then it might affect local businesses, whether or not they offer fishing or boating supplies. These negative impacts likely would not be measureable at the county or state level.

c. Customs and traditions

Because Alternative 3 does not allow additional boating opportunities on the Chattooga River, existing customs and traditions of recreating on the upper segment of the Chattooga WSR while having a boat-free experience would not change.

H. Alternative 8 – Direct and Indirect Effects

1. VBAs

For additional discussion on recreation impacts, see Section 3.2.1 Recreation.

a. Solitude

Opportunities for solitude, remoteness and a wilderness experience would be maintained as capacities are designed to maintain backcountry recreation use in the high use season. However, parking may become limiting as recreation use grows. Alternative 8 would change the current zoning, so that whitewater boating would be allowed on the Chattooga WSR, from the Green Creek put-in downstream to Tugaloo Lake. Families would still have opportunities for frontcountry recreation, but there may be some concerns about allowing their children to swim. In general, swimmers prefer using the lower flows, but boaters prefer using the high flows, so conflicts should be minimal.

b. Overuse

Parking lot surveys completed in 2007 indicate that existing parking lot capacity meets current demand except at occasional peak season weekends. The management of parking lots, trails and campsites in alternatives 2, 3, 8, 11, 12, 13, and 14 would limit the number of visitors; this may be viewed as positive by local residents or vacationers who would see the area as being more pristine and an added value for their lifestyle. If monitoring indicates that demand is approaching capacity, adaptive management

measures may be needed. Indirect measures would involve techniques to distribute use. However, if indirect measures are ineffective, then direct measures may be needed and may require permits and reservations for campsites. These management actions would restrict visitor's behaviors, but may be seen as a plus for some, since these measures would maintain opportunities for solitude.

2. Lifestyles

a. Patterns of Work and Leisure

This alternative would add a new user group, year round, at all flows in all four reaches. Therefore, there would be a new mix of recreation opportunities under Alternative 8. As a result, those visitors who desire a guaranteed, boat-free experience may choose to go elsewhere to recreate. In addition, this could cause an influx of boaters throughout the year. Overall this change would have very minor impacts to the local tourism industry at the three-state level.

b. Local Job Opportunities and/or Nature-based Tourism

Locally available jobs would not be noticeably affected by this alternative at a county level, although some local businesses may see some changes in requests for goods or services. While the overall economic impact is minor, local businesses could see minor changes in demand for fishing and kayaking supplies.

c. Customs and Traditions

Because Alternative 8 allows boating at all flows, in all reaches, year round, some existing customs and traditions of recreating on the upper segment of the Chattooga WSR while having a boat-free experience could change. Conversely, allowing boating on the upper segment of the Chattooga WSR could provide for new customs and traditions for others involved in boating.

I. Alternative 11 – Direct and Indirect Effects

1. VBAs

For additional discussion on recreation impacts, see section 3.2.1 Recreation.

a. Solitude

Opportunities for solitude, remoteness and a wilderness experience would be maintained as capacities are designed to maintain existing backcountry recreation use in the high use season. However, parking may become limiting as recreation use grows. Alternative 11 would change the current zoning, so that whitewater boating would be allowed on the Chattooga WSR, from the Green Creek put-in downstream to Tugaloo Lake at flows of 350 cfs or great. Families would still have opportunities for frontcountry recreation, but there may be some concerns about allowing their children to swim. In general, swimmers prefer using the lower flows, but boaters prefer using the high flows, so conflicts should be minimal since this alternative does not allow boating at low flows.

b. Overuse

Parking lot surveys completed in 2007 indicate that existing parking lot capacity meets current demand except at occasional peak season weekends. The management of parking lots, trails and campsites in Alternatives 2, 3, 8, and 11 to 14would limit the number of visitors; this may be viewed as positive by local residents or vacationers who would see the area as being more pristine and an added value for their lifestyle. If monitoring indicates that demand is approaching capacity, adaptive management measures may be needed. Indirect measures would involve techniques to distribute use. However, if indirect measures are ineffective, then direct measures may be needed and may requires permits and reservations for campsites. These management actions would restrict visitor's behaviors, but may be seen as a plus for some, since these measures would maintain opportunities for solitude.

2. Lifestyles

a. Patterns of Work and Leisure

This alternative would add a new user group, year round, at flows of 350 cfs or greater in all four reaches. Therefore, there would be a new mix of recreation opportunities under Alternative 11. As a result, those visitors who desire a guaranteed, boat-free experience may choose to go elsewhere to recreate. In addition, allowing the new use of boating could cause an influx of boaters throughout the year. Overall this change would have very minor impacts to the local tourism industry at the three-state level.

b. Local Job Opportunities and/or Nature-based Tourism

Locally available jobs would not be noticeably affected by this alternative at a county level, although some local businesses may see some changes in requests for goods or services. While the overall economic impact is minor, local businesses could see less demand for fishing supplies and an increased demand for kayaking supplies.

c. Customs and Traditions

Because Alternative 11 allows boating at flows of 350 cfs or greater, in all reaches, year round, some existing customs and traditions of recreating on the upper segment of the Chattooga WSR while having a boat-free experience could change. Conversely, allowing boating on the upper segment of the Chattooga WSR could provide for new customs and traditions for others involved in boating.

J. Alternative 12 – Direct and Indirect Effects

1. VBAs

For additional discussion on recreation impacts, see Section 3.2.1 Recreation.

a. Solitude

Opportunities for solitude, remoteness and a wilderness experience would be maintained as capacities are designed to maintain existing backcountry recreation use in the high use season. However, parking may become limiting as recreation use grows. Alternative 12 would change the current zoning, so that whitewater boating would be allowed on the Chattooga WSR, from the Green Creek put-in downstream to Burrells Ford from December 1 to January 15 and from Burrells Ford to Lick Log creek from January 16 to March 1 . Families would have opportunities for frontcountry recreation without concerns that boating would interfere with swimming. In general, swimmers use the river in the warmer month and boaters would be limited to the winter months, so no conflicts between boaters and swimmers are anticipated.

b. Overuse

Parking lot surveys completed in 2007 indicate that existing parking lot capacity meets current demand except at occasional peak season weekends. The management of parking lots, trails and campsites in Alternatives 2, 3, 8, and 11 to 14would limit the number of visitors; this may be viewed as positive by local residents or vacationers who would see the area as being more pristine and an added value for their lifestyle. If monitoring indicates that demand is approaching capacity, adaptive management measures may be needed. Indirect measures would involve techniques to distribute use. However, if indirect measures are ineffective, then direct measures may be needed and

may requires permits and reservations for campsites. These management actions would restrict visitor's behaviors, but may be seen as a plus for some, since these measures would maintain opportunities for solitude.

2. Lifestyles

a. Patterns of Work and Leisure

This alternative would add a new user group, from December 1 to January 15 or from January 16 to March1, at all flows in from Green Creek down to Lick Log Creek. Therefore, there would be a new mix of recreation opportunities under Alternative 12. As a result, those visitors who desire a guaranteed, boat-free experience may choose to go elsewhere to recreate. This alternative would allow visitors who desire a boat-free experience during the winter months in the Chattooga Cliffs or Ellicott Rock Reaches with some advanced planning. In addition, allowing the new use of boating could cause an influx of boaters during the winter months. Overall this change would have very minor impacts to the local tourism industry at the three-state level.

b. Local Job Opportunities and/or Nature-based Tourism

Locally available jobs would not be noticeably affected by this alternative at a county level, although some local businesses may see some changes in requests for goods or services. While the overall economic impact is minor, local businesses could see less demand for fishing supplies and an increased demand for kayaking supplies.

c. Customs and Traditions

Because Alternative 12 allows boating at all flows from Green Creek down to Lick Log Creek from either December 1 to January 15 or from January 15 to March 1,there may be some minor impacts to some existing customs and traditions of recreating on the upper segment of the Chattooga WSR while having a boat-free experience could change. Conversely, allowing boating on the upper segment of the Chattooga WSR could provide for new customs and traditions for others involved in boating.

K. Alternative 13 – Direct and Indirect Effects

1. VBAs

For additional discussion on recreation impacts, see Section 3.2.1 Recreation.

a. Solitude

Opportunities for solitude, remoteness and a wilderness experience would be maintained as capacities are designed to maintain existing backcountry recreation use in the high use season. However, parking may become limiting as recreation use grows. Alternative 13 would change the current zoning, so that whitewater boating would be allowed on the Chattooga WSR, from the Green Creek put-in downstream to Lick Log creek from December 1 to March 1 at flows of 350 cfs or greater. Families would have opportunities for frontcountry recreation without concerns that boating would interfere with swimming. In general, swimmers use the river in the warmer month and boaters would be limited to the winter months, so no conflicts between boaters and swimmers are anticipated.

b. Overuse

Parking lot surveys completed in 2007 indicate that existing parking lot capacity meets current demand except at occasional peak season weekends. The management of parking lots, trails and campsites in Alternatives 2, 3, 8, and 11 to 14would limit the number of visitors; this may be viewed as positive by local residents or vacationers who would see the area as being more pristine and an added value for their lifestyle. If monitoring indicates that demand is approaching capacity, adaptive management measures may be needed. Indirect measures would involve techniques to distribute use. However, if indirect measures are ineffective, then direct measures may be needed and may requires permits and reservations for campsites. These management actions would restrict visitor's behaviors, but may be seen as a plus for some, since these measures would maintain opportunities for solitude.

2. Lifestyles

a. Patterns of Work and Leisure

This alternative would add a new user group, boating, at above 350 cfs from December 1 to March 1 between Green Creek and Lick Log Creek. Therefore, there would be a new mix of recreation opportunities under Alternative 13. As a result, those visitors who desire a guaranteed, boat-free experience may choose to go elsewhere to recreate. In addition, allowing the new use of boating could cause an influx of boaters throughout the winter months. Overall this change would have very minor impacts to the local tourism industry at the three-state level.

b. Local Job Opportunities and/or Nature-based Tourism

Locally available jobs would not be noticeably affected by this alternative at a county level, although some local businesses may see some changes in requests for goods or services. While the overall economic impact is minor, local businesses could see less demand for fishing supplies and an increased demand for kayaking supplies.

c. Customs and Traditions

Because Alternative 13 allows boating at flows of 350 cfs or higher, from Green Creek to Lick Log Creek in the winter, some existing customs and traditions of recreating on the upper segment of the Chattooga WSR while having a boat-free experience could change. Conversely, allowing boating on the upper segment of the Chattooga WSR could provide new customs and traditions for others involved in boating.

L. Alternative 14 – Direct and Indirect Effects

1. VBAs

For additional discussion on recreation impacts, see Section 3.2.1 Recreation.

a. Solitude

Opportunities for solitude, remoteness and a wilderness experience would be maintained as capacities are designed to maintain existing backcountry recreation use in the high use season. However, parking may become limiting as recreation use grows. Alternative 14 would allow boating on the upper segment of the Chattooga WSR, from the Green Creek put-in Hwy. 28 at flows of 450 cfs or great. Families would still have opportunities for frontcountry recreation, but there may be some concerns about allowing their children to swim. In general, swimmers prefer using lower flows, but boaters prefer using high flows, so conflicts should be minimal since this alternative limits boating to flows above 450 cfs.

b. Overuse

Parking lot surveys completed in 2007 indicate that existing parking lot capacity meets current demand except at occasional peak season weekends. The management of parking lots, trails and campsites in Alternatives 2, 3, 8, and 11 to 14would limit the number of visitors; this may be viewed as positive by local residents or vacationers who would see the area as being more pristine and an added value for their lifestyle. If monitoring indicates that demand is approaching capacity, adaptive management measures may be needed. Indirect measures would involve techniques to distribute use. However, if indirect measures are ineffective, then direct measures may be needed and may requires permits and reservations for campsites. These management actions would restrict visitor's behaviors, but may be seen as a plus for some, since these measures would maintain opportunities for solitude.

2. Lifestyles

a. Patterns of Work and Leisure

This alternative would add a new user group, year round, at flows of 450 cfs or higher in all four reaches. Therefore, there would be a new mix of recreation opportunities under Alternative 14. As a result, those visitors who desire a guaranteed, boat-free experience may choose to go elsewhere to recreate. In addition, allowing the new use of boating could cause an influx of boaters throughout the year. Overall this change would have very minor impacts to the local tourism industry at the three-state level.

b. Local Job Opportunities and/or Nature-based Tourism

Locally available jobs would not be noticeably affected by this alternative at a county level, although some local businesses may see some changes in requests for goods or services. While the overall economic impact is minor, local businesses could see less demand for fishing supplies and an increased demand for kayaking supplies.

c. Customs and Traditions

Because Alternative 14 allows boating at high flows, in all reaches, year round, some existing customs and traditions of recreating on the upper segment of the Chattooga WSR while having a boat-free experience could change. Conversely, allowing boating on the upper segment of the Chattooga WSR could provide for new customs and traditions for others involved in boating.

M Cumulative Effects Common to All Alternatives

Minor cumulative effects are anticipated when the recreation uses in these alternatives are considered with past, present or reasonably foreseeable management actions (see Table 3.1-7). Boaters would continue to have year-round boating on the lower Chattooga River. Those actions that may impact frontcountry and backcountry recreation experiences include the Burrells Ford Campground rehabilitation, the development of the Southern Appalachian Farmstead (SAF), Chattooga Trail reconstruction/relocation, County Line Road parking lot construction and requests for new special-use recreation permits. Minor cumulative effects to recreation use patterns, mix of recreation uses or impacts to local, nature-based businesses would occur but would not be detectable at the county level.

1. VBAs

Past, present and foreseeable activities within the Chattooga River corridor would not change the natural amenities that visitors and migrants value so highly, but could change recreation use patterns slightly. Current Forest Service management would continue to

provide those outdoor recreation opportunities that draw people to the surrounding four-county area.

The proposed parking lot off County Line Trail would replace parking spaces that were lost when County Road 1011 was widened. The proposal to restore the SAF includes a 30-car parking lot located about 0.5 miles from the S.C. Highway 28 bridge. This parking lot is not anticipated to increase parking capacity for the upper segment of the Chattooga WSR Corridor, but to provide parking for existing and future visitors to the SAF or the river next to the proposed SAF.

2. Lifestyles

Current Forest Service management would continue to provide outdoor recreation opportunities that reinforce family bonds and friendships. The development of the SAF would provide additional recreation opportunities that could improve lifestyle and job opportunities in the surrounding area. Whitewater rafting and guiding on the lower Chattooga River would continue to draw in tourists.

3. Social Organization

Management actions in this alternative would continue to have a very minor indirect effect on local job opportunities and nature-based tourism, as would any special-use permits approved in the future. Existing guiding and rafting opportunities would continue. If the SAF is approved, it may put additional demand on Oconee County services. Routine maintenance of Forest Service roads would slightly improve the surrounding counties' and/or the three states' abilities to provide some services, such as emergency or wildfire response.

3.7 WILDERNESS

I. SUMMARY OF FINDINGS

This analysis is focused only on the Ellicott Rock reach and specifically the Ellicott Rock Wilderness within the Chattooga River corridor. The analysis incorporates Table 3.7-1 as a guide for the discussion of the effects. The four qualities of wilderness character are used as a framework for analysis and discussion. Those qualities are:

- Untrammeled
- Natural
- Undeveloped; and
- Outstanding opportunities for solitude or a primitive and unconfined type recreation.

Undeveloped and *outstanding opportunities for solitude or a primitive and unconfined type recreation* are two of the four qualities of wilderness character that might be affected by the proposed mix of recreation uses. The analysis suggests that Alternative 8 would likely result in the most negative impacts to the wilderness character. This is because the alternative presents a higher potential for the use of mechanized transport. Also, the addition of unlimited boating in this alternative would introduce the potential for forest visitors to now have encounters in an area, the river, where they had not had encounters previously. Introducing this potential would change the recreation setting. Before, a visitor may have been able to be assured that while hiking along the riverbank or looking out across the river, they would not encounter another visitor on the river. This potential for an encounter with someone on the river now exists. This would equate to a reduction in opportunities for solitude because of the change in setting that now includes boaters. This would negatively impact opportunities for solitude. Alternative 2 would likely result in the most improvement in wilderness character. This is a result of the numerous actions being proposed to promote opportunities for solitude. The effects of all other alternatives would fall somewhere in between these two.

II. AFFECTED ENVIRONMENT

The upper segment of the Chattooga WSR Corridor overlaps with 1,576 acres of the Ellicott Rock Wilderness. An approximate five-mile stretch of the Wild and Scenic Chattooga River (Chattooga WSR) flows through the Ellicott Rock Wilderness. The Ellicott Rock Reach runs from approximately one-quarter mile below Bullpen Road Bridge in North Carolina to approximately one-quarter mile above Burrells Ford Bridge in South Carolina and Georgia.

The Ellicott Rock Wilderness was originally designated in 1975; additional acres were added in 1984. Today, this wilderness totals 8,724 acres. This is the only wilderness in the nation that lies in three states—South Carolina, North Carolina and Georgia. Although logging operations occurred here in the early 1900s, today the wilderness contains a diversity of species that

includes white pine, hemlock, upland hardwoods, scrub oak and pitch pine. A special feature of the area is Ellicott Rock where, in 1811, surveyor Andrew Ellicott determined the starting point for the North Carolina–Georgia border and chiseled an inconspicuous mark on the east bank of the Chattooga River.

Similar to elsewhere on the upper segment of the Chattooga WSR, current activities in the Ellicott Rock Wilderness include hiking, backpacking, wildlife viewing, fishing, swimming and other land-based activities. Whittaker and Shelby (2007) report the following:

- A 1994–1995 survey of existing Ellicott Wilderness users shows an average group size of 4.5 (Rutlin 1995). The study shows 62% were day users; only 15% spent more than one night. Among day users, nearly half stayed just a few hours, 42% spent half a day, and 13% spent the full day.
- The 1994–1995 study reported primary activities for the sample: 45% day hikers, 30% campers, 20% anglers, and 3% wildlife viewers. Because people engaged in multiple activities, participation rates were higher; about 75% reported day hiking, 45% viewing wildlife, 38% camping, 34% fishing, and 4% swimming.
- Most hiking use is focused on the designated trails between Ellicott Rock and Burrells Ford and up the East Fork Trail to the Walhalla Fish Hatchery, all of which are relatively close to the river. Off-trail use in the wilderness is considered light.

Wilderness management is bound by the legal requirements of the Wilderness Act of 1964. The act describes the primary direction for wilderness stewardship as "each agency administering any area designated as wilderness shall be responsible for preserving the wilderness character of the area" (Landres et al. 2008; McCloskey 1999; Rohlf and Honnold 1988; US Congress 1983).

Projects proposed in designated wilderness are evaluated for their impacts to the four qualities of wilderness character as described by Landres et al. (2008). As noted in the summary, these four qualities are:

- Untrammeled—Wilderness is essentially unhindered and free from modern control or manipulation. The indicators are activities that manipulate the biophysical environment;
- Natural—Wilderness ecological systems are substantially free from the effects of modern civilization. Indicators are indigenous plants and animals that are listed or of concern, non-indigenous invasive plant and animal species, water quality, and soil disturbance and erosion;
- Undeveloped—Wilderness retains its primeval character and influence, and is essentially without permanent improvement or modern human occupation. Indicators include non-recreational structures and improvements, motorized equipment use, mechanical transport use, and disturbance to cultural sites; and
- Outstanding opportunities for solitude or a primitive and unconfined type recreation—Wilderness provides outstanding opportunities for solitude or primitive and unconfined recreation. Indicators include remoteness from sights and sounds of people inside the wilderness and management restrictions on visitor behavior.

III. Existing Impacts to the Environment

The existing impacts to the wilderness character of the Ellicott Rock Wilderness include:

A. Untrammeled

Activities that may currently impact this quality include fire suppression. None of the proposed alternatives would affect the untrammeled quality of wilderness because no actions are being proposed (authorized or unauthorized) that would intentionally control or manipulate ecological systems in the wilderness. Therefore, this quality is not discussed in the direct or indirect effects.

B. Natural

The main impact on this quality may be the timber management activities of the early 1900s. Additionally, non-system trails, campsite impacts, populations of non-native invasive species may also be currently impacting the environment.

Indigenous plants and animals that are listed or of concern, non-native invasive plant and animal species, water quality, and soil disturbance and erosion are discussed in detail in other sections of this document (see Section 3.1 Physical Resources and Section 3.2 Biological Resources). Based on those analyses, none of the proposed alternatives would negatively affect the natural quality of the Ellicott Rock Wilderness.

C. Undeveloped

No known impacts to the undeveloped quality currently exist. No non-recreational structures and improvements are proposed. Based on review by the Forest Archaeologist, no impacts would occur to known historic sites within the Ellicott Rock Wilderness (see Section 3.3.2 Heritage Resources). Therefore, this quality is not discussed in the direct or indirect effects.

D. Outstanding Opportunities for Solitude or Primitive and Unconfined Recreation

The wilderness receives high levels of visitation during the peak season of summer (June 1–Aug. 31). Opportunities for solitude may be reduced during this time of the year. Opportunities for primitive or unconfined recreation remain stable throughout the year.

IV. Environmental Consequences

A. All Alternatives—Direct and Indirect Effects

1. Undeveloped

As outlined in Section 3.3.3 Human Health and Safety (Search and Rescue), "The number of accidents, fatalities and SAR would likely increase if boating is allowed in the upper segment of the Chattooga WSR." Therefore requests for mechanized transport during search and rescue operations likely would increase. The more boating activity that occurs on the upper segment of the Chattooga WSR as a result of management actions in alternatives 8, 11, 12, 13 and 14, the more likely it is that SAR needs would increase from current levels and result in negatively impacting the undeveloped quality of the wilderness.

2. Outstanding Opportunities for Solitude or Primitive and Unconfined Recreation

Management actions in all of the alternatives would protect the existing outstanding opportunities for solitude in the Ellicott Rock Wilderness (see Section 3.3.1 Recreation), some more than others. For example, Alternative 8 would provide the least protection of the opportunities for solitude because the addition of unlimited boating in this alternative would introduce the potential for forest visitors to now have encounters in an area, the river, where they had not had encounters previously. Introducing this potential would change the recreation setting. Under current management, a visitor may have been able to be assured that while hiking along the riverbank or looking out across the river, they would not encounter another visitor on the river. This potential for an encounter with someone on the river now exists. This would equate to a reduction in opportunities for solitude because of the change in setting that now includes boaters. The potential for such encounters in Alternative 8 could negatively impact opportunities for solitude for some users. On the opposite end of the spectrum, a permit system limiting use in Alternative 2 would provide more outstanding opportunities for solitude in the Ellicott Rock Reach than under current management. The other alternatives fall somewhere in between the two.

B. Alternative 1—Direct and Indirect Effects

1. Undeveloped

Despite consistent hiking, swimming and angling use on the upper segment of the Chattooga WSR for the last 20 years, no fatalities have been recorded above Highway 28; SAR responses are rare. In the short term, existing mixes of recreation uses would not change; therefore, SAR responses would remain about the same. Generally speaking,

recreation use is increasing in almost all activities except hunting (Whittaker and Shelby 2007). In the long term, it is unlikely that fatalities would increase and the potential for a substantial increase in SAR responses, as well as increased use in mechanized equipment in the wilderness, is low.

2. Outstanding Opportunities for Solitude or Primitive and Unconfined Recreation

Under this alternative, only one national forest (Nantahala in North Carolina) limits the number of encounters in the wilderness; currently, capacity is dictated by parking lot availability although the agency could, on a site-specific basis, increase parking at any time under this alternative. Given predicted trends in recreation, as well as the lack of capacity limits in this alternative, opportunities for solitude could be reduced as recreation use is allowed to increase into the future.

Additionally, the primitive and unconfined recreation quality of the wilderness would be impacted under Alternative 1 because boaters would not be permitted to float there.

C. Alternative 1—Cumulative Effects

No past, present, or foreseeable activities would affect the four qualities of wilderness character within the Ellicott Rock Wilderness. Management activities listed in Table 3.1-6 would occur outside of the wilderness area and would not affect access into the wilderness. Ongoing activities, such as routine trail or parking lot maintenance would continue and would not affect the qualities of Untrammeled, Natural, Undeveloped, or Solitude or Primitive and Unconfined Recreation.

D. Alternative 2—Direct and Indirect Effects

The mix of recreation uses in Ellicott Rock reach would not change. In the long-term, opportunities for solitude could be improved as the permitting system could be used to separate recreation users within Ellicott Rock Wilderness.

1. Undeveloped

There would likely be a slight positive effect on this quality within the Ellicott Rock Reach and in the Ellicott Rock Wilderness. This is because a permit system and reservations for campsites would provide for pre-trip education opportunities when visitors can be informed of practices concerning safe wilderness travel, as well as appropriate activities within the wilderness. This should result in a minimization of requests and authorizations for mechanized travel for SAR. Additionally, the primitive and unconfined recreation quality of the wilderness would be impacted under Alternative 1 because boaters would not be permitted to float there.

2. Outstanding Opportunities for Solitude or Primitive and Unconfined Recreation

The use of capacity limits, a permit system, reduced parking opportunities, group size limits, trail designs for solitude, camping restrictions and reservations would all serve to provide a moderate positive effect on this quality within the Ellicott Rock Reach. At the same time, the types of management restrictions proposed would also provide a moderate negative effect within the Ellicott Rock Wilderness.

E. Alternative 2—Cumulative Effects

No past, present, or foreseeable activities would affect the four qualities of wilderness character within the Ellicott Rock Reach or the Ellicott Rock Wilderness. Management activities listed in Table 3.1-6 would occur outside of the wilderness area and would not affect access into the wilderness. Ongoing activities, such as routine trail or parking lot maintenance would continue and would not affect the qualities of Untrammeled, Natural, Undeveloped, or Solitude or Primitive and Unconfined Recreation.

F. Alternative 3—Direct and Indirect Effects

The mix of recreation uses in Ellicott Rock reach would not change. In the long-term, opportunities for solitude could be improved as backcountry capacity is used to limit the number of visitors to Ellicott Rock Wilderness.

1. Undeveloped

There would be a slight change in this quality during the winter, fall and spring where use would be allowed and expected to increase slightly and thereby increase the need for SAR.

2. Outstanding Opportunities for Solitude or Primitive and Unconfined Recreation

The use of backcountry capacities, parking limits, group size limits and camping restrictions would all serve to provide a slight positive effect on this quality within the Ellicott Rock Wilderness. The allowance of growth in winter, fall, and spring seasons in the future will create a slight negative effect within Ellicott Rock Reach and the Ellicott Rock Wilderness. Additionally, a negative impact would exist in the primitive and unconfined recreation component from the management restrictions on boaters in this alternative.

G. Alternative 3—Cumulative Effects

No past, present, or foreseeable activities would affect the four qualities of wilderness character within the Ellicott Rock Reach or the Ellicott Rock Wilderness. Management activities listed in Table 3.1-6 would occur outside of the wilderness area and would not affect access into the wilderness. Ongoing activities, such as routine trail or parking lot maintenance would continue and would not affect the qualities of Untrammeled, Natural, Undeveloped, or Solitude or Primitive and Unconfined Recreation for the Wilderness character of Ellicott Rock Wilderness.

H. Alternative 8—Direct and Indirect Effects

The mix of recreation uses with Ellicott Rock Reach would include boating. It is anticipated that boaters would be present at flow levels from 225 to 800 cfs for an average of 63 days per year (using the MDF method) and an average of 99 days using peak, year-round within Ellicott Rock Reach.

1. Undeveloped

Since boaters would be floating through the Ellicott Rock Reach without regulated flow restrictions, there would be potential moderate negative impacts. Specifically, at flows between 225 and 800 cfs, there would be an average of 63 days when boating opportunities are available per year (using Mean Daily Flow) and 99 days per year (using peak), the largest number of boaters in this reach in all the alternatives. This increase in boating use over the entire year together with increases in existing users during the shoulder seasons (winter, spring and fall) would increase the likelihood of search and rescue operations and requests to use mechanical transport. These requests are expected to be higher than Alternative 1.

2. Outstanding Opportunities for Solitude or Primitive and Unconfined Recreation

There would likely be a moderate negative effect on the solitude component of this quality within the Ellicott Rock Reach and the Ellicott Rock Wilderness. The use of capacity limits, parking limits, group size limits and camping restrictions would have positive effects on opportunities for solitude. However, the addition of boating on the river without regulated flow restrictions, along with the allowance of growth in winter, fall and spring for existing users, would create a negative effect within the Ellicott Rock Reach. However, because of the partial separation of uses generated by flows and associated cold, wet weather, solitude impacts are expected to be slight (although they are the greatest impacts to solitude opportunities of all alternatives). Opportunities for primitive and unconfined recreation would not be affected in this alternative.

Boaters would likely use the parking areas at Burrells Ford to access the river. Since parking is limited, it might result in hikers or backpackers being displaced from the Ellicott Rock Reach as the parking areas here fill during peak-use times. However, it is expected that most of the boaters would be on the river at times when few hikers and backpackers would be present (Section 3.2.1 Recreation).

I. Alternative 8—Cumulative Effects

No past, present, or foreseeable activities would affect the four qualities of wilderness character within the Ellicott Rock Reach or the Ellicott Rock Wilderness. Management activities listed in Table 3.1-6 would occur outside of the wilderness area and would not affect access into the wilderness. Ongoing activities, such as routine trail or parking lot maintenance would continue and would not affect the qualities of Untrammeled, Natural, Undeveloped or Outstanding Opportunities for Solitude or Primitive and Unconfined Recreation for the Wilderness character of Ellicott Rock Wilderness.

J. Alternative 11—Direct and Indirect Effects

1. Undeveloped

There would likely be a slight negative effect on this quality within the Ellicott Rock Reach in the Ellicott Rock Wilderness. Allowing boats at 450 cfs and above would result in an average of 15 days with boating opportunities per year (using MDF) and an average of 35 days per year (using peak). This boating use, together with existing users that would be allowed to increase in the shoulder seasons (winter, spring and fall), may precipitate the need for additional SAR operations and associated requests to use mechanical transport. However, these requests are expected to be similar to Alternative 3 (since boaters tend to self rescue more than existing users). Access to the Ellicott Rock Reach is limited by steep terrain and any river rescues would likely require the use of mechanical transport.

2. Outstanding Opportunities for Solitude or Primitive and Unconfined Recreation

There would likely be a slight negative effect on the solitude component of this quality within the Ellicott Rock Wilderness. However, the use of capacity limits, parking limits, group size limits, camping restrictions and flow restrictions for boaters (along with the associated wet, cold weather) would serve to mitigate effects on opportunities for solitude (about the same as Alternative 3) from the addition of boating and the allowance of some growth for existing users in the winter, spring and fall.

An additional negative impact to the Primitive and Unconfined Recreation component of the above quality would result from the management restrictions placed on boaters.

Boaters would likely use the parking areas at Burrells Ford to access the river. Since parking is limited, it might result in hikers or backpackers being displaced from the Ellicott Rock Reach as the parking areas here fill during peak-use times. However, it is expected that most of the boaters would be on the river at times when few hikers and backpackers would be present (Section 3.3-1 Recreation). This impact would be considerably less than Alternative 8.

K. Alternative 11—Cumulative Effects

No past, present, or foreseeable activities would affect the four qualities of wilderness character within the Ellicott Rock Reach or the Ellicott Rock Wilderness. Management activities listed in Table 3.1-6 would occur outside of the wilderness area and would not affect access into the wilderness. Ongoing activities, such as routine trail or parking lot maintenance would continue and would not affect the qualities of Untrammeled, Natural, Undeveloped, or Solitude or Primitive and Unconfined Recreation for the Wilderness character of Ellicott Rock Wilderness.

L. Alternative 12—Direct and Indirect Effects

1. Undeveloped

There would be a slight negative effect on this quality within Ellicott Rock Reach. Under this alternative, it is anticipated that an average of nine days per year would have sufficient mean daily flows to allow boating for a six-week period from either December 1 to January 15. This would increase the likelihood that SAR operations would be needed within the Ellicott Rock Reach and Wilderness and the associated requests for the use of mechanical transport. Impacts should be similar to Alternatives 3 and 11.

2. Outstanding Opportunities for Solitude or Primitive and Unconfined Recreation

There would likely be a slight negative effect on this quality within the Ellicott Rock Reach and Wilderness due to the addition of boating along with the potential growth of existing user groups in winter, fall and spring. However, the use of capacity limits, boating restrictions, parking limits, group size limits and camping restrictions would all serve to mitigate this slight negative effect on opportunities for solitude. An additional negative impact to the primitive and unconfined recreation component would result from the management restrictions placed on boaters (more impact than Alternative 11).

M. Alternative 12—Cumulative Effects

No past, present, or foreseeable activities would affect the four qualities of wilderness character within the Ellicott Rock Reach or the Ellicott Rock Wilderness. Management activities listed in Table 3.1-6 would occur outside of the wilderness area and would not affect access into the wilderness. Ongoing activities, such as routine trail or parking lot maintenance would continue and would not affect the qualities of Untrammeled, Natural,

Undeveloped, or Solitude or Primitive and Unconfined Recreation for the Wilderness character of Ellicott Rock Wilderness.

N. Alternative 13—Direct and Indirect Effects

1. Undeveloped

There would likely be a slight negative effect on this quality since this alternative would allow for a mid-range of days with boating opportunities. Boating use together with existing users that are allowed to increase in the shoulder seasons (winter, spring and fall) may precipitate the need for additional SAR operations and associated requests to use mechanical transport. However, these requests are expected to be similar to Alternative 3 and 11 (since boaters tend to self rescue more than existing users).

2. Outstanding Opportunities for Solitude or Primitive and Unconfined Recreation

There would likely be a slight negative effect on the opportunities for solitude component of this quality. However, the use of capacity limits, parking limits, group size limits, camping restrictions and flow and seasonal restrictions for boaters would all serve to mitigate these impacts from boaters December 1 to March 1 and existing users during the shoulder seasons (winter, spring and fall). The resulting effects to opportunities to solitude component would be expected to be similar to those found in alternative three and eleven.

An additional negative impact to the primitive and unconfined component of the above quality would result from the management restrictions placed on boaters (about the same as Alternative 12).

O. Alternative 13—Cumulative Effects

No past, present, or foreseeable activities would affect the four qualities of wilderness character within the Ellicott Rock Reach or the Ellicott Rock Wilderness. Management activities listed in Table 3.1-6 would occur outside of the wilderness area and would not affect access into the wilderness. Ongoing activities, such as routine trail or parking lot maintenance would continue and would not affect the qualities of Untrammeled, Natural, Undeveloped, or Solitude or Primitive and Unconfined Recreation for the Wilderness character of Ellicott Rock Wilderness.

P. Alternative 14—Direct and Indirect Effects

1. Undeveloped

There would likely be a slight negative effect on this quality. This alternative would allow for a mid range of days with boating opportunities along with the potential for existing users to increase in the shoulder seasons. This would increase the likelihood for search and rescue and operations and the associated requests to use mechanical transport. Impacts would be greater than Alternative 11 but less than Alternative 8.

2. Outstanding Opportunities for Solitude or Primitive and Unconfined Recreation

There would likely be a slight negative effect on this quality. The use of capacity limits, parking limits, group size limits, camping restrictions and flow restrictions on boaters would all serve to mitigate impacts which would be expected to be similar to those found in Alternative 11.

An additional negative impact would result from the management restrictions placed on boaters. Impacts would be about the same as Alternative 11.

Q. Alternative 14—Cumulative Effects

No past, present, or foreseeable activities would affect the four qualities of wilderness character within the Ellicott Rock Reach or the Ellicott Rock Wilderness. Management activities listed in Table 3.1-6 would occur outside of the wilderness area and would not affect access into the wilderness. Ongoing activities, such as routine trail or parking lot maintenance would continue and would not affect the qualities of Untrammeled, Natural, Undeveloped, or Solitude or Primitive and Unconfined Recreation for the Wilderness character of Ellicott Rock Wilderness.

Table 3.7-1 Summary of Effects of Alternatives on the Four Qualities of Wilderness Character

Proposed Action										
Quality	Component	Indicator	Summary of Effects by Alternative							
			1	2	3	8	11	12	13	14
Untrammeled Wilderness is essentially unhindered and free from modern control or manipulation	Authorized actions that control or manipulate the "earth and its community of life"	Actions authorized by the Federal land manager that manipulate the biophysical environment	0	0	0	0	0	0	0	0
	Unauthorized actions that control or manipulate the "earth and its community of life"	Actions not authorized by the Federal land manager that manipulate the biophysical environment	0	0	0	0	0	0	0	0
Natural Wilderness ecological systems are substantially free from the effects of modern civilization	Terrestrial, aquatic, and atmospheric natural species and physical resources.	Indigenous plant and animal species that are listed or of concern	S	S	S	S	S	S	S	S
		Non-indigenous invasive plant and animal species	S	S	S	S	S	S	S	S
		Water quality	S	S	S	S	S	S	S	S
		Soil disturbance and erosion	S	S	S	S	S	S	S	S
	Terrestrial aquatic, and atmospheric biophysical processes	No indicators identified								
Undeveloped Wilderness retains its primeval character and influence, and essentially without permanent improvement or modern human occupation.	Development	Non-recreational structures and improvements	0	0	0	0	0	0	0	0
	Mechanization	Motorized equipment use	0	0	0	0	0	0	0	0
		Mechanical transport use	0	+	0	**	*	*	*	*
	Loss of statutorily protected resources	Disturbance to cultural sites	S	S	S	S	S	S	S	S
Solitude or Primitive and Unconfined Recreation Wilderness provides outstanding opportunities for solitude or primitive and unconfined recreation	Outstanding opportunities for solitude	Remoteness from sights and sounds of people inside the wilderness	*	++	+*	**	*	*	*	*
	Outstanding opportunities for primitive and unconfined recreation	Management restrictions on visitor behavior	* B	** E B	*B	0	*B	*B	*	*

*** Significant negative effect: Effects are long lasting and have the potential to significantly degrade the wilderness character
** Moderate negative effect: Effects are of moderate to long-term duration and have potential to appreciably degrade the wilderness character
* Slight negative effect: Effects are of short-term duration; the effect on wilderness character is deemed negative though minor in intensity.
0 No discernable effect: Effects of the proposed action on this indicator are negligible in intensity and duration..
+ Slight positive effect: Effects are of short-term duration; the effect on wilderness character is deemed positive though minor in intensity..
++ Moderate positive effect: Effects are of moderate to long-term duration and have potential to appreciably improve the wilderness character.
+++ Significant positive effect: Effects are long lasting and have potential to significantly improve the wilderness character.
S Analysis for this indicator has not been completed in this section; other sections of this EA cover this analysis.
B Boaters
E Existing users

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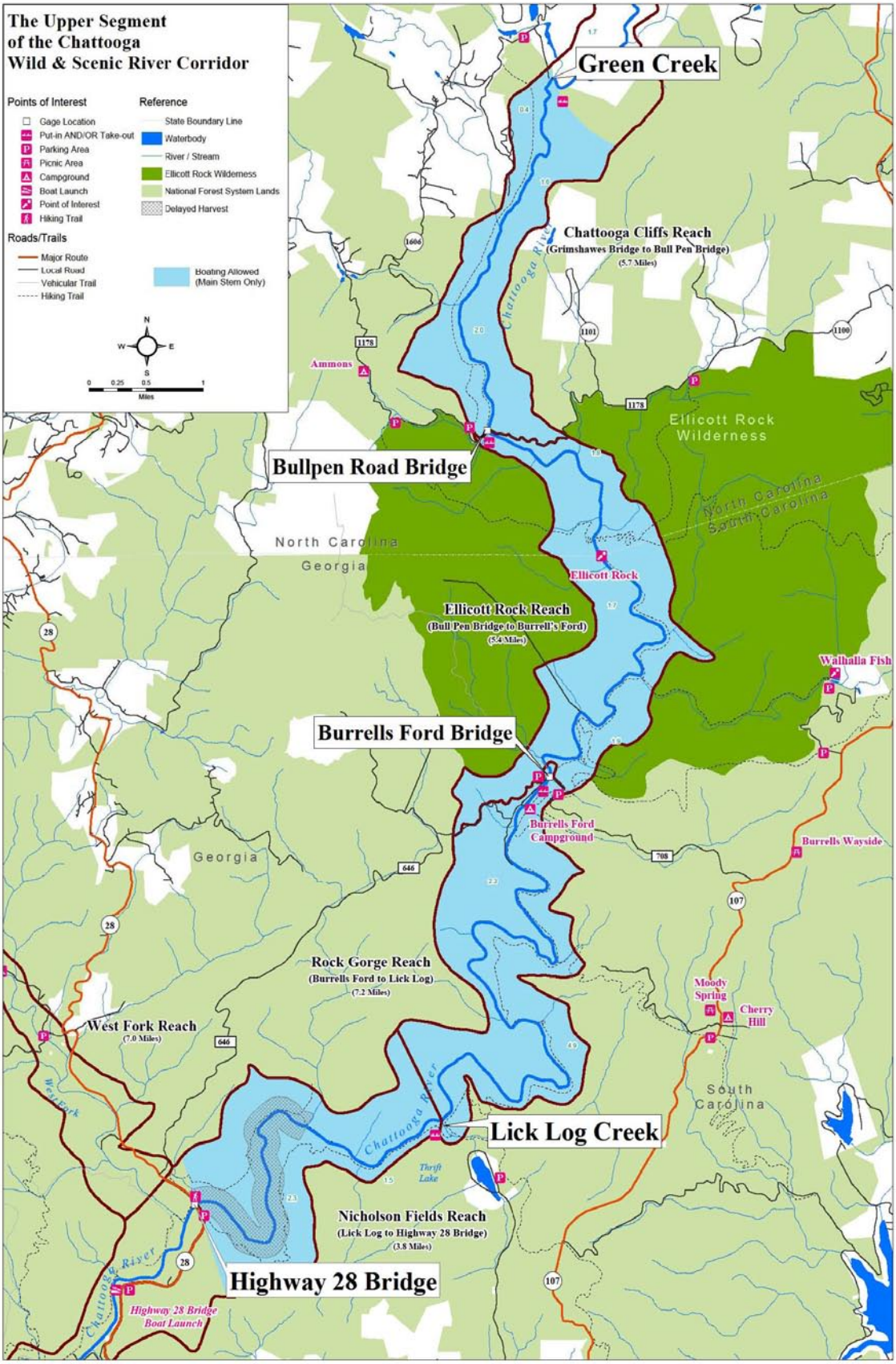
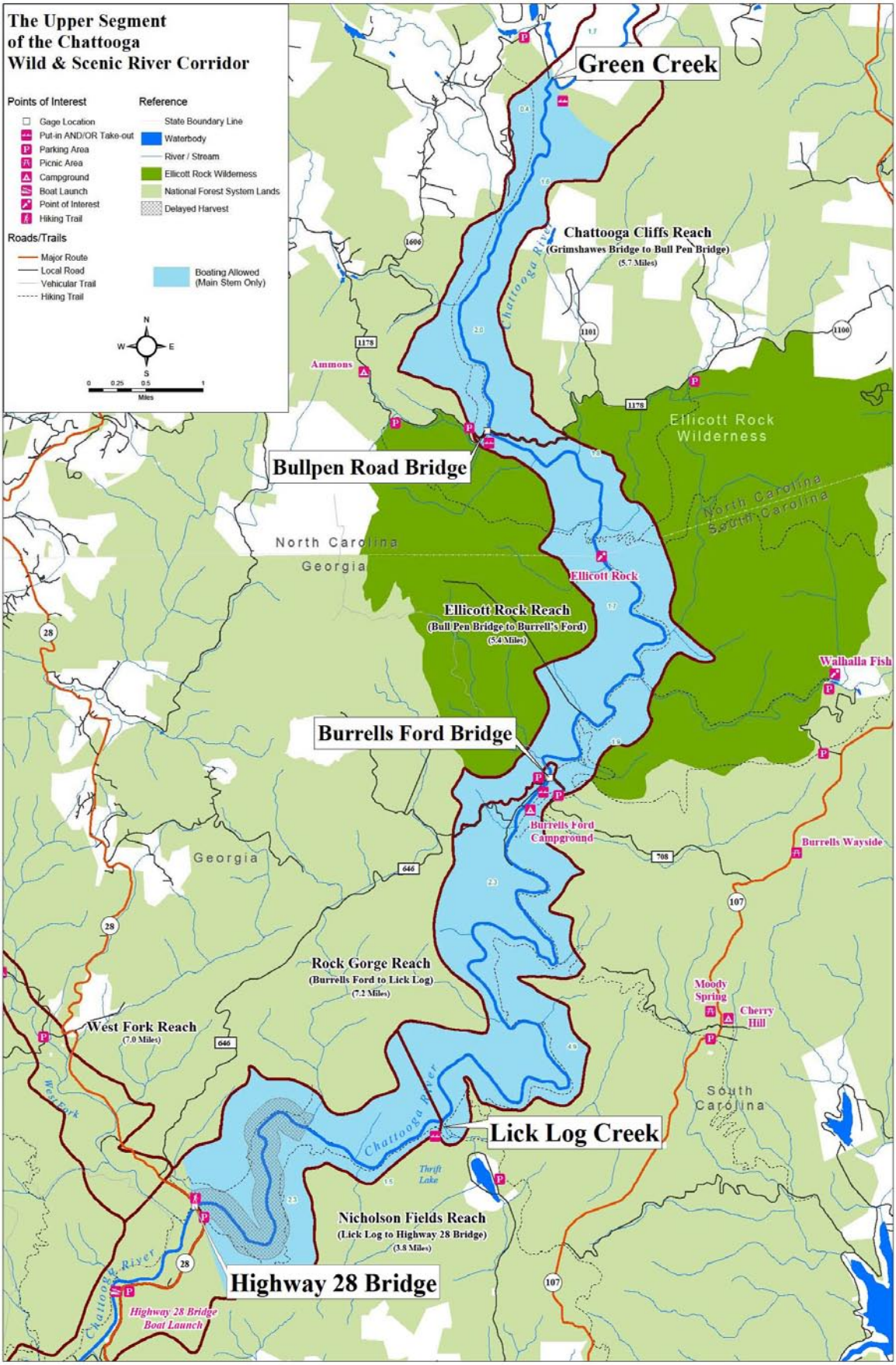
- Terry Seyden – Former PAO NC
- Karen McKenzie – Former PAO CONF
- Charlene Breeden– Former Hydrologist (CONF)
- John Petrick – Forest Planner (CONF)
- Paul Arndt – Regional Planner (RO)

APPENDICES

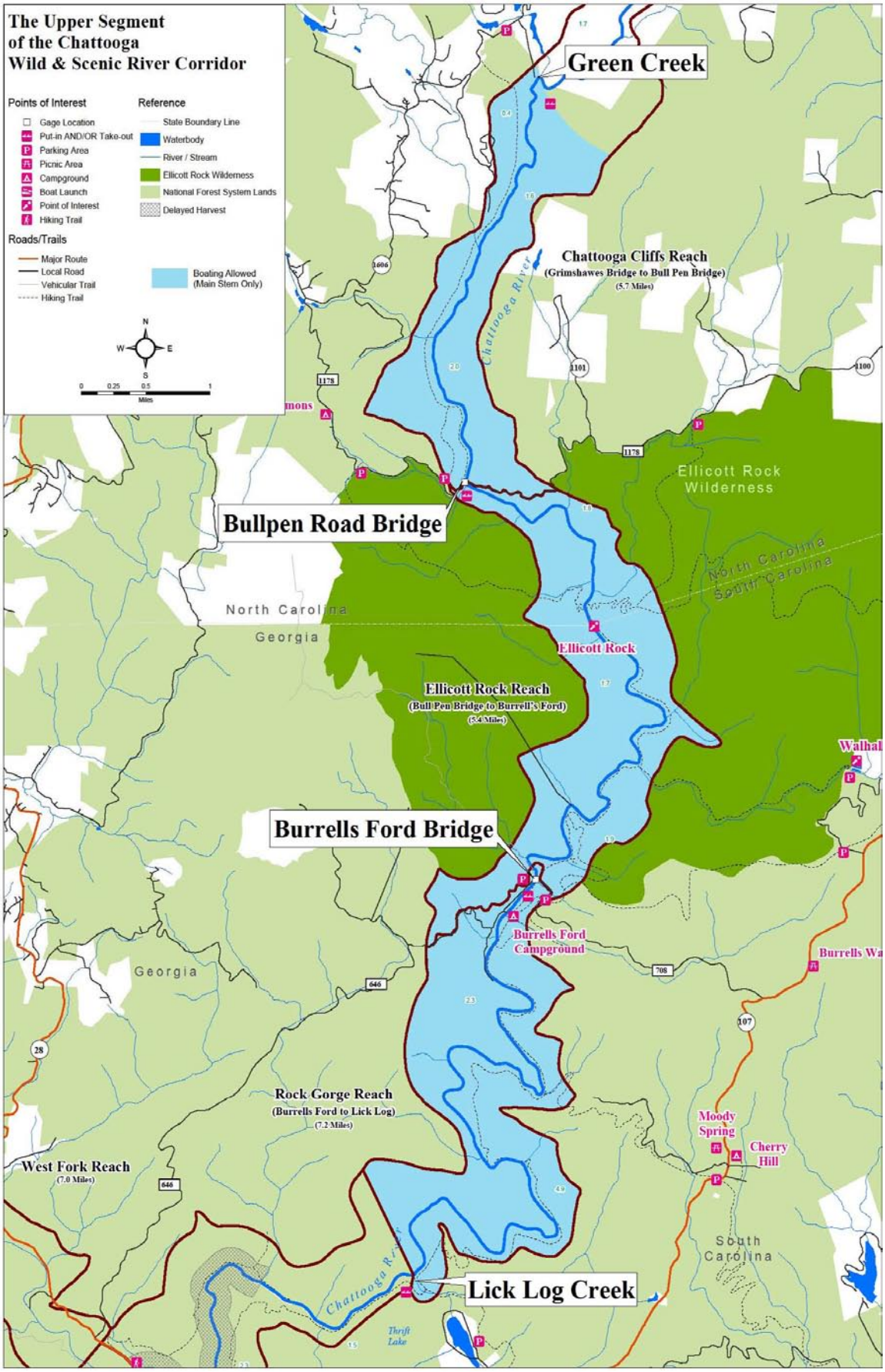
APPENDIX A—ALTERNATIVE 8



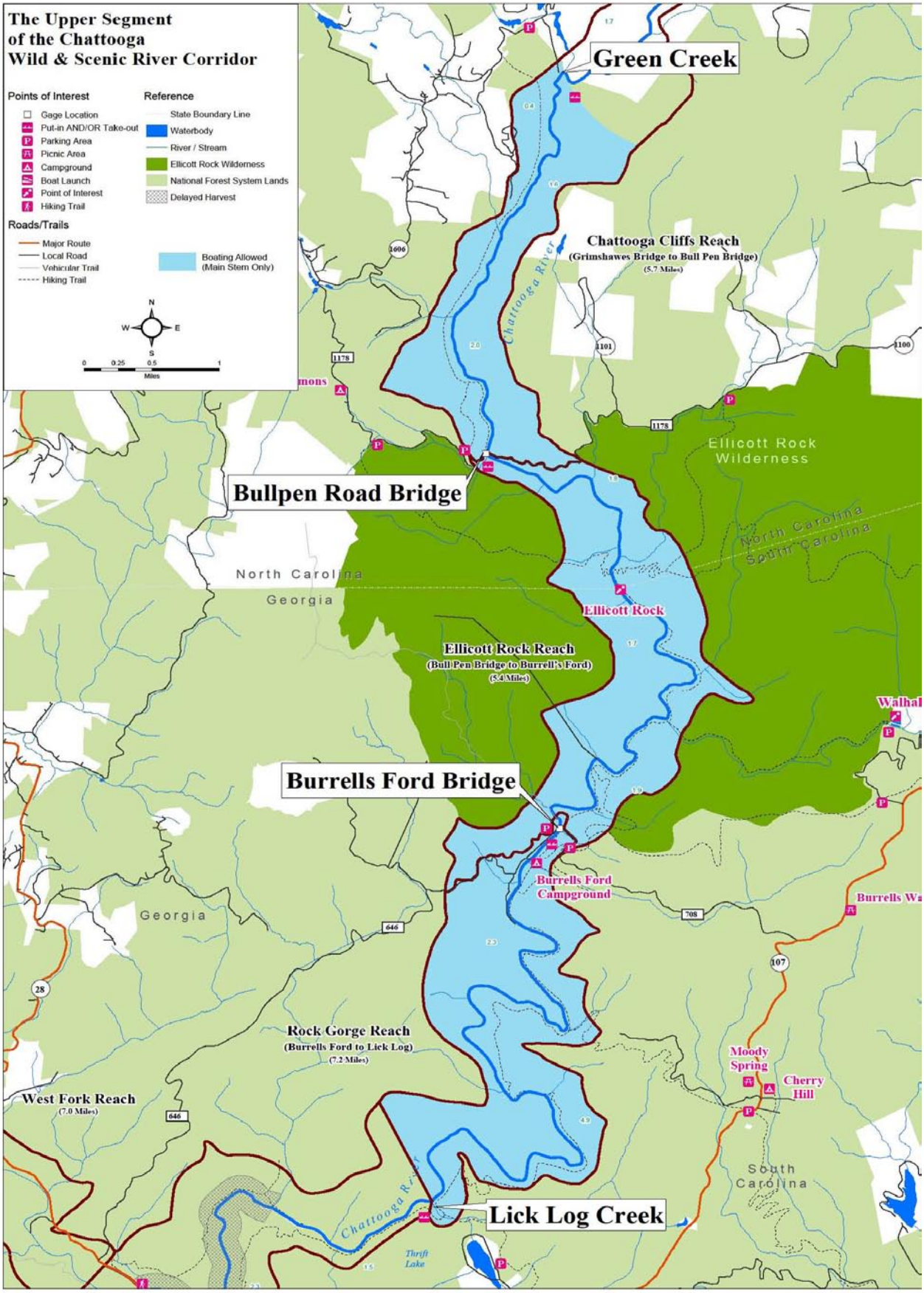
APPENDIX A—ALTERNATIVE 11



APPENDIX A—ALTERNATIVE 12



APPENDIX A—ALTERNATIVE 13



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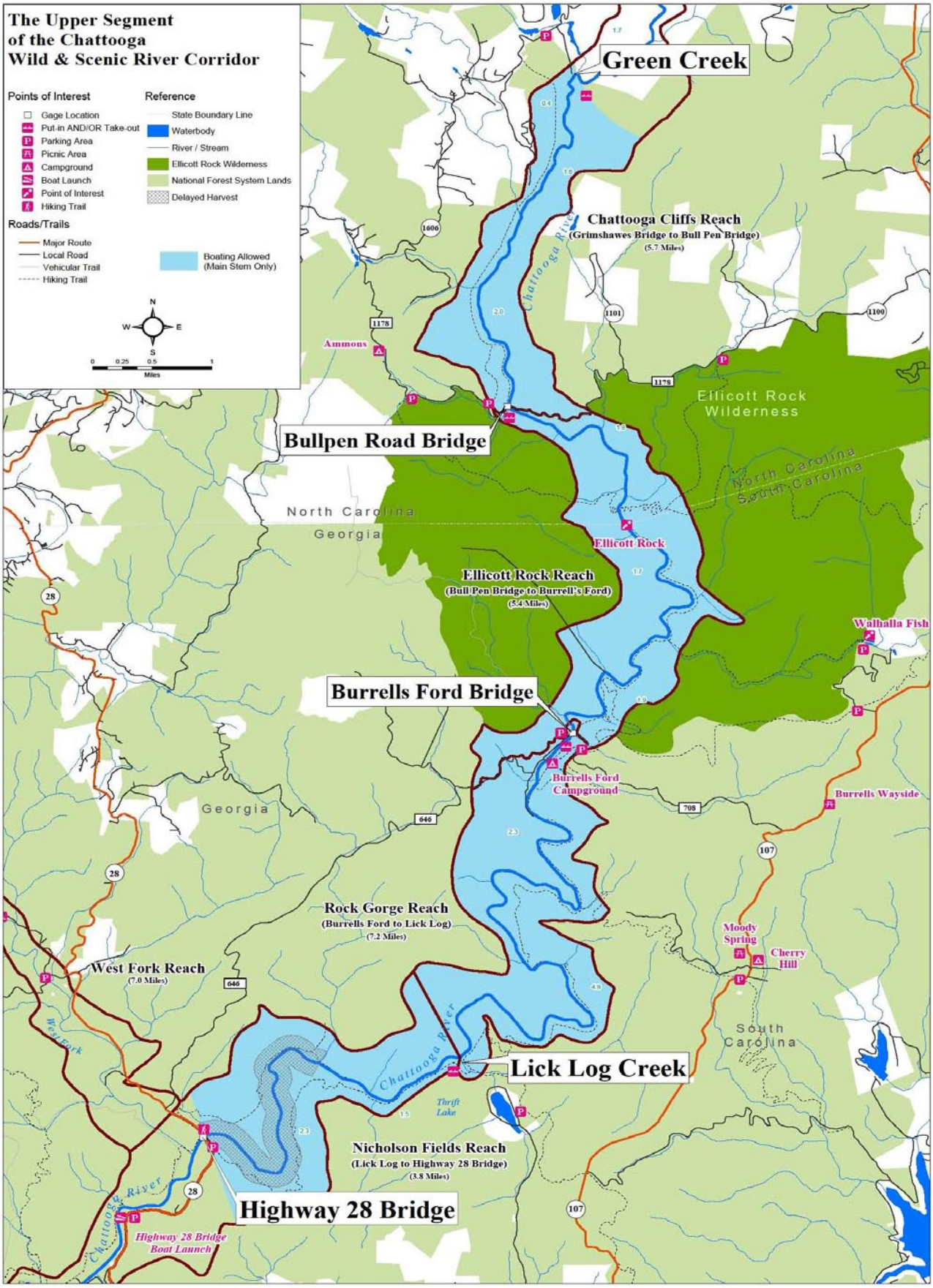


APPENDIX B—IMPLEMENTATION

Estimates of probable projects, activities, additional workloads 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 workloads and associated costs are estimated in the tables below.

Designate campsites (Alternatives 2, 3, 8, 11, 12, 13 and 14)

- 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

Designate trails (Alternatives 2, 3, 8, 11, 12, 13 and 14)

- 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 a quarter mile of Burrells Ford Bridge (Alternative 2)

- Install signage
- Monitoring and enforcement

Camping Reservations (Alternative 2)

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

Boater Registration (Alternatives 2, 3, 8, 11, 12, 13 and 14)

- 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 (Alternative 2)

- 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 Additional Long-Term Staff Workloads (FTEs) for the First five Years and Beyond, and Associated Funds Needed per Year in Thousands of Dollars by Forest by Alternative.

Alt	Georgia		NC		SC		Totals	
	Staffing	$	Staffing	$	Staffing	$	Staffing	$
2	0.25	10k	0.1	4k	0.25	10k	0.6	24k
3	0.5	20k	0.1	4k	0.25	10k	0.85	34k
8	0.5	20k	0.1	4k	1.0	40k	1.6	64k
11	0.5	20k	0.5	20k	0.5	20k	1.5	60k
12	0.5	20k	0.25	10k	0.5	20k	1.25	50k
13	0.5	20k	0.35	14k	0.5	20k	1.35	54k
14	0.5	20k	0.5	20k	0.75	30k	1.75	70k

Table B-2 Estimated Additional Short-Term Permanent or Seasonal Staff Workloads (FTEs) Over and Above table B-1 during the First Four Years of Implementation and Associated Funds Needed in Thousands per Year by Forest, by Alternative.

Alt	GA		NC		SC		Totals			
	Staffing	$	Staffing	$	Staffing	$	Years 1 and 2		Years 3 and 4	
							Staffing	$	Staffing	$
2	None	-	0.5 for 2 years	20k	2 for 4 years	80k	2.5	100k	2	80k
3	None	-	0.5 for 2 years	2k0	2 for 4 years	80k	2.5	100k	2	80k
8	None	-	0.5 for 2 years	20k	2 for 4 years	80k	2.5	100k	2	80k
11	None	-	0.75 for 2 years	20k	2 for 4 years	80k	2.5	100k	2	80k
12	None	-	0.5 for 2 years	20k	2 for 4 years	80k	2.5	100k	2	80k
13	None	-	0.75 for 2 years	20k	2 for 4 years	80k	2.5	100k	2	80k
14	None	-	1.0 for 2 years	20k	2 for 4 years	80k	2.5	100k	2	80k

Table B-3 Combined Estimated Additional Staff Workloads (FTEs) and Associated Dollars in Thousands per Year by Year by Alternative (table B-1 and table B-2 Added Together)

Alt	**Years 1 and 2**		**Years 3 and 4**		**Year 5 and Beyond**	
	Staffing	**$**	**Staffing**	**$**	**Staffing**	**$**
2	3.1	124k	2.6	104k	0.6	24k
3	3.35	134k	2.85	114k	0.85	34k
8	4.1	164k	3.6	144k	1.6	64k
11	4	160k	3.5	140k	1.5	60k
12	3.75	150k	3.25	130k	1.25	50k
13	3.85	154k	3.35	134k	1.35	54k
14	4.25	170k	3.75	150k	1.75	70k

NOTE

Tables are labeled additional staff workloads, rather than additional staff positions. Numbers associated with staffing and dollars should not be interpreted as additional staffing. They represent work that will be accomplished with existing staff or additional hires, and may be associated with permanent, seasonal and/or shared positions. Dollar amounts do not include costs associated with materials, supplies, contracts, fleet, travel or overtime.

APPENDIX C— CHATTOOGA RIVER RECORDS AND PREDICTION OF FLOWS AT BURRELLS FORD

Several types of data were used to predict various flow scenarios for evaluation of potential boating, fishing and other recreational uses in the upper Chattooga. The flow information in this appendix was customized to fit the intent of this EA. Other information on the topic that was developed during the course of analysis are available in the process record. The long-term stream flow record for the Chattooga River near Clayton, GA includes more than 71 years of records of mean daily flow (MDF) from October 1, 1939 to January 24, 2011. This appendix summarizes two approaches used to predict historic flows in the upper Chattooga River site at Burrells Ford based on flow data from the lower Chattooga River. One of these approaches is based on the long term MDF data and the other one is based on the short term storm peak relationship between the two locations. The MDF approach has the inherent potential to underestimate the number of days within the elevated flow categories, and the storm peak relationship approach has the potential to overestimate the days in the elevated flow categories. More on these specifics and differences will be discussed later. The MDF approach was able to utilize 71 years of data, while the information on detailed flow had 24 years of the US Geologic Survey (USGS) flow data. The short term detailed data was collected at 15-minute intervals from October 1, 1985 to September 30, 2009 (water years 1986 to 2009). Although most of the detailed 2010 flow data was available, there were some missing records that prevented its use as part of a continuous data set. Archived flow data prior to October 1, 1985 was only available in MDF form. In general, data in this appendix is presented by calendar year (January 1 – December 31) or by water year (October 1 to September 30), unless otherwise indicated.

MDF data is defined as the average flow during a 24-hour period. MDF is calculated by adding together each 15-minute reading of instantaneous flow, and dividing that total by the 96 readings. Each instantaneous flow reading is obtained by converting the stage height or elevation of the water in the stream channel at the gauging site into cubic feet per second (cfs). This conversion is enabled from collecting and analyzing numerous wading and other flow measurements during different stages of water surface elevation. Fairly sophisticated equipment and procedures are used to make streamflow measurements; good measurements are typically in the range of plus or minus 10% of the actual value. Collecting ample readings during high flow and flood periods is also a major part of this work. Regular readings are obtained over time to improve the stage discharge rating curve and also to make any adjustments needed due to changes in channel morphology (such as those caused by excess sediment or floods). The resultant plot or equation in some instances defines the stage discharge relationship as typically developed by USGS.

Streamflow is typically presented in units of cubic feet per second (cfs). One cfs equals 449 gallons per minute. Over a day's time at 1 cfs would amount to 1.98 acre feet (i.e., enough water to cover nearly two acres with one foot of water).

Some records are from limited flow data collected by the US Forest Service on the upper Chattooga River at Burrells Ford from June 2006 – July 2007, and November 2008 – April 2009. The data were collected by recording the stream stage with a pressure transducer into the data logger. The stage–discharge rating curve was developed by flow measurements taken while wading by the USFS with a type AA current meter. The USGS took the higher flow readings in

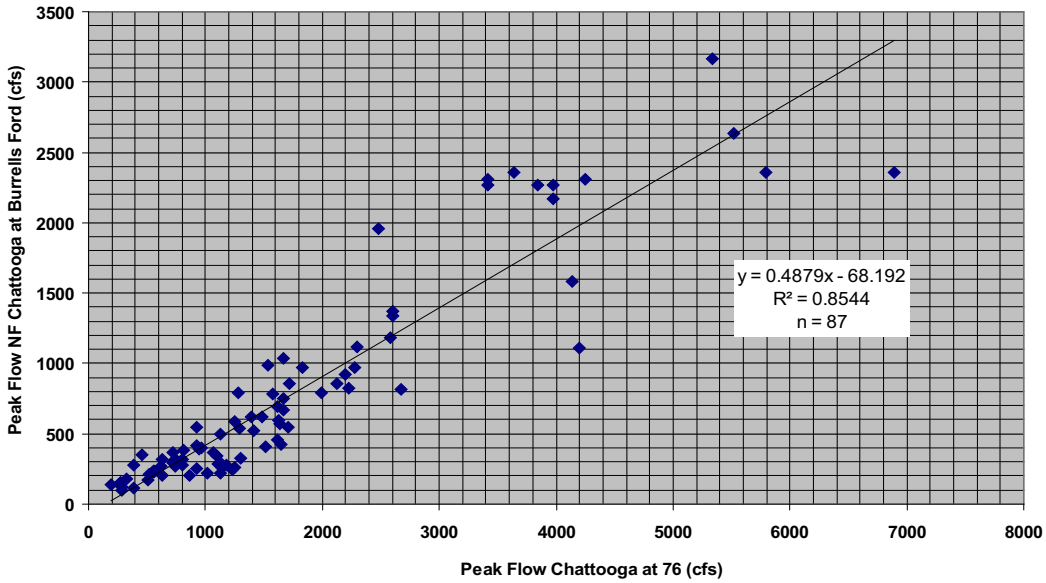
the curve when flow was too high to wade. Intermittently, the transducer employed by the USFS measurement fouled with sediment; therefore, some records were lost or were difficult to extract. However, many of the stream measurements the U.S. Forest Service (USFS) collected at Burrells Ford were suitable to use.

In October 2009, the USFS cooperated with the USGS to install and maintain a permanent streamflow gauge in the upper Chattooga River at Burrells Ford. Both published and preliminary records with MDFs and 15-minute peak flows were used to compare how the upper Chattooga and lower Chattooga River sites relate to each other relative to storm peaks, MDF and the timing of flow peaks between the sites. Preliminary flow data from October 1, 2010 to February 6, 2011 were incomplete as a water year, but some of this data was also used in the flow comparison between the two locations.

During 87 storms, peak flows from the upper Chattooga River at Burrells Ford were compared to the peaks obtained from the lower Chattooga River near Clayton, GA at Highway 76 (Figure C-1). Time-adjusted instantaneous flows and MDF estimates from both sites were used to compare flow responses associated during these time periods. It was necessary to make time adjustments when using instantaneous flow data because, in general, the upper Chattooga responds and peaks more rapidly than the lower Chattooga. Although the timing difference between peak flows at these sites is variable with each storm and flow regime, a good rule of thumb was considered to be about six hours difference when making time adjustments. Without some time adjustments, comparing the instantaneous flows between the two sites during storm periods was very problematic; in some instances, the upper Chattooga was rising and peaking well before the lower Chattooga responded.

Figure 1 indicates that storm peaks from the upper Chattooga River and lower Chattooga River are highly correlated based on 87 storm comparisons taken from available records between 2006 and 2011.

Figure C-1. Storm Peaks Chattooga River at Highway 76 and Burrells Ford based on Preliminary USGS and USFS Data (preliminary data compiled by W. Hansen, USFS).



The data in Figure C-1 suggest that the upper Chattooga at Burrells Ford storm peak flows of 225 cfs, 350 cfs, 450 cfs and 800 cfs compare well with lower Chattooga storm peak flows of 600 cfs, 860 cfs, 1060 cfs, and 1780 cfs respectively. The variability of the peak flow data suggests there are storm variations or other differences that were not predicted in this simple relationship.

This appendix concentrates on the utility of the long-term flow records for the lower Chattooga River in predicting flows on the upper Chattooga. The lower Chattooga stream gauge at Highway 76 has been used by many locals as an indicator of upper Chattooga flow conditions. For this reason, this gauge was used in the report *Capacity and Conflict on the Upper Chattooga River* (Whittaker and Shelby 2007). Some of the short-term comparisons made with actual data from the lower and upper Chattooga sites were made to confirm that flows from these two sites were well correlated. Since the sites are both within the same watershed and downstream flows to some degree depend on upstream flows, the lower Chattooga is not fully independent of the upper Chattooga. Therefore, some issues may arise when using these two sites in pure statistical comparisons.

For the most part, flow estimates in Whittaker and Shelby (2007) compare flows that fishing enthusiasts and others use to evaluate optimal days for fishing and boating. For long-term estimates, MDF data were used. At that time, limited data was available to compare the lower and upper Chattooga River sites for storm peaks or detailed flow records. Since that time, more data has been collected which allowed the more rigorous comparisons between the upper and lower river flow gauges presented in this appendix.

Estimates of the number of days with boating opportunities based on MDFs when compared with those same estimates based on storm-derived comparisons with detailed data were different enough that additional analysis needed to be done. Therefore, storm-derived comparisons with detailed data were also used to evaluate the potential for days within flow categories addressed in the EA alternatives. It should be noted that the MDF information and information from the

detailed flow data are not directly comparable. A day within the 0-224 cfs flow category using the MDF approach means that the mean flow for that day, based on 96 readings averaged less than 225 cfs. Some of the actual readings may have been over 225 cfs, but there was not enough of them to push the mean flow of that day to 225 cfs or more. Using the detailed flow data, the peak or maximum flow based on the 96 flow readings on that day was less than 225 cfs. This means that no value during the day exceeded 224 cfs. On the other end of the spectrum of the 800 cfs and more category, the MDF data indicates that the mean daily flow for that day was 800 cfs or more. Many of the individual flow readings during the day would be over 800 cfs to produce this mean flow. The peak or maximum flow data in the 800 cfs or more category indicates that one or more of the 15-minute flow values exceeded 799 cfs.

The analyses provided is sufficient to contain the outer bounds for boating under any of the alternatives by analyzing over entire days, even though some of the identified days may only have had suitable flows during nighttime hours. Flow categories used were those outlined in the Whittaker and Shelby (2007) report. The peak or maximum flow for any day could occur anytime within a 24-hour period; therefore, these figures may overestimate the number of daytime periods within these categories. Even with the assumptions used, infrequently there could be extreme wet years with more days in the elevated flow categories. For example of 71 years of mean daily flow information, the calendar year 1950 had the most days in elevated flow categories (i.e., 225 cfs or more at Burrells Ford) with flow estimates of 91 days in the 0-224 cfs category, 187 days in the 225-349 cfs category, 42 days in the 350-449 flow category, 34 days in the 450-799 flow category and 11 days in the 800 or more cfs category. Of these 274 days in 1950 in elevated flow categories, if we were to consider that 12 hours in 24-hour days or 1/2 of those days, 137 days might have suitable flows that would allow boating.

Detailed Flow Record – Water Years 1986-2009

Using the linear storm peak comparison in Figure 1, the detailed flow records of the lower Chattooga from October 1, 1985 to September 30, 2009 were used to estimate how many days would have produced flows with boating opportunities in alternatives 8 and 11-14. Monthly and yearly totals are provided and analyzed to produce the average monthly and yearly days. A weakness of applying the linear relationship based on peak flows is that flows during non-peak periods tend to rise and fall faster at the upper Chattooga site. The result of applying the storm-peak relationship has the potential for overestimating upper Chattooga flows by tracking the slower hydrograph response of the lower Chattooga.

Table 1 summarizes the estimated number of days during the 24-year period with the instantaneous peak or maximum flow each day falling into one of the flow categories in cubic feet per second (cfs). Based on this information, 35.5 days each year on average have a high daily flow value ranging from 450 cfs to 799 cfs. If flows from 350 cfs to 799 cfs were to be included, the average is 65.8 days. Annual and monthly data were calculated for each year in the 24-year analysis period. The annual and monthly detail for each year is included in the process record. In assembling this analysis, no lag time in response was assumed between the two sites. Table C-1 indicates about 132 days of elevated flows between 225 cfs and 800 cfs. This is sufficient to provide that outer bound that would probably include boatable flow periods associated with almost any wet year we are likely to have, such as 1950.

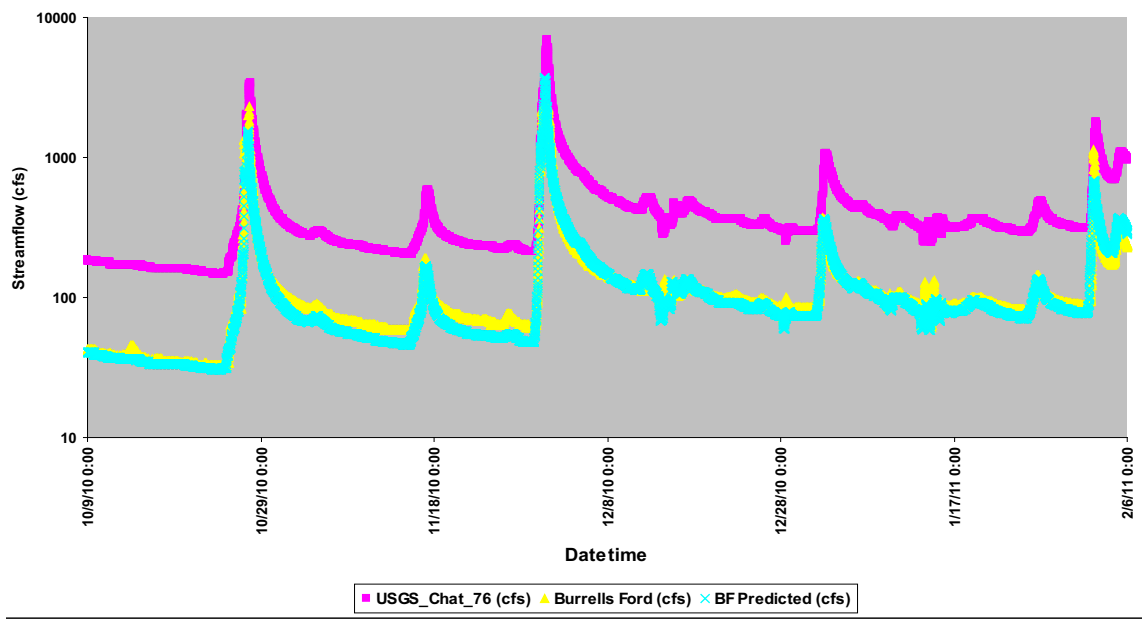
Table C-1. Estimated Days in Flow Categories Based on the Storm Peak Relationship between Upper Chattooga at Burrells Ford and Lower Chattooga River near Clayton, GA

Flow Range (cfs)	Jan	Feb	March	April	May	June	July	Aug	Sept	Oct	Nov	Dec	Total
0-224	14.31	12.84	10.83	10.87	18.08	19.21	23.47	22.71	21.08	24.85	21.06	16.34	215.64
225-349	7.39	6.79	7.61	8.60	6.83	5.14	2.41	3.34	4.60	2.87	3.84	6.58	65.99
350-449	2.65	3.48	4.78	4.53	2.38	2.06	1.37	2.13	1.00	1.37	1.41	3.09	30.26
450-799	4.39	3.66	5.44	4.95	2.83	2.41	2.28	1.68	1.63	1.09	1.86	3.26	35.48
800+	2.26	1.48	2.35	1.05	0.88	1.18	1.47	1.12	1.68	0.82	1.82	1.72	17.83
total	31.00	28.25	31.00	30.00	31.00	30.00	31.00	30.98	29.99	31.00	29.99	31.00	**365.21**

Monthly and Annual Average Number of Days in Each Flow Category based on 24 water years (1986-2009) data
Missing flow records during the 24 year period were accounted for in the table.
Linear equation for storm peaks -- Y (Burrells Ford (cfs)) = 0.4879 X (Lower Chattooga River (cfs)) - 68.192
Maximum flow used each day occurred anytime during a 24 hour period and made no adjustments for timing differences

Figure C-2 provides an example of how an exponential equation, with a six-hour lag time was used to account for storm and non-storm differences. The predicted upper Chattooga River at Burrells Ford (**Y**) data was based on the lower Chattooga River near Clayton, GA (**X**) data based on an exponential equation $\mathbf{Y = 0.07\ X^{1.2475}}$. The yellow line is the actual flow record at Burrells Ford and the turquoise line is the predicted flow, based on the lower Chattooga flow with six hour lag time adjustment. It highlights some of the complexity of modeling storm hydrographs at an upstream site based on downstream flow records.

Figure C-2. Upper and Lower Chattooga River Preliminary Data 10/09/10 – 02/06/11 with Six-Hour Lag Time. Burrells Ford Predicted (cfs) = 0.07 x Chattooga @ 76 (cfs)$^{1.2475}$ (r^2 - .89)*



*This exponential equation was developed with sporadic data available from USFS and USGS for the two gauging sites, and should be considered preliminary. The relationship was evaluated by using a six-hour lag time been the upper Chattooga and lower Chattooga River flows.

The exponential flow relationship is probably a better predictor in the more rapid rise and fall of the upper Chattooga River in comparison to the linear relationship based on storm peaks, resulting in some reductions in the number of days predicted in the upper flow categories.

Although the equation used is promising, it had not been evaluated against very much data to determine its validity. For the EA, it was decided that even though the peak or maximum flow estimates based on the linear storm peak relationship tended to overestimate days in the upper flow categories, it provided an upper bounds for effects analysis using a much larger data set.

Comparison of Flow Data Periods

A comparison between the short term detailed flow period was made with the long term flow period to determine if they were similar, or if adjustment was needed due to markedly wetter or drier conditions compared to the long term data. To make this comparison of periods, it was best to use the MDF data for both periods. So in the next two sections, the long term MDF estimates of upper Chattooga River for flow categories from October 1, 1939 to September 30, 2009 in the lower Chattooga were compared with the estimated days in flow categories using MDFs from October 1, 1985 to September 31, 2009 (note: coincides with the detailed flow period lower Chattooga).

Long Term Flow Period – Water Years 1940 – 2009 (70 years)

Table C 2. Monthly and Annual Estimate of Days within Flow Categories for upper Chattooga at Burrells Ford using MDF from USGS lower Chattooga gauge near Clayton, GA Stream Gauge from October 1939 to September 30, 2009.

Flow Range (cfs)	Jan	Feb	March	April	May	June	July	Aug	Sept	Oct	Nov	Dec	Total
0-224	19.5	16.19	14.84	15.03	21.6	24.74	26.84	27.27	26.64	27.64	25.53	22.4	268.22
225-349	7.53	7.51	10.19	9.87	6.76	3.21	2.63	2.34	1.91	2.21	2.71	5.5	62.37
350-449	2	2.29	2.97	2.71	1.37	1.06	0.6	0.54	0.49	0.44	0.73	1.53	16.73
450-799	1.51	1.81	2.49	2.11	1.06	0.84	0.66	0.67	0.6	0.53	0.84	1.26	14.38
800+	0.46	0.46	0.51	0.27	0.21	0.14	0.27	0.17	0.36	0.17	0.19	0.31	3.52
total	**31**	**28.26**	**31**	**29.99**	**31**	**29.99**	**31**	**30.99**	**30**	**30.99**	**30**	**31**	**365.22**

The mean daily flows (MDF) for Upper Chattooga (Burrells Ford) in cfs = 0.317x (MDF flow in cfs at lower Chattooga near Clayton, GA) – 17.753 (r2=0.745).
The comparison relationship was based on 908 MDF data pairs with about ½ USFS gauging effort from 2006-2009 and ½ USGS gage 2009-2011.
Burrells Ford Flows of 225 cfs, 350 cfs and 800 cfs are estimated from Lower Chattooga flows of about 775cfs, 1160 cfs and 2572 cfs.
The MDF relationship between Upper and Lower Chattooga is preliminary and based on the equivalent of almost 3 years of data, not continuous. MDF is calculated by adding the 15 minute flow measurements taken throughout each day, and dividing by 96 9the number of quarter hours in a day). Therefore, MDFs comparing these sites are not as consistent during storm periods, causing variability.

Short Term, Detailed Flow Period (15 minute intervals) – Water Years 1986-2009

Table 3 compiles the MDF data for the 24 yrs that detailed flow information was utilized to make estimates. It suggests that there was a slight reduction in the number of higher flow days from October 1985 to September 2009 (24 water years). Several years during this period of time were drought years that contributed to a 10% reduction in the elevated flow categories about over this 24-year period, as compared to the long-term record. The flow categories from 350 cfs to 799 cfs were reduced about 7%. As a result, the lowest flow category from 0-225 cfs increased about 4%. These modest differences are not large and well within the normal range of annual variation, but do suggest that the flow analysis during water years 1986 to 2009 with the

detailed flow data may slightly underestimate the number of days as compared to calculations if long term detailed records had been available. At this time, no adjustments were made due to these differences, just the recognition that the detailed data from water years 1986-2009 may be about 5-10% low in estimating days within the 350-799 cfs categories.

Table 3. Monthly and Annual Estimate of Days within Flow Categories for Upper Chattooga at Burrells Ford using MDF from USGS Lower Chattooga near Clayton, GA Stream Gauge from October 1985 to September 2009.

Flow Range (cfs)	Jan	Feb	March	April	May	June	July	Aug	Sept	Oct	Nov	Dec	Total
0-224	20.88	18.25	16.83	18.08	24.67	24.75	26.58	26.33	25.83	27.75	25.42	22.75	278.12
225-349	6	6.5	8.54	8.71	4.38	3.46	1.92	3.25	2.04	2.29	2.46	5.58	55.13
350-449	2.08	1.54	3	2.08	1.25	0.75	1.04	0.5	0.75	0.29	0.75	1.38	15.41
450-799	1.62	1.54	2.25	1.12	0.62	0.92	1.08	0.71	0.88	0.54	1.17	1.12	13.57
800+	0.42	0.42	0.38		0.08	0.12	0.38	0.21	0.5	0.12	0.21	0.17	3.01
total	**31**	**28.25**	**31**	**29.99**	**31**	**30**	**31**	**31**	**30**	**30.99**	**30.01**	**31**	**365.24**

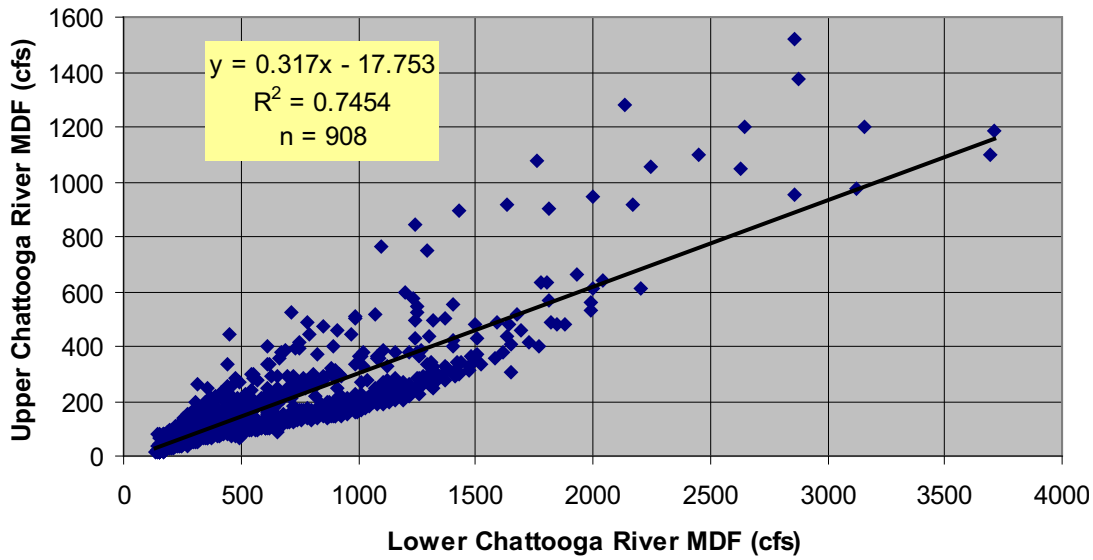
The mean daily flows (MDF) for Upper Chattooga (Burrells Ford) in cfs = 0.317 x (MDF flow in cfs at Lower Chattooga near Clayton, GA) - 17.753 (r2=0.745)
The comparison relationship was based on 908 MDF data pairs with about 1/2 USFS gauging effort from 2006-2009 and 1/2 USGS gage 2009-2011
Burrells Ford flows of 225 cfs, 350 cfs, 450 cfs, and 800 cfs are estimated from Lower Chattooga flows of about 775 cfs, 1160 cfs, 1475 cfs and 2575 cfs.
The MDF relationship between Upper and Lower Chattooga is preliminary and based on the equivalent of almost 3 years of data, not continuous.
MDF is calculated by adding the 15 minute flow measurements taken throughout each day, and dividing by 96 (the number of quarter hours in a day)
Storm event peaks in Upper Chattooga occur hours before Lower Chattooga, and sometimes not in the same day.
Therefore, MDFs comparing these sites are not as consistent during storm periods, causing variability.

There has been some concern that MDF may underestimate the number of days, because the 96 values of flow collected for each day are averaged and then fit into the appropriate flow category. It is more difficult to achieve a designated flow using MDF as compared to the peak or maximum daily flow that can occur within any 15-minute period of time during a day. There are greater assurances that estimates based on MDF are more likely to have suitable periods of time that have certain flows within that specific flow category. On average, there were about 3-4 days with MDFs in the 800 cfs and above category, while using the peak or maximum daily flow, about 14 more days each year were estimated to have one or more flow values in this flow category as compared to the MDF data. This difference may suggest that there were potentially flows within the 800 cfs flow category that would not be recognized when using the detail associated with the peak or maximum daily flow data.

Comparisons were made on MDF records from 2006-2011 when there was data available for both the upper and lower Chattooga stream gauging sites. The MDF comparisons are not always good during storm flow periods due to the differences in response and lag time associated with peaks between the sites. The comparisons for upper and lower Chattooga flows during this period helped to evaluate whether the MDF comparisons for the upper Chattooga values of 225 cfs, 350 cfs, 450 cfs and 800 cfs are consistent or inconsistent with the corresponding MDF values in the lower Chattooga of 700 cfs, 1100 cfs, 1400 cfs and 2500 cfs, respectively. Depending on the differences, adjustments or qualifications can be made as being high or low.

Upon analysis of more than 900 days from 2006-2010 with MDFs at both upper and lower Chattooga sites, the results with an r square of 0.75 indicate that the upper Chattooga MDF values of 225 cfs, 350 cfs, 450 cfs and 800 cfs corresponded with MDF values in the lower Chattooga of 775 cfs, 1160 cfs, 1475 cfs and 2575 cfs, respectively. Figure 3 displays the relationship and the variation from this data. Some of this variation is likely due to the response differences relative to storms and the lag time of this response. No adjustments were made for this in the comparison. The relationship of MDF between the two sites that was initially applied in the Whittaker report indicates that the original MDF data used was very close to what was found with this more detailed comparison of actual MDF data and relationship from available data from both the lower and upper Chattooga gauging sites during 2006-2010.

Figure C-3. Comparison MDF between upper and lower Chattooga River, USFS and USGS data 2006-2010.



DATA USED IN ENVIRONMENTAL ANALYSIS

The flow information used in the EA are presented in Table 1 (short term, detailed data) and Table 4 (long term, MDF data). No adjustments were made when applying the detailed records since it was apparent that the differences between the short term and long term data records were minor. It was decided to utilize the 71 calendar years of information for the environmental analysis (Table 4). Days with missing records were accounted for based on the long term averages in the month the missing record occurred. For example, if there were 5 days missing in the month of January over the 24 years of detailed record available, there would be 739 days with records dispersed among the flow categories and 5 days without record, a correction factor of 1.00678 was used to multiply each flow category to compensate for the days without data.

Table 4. Monthly and Annual Estimate of Days within Flow Categories for upper Chattooga at Burrells Ford using MDF from USGS lower Chattooga gauge near Clayton, GA Stream Gauge from January 1940 to December 2010.

Flow Range (cfs)	Jan	Feb	March	April	May	June	July	Aug	Sept	Oct	Nov	Dec	Total
0-224	19.23	15.96	14.63	15.13	21.63	24.7	26.9	27.31	26.69	27.37	25.15	22.03	266.73
225-349	7.62	7.54	10.46	9.82	6.75	3.21	2.59	2.32	1.89	2.42	2.9	5.49	63.01
350-449	2.11	2.44	2.94	2.69	1.37	1.07	0.59	0.54	0.48	0.49	0.85	1.73	17.30
450-799	1.58	1.85	2.45	2.08	1.04	0.87	0.65	0.66	0.59	0.55	0.9	1.41	14.63
800 +	0.46	0.48	0.51	0.28	0.21	0.14	0.27	0.17	0.35	0.17	0.2	0.34	3.58
total	31.00	28.27	30.99	30.00	31.00	29.99	31.00	31.00	30.00	31.00	30.00	31.00	**365.25**

The mean daily flows (MDF) for Upper Chattooga (Burrells Ford) in cfs = 0.317x (MDF flow in cfs at lower Chattooga near Clayton, GA) – 17.753 (r2=0.745).
The comparison relationship was based on 908 MDF data pairs with about ½ USFS gauging effort from 2006-2009 and ½ USGS gage 2009-2011.
Burrells Ford Flows of 225 cfs, 350 cfs and 800 cfs are estimated from Lower Chattooga flows of about 775cfs, 1160 cfs and 2572 cfs.
The MDF relationship between Upper and Lower Chattooga is preliminary and based on the equivalent of almost 3 years of data, not continuous. MDF is calculated by adding the 15 minute flow measurements taken throughout each day, and dividing by 96 9the number of quarter hours in a day). Therefore, MDFs comparing these sites are not as consistent during storm periods, causing variability.

CONCLUSIONS

The peak or maximum daily flow data suggest there are more days in the elevated flow categories as compared to the MDF data estimates, however, it must be recognized that this sets the upper bounds for analysis with the maximum flows occurring anytime within a 24-hour period. With a few assumptions, it appears that the peak or maximum daily flow data may even account for flows that might be used for boating in a wet year such as 1950. It is recognized that the data connected to the peak or maximum daily flow may be about 5-10% low in predicting days within the flow categories of 350-449 cfs and 450-799 cfs as compared with the available long term record. Had some adjustments been made for daylight and lag time differences, these two approaches may have been closer in their estimates. In addition, some of the days with maximum flows above 800 cfs may have contained periods of time with suitable flows for boating, so there may be some potential for undercounting when using the peak or maximum daily flow data.

The linear relationship developed from storm peaks for the lower and upper Chattooga River sites does tend to overestimate periods with suitable flows in the upper Chattooga when this equation is used to predict flows at Burrells Ford. The linear relationship based on storm peaks does not mimic well the differences in hydrograph response between the upper and lower Chattooga River, and since the lower Chattooga responds more slowly to change, it extends the elevated flow periods estimated for the upper Chattooga. The exponential relationship appears to follow better the hydrograph slope and shape as long as reasonable lag time adjustments are included. Had the lag times not been adjusted for these comparisons, the flow relationships would have been much worse. However, the exponential equation has not been validated sufficiently to be applied without some limits and continued checking. Further assumptions and analysis detail may still be used to provide more realistic estimates of past days with suitable flows. By having the upper Chattooga River stream gage at Burrells Ford, the need to estimate flow in the future based on other sites is essentially eliminated. However if the need arises to

better understand the potential for river uses in the upper Chattooga based on flow and timing, we do have additional tools that can be applied.

Comparing MDF data from different data periods when data was used for various types of analysis suggested that water years 1986-2009 period was somewhat drier than the water years 1940-2009 period, but the differences in predicted days within the elevated flow categories were within 5-10%. The period of 1985-2009 had several years of severe drought, but these years were also contained within the long term data. All of the above data sets had some missing data that had to be adjusted for. There is no reason to believe that these data do not provide sufficient detail to provide the outer bounds desired for environmental analysis concerning the variety of alternatives under consideration. Implementation type questions such as how this data may address flow, daylight hours and time needed for trip scenarios were not included in this analysis.

ACKNOWLEDGEMENTS

The recent updates and analysis of the MDF and detailed flow information has been largely facilitated by the data programming and other assistance by Geoff Holden (FMS GIS Coordinator). Jim Knibbs (FMS NEPA Coordinator) and others on the Chattooga analysis and steering teams have provided requests and review of various types of flow data that have been produced over the analysis period to refine the requests so the issues were appropriately framed and evaluated. I give special thanks to Brian McCallum and Chris Smith of the USGS in Atlanta, GA for providing access to archived flow data and the recent provisional data of the Chattooga River near Clayton, GA and other sites. Their efforts as reliable partners with the USFS have been instrumental in installing and co-funding the permanent streamflow and precipitation gage in the upper Chattooga River at Burrells Ford. USFS individuals that provided assistance in portions of the flow data collected by the USFS include David Hedden (former FMS River Ranger) and Charlene Breeden (former Chattahoochee-Oconee NFs Hydrologist).

APPENDIX D—ENCOUNTER CALCULATIONS

Use - Capacity - Encounter Relationships

Introduction

Social impacts are the primary limiting factor for estimating capacities in backcountry areas on the Chattooga River. Encounters between different recreation groups are the primary limiting factor among social impacts in the backcountry. The US Forest Service has developed models to analyze how encounters might change as use levels change. These models can be used to estimate the average number of encounters for given use levels, or estimate the maximum amount of use (for different types of uses) for a given number of encounters.

The models are based on a series of assumptions about 1) how different types of users behave and encounter each other; 2) the proportions of different types of use; 3) differences between use through the season; 4) differences between use on weekends and weekdays; and 5) differences between segments. Model details (definitions and assumptions) are given below.

Encounter Models

Average Encounters: The average number of groups encountered (seen) per day while traveling in a backcountry area.

Total encounters: The sum of encounters a recreationist (of any kind) has with another day hiker, overnight user, angler and boater (alone or in a group).

Assumptions

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.

- Day hikers include hikers, birdwatchers, wildlife viewers, swimmers, picnickers, hunters and other day users that use the trails for the day (without spending the night).

- Backpackers include any user that spends the night in the corridor (not including the Burrell's Ford walk-in campground).

- Anglers include users who fish in the backcountry. For purposes of analysis, one angler = one angler group.

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

- Average 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).

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) to develop an approximate relationship between the two. Then average encounters were estimated from current use estimates.

Average encounters per day were estimated by applying the following relationships:

For the Lower Nicholson Fields Reach (between Reed Creek and Highway 28), a recreationist will encounter approximately:
- 50% of other day hiking groups
- 38% of other angler groups
- 50% of other backpacking groups

For all other reaches, a recreationist will encounter approximately:
- 50% of other day hiking groups
- 25% of other angler groups
- 50% of other backpacking groups

The 50% estimate for day hiking and backpacking use assumes average encounters to be about half of all groups visiting a particular reach. This assumption is based on consideration of the findings from Rutlin (1995), Berger (2007a) and Berger and CRC (2007).

Angling estimates during the workshop (Berger and CRC 2007) were provided in people at one time (PAOTs) because that is the more important indicator for fishing quality; it also fits with the available creel data (organized by people, not groups). Since average group size for anglers is one (Berger and CRC 2007), PAOTs for anglers equals GAOTs. 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 half (50%) of half (50%) of PAOTs or one-fourth (25%).This percentage is assumed to be higher in the Lower Nicholson Fields Reach because this reach has more trails within close proximity to the river than any of the other three reaches. Trails close to the river present more opportunity for encounters.

The basic use-encounter model:

Encounters =
(50%) * (# of hiking groups) +
(50%) * (# of backpacking groups) +
(25%) * (# of angler groups)

Example Calculations for Capacity and Encounters for the Rock Gorge Reach

The following table is an excerpt from the Use Estimation Workshop (Berger and CRC 2007):

Table D- 1. Use Estimation Workshop Results (Berger and CRC 2007) in GAOT and PAOT for the Rock Gorge Reach from June through August

Rock Gorge Reach (Backcountry)	Weekdays Average	Weekends Average
Day Hiking (GAOT)		
Jun	5	10
Jul	5	10
Aug	5	10
Backpacking (GAOT)		
Jun	10	15
Jul	10	15
Aug	8	12
Angling (PAOT) [2]		
Jun	1	4
Jul	1	1
Aug	1	1

GAOT= Groups at one time.

[2]Angling estimates during the workshop (Berger and CRC 2007) were provided in PAOTs because that is the more important indicator for fishing quality; it also 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 is interchangeable with GAOTs.

A. Calculate the Total Number of Existing User Groups June through August

Combine the three user groups in table 1 above (day hikers, backpackers and anglers) for each month by weekday and weekend to generate total existing user groups.

Two examples follow:

Average Total Groups per Day on Weekdays in June

June Hiking (5 GAOTs) +
June Backpacking (10 GAOTs) +
June Angling (1 GAOT) =
16 GAOTs

Average Total Groups per Day on Weekends in June

June Hiking (10 GAOT) +
June Backpacking (15) +
June Angling (4) =
29 GAOTs

The following table results from the combination:

Table D-2 Total Existing Use in GAOTs for the Rock Gorge Reach from June - August

Rock Gorge Reach Total Existing Use (GAOT)	Weekdays Average	Weekends Average
Jun	16.0	29.0
Jul	16.0	26.0
Aug	14.0	23.0

B. Establishing a Capacity for the Rock Gorge Reach

Using the data in Table 2 above (consolidated from table 1), the month with the highest Average Groups at One Time (June) was selected to set the capacity for the Rock Gorge Reach in Groups per day.

Table D-3 Capacity for the Rock Gorge Reach

Rock Gorge Reach Capacity in Groups per Day[3]	Weekdays (average)	Weekends (average)
June	16.0	29.0

[3]Groups at one time (GAOT) was converted directly to groups per day (GPD) because in the backcountry there is very little turnover (as compared to the frontcountry); therefore GAOTs are the same as GPD.

C. Estimating Encounters for the Rock Gorge Reach

Using the data in table 1 above, 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):

Total Encounters =
50% of day hiking GAOT +
50% of backpacking GAOT +
25% of angling PAOT

Two example calculations follow:

Average Encounters in Groups per Day on Weekdays in June

June Hiking 0.5*(5 GAOTs) +
June Backpacking 0.5* (10 GAOTs) +
June Angling 0.25*(1 GAOT) =
7.8 GAOTs

Average Encounters in Groups per Day on Weekends in June

June Hiking 0.5*(10 GAOT) +
June Backpacking 0.5*(15 GAOTs) +
June Angling 0.25*(4 GAOTs) =
13.5 GAOTs

All the results are shown in table 4 (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 D-4 Total Average Encounters Between Existing Users (hikers, backpackers and backcountry anglers) for the Rock Gorge Reach from June - August.

Total Encounters in Groups per day	Weekdays Average	Weekends Average
Jun	**8**	**14**
Jul	**8**	**13**
Aug	**7**	**11**

Note that the average encounters for the month of June in table 4, weekdays and weekends, correspond directly with the capacity for the Rock Gorge Reach in Table 3.

Appendix E-Vegetation (PETS and Locally Rare Species)

Table E-1: Analysis for Federally listed and Region 8 Sensitive plant species on the Nantahala National Forest, Chattahoochee-Oconee National Forest, and the Sumter National Forest. Species highlighted in **bold** have documented occurrences in the Chattooga River Watershed.

Species	Common Name	Form	Forest Status	Natural Communities, habitat	Forest	Analysis
Echinacea laevigata	Smooth Coneflower	Vascular plant	Endangered	Roadside, Glades, Open habitats	CONF, SNF	4
Geum radiatum	Cliff Avens	Vascular plant	Endangered	High Elevation Rocky Summit	NNF	5
Gymnoderma lineare	**Rock Gnome Lichen**	**Lichen**	**Endangered**	**High Elevation Rocky Summit, Moist Rock Outcrop in Acidic Cove in Gorge**	**NNF, CONF**	**1**
Helonias bullata	**Swamp Pink**	**Vascular plant**	**Threatened**	**Southern Appalachian Bog, Swamp Forest-Bog Complex**	**NNF, CONF**	**4**
Isotria medeoloides	**Small Whorled Pogonia**	**Vascular plant**	**Threatened**	**White Pine Forest, Mesic Oak-Hickory**	**NNF, CONF, SNF**	**4**
Ribes echinellum	Florida Gooseberry	Vascular plant	Threatened	Basic Mixed Hardwood Forests	SNF	6
Sarracenia oreophila	Green Pitcher Plant	Vascular plant	Endangered	Low elevation Southern Appalachian Bog	NNF, CONF	4
Scutellaria montana	Large flowered Skullcap	Vascular plant	Threatened	Mature Oak-Pine Forest with sparse understory	CONF	4
Spiraea virginiana	Virginia Spiraea	Vascular plant	Threatened	Riverside scour zone	NNF	5
Trillium persistens	Persistent Trillium	Vascular plant	Endangered	Mixed Mesic Forest in Tallulah-Tugaloo River watershed	CONF, SNF	4
Trillium reliquum	Relict Trillium	Vascular plant	Endangered	Basic Mesic Forests, lower piedmont/fall line sandhills region	CONF, SNF	6
Aconitum reclinatum	Trailing Wolfsbane	Vascular plant	Sensitive	Northern Hardwood Forest, Boulderfield Forest, High Elevation Seep, Rich Cove Forest	NNF	5
Acrobolbus ciliatus	**A Liverwort**	**Liverwort**	**Sensitive**	**Spruce-Fir Forest, Spray Cliff, Acidic Cove**	**NNF, CONF**	**1**
Amorpha schwerini	Piedmont Indigo Bush	Vascular plant	Sensitive	Dry Oak-Hickory Forest, Pine-Oak Forest	CONF, SNF	6

Species	Common Name	Form	Forest Status	Natural Communities, habitat	Forest	Analysis
Aneura maxima	**A Liverwort**	**Liverwort**	**Sensitive**	**Spray Cliff**	**NNF**	**3**
Anzia americana	A Foliose Lichen	Lichen	Sensitive	Gorge, Acidic Cove or exposed habitat	NNF	4
Arabis georgiana	Georgia Rockcress	Vascular plant	Sensitive	Rock outcrop, rocky bluff, circumneutral soil	CONF	4
Arabis patens	Spreading Rockcress	Vascular plant	Sensitive	Montane Mafic Cliff, Montane Calcareous Cliff	NNF	4
Aspiromitus appalachianus	A Hornwort	Hornwort	Sensitive	Stream	NNF	4
Aureolaria patula	Spreading Yellow False Foxglove	Vascular plant	Sensitive	Steep limestone bluffs	CONF	4
Philonotis cernua (= Bartramidula wilsonii)	**Dwarf Apple Moss**	**Moss**	**Sensitive**	**Spray Cliff, Moist Montane Acidic Cliff, Gorge**	**NNF**	**4**
Bazzania nudicaulis	A Liverwort	Liverwort	Sensitive	Spruce-Fir Forest	NNF	5
Berberis canadensis	American Barberry	Vascular plant	Sensitive	Rich Cove Forest, Glade, mafic rock	NNF, CONF	4
Botrychium jenmanii	Alabama Grape Fern	Vascular plant	Sensitive	Rich Cove Forest	NNF, CONF	4
Brachydontium trichodes	Peak Moss	Moss	Sensitive	Spruce-Fir Forest	NNF	5
Bryocrumia vivicolor	**Gorge Moss**	**Moss**	**Sensitive**	**Spray Cliff, Moist Montane Acidic Cliff, Gorge**	**NNF**	**4**
Buckleya distichophylla	Piratebush	Vascular plant	Sensitive	Hemlock Hardwood Forest, Acidic Cove Forest, Montane Acidic Cliff, Mesic Oak-Hickory	NNF	4
Buxbaumia minakatae	Hump-backed Elves	Moss	Sensitive	Rotting logs	NNF	4
Cardamine clematitis	**Mountain Bittercress**	**Vascular plant**	**Sensitive**	**Boulderfield Forest, Northern Hardwood Forest, Spruce-Fir Forest, High Elevation Seep**	**NNF, CONF**	**5**
Carex biltmoreana	**Biltmore Sedge**	**Vascular plant**	**Sensitive**	**High Elevation Granitic Dome, Montane Cedar-Hardwood Forest, Montane Acidic Cliff**	**NNF, CONF, SNF**	**3**
Carex communis var. amplisquama	**Fox Mountain Sedge**	**Vascular plant**	**Sensitive**	**Rich Cove Forest, Mafic Rock**	**NNF, CONF, SNF**	**3**
Carex misera	**Miserable Sedge**	**Vascular plant**	**Sensitive**	**High Elevation Rocky Summit, Montane Acidic Cliff, High Elevation Granitic Dome**	**NNF, CONF**	**5**
Carex radfordii	Radford's Sedge	Vascular plant	Sensitive	Rich Cove Forest, Escarpment Gorge	NNF, CONF, SNF	4

Species	Common Name	Form	Forest Status	Natural Communities, habitat	Forest	Analysis
Carex roanensis	Roan Sedge	Vascular plant	Sensitive	Rich Cove Forest, Montane Oak-Hickory	NNF, CONF	5
Cephalozia macrostachya ssp. australis	**A Liverwort**	**Liverwort**	**Sensitive**	**Rock Outcrop in Acidic Cove Forest in Gorge**	**NNF**	**2**
Cephaloziella massalongi	A Liverwort	Liverwort	Sensitive	High Elevation Rocky Summit	NNF	5
Cheilolejeunea evansii	**A Liverwort**	**Liverwort**	**Sensitive**	**Acidic Cove, Oak-White Pine Forest, Escarpment Gorge**	**NNF, SNF**	**3**
Chelone cuthbertii	**Cuthbert's Turtlehead**	**Vascular plant**	**Sensitive**	**Southern Appalachian Bog**	**NNF, CONF**	**4**
Cleistes bifaria	Small Spreading Pogonia	Vascular plant	Sensitive	Pine-Oak/Heath Forest, Pine-Oak Woodland	NNF, CONF, SNF	4
Collinsonia verticillata	**Whorled Horsebalm**	**Vascular plant**	**Sensitive**	**Basic Oak-Hickory Forest in Piedmont**	**CONF, SNF**	**6**
Coreopsis latifolia	Broadleaf Coreopsis	Vascular plant	Sensitive	Rich Cove Forest, Northern Hardwood Forest	NNF, CONF	4
Danthonia epilis	**Bog Oatgrass**	**Vascular plant**	**Sensitive**	**High Elevation Granitic Dome, Seep**	**NNF**	**4**
Delphinium exaltatum	Tall Larkspur	Vascular plant	Sensitive	Rich Cove Forest, Grassy Bald, Glade, Montane Oak-Hickory, mafic rock	NNF	5
Desmodium ochroleucum	Creamy Tick-trefoil	Vascular plant	Sensitive	openings, xeric woodlands	NNF	4
Ditrichum ambiguum	Ambiguous Ditrichium	Moss	Sensitive	Acidic Cove Forest, High Elevation Red Oak	NNF	4
Drepanolejeunea appalachiana	**A Liverwort**	**Liverwort**	**Sensitive**	**Acidic Cove, Montane Oak-Hickory, Serpentine Woodland, Serpentine Forest**	**NNF, CONF**	**3**
Ephebe americana	A Fructicose Lichen	Lichen	Sensitive	High Elevation Rocky Summit	NNF	5
Euphorbia purpurea	Glade Spurge	Vascular plant	Sensitive	Northern Hardwood Forest, Rich Cove Forest, Mesic oak-hickory	NNF	5
Eurybia avita	Alexander's Rock Aster	Vascular plant	Sensitive	Granitic Outcrop	NNF	4
Fissidens appalachensis	Appalachian Pocket Moss	Moss	Sensitive	streams at high elevations	NNF	5

Species	Common Name	Form	Forest Status	Natural Communities, habitat	Forest	Analysis
Fothergilla major	Large Witch-alder	Vascular plant	Sensitive	Pine-Oak/Heath Forest, Montane Oak Woodland, Roadside	NNF, CONF, SNF	4
Frullania appalachiana	A Liverwort	Liverwort	Sensitive	Spruce-Fir Forest	NNF	5
Frullania oakesiana	A Liverwort	Liverwort	Sensitive	Spruce-Fir Forest	NNF	5
Gentiana austromontana	Appalachian Gentian	Vascular plant	Sensitive	Grassy Bald, High Elevation Red Oak Forest, Northern Hardwood Forest	NNF	5
Glyceria nubigena	Smoky Mountain Mannagrass	Vascular plant	Sensitive	Northern Hardwood Forest, Boulderfield Forest, High Elevation Seep, Spruce-Fir Forest	NNF	5
Grammitis nimbata	West Indian Dwarf Polypody	Vascular plant	Sensitive	Spray Cliff	NNF	4
Helianthus glaucophyllus	Whiteleaf Sunflower	Vascular plant	Sensitive	Rich Cove Forest, Northern Hardwood Forest, High Elevation Red Oak Forest, Mesic Oak-Hickory Forest, Roadside	NNF, CONF	4
Helianthus smithii	Smith's Sunflower	Vascular plant	Sensitive	Open Oak-hickory-pine forests or woodlands	CONF	6
Hexastylis shuttleworthii var. harperi	Harper's Wild Ginger	Vascular plant	Sensitive	Bogs, hardwood wetlands	CONF	4
Homaliadelphus sharpii	Sharp's Homaliadelphus	Moss	Sensitive	Dry Montane Calcareous Cliff	NNF	4
Hydrothyria venosa	**An Aquatic Lichen**	**Lichen**	**Sensitive**	**Stream**	**NNF**	**1**
Hygrohypnum closteri	Closter's Brook-hypnum	Moss	Sensitive	Stream	NNF	4
Hymenocallis coronaria	Shoal's Spider Lily	Vascular plant	Sensitive	Rocky river shoals, Piedmont and Sandhills	SNF	6
Hymenophyllum tayloriae	**Gorge Filmy Fern**	**Vascular plant**	**Sensitive**	**Spray Cliff, Grotto, Gorge**	**NNF, CONF**	**3**
Hypericum graveolens	Mountain St. John's-wort	Vascular plant	Sensitive	High Elevation Seep, Wet Meadow	NNF	5
Hypericum mitchellianum	Mitchell's St. John's-wort	Vascular plant	Sensitive	High Elevation Seep, Wet Meadow	NNF	5
Hypotrachyna virginica	A Foliose Lichen	Lichen	Sensitive	High Elevation Forest	NNF	5
Ilex collina	Long-stalked Holly	Vascular plant	Sensitive	Northern Hardwood Forest, Boulderfield Forest, Southern Appalachian Bog, Swamp Forest Bog Complex	NNF	5

Species	Common Name	Form	Forest Status	Natural Communities, habitat	Forest	Analysis
Juglans cinerea	**Butternut**	**Vascular plant**	**Sensitive**	**Rich Cove Forest, Mesic Oak-Hickory, Montane Alluvial Forest**	**NNF, CONF, SNF**	**4**
Juncus caesariensis	Rough Rush	Vascular plant	Sensitive	low elevation Southern Appalachian Bog	NNF	4
Lejeunea blomquistii	**A Liverwort**	**Liverwort**	**Sensitive**	**Spray Cliff**	**NNF, CONF**	**1**
Leptodontium excelsum	Grandfather Mountain Leptodontium	Moss	Sensitive	Spruce-Fir Forest	NNF	5
Leptohymenium sharpii	Mount Leconte Moss	Moss	Sensitive	Spruce-Fir Forest	NNF	5
Liatris turgida	**Shale-barren Blazing Star**	**Vascular plant**	**Sensitive**	**High Elevation Granitic Dome, Montane Oak Woodland**	**NNF**	**4**
Lophocolea appalachiana	**A Liverwort**	**Liverwort**	**Sensitive**	**Spray Cliff**	**NNF**	**1**
Lysimachia fraseri	**Fraser's Loosestrife**	**Vascular plant**	**Sensitive**	**Mesic Oak-Hickory Forest, Montane Oak Forest, Rich Cove Forest, Acidic Cove Forest, Roadside**	**NNF, CONF, SNF**	**1**
Mannia californica	A Liverwort	Liverwort	Sensitive	Dry Montane Acidic Cliff	NNF	4
Marshallia trinervia	Broadleaf Barbara's Buttons	Vascular plant	Sensitive	Moist rocky streambanks in calcareous clays	NNF	4
Marsupella emarginata var. latiloba	**A Liverwort**	**Liverwort**	**Sensitive**	**Spray Cliff**	**NNF**	**2**
Megaceros aenigmaticus	A Hornwort	Hornwort	Sensitive	Streams in extreme northwestern NC and adjacent TN	NNF, CONF	5
Metzgeria temperate (= M. fruticulosa)	**A Liverwort**	**Liverwort**	**Sensitive**	**High Elevation Forest**	**NNF**	**5**
Metzgeria furcata var. setigera	A Liverwort	Liverwort	Sensitive	Spruce-Fir Forest, Acidic Cove Forest in Gorge	NNF	4
Metzgeria uncigera	A Liverwort	Liverwort	Sensitive	Acidic Cove Forest	NNF	4
Monotropsis odorata	**Sweet Pinesap**	**Vascular plant**	**Sensitive**	**Rich Cove Forest, Mesic Oak-Hickory, Xeric Oak-Hickory, Pine-Oak/Heath Forest**	**NNF, CONF, SNF**	**3**
Nardia lescurii	A Liverwort	Liverwort	Sensitive	Acidic Cove Forest, near streams	NNF, CONF	4

Species	Common Name	Form	Forest Status	Natural Communities, habitat	Forest	Analysis
Packera millefolium	**Divided-leaf Ragwort**	**Vascular plant**	**Sensitive**	**Montane Acidic Cliff, Montane Cedar-Hardwood Woodland, High Elevation Granitic Dome**	**NNF, CONF**	**4**
Pellia appalachiana	**A Liverwort**	**Liverwort**	**Sensitive**	**rock outcrop near spray Cliff**	**NNF, CONF**	**1**
Penstemon smallii	Small's Beardtongue	Vascular plant	Sensitive	rock outcrops, woodlands	NNF, CONF	5
Physcia pseudospeciosa	A Foliose Lichen	Lichen	Sensitive	High Elevation Granitic Dome	NNF	4
Plagiochila austinii	**A Liverwort**	**Liverwort**	**Sensitive**	**Moist Montane Acidic Cliff**	**NNF**	**1**
Plagiochila caduciloba	**A Liverwort**	**Liverwort**	**Sensitive**	**Spray Cliff, Streamside, Rock Outcrop in Acidic Cove Forest in Gorge**	**NNF, CONF, SNF**	**1**
Plagiochila echinata	**A Liverwort**	**Liverwort**	**Sensitive**	**Spray Cliff, Streamside, Rock Outcrop in Acidic Cove Forest in Gorge**	**NNF, CONF**	**4**
Plagiochila sharpii	**A Liverwort**	**Liverwort**	**Sensitive**	**High Elevation Rocky Summit, Rock Outcrop in Acidic Cove Forest in Gorge**	**NNF, CONF, SNF**	**1**
Plagiochila sullivantii var. spinigera	A Liverwort	Liverwort	Sensitive	Spray Cliff	NNF	4
Plagiochila sullivantii var. sullivantii	**Sullivant's Leafy Liverwort**	**Liverwort**	**Sensitive**	**Spray Cliff, Spruce-Fir Forest**	**NNF**	**1**
Plagiochila virginica var. caroliniana	A Liverwort	Liverwort	Sensitive	Spray Cliff, Rock Outcrop in Acidic Cove Forest in Gorge	NNF	4
Plagiochila virginica var. virginica	A Liverwort	Liverwort	Sensitive	on limestone	NNF	4
Plagiomnium carolinianum	**Carolina Star-moss**	**Moss**	**Sensitive**	**Rock Outcrop in Acidic Cove Forest in Gorge, Streambank**	**NNF, CONF, SNF**	**1**
Platanthera integrilabia	White Fringeless Orchid	Vascular plant	Sensitive	High Elevation Seep, Southern Appalachian Bog	NNF, CONF	4
Platyhypnidium pringlei	**Pringle's Eurhynchium**	**Moss**	**Sensitive**	**Spray Cliff, Rock Outcrop in Acidic Cove Forest in Gorge**	**NNF, CONF**	**4**
Polymnia laevigata	Tennessee Leafcup	Vascular plant	Sensitive	Mesic high nutrient forests	CONF	4

Species	Common Name	Form	Forest Status	Natural Communities, habitat	Forest	Analysis
Polytrichum appalachianum	Appalachian Haircap Moss	Moss	Sensitive	Rocky Summits, mid to high elevation	NNF, CONF	5
Porella japonica ssp. appalachiana	A Liverwort	Liverwort	Sensitive	Spray Cliff	NNF	4
Porella wataugensis	**A Liverwort**	**Liverwort**	**Sensitive**	**Rock Outcrop in Acidic Cove Forest in Gorge**	**NNF**	**4**
Porpidia diversa	A Crustose Lichen	Lichen	Sensitive	High Elevation Rocky Summit	NNF	5
Porpidia herteliana	A Crustose Lichen	Lichen	Sensitive	High Elevation Rocky Summit	NNF	5
Prenanthes roanensis	Roan Rattlesnakeroot	Vascular plant	Sensitive	Northern Hardwood Forest, Grassy Bald, Meadow, Roadside, High Elevation Red Oak Forest	NNF	5
Pycnanthemum beadlei	**Beadle's Mountain-mint**	**Vascular plant**	**Sensitive**	**rock outcrops, woodlands**	**NNF, CONF**	**4**
Pycnanthemum torrei	**Torrey's Mountain-mint**	**Vascular plant**	**Sensitive**	**Xeric Oak-Hickory, Glade**	**NNF**	**6**
Quercus oglethorpensis	Oglethorpe Oak	Vascular plant	Sensitive	Upland Wetland Depressions in Carolina slate Belt	CONF, SNF	6
Rudbeckia triloba var. pinnatiloba	Pinnate-leaf Coneflower	Vascular plant	Sensitive	Mafic rock outcrops	NNF	4
Radula sullivantii	**A Liverwort**	**Liverwort**	**Sensitive**	**Spray Cliff, Rock Outcrop in Acidic Cove Forest in Gorge**	**NNF, CONF, SNF**	**1**
Radula voluta	A Liverwort	Liverwort	Sensitive	Spray Cliff	NNF	4
Rhachithecium perpusillum	Budding Tortula	Moss	Sensitive	Hardwood Trees	NNF	4
Rhododendron vaseyi	**Pink-shell Azalea**	**Vascular plant**	**Sensitive**	**Northern Hardwood Forest, High Elevation Seep, Southern Appalachian Bog, Meadow, Roadside**	**NNF**	**5**
Riccardia jugata	**A Liverwort**	**Liverwort**	**Sensitive**	**Rotten Logs in Acidic Cove Forest in Gorge**	**NNF, CONF**	**3**
Robinia viscosa var. hartwegii	**Hartweg's Locust**	**Vascular plant**	**Sensitive**	**High Elevation Granitic Dome**	**NNF, SNF**	**5**
Robinia viscosa var. viscosa	**Clammy Locust**	**Vascular plant**	**Sensitive**	**High Elevation Granitic Dome, woodlands**	**NNF**	**5**
Rudbeckia heliopsidis	Sun-facing Coneflower	Vascular plant	Sensitive	Roadsides, open areas	SNF	4

Species	Common Name	Form	Forest Status	Natural Communities, habitat	Forest	Analysis
Rugelia nudicaulis	Rugel's Ragwort	Vascular plant	Sensitive	Spruce-Fir Forest	NNF	5
Sabatia capitata	Cumberland Rose Gentian	Vascular plant	Sensitive	Glade?, Pine-oak Woodlands	NNF, CONF	4
Saxifraga caroliniana	**Carolina Saxifrage**	**Vascular plant**	**Sensitive**	**Northern Hardwood Forest, Montane Acidic Cliff, High Elevation Rocky Summit**	**NNF**	**5**
Schlotheimia lancifolia	**Highlands Moss**	**Moss**	**Sensitive**	**Oak-Hickory Forest, Acidic Cove Forest, Hemlock Hardwood Forest, Highlands Plateau, Gorge**	**NNF**	**3**
Schisandra glabra	Bay Starvine	Vascular plant	Sensitive	Mesic forests	CONF	4
Scopelophila cataractae	Agoyan Cataract Moss	Moss	Sensitive	Copper-rich Soils, Roadsides	NNF	4
Scutellaria saxatilis	Rock Skullcap	Vascular plant	Sensitive	Northern Hardwood Forest, Boulderfield Forest, Rich Cove Forest	NNF	5
Shortia galacifolia var. galacifolia	**Southern Oconee Bells**	**Vascular plant**	**Sensitive**	**Acidic Cove Forest, Streambank, Gorge**	**NNF, CONF, SNF**	**4**
Silene ovata	Mountain Catchfly	Vascular plant	Sensitive	Rich Cove Forest, Mesic Oak-Hickory, Roadside, mafic rock	NNF, CONF	6
Solidago simulans	**Granite Dome Goldenrod**	**Vascular plant**	**Sensitive**	**High Elevation Granitic Dome**	**NNF, CONF**	**6**
Sphagnum flavicomans	A Peatmoss	Moss	Sensitive	Seeps on Rock or Spray Cliffs	NNF	4
Sphenolobopsis pearsonii	A Liverwort	Liverwort	Sensitive	Fraser-Fir Forest	NNF	5
Splachnum pennsylvanicum	Southern Dung Moss	Moss	Sensitive	Southern Appalachian Bog	NNF	4
Stachys clingmanii	**Clingman's Hedge-nettle**	**Vascular plant**	**Sensitive**	**Northern Hardwood Forest, Boulderfield Forest**	**NNF**	**5**
Sticta limbata	A Foliose Lichen	Lichen	Sensitive	High Elevation Forest	NNF	5
Symphyotrichum georgianum	Georgia Aster	Vascular plant	Sensitive	roadsides, glades	CONF, SNF	6
Taxiphyllum alternans	Japanese Yew-moss	Moss	Sensitive	Spray Cliff, mafic rock	NNF	4
Thalictrum macrostylum	Small-leaved Meadowrue	Vascular plant	Sensitive	Serpentine Woodland, moist Forest over mafic rock	NNF	4

Species	Common Name	Form	Forest Status	Natural Communities, habitat	Forest	Analysis
Thaspium pinnatifidum	Mountain Thaspium	Vascular plant	Sensitive	Rich Cove Forest, Mesic Oak-Hickory, Roadside, mafic rock	NNF	4
Thermopsis fraxinifolia	Ash-leaved Gloden-banner	Vascular plant	Sensitive	Xeric Oak-Hickory Forest, Montane Oak Woodland, Pine-Oak/Heath	NNF, CONF, SNF	4
Tortula ammonsiana	Ammon's Tortula	Moss	Sensitive	Moist Montane Mafic Cliff	NNF	5
Trillium lancifolium	Lanceleaf Trillium	Vascular plant	Sensitive	Basic Mesic Forest, Piedmont	CONF, SNF	6
Trillium pusillum var. ozarkanum	Ozark Least Trillium	Vascular plant	Sensitive	Dry-Mesic Oak-Hickory, Mesic Oak-Hickory	NNF	4
Trillium pusillum var. georgianum	Georgia Least Trillium	Vascular plant	Sensitive	Hardwood Forest	CONF	4
Trillium rugelii	Southern Nodding Trillium	Vascular plant	Sensitive	Rich Cove Forest, low elevation	NNF, CONF, SNF	4
Trillium simile	**Sweet White Trillium**	**Vascular plant**	**Sensitive**	**Rich Cove Forest**	**NNF, CONF, SNF**	**4**
Tsuga caroliniana	**Carolina Hemlock**	**Vascular plant**	**Sensitive**	**Carolina Hemlock Forest, Montane Acidic Cliff, Pine-Oak/Heath, High Elevation Rocky Summit**	**NNF, CONF**	**4**
Viola appalachiensis	Appalachian Violet	Vascular plant	Sensitive	Serpentine Woodland, Serpentine Forest, Rich Cove Forest, Mesic Oak-Hickory	NNF	4
Waldsteinia lobata	**Lobed Barren-strawberry**	**Vascular plant**	**Sensitive**	**Acidic Cove Forest, Mesic Oak-Hickory, Gorge**	**NNF, CONF, SNF**	**4**
Xanthoparmelia monticola	A Foliose Lichen	Lichen	Sensitive	High Elevation Rocky Summit	NNF	5

Analysis

1 = Requires effects analysis, Species documented or relocated in 2007 survey within proposed project area

2 = Requires effects analysis, Species previously documented in proposed project area or suitable habitat determined to be present

3 = Dropped from further analysis, Species known to occur within project area but unlikely to be impacted by activities associated with the proposed project

4 = Dropped from further analysis, Suitable habitat for the species present outside project activity area or species not located during 2007 or previous surveys

5 = Dropped from further analysis, Suitable habitat for the species present outside project activity area and species range in higher mountains of the proposed project area

6 = Dropped from further analysis, Suitable habitat for the species present outside project activity area and species range far south (piedmont) of the proposed project area

Table F-2: Analysis for Locally Rare plant species on the Nantahala National Forest, and the Chattahoochee-Oconee National Forests. Species highlighted in **bold** have documented occurrences in the Chattooga River Watershed for the respective forest the species is tracked.

Species	Common Name	Form	Forest Status	Natural Communities, habitat	Forest	Analysis
Acer spicatum	Mountain Maple	Vascular plant	Locally Rare	Northern Hardwood Forest	CONF	5
Adlumia fungosa	Climbing Fumitory	Vascular plant	Locally Rare	Rich Cove Forest, Montane Acidic Cliff, Montane Calcareous Cliff	NNF	4
Agastache nepetoides	**Yellow Giant-hyssop**	**Vascular plant**	**Locally Rare**	**Rich Cove Forest, especially over mafic rock**	**NNF, CONF**	**4**
Agastache scrophulariifolia	**Purple Giant-hyssop**	**Vascular plant**	**Locally Rare**	**Rich cove Forest and woodlands, Bottomland Forest**	**CONF**	**4**
Amelanchier sanguinea	Roundleaf Serviceberry	Vascular plant	Locally Rare	Montane Mafic Cliff, Montane Acidic Cliff, High Elevation Granitic Dome	NNF	5
Amorpha nitens	Shining Indigo Bush	Vascular plant	Locally Rare	Bottomland Forest	CONF	4
Anemone caroliniana	Carolina Anemone	Vascular plant	Locally Rare	Post Oak & Blackjack Oak Forest, Piedmont	CONF	6
Arethusa bulbosa	Bog Rose	Vascular plant	Locally Rare	Southern Appalachian Bog	NNF	4
Arisaema triphyllum ssp. stewardsonii	Bog Jack-in-the-Pulpit	Vascular plant	Locally Rare	Southern Appalachian Bog	NNF	4
Asplenium bradleyi	Bradley's Spleenwort	Vascular plant	Locally Rare	Montane Mafic Cliff, Montane Calcareous Cliff	NNF	4
Asplenium monanthes	Single-Sorus Spleenwort	Vascular plant	Locally Rare	Spray Cliff, Montane Acidic Cliff	NNF	4
Botrychium lanceolatum var. angustisegmentum	Lance-leaf Moonwort	Vascular plant	Locally Rare	Rich Cove Forest	NNF	4
Botrychium matricariifolium	Daisy-leaf Moonwort	Vascular plant	Locally Rare	Rich Cove Forest, Meadow	NNF	5
Botrychium oneidense	Blunt-lobed Grape Fern	Vascular plant	Locally Rare	Northern Hardwood Forest, Rich Cove Forest, Southern Appalachian Bog	NNF	5
Botrychium simplex var. simplex	Least Moonwort	Vascular plant	Locally Rare	Meadow, Roadside	NNF	5

Species	Common Name	Form	Forest Status	Natural Communities, habitat	Forest	Analysis
Brachyelytrum septentrionale	**Northern Shorthusk**	**Vascular plant**	**Locally Rare**	**Serpentine Forest, Northern Hardwood Forest, Rich Cove Forest**	NNF	**4**
Brachymenium andersonii	Anderson's Melon-moss	Moss	Locally Rare	Acidic Cove Forest	NNF	4
Brachymenium systylium	Mexican Melon-moss	Moss	Locally Rare	Acidic Cove Forest	NNF	4
Brachythecium rotaeanum	Rota's Feather Moss	Moss	Locally Rare	Acidic Cove Forest	NNF	4
Bryoerythrophyllum ferruginascens	**A Moss**	**Moss**	**Locally Rare**	**High Elevation Forest**	NNF	**5**
Bryoxiphium norvegicum	**Sword Moss**	**Moss**	**Locally Rare**	**Spray Cliff, Gorge**	NNF	**1**
Bryum riparium	Riverside Bryum	Moss	Locally Rare	Spray Cliff	NNF	4
Calamagrostis canadensis	Canada Reedgrass	Vascular plant	Locally Rare	High Elevation Seep, Grassy Bald	NNF	5
Calamagrostis porteri	**Porter's Reedgrass**	**Vascular plant**	**Locally Rare**	**Serpentine Woodland, Montane Oak-Hickory Forest**	NNF, CONF	**4**
Calystegia catesbiana ssp. sericata	**Blue Ridge Bindweed**	**Vascular plant**	**Locally Rare**	**Serpentine Forest, Mesic to Xeric Oak Forest, Roadside**	**CONF**	**2**
Campanula aparinoides	Marsh Bellflower	Vascular plant	Locally Rare	Southern Appalachian Bog, Wet Meadow	NNF	6
Campylopus atrovirens var. atrovirens	**Black Fish Hook**	**Moss**	**Locally Rare**	**Seepage on High Elevation Granitic Domes**	NNF	**5**
Carex careyana	Carey's Sedge	Vascular plant	Locally Rare	Rich Cove Forest	NNF	4
Carex cherokeensis	Cherokee Sedge	Vascular plant	Locally Rare	Montane Alluvial Forest, Roadside, Rich Cove Forest	NNF	4
Carex cristatella	Small-crested Sedge	Vascular plant	Locally Rare	Grassy Bald, Southern Appalachian Bog	NNF	5
Carex deflexa	A sedge	Vascular plant	Locally Rare	High Elevation Seep	NNF	5

Species	Common Name	Form	Forest Status	Natural Communities, habitat	Forest	Analysis
Carex hitchcockiana	Hitchcock's Sedge	Vascular plant	Locally Rare	Rich Cove Forest, Mesic Oak-Hickory Forest, mafic rock	NNF	4
Carex manhartii	**Manhart's Sedge**	**Vascular plant**	**Locally Rare**	**Rich Cove Forest, Acidic Cove Forest**	CONF	**1**
Carex pedunculata	Longstalk Sedge	Vascular plant	Locally Rare	Rich Cove Forest	NNF	4
Carex platphylla	Broadleaf Sedge	Vascular plant	Locally Rare	Rich Cove Forest, mostly over mafic rock	CONF	4
Carex projecta	Necklace Sedge	Vascular plant	Locally Rare	High Elevation Seep, Southern Appalachian Bog, Marsh, Wet Meadow	NNF	4
Carex purpurifera	Purple Sedge	Vascular plant	Locally Rare	Rich Cove Forest, Montane Alluvial Forest	NNF, CONF	4
Carex scabrata	**Rough Sedge**	**Vascular plant**	**Locally Rare**	**Shaded Seepage slopes**	**CONF**	**4**
Carex tetanica	Rigid Sedge	Vascular plant	Locally Rare	Southern Appalachian Bog, Swamp Forest-Bog Complex	NNF	4
Carex trisperma	Three-seeded Sedge	Vascular plant	Locally Rare	Southern Appalachian Bog, High Elevation Seep	NNF	4
Carex woodii	**Wood's Sedge**	**Vascular plant**	**Locally Rare**	**Northern Hardwood Forest, Rich Cove Forest, Acidic Cove Forest, Mesic Oak-Hickory**	NNF	**3**
Castanea dentata (nut-bearing)	American Chestnut	Vascular plant	Locally Rare	Mesic Forests	CONF	4
Caulophyllum giganteum	Northern Blue Cohosh	Vascular plant	Locally Rare	Rich Cove Forest, Northern Hardwood Forest	NNF	4
Castilleja coccinea	Indian Paintbrush	Vascular plant	Locally Rare	Glades, Woodland, Barrens over mafic rock	CONF	4
Celastrus scandens	American Bittersweet	Vascular	Locally Rare	Rich Cove Forest, Montane Oak-Hickory, mafic rock	NNF	4
Cephalozia pleniceps var. carolinana	A Liverwort	Liverwort	Locally Rare	Stream Edge	NNF	4
Cephaloziella obtusilobula	**A Liverwort**	**Liverwort**	**Locally Rare**	**High Elevation Rock Outcrops**	**NNF**	**5**
Cephaloziella spinicaulis	A Liverwort	Liverwort	Locally Rare	High Elevation Rocky Summit	NNF	5

Species	Common Name	Form	Forest Status	Natural Communities, habitat	Forest	Analysis
Cetrelia cetrarioides	**A Foliose Lichen**	**Lichen**	**Locally Rare**	**High Elevation Forest**	NNF	**5**
Cheilolejeunea myriantha	A Liverwort	Liverwort	Locally Rare	Acidic Cove Forest in Gorge	NNF	4
Chenopodium simplex	Giant-seed Goosefoot	Vascular plant	Locally Rare	Montane Acidic Cliff	NNF	4
Chiloscyphus muricatus	**A Liverwort**	**Liverwort**	**Locally Rare**	**Rock Outcrop in Acidic Cove Forest in Gorge**	NNF	**1**
Chrysosplenium americanum	Golden Saxifrage	Vascular plant	Locally Rare	Seep	CONF	4
Cirriphyllum piliferum	A Moss	Moss	Locally Rare	Spray Cliff, Rock Outcrop in Acidic Cove Forest in Gorge	NNF	4
Cirsium carolinianum	Carolina Thistle	Vascular plant	Locally Rare	Glades, Woodland, Barrens over mafic rock	CONF	4
Cladrastis kentukea	Yellowwood	Vascular plant	Locally Rare	Rich Cove Forest over mafic rock	CONF	4
Clematis ochroleuca	Curlyheads	Vascular plant	Locally Rare	Dry Woodland over mafic rock	CONF	4
Coeloglossum viride var. virescens	Long-bracted Frog Orchid	Vascular plant	Locally Rare	Seep, Rich Cove Forest	NNF	4
Comptonia peregrina	**Sweet Fern**	**Vascular plant**	**Locally Rare**	**Pine-Oak/Heath, low Mts**	**CONF**	**4**
Convallaria majuscula	American Lily-of-the-valley	Vascular plant	Locally Rare	Rocky woodlands, mostly High Elevation Red oak Forest	CONF	4
Corallorhiza wisteriana	Spring Coralroot	Vascular plant	Locally Rare	Mesic forests	NNF	4
Coreopsis grandiflora var. grandiflora	**Large-flowered Tickseed**	**Vascular plant**	**Locally Rare**	**Granitic outcrops**	**NNF**	**4**
Corydalis micrantha ssp. micrantha	Slender Corydalis	Vascular plant	Locally Rare	Montane Acidic Cliff	NNF	4
Corydalis sempervirens	**Pale Corydalis**	**Vascular plant**	**Locally Rare**	**High Elevation Granitic Dome**	**CONF**	**4**
Cymophyllus fraserianus	Fraser's Sedge	Vascular plant	Locally Rare	Cove Forests, typically acidic soil	CONF	**4**

Species	Common Name	Form	Forest Status	Natural Communities, habitat	Forest	Analysis
Cypripedium parviflorum var. pubescens	**Large Yellow Lady's Slipper**	**Vascular plant**	**Locally Rare**	**Rich Cove Forest over mafic rock**	**NNF, CONF**	**4**
Cypripedium parviflorum var. parviflorum	Small Yellow Lady's Slipper	Vascular plant	Locally Rare	Rich Cove Forest over mafic rock	CONF	4
Cystopteris tennesseensis	Tennessee Bladder-fern	Vascular plant	Locally Rare	Montane Calcareous Cliff	NNF	4
Cystopteris tenuis	Upland Bladder-fern	Vascular plant	Locally Rare	High Elevation Rocky Summit	NNF	5
Dalibarda repens	Robin Runaway	Vascular plant	Locally Rare	Southern Appalachian Bog, Acidic Cove Forest, Swamp Forest-Bog Complex	NNF	4
Dendrolycopodium dendroideum	**Tree Ground-pine**	**Vascular plant**	**Locally Rare**	**Grassy Balds, Northern Hardwood Forest**	**NNF**	**4**
Dendrolycopodium hickeyi	**Pennsylvania Ground-pine**	**Vascular plant**	**Locally Rare**	**Grassy Balds, Bog margins, high elevation forest**	**NNF**	**5**
Deschampsia cespitosa ssp. glauca	Tufted Hairgrass	Vascular plant	Locally Rare	Serpentine Woodland, Serpentine Forest	NNF	4
Diarrhena americana	Eastern Beakgrass	Vascular plant	Locally Rare	Rich Cove Forest, Montane Oak-Hickory, mafic rock	NNF	4
Dicentra canadensis	Squirrel Corn	Vascular plant	Locally Rare	Rich Cove Forest	CONF	4
Dicentra eximia	Bleeding Heart	Vascular plant	Locally Rare	Montane Acidic Cliff, Montane Mafic Cliff	NNF, CONF	4
Dichodontium pellucidum	A Moss	Moss	Locally Rare	Spray Cliff	NNF	4
Diphastriastrum tristachyum	Ground Cedar	Vascular plant	Locally Rare	Dry Forests, Glades, Barrens	CONF	4
Diplophyllum taxifolium var. mucronatum	A Liverwort	Vascular plant	Locally Rare	High Elevation Rocky Summit	NNF	4
Dirca palustria	Leatherwood	Vascular plant	Locally Rare	Rich Cove Forest over mafic rock	CONF	4
Dodecatheon meadia var. meadia	Eastern Shooting Star	Vascular plant	Locally Rare	Montane Mafic Cliff, Montane Cedar-Hardwood Forest	NNF, CONF	4
Draba ramosissima	Branching Draba	Vascular plant	Locally Rare	Montane Mafic Cliff, Montane Calcareous Cliff	NNF	4

Species	Common Name	Form	Forest Status	Natural Communities, habitat	Forest	Analysis
Dryopteris celsa	Log Fern	Vascular plant	Locally Rare	swamps, seepage bogs	CONF	4
Dryopteris goldiana	Goldie's Wood Fern	Vascular plant	Locally Rare	Northern Hardwood Forest, Rich Cove Forest	CONF	4
Echinacea purpurea	Purple Coneflower	Vascular plant	Locally Rare	Glade, Roadside, mafic rock	NNF	5
Elymus trachycaulus ssp. trachycaulus	Slender Wheatgrass	Vascular plant	Locally Rare	Serpentine Woodland	NNF	4
Encalypta procera	Extinguisher Moss	Moss	Locally Rare	Moist Montane Calcareous Cliff	NNF	4
Entodon compressus	Ftattened Entodon	Moss	Locally Rare	Moist Montane Calcareous Cliff	NNF	4
Entodon sullivantii	**Sullivant's Entodon**	**Moss**	**Locally Rare**	**Spray Cliff, Rock Outcrop in Acidic Cove Forest in Gorge**	NNF	**4**
Ephebe lanata	A Fructicose Lichen	Lichen	Locally Rare	Stream	NNF	4
Ephebe solida	**A Fructicose Lichen**	**Lichen**	**Locally Rare**	**Stream**	NNF	**1**
Epilobium ciliatum	Purpleleaf Willowherb	Vascular plant	Locally Rare	Southern Appalachian Bog, Seep	NNF	4
Filipendula rubra	Queen-of-the-Prairie	Vascular plant	Locally Rare	Southern Appalachian Bog, Wet Meadow	NNF	4
Fontinalis sphagnifolia	**A Water Moss**	**Moss**	**Locally Rare**	**Rocks in flowing water near Spray Cliff**	**NNF**	**4**
Frasera caroliniensis	Columbo	Vascular plant	Locally Rare	Rich Cove Forest, Mesic Oak-Hickory Forest	NNF	4
Gentianopsis crinita	Fringed Gentian	Vascular plant	Locally Rare	Serpentine Woodland, Glade	NNF, CONF	4
Geum aleppicum	Yellow Avens	Vascular plant	Locally Rare	Southern Appalachian Bog	NNF	4
Glyceria laxa	Lax Mannagrass	Vascular plant	Locally Rare	Seep	NNF	4
Hackelia virginiana	Virginia Stickseed	Vascular plant	Locally Rare	Forests and Woodlands over mafic rock	NNF	4

Species	Common Name	Form	Forest Status	Natural Communities, habitat	Forest	Analysis
Helenium brevifolium	Littleleaf Sneezeweed	Vascular plant	Locally Rare	Southern Appalachian Bog, Wet Meadow, Seeps, Riverbanks	NNF	4
Helianthemum bicknellii	Plains Sunrose	Vascular plant	Locally Rare	Montane Mafic Cliff, Montane Calcareous Cliff, High Elevation Granitic Dome	NNF	4
Helianthemum propinquum	Creeping Sunrose	Vascular plant	Locally Rare	Glade, Southern Appalachian Fen, Montane Acidic Cliff	NNF	4
Helianthus occidentalis var. occidentalis	Naked-stem Sunflower	Vascular plant	Locally Rare	Montane Alluvial Forest, sandy bottom	NNF	4
Heracleum maximum	Cow Parsnip	Vsacular plant	Locally Rare	Meadows, forest edge, balds	CONF	4
Herzogiella turfacea	Flat Stump Moss	Moss	Locally Rare	Tree base and decaying logs in coniferous woods or swamps	NNF	4
Hexalectris spicata	Crested Coralroot	Vascular plant	Locally Rare	Rich Cove Forest, Glade, Mesic Oak-Hickory, mafic rock	NNF	4
Hierochloe odorata	Holy Grass	Vascular plant	Locally Rare	Southern Appalachian Bog	NNF	4
Homalia trichomanoides	**Lime Homalia**	**Moss**	**Locally Rare**	**Spray Cliff, Rock Outcrop in Acidic Cove Forest in Gorge**	NNF	**2**
Huperzia appresa	**Appalachian Fir Clubmoss**	**Vascular plant**	**Locally Rare**	**High Elevation Seep, High Elevation Rocky Summit, High Elevation Granitic Dome**	**CONF**	**3**
Huperzia porophila	**Rock Fir Clubmoss**	**Vascular plant**	**Locally Rare**	**Spray Cliff**	**NNF, CONF**	**3**
Hydrastis canadensis	**Goldenseal**	**Vascular plant**	**Locally Rare**	**Rich Cove Forest, Mesic Oak-Hickory, mafic rock**	**NNF, CONF**	**4**
Hydrophyllum macrophyllum	Largeleaf Waterleaf	Vascular plant	Locally Rare	Rich Cove Forest, Mesic Oak-Hickory, mafic rock	CONF	4
Hylocomiastrum umbratum	Shaded Feather Moss	Moss	Locally Rare	On trees and rocks in high elevation moist forest, mainly Spruce-Fir Forest	NNF	5
Hypericum buckleyi	**Blue Ridge St. John's Wort**	**Vascular plant**	**Locally Rare**	**High Elevation Granitic Dome, seepage rock**	**CONF**	**4**
Hypotrachyna sinuosa	A Foliose Lichen	Lichen	Locally Rare	High Elevation Forest	NNF	5
Jeffersonia diphylla	Twin Leaf	Vascular plant	Locally Rare	Rich Cove Forest, mafic rock	NNF	4

Species	Common Name	Form	Forest Status	Natural Communities, habitat	Forest	Analysis
Juncus gymnocarpus	**Naked-fruit Rush**	**Vascular plant**	**Locally Rare**	**Shaded Seeps**	**CONF**	**2**
Juniperus communis var. depressa	**Dwarf Juniper**	**Vascular plant**	**Locally Rare**	**High Elevation Granitic Dome, Low Elevation Rocky Summit**	**NNF, CONF**	**4**
Kalmia buxifolia (= Leiophyllum buxifolium)	**Sand Myrtle**	**Vascular plant**	**Locally Rare**	**Granitic Domes, Heath Balds**	**CONF**	**5**
Kalmia carolina	Sheep Laurel	Vascular plant	Locally Rare	Bogs, Fens, Pocosins	CONF	4
Leptoscyphus cunefolius (= Anomylia cuneifolia)	A Liverwort	Liverwort	Locally Rare	Spruce-Fir Forest	NNF	5
Liatris aspera	**Rough Blazing Star**	**Vascular plant**	**Locally Rare**	**Glade, Montane Oak Woodland, Southern Appalachian Fen**	**NNF**	**4**
Liatris microcephala	Small-head Blazing Star	Vascular plant	Locally Rare	Montane Mafic Cliff, Glade, Montane Oak Woodland	NNF	4
Liatris squarrulosa	Earle's Blazing Star	Vascular plant	Locally Rare	Roadside, Pine-Oak Woodland	NNF	4
Lilium canadense ssp. editorum	Red Canada Lily	Vascular plant	Locally Rare	Wet Meadow, Southern Appalachian Bog	NNF	4
Lilium philadelphicum var. philadelphicum	Wood Lily	Vascular plant	Locally Rare	Grassy Bald, Meadow, Glade	NNF	5
Liparis loeselii	Fen Orchid	Vascular plant	Locally Rare	Seep, Roadside	NNF	4
Listera australis	Southern Twayblade	Vascular plant	Locally Rare	Acidic Cove Forest, Montane Alluvial Forest	CONF	4
Listera smallii	**Kidney-leaved Twayblade**	**Vascular plant**	**Locally Rare**	**Acidic Cove Forest, Montane Alluvial Forest**	CONF	**2**
Lobaria scrobiculata	Textured Lungwort	Lichen	Locally Rare	High Elevation Forest primarily Spruce-Fir	NNF	5
Lonicera canadensis	American Fly-honeysuckle	Vascular plant	Locally Rare	Northern Hardwood Forest, High Elevation Seep	NNF	5
Lycopodiella inundata	Bog Clubmoss	Vascular plant	Locally Rare	Southern Appalachian Bog, Swamp Forest-Bog Complex	NNF	4
Lycopodium clavatum	**Running Clubmoss**	**Vascular plant**	**Locally Rare**	**Grassy Balds, openings, Roadsides**	**CONF**	**5**

Species	Common Name	Form	Forest Status	Natural Communities, habitat	Forest	Analysis
Lygodium palmatum	**Climbing Fern**	**Vascular plant**	**Locally Rare**	**Southern Appalachian Bog, Swamp Forest**	**CONF**	**2**
Macrocoma sullivantii	**Sullivant's Maned-Moss**	**Moss**	**Locally Rare**	**Montane Cedar Hardwood Forest, Pine-Oak/Heath Forest**	NNF	**3**
Meehania cordata	Meehania	Vascular plant	Locally Rare	Northern Hardwood Forest, Boulderfield Forest, Rich Cove Forest	NNF	4
Melanelia stygia	A Foliose Lichen	Lichen	Locally Rare	High Elevation Rocky Summit	NNF	5
Melanthium latifolium	**Broadleaf Bunchflower**	**Vascular plant**	**Locally Rare**	**Mesic Hardwood Forest**	**CONF**	**4**
Mertensia virginica	Virginia Bluebell	Vascular plant	Locally Rare	Rich Cove Forest	CONF	4
Milium effusum	Millet-grass	Vascular plant	Locally Rare	Northern Hardwood Forest, High Elevation Red Oak Forest, Grassy Bald	NNF	5
Muhlenbergia glomerata	Bristly Muhly	Vascular plant	Locally Rare	Serpentine Woodland, Southern Appalachian Fen, Montane Mafic Cliff	NNF	4
Muhlenbergia sobolifera	Rock Muhly	Vascular plant	Locally Rare	Montane Acidic Cliff	NNF	4
Mylia tayorii	A Liverwort	Liverwort	Locally Rare	Spray Cliff	NNF	4
Nestronia umbellulata	Indian Olive	Vascular plant	Locally Rare	Mesic to Dry-Mesic Oak Forest	CONF	6
Oenothera perennis	**Perennial Sundrops**	**Vascular plant**	**Locally Rare**	**Southern Appalachian Bog, Roadside**	NNF	**4**
Orthodontium pellucens	Translucent Orthodontium	Moss	Locally Rare	Moist Montane Calcareous Cliff	NNF	4
Packera paupercula var. papercula	Balsam Ragwort	Vascular plant	Locally Rare	Southern Appalachian Bog, Southern Appalachian Fen	NNF	4
Packera paupercula var. appalachiana	Prairie Ragwort	Vascular plant	Locally Rare	Serpentine Woodland, Serpentine Forest, Montane Mafic Cliff, Montane Calcareous Cliff	NNF	4
Palamocladium leskeoides	Palamocladium	Moss	Locally Rare	Moist Montane Calcareous Cliff, Gorge	NNF	4
Panax trifolius	**Dwarf Ginseng**	**Vascular plant**	**Locally Rare**	**Rich Cove Forest, Northern Hardwood Forest**	**CONF**	**4**

Species	Common Name	Form	Forest Status	Natural Communities, habitat	Forest	Analysis
Parnassia grandifolia	Large-leaved Grass-of-parnassus	Vascular plant	Locally Rare	Seep, Fen, Serpentine Woodland, Roadside, mafic rock	NNF	4
Paronychia argrocoma	Silverling	Vascular plant	Locally Rare	thin soils of rock outcrops	CONF	4
Parthenium auriculatum	Glade Wild Quinine	Vascular plant	Locally Rare	Glades, Woodland, mafic rock	NNF	4
Pedicularis lanceolata	Swamp Lousewort	Vascular plant	Locally Rare	Serpentine Woodland, Southern Appalachian Bog, Seep, Swamp, Wet Meadow	NNF, CONF	4
Phegopteris connectilis	Northern Beech Fern	Vascular plant	Locally Rare	Spray Cliff, Spruce-Fir Forest, High Elevation Seep	NNF	5
Phlox amplifolia	Broadleaf Phlox	Vascular plant	Locally Rare	Rich Cove Forest	CONF	4
Phlox subulata	**Moss Pink**	**Vascular plant**	**Locally Rare**	**High Elevation Rocky Summit, Montane Mafic Cliff, mafic rock**	**NNF**	**4**
Pilosium chlorophyllum	A Moss	Moss	Locally Rare	Moist Hardwoods in Escarpment Gorge	NNF	4
Plagiochila corniculata	A Liverwort	Liverwort	Locally Rare	Fraser-Fir Forest	NNF	5
Plagiochila ludoviciana	A Liverwort	Liverwort	Locally Rare	Rock Outcrop in Acidic Cove Forest in Gorge	NNF	4
Plagiomnium ellipticum	Marsh Magnificent Moss	Moss	Locally Rare	Wet rocks in northern mountains	NNF	5
Plagiomnium rostratum	Long-beaked Thread Moss	Moss	Locally Rare	Wet calcareous or mafic rocks	NNF	4
Platanthera flava var. herbiola	Northern Green Orchid	Vascular plant	Locally Rare	Southern Appalachian Bog, Swamp Forest-Bog Complex	NNF	4
Platanthera grandiflora	Large Purple-fringed Orchid	Vascular plant	Locally Rare	High Elevation Seep, Grassy Bald, Roadside, Northern Hardwood Forest, Southern Appalachian Bog	NNF, CONF	5
Platanthera peramoena	Purple Fringeless Orchid	Vascular plant	Locally Rare	Southern Appalachian Bog, Seep, Marsh	NNF, CONF	4
Platanthera psycodes	Small Purple-fringed Orchid	Vascular plant	Locally Rare	Northern Hardwood Forest, Bogs	CONF	5
Poa palustris	Swamp Bluegrass	Vascular plant	Locally Rare	Grassy Bald, Spruce-Fir Forest	NNF	5

Species	Common Name	Form	Forest Status	Natural Communities, habitat	Forest	Analysis
Poa saltuensis	A Bluegrass	Vascular plant	Locally Rare	Serpentine Woodland, Serpentine Forest	NNF	4
Pohlia lescuriana	**Spherical Bulb Nodding Moss**	**Moss**	**Locally Rare**	**Wet soil in open areas, stream banks**	**NNF**	**2**
Polygala senega	Senega Snakeroot	Vascular Plant	Locally Rare	Woodlands over mafic or calcareous soils	NNF	4
Prenanthes alba	White Rattlesnake Root	Vascular plant	Locally Rare	Rich Cove Forest, Mesic Oak-Hickory	NNF	4
Prosartes maculata	Spotted Mandarin	Vascular plant	Locally Rare	High Nutrient Rich Cove Forest or Oak-Hickory Forest	CONF	4
Prunus pensylvanica	**Fire Cherry**	**Vascular plant**	**Locally Rare**	**Northern Hardwood Forest**	**CONF**	**5**
Prunus virginiana	Choke Cherry	Vascular plant	Locally Rare	Northern Hardwood Forest, Mesic Oak Forest	CONF	5
Pycnanthemum virginianum	Virginia Mountain-mint	Vascular plant	Locally Rare	Meadows or Marshes over mafic rock	**NNF, CONF**	4
Quercus prinoides	Dwarf Chinqupin Oak	Vascular plant	Locally Rare	Xeric Oak-Hickory, Pine-Oak/Heath Forest, Glade	NNF	4
Racomitrium aciculare	**Dark Mountain Fringe Moss**	**Moss**	**Locally Rare**	**Moist shaded acidic rock**	**NNF**	**4**
Ranunculus fascicularis	Early Buttercup	Vascular plant	Locally Rare	Roadside, Serpentine Woodland	NNF	4
Rhabdoweisia crenulata	Himalayan Ribbed-weissia	Moss	Locally Rare	Rock Outcrop in Acidic Cove Forest in Gorge	NNF	4
Rhododendron cumberlandense	Cumberland Azalea	Vascular plant	Locally Rare	Grassy Bald, Heath Bald	NNF	5
Rhytidadelphus subpinnatus	A Moss	Moss	Locally Rare	Wet substrates in swamps and moist forests, streams, waterfalls	NNF	4
Rhus typhina	Staghorn Sumac	Vascular plant	Locally Rare	Barrens, Open Areas, Rock Outcrops	CONF	4
Robinia hispida var fertilis	**Fruitful Locust**	**Vascular plant**	**Locally Rare**	**Northern Hardwood Forest, Acidic Cove Forest, High Elevation Granitic Dome**	NNF	**5**
Robinia hispida var kelseyi	Kelsey's Locust	Vascular plant	Locally Rare	High Elevation Red Oak Forest, Montane Acidic Cliff	NNF	5

Species	Common Name	Form	Forest Status	Natural Communities, habitat	Forest	Analysis
Rubus idaeus ssp. strigosus	Red Raspberry	Vascular plant	Locally Rare	Northern Hardwood Forest, Boulderfield Forest, Spruce-Fir Forest	NNF	5
Sabal minor	Dwarf Palmetto	Vascular plant	Locally Rare	Swamps, Piedmont Alluvial Forest	CONF	6
Sambucus racemosa ssp. pubens	Red Elderberry	Vascular plant	Locally Rare	Northern Hardwood Forest	CONF	4
Sanguisorba canadensis	**Canadian Burnet**	**Vascular plant**	**Locally Rare**	**Serpentine Barrens, Fens, Seeps over mafic rock**	**CONF**	**4**
Sarracenia purpurea	Purple Pitcher Plant	Vascular plant	Locally Rare	Southern Appalachian Bog, Seeps	CONF	4
Scopelophila ligulata	Copper Moss	Moss	Locally Rare	Copper-rich Soils, Roadsides	NNF	4
Scutellaria nervosa	Bottomland Skullcap	Vascular plant	Locally Rare	Alluvial and Mesic Forests in the Piedmont and Coastal Plain	CONF	6
Sedum glaucophyllum	Cliff Stonecrop	Vascular plant	Locally Rare	Montane Cedar-Hardwood Woodland	NNF	4
Sibbaldiopsis tridentata	Three-toothed Cinqufoil	Vascular plant	Locally Rare	High Elevation Granitic Dome	CONF	5
Smilax biltmoreana	Biltmore's Carrionflower	Vascular plant	Locally Rare	Montane Oak-Hickory Forest, Rich Cove Forest, Acidic Cove Forest	CONF	4
Smilax hugeri	Huger's Carrion-flower	Vascular plant	Locally Rare	Rich Cove Forest, Mesic Oak-Hickory, mafic rock	NNF	4
Solidago rigida var. rigida	Prairie Bold Goldenrod	Vascular plant	Locally Rare	Montane Oak Woodland, Glade, Roadside, mafic rock	NNF	4
Solidago ptarmicoides	White Goldenrod	Vascular plant	Locally Rare	Barrens over mafic rock, woodlands	CONF	4
Solidago uliginosa	**Bog Goldenrod**	**Vascular plant**	**Locally Rare**	**High Elevation Seep, Southern Appalachian Bog**	NNF	**4**
Sorbus americana	**American Mountain Ash**	**Vascular plant**	**Locally Rare**	**Northern Hardwood, high elevation openings**	**CONF**	**5**
Spartina pectinata	Freshwater Cordgrass	Vascular plant	Locally Rare	Spray Cliff	NNF	4
Sphagnum angustifolium	Narrowleaf Peatmoss	Moss	Locally Rare	Southern Appalachian Bog	NNF	4

Species	Common Name	Form	Forest Status	Natural Communities, habitat	Forest	Analysis
Sphagnum capillifolium	**Northern Peatmoss**	**Moss**	**Locally Rare**	**Southern Appalachian Bog**	**NNF**	**4**
Sphagnum fallax	Pretty Peatmoss	Moss	Locally Rare	Southern Appalachian Bog	NNF	4
Sphagnum flexuosum	Flexuous Peatmoss	Moss	Locally Rare	Southern Appalachian Bog	NNF	4
Sphagnum pylaesii	**Simple Peatmoss**	**Moss**	**Locally Rare**	**Spray Cliff, Pool**	**NNF**	**4**
Sphagnum russowii	**Russow's Peatmoss**	**Moss**	**Locally Rare**	**Southern Appalachian Bog**	**NNF**	**4**
Sphagnum squarrosum	Squarrose Peatmoss	Moss	Locally Rare	Spray Cliff, Spruce-Fir Forest Seep	NNF	5
Sphagnum subsecundum	Orange Peatmoss	Moss	Locally Rare	Southern Appalachian Bog, Fen	NNF	4
Sphagnum tenellum	**Delicate Peatmoss**	**Moss**	**Locally Rare**	**High Elevation Granitic Dome**	NNF	**5**
Spigelia marilandica	Pink root	Vascular plant	Locally Rare	Montane Oak Woodland, Mesic Oak-Hickory, White Pine Forest	NNF	4
Spiranthes lacera var. lacera	Northern Slender Ladies-tresses	Vascular	Locally Rare	Balds	NNF	5
Spiranthes ochroleuca	Yellow Ladies'-tresses	Vascular plant	Locally Rare	Northern Hardwood Forest, Grassy Bald, Meadow	NNF	5
Spiraea tomentosa	Hardhack	Vascular plant	Locally Rare	Seeps, Bogs, Swamps	CONF	4
Spiranthes ovalis var. erostellata	Oval Laddes' Tresses	Vascular plant	Locally Rare	Swamp Forest, Bottomland Forest	CONF	4
Sporobolus heterolepis	**Prairie Dropseed**	**Vascular plant**	**Locally Rare**	**Serpentine Woodland**	NNF	**4**
Stachys eplingii	Epling's Hedge-nettle	Vascular plant	Locally Rare	Southern Appalachian Bog	NNF	4
Stachys nuttallii	Heartleaf Hedge-nettle	Vascular plant	Locally Rare	Southern Appalachian Bog	CONF	4
Stewartia ovata	**Mountain Camellia**	**Vascular**	**Locally Rare**	**Acidic Cove Forest, Montane Alluvial Forest**	**NNF, CONF**	**1**

Species	Common Name	Form	Forest Status	Natural Communities, habitat	Forest	Analysis
Streptopus amplexifolius	White Mandarin	Vascular plant	Locally Rare	High Elevation Seep, Northern Hardwood Forest, Spruce-Fir Forest	NNF	5
Streptopus lanceolatus var. lanceolatus	Rosy Twisted Stalk	Vascular plant	Locally Rare	Northern Hardwood Forest	CONF	5
Symphyotrichum rhiannon	Rhiannon's Aster	Vascular	Locally Rare	Serpentine Barren	NNF	4
Symphyotrichum shortii	Short's Aster	Vascular plant	Locally Rare	Roadside, Montane Oak-Hickory Forest	NNF	4
Synandra hispidula	Synandra	Vascular plant	Locally Rare	Rich Cove Forest, mafic rock	NNF	4
Tortula fragilis	Fragile Tortula	Moss	Locally Rare	Moist Montane Mafic Cliff	NNF	4
Triantha glutinosa (= Tofieldia glutinosa)	**Sticky Bog Asphodel**	**Vascular plant**	**Locally Rare**	**Southern Appalachian Bog, Seep**	NNF	**4**
Trichomanes boschianum	**Appalachian Filmy-fern**	**Vascular plant**	**Locally Rare**	**Spray Cliff, Grotto, Gorge**	NNF	**2**
Trichomanes petersii	**Dwarf Filmy-fern**	**Vascular plant**	**Locally Rare**	**Montane Acidic Cliff, Grotto, Gorge**	**NNF, CONF**	**2**
Trichophorum caespitosum	**Deerhair Bulrush**	**Vascular plant**	**Locally Rare**	**Montane Acidic Cliff, High Elevation Granitic Dome**	**NNF, CONF**	**5**
Trientalis borealis	Starflower	Vascular plant	Locally Rare	Rich Cove Forest, Northern Hardwood Forest	NNF, CONF	5
Trillium discolor	Mottled Trillium	Vascular plant	Locally Rare	Rich Cove Forest, Gorge	NNF, CONF	4
Trillium flexipes	Bent White Trillium	Vascular plant	Locally Rare	Rich Cove Forest	NNF	4
Trillium sulcatum	Barksdale Trillium	Vascular plant	Locally Rare	Rich Cove Forest	CONF	4
Triosteum aurantiacum	Horse Gentian	Vascular plant	Locally Rare	Rich Cove Forest	CONF	4
Triphora trianthophora	**Three-bird's Orchid**	**Vascular plant**	**Locally Rare**	**Mesic forests, open to closed understory**	**CONF**	**4**
Usnea angulata	Old Man's Beard	Lichen	Locally Rare	Juniper branches on high elevation granitic domes	NNF	5

Species	Common Name	Form	Forest Status	Natural Communities, habitat	Forest	Analysis
Vaccium erythrocarpum	**Bearberry**	**Vascular plant**	**Locally Rare**	**Northern Hardwood Forest, Spruce-Fir Forest**	**CONF**	**5**
Veratrum viride	American False Hellebore	Vascular plant	Locally Rare	High Elevation Seeps, Boulderfields	CONF	4
Veratrum woodii	Ozark Bunchflower	Vascular plant	Locally Rare	Woodlands over mafic rock	CONF	4
Viola conspersa	American Dog Violet	Vascular plant	Locally Rare	Moist Alluvial Woodlands, over marl or circumneutral rock	CONF	4
Viola walteri	Prostrate Blue Violet	Vascular	Locally Rare	Open woods over mafic or calcareous rock	NNF	4
Warnstorfia fluitans	Floating Sickle-moss	Moss	Locally Rare	Spray Cliff	NNF	4
Xerophyllum asphodeloides	Turkeybeard	Vascular plant	Locally Rare	Pine-Oak/Heath	CONF	4

Analysis

1 = Requires effects analysis, Species documented or relocated in 2007 survey within proposed project area

2 = Requires effects analysis, Species previously documented in proposed project area or suitable habitat determined to be present

3 = Dropped from further analysis, Species known to occur within project area but unlikely to be impacted by activities associated with the proposed project

4 = Dropped from further analysis, Suitable habitat for the species present outside project activity area or species not located during 2007 or previous surveys

5 = Dropped from further analysis, Suitable habitat for the species present outside project activity area and species range in higher mountains of the proposed project area

6 = Dropped from further analysis, Suitable habitat for the species present outside project activity area and species range far south (piedmont) of the proposed project area

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APPENDIX F—SOCIAL IMPACT ANALYSIS AND THE LIMITS OF ACCEPTABLE CHANGE

Sections 30-34 of the US Forest Service Handbook (FSH) 1909.17 provide direction on completing a social impact analysis (SIA). The FSH directs the agency to consider the potential effects of each alternative on the attitudes, beliefs, values, lifestyles, social organization, population, land-use patterns and civil rights within the zone of influence. For this SIA the zone of influence falls into two categories:

- **Values, Beliefs and Attitudes (VBAs)** - The zone of influence for the VBAs is the recreation users that visit the upper segment of the Chattooga WSR. These users include not only those from the surrounding counties but also those from the Southeast and across the U.S. who visit the Chattooga WSR. Public comments that were received from 2005 to 2009 were used to complete this assessment.
- **Socio-Economic** - For lifestyles, social organization, population, land-use patterns and civil rights, the zone of influence is the four-county area surrounding the upper segment of the Chattooga WSR. These four counties are in the three states surrounding the river: Rabun County in northwest Georgia, Oconee County in northeast South Carolina, and Jackson and Macon counties in southwest North Carolina (see Figure F-1 in Appendix F).

Zones of Influence: VBAs

VBAs are used to describe people's feelings, preferences and expectations of their relationship with national forest lands and how those lands are managed. Understanding VBAs can help forest managers develop alternatives to address those areas of importance to national forest users and residents of nearby communities. They also can help explain why various proposals are either favored or rejected by those users and residents.

Since its inception, the US Forest Service has managed national forest system (NFS) lands according to the principle of multiple uses. This principle allows the agency to manage NFS lands for a variety of uses, including amenity, commodity, non-commodity and recreation. The Multiple-Use Sustained Yield Act (Public Law 104-33) formalized this management philosophy, stating that the US Forest Service is to manage resources to best meet the needs of the American public with flexibility to provide for "periodic adjustments in use to conform the changing needs and conditions" (Section 4(a) of the Act [16 USC 531]). Beliefs and values about the multiple-use principle influence the interpretation of management and planning activities within the Chattooga WSR Corridor. For example, some people perceive multiple-use management as allowing for a mix of diverse uses in a designated area, such as a wild and scenic river corridor.

The implications of these diverse values and beliefs create a need for balancing uses when implementing the multiple-use principle. Managing a wild and scenic river corridor requires careful consideration not only of the natural resources, but also of people's values and beliefs, needs and wants, and individual and community connections to the wild and scenic river corridor. Since Americans show diverse values and beliefs, the management of NFS lands is inherently controversial.

Allen et al. (2009) note that VBAs are closely linked concepts that can tell a story and, when all three concepts are linked together, each can explain the other. Some definitions used by the authors include:

- **Values** are relatively general, but enduring concepts of what is good or bad, right or wrong, desirable or undesirable.
- **Beliefs** are judgments about what is true or false and what attributes are linked to a given object.
- **Attitudes** are tendencies to react favorably or unfavorably to a situation, individual, object or concept.
- **Intentions** are convictions or aims to act in a certain way.
- **Behaviors** are observable actions or activities people actually do that may or may not conform to their prior intentions.

Allen et al. (2009) also note that VBAs are enduring and are not readily changed by Forest Service policy. However, VBAs *do* affect how people react to and feel about Forest Service recreation management. While VBAs do not rapidly change, behaviors may change very quickly. Changes in behaviors can occur due to a variety of reasons such as a change in income or health. For instance, a hunter may no longer go hunting due to health problems; however, that hunter still values the hunting experience.

Background and Public Involvement

A review of past documents provides insight into some events that may have influenced people's VBAs today. The following section summarizes findings from other documents that examine public interest in the recreation outstandingly remarkable value (ORV) and the desired recreation experiences of people visiting the Chattooga WSR Corridor. This brief history outlines how increasing public use created conflict and controversy over the use of the Chattooga WSR, particularly the upper segment of the Chattooga WSR.

Ellicott Rock Wilderness was designated in 1964 prior to the designation of the Chattooga as a wild and scenic river. While an environmental statement was developed for the1966 management plan, there is little discussion on VBAs, there is some discussion on recreation opportunities and a desire for solitude:

> Formal classification will inevitably lead to extensive publicity and increased use. This increased use will eventually create severe impacts on the limited trail system and the existing road access system…. In 1969-70, public hearings and listening sessions were held on the Chattooga Wild and Scenic River. In 1972 public listening sessions were held on Unit Planning on the Andrew Pickens Ranger District. At all of these sentiment was expressed for a wilderness area around the Ellicott Rock. Some were satisfied with the Scenic Area classification, but some persons wanted wilderness classification.

Prior to designation of the Chattooga as a wild and scenic river, public hearings and listening sessions were held. As part of these public involvement efforts, the US Forest Service released *A Proposal, the Chattooga, A Wild and Scenic Rive*r in 1970. This document compared various uses of the Chattooga River and implications of those various options.

Based on the public comments received at the listening session and in letters, the US Forest Service developed the 1971 "Wild and Scenic River Study Report, Chattooga River". This report recommends designating the Chattooga as a wild and scenic river and is one of the earliest documents to discuss the public's interest in recreation on the Chattooga WSR. Congress used this report to determine whether the Chattooga should be designated as wild and scenic. The report notes the strong public interest in recreation on the "secret river." In 1971 the primary activity on the river was fishing. The report identifies 12 possible recreation activities, but states that only seven seem compatible with the Chattooga River. Compatible activities are divided into two general categories:

- **Floating**, which includes rafting, canoeing and kayaking; and
- **Hiking and related activities**, which includes sightseeing, nature study, photography, hunting and fishing.

The study notes that camping could be an additional activity, but that it must be defined clearly to type and location. It also notes concerns about overuse in the future and the potential loss of solitude, serenity and challenge. Page 108 outlines the benchmark for the recreation ORV:

> The river offers exceptional values of solitude, adventure, and awareness, serenity, and challenge. Administratively controlled saturation levels, based on limiting numbers of people to maintain a primitive level of experience, will probably be the most severe limiting factors affecting use of this river.

Limited written documentation of the specific reasons for zoning the river 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 conflict "where floaters and fishermen use the same waters."

Since the Chattooga River was designated, the US Forest Service has studied the VBAs and recreation management issues regarding forest visitors, as well as people within the surrounding communities. Prior to the 1985 Sumter LRMP, some of the studies included:

- In 1976, visitor use survey was completed by Clemson Parks, Recreation, and Tourism. Howard et al (1976) interviewed private and commercial boaters, who enjoyed the Chattooga WSR for enjoying the scenery and clean air, experiencing the wilderness and isolation, meeting the challenge of whitewater and enjoying the companionship of friends. Neither group perceived the river to be *overcrowded*. They saw few people on the banks other than those at the launch site.

- Craig (1977) studied reducing impacts from visitors and noted options, such as scheduling boaters, road closures, management of put-ins, take-outs and campsites.

- Craig and Lindenbloom (1979) discussed social carrying capacity in *A study of floating use on the Chattooga Wild and Scenic River.* Some recommendations included limiting the commercial outfitters and guides to three, but the report did not recommend any limits on private boaters.

- Townsend (1980) noted in his report, *Chattooga! A case study of wild and scenic river management problems*, conflicts among the US Forest Service, local residents, and boaters. Many of the local residents believed that their river had been taken away from them.

For the 1985 Sumter Land and Resources Management Plan (LRMP), a Final Environmental Impact Statement (FEIS) was prepared. Appendix M of the 1985 FEIS contains discussion on carrying capacity and the Limits of Acceptable Change for the Chattooga WSR. This analysis includes: a recommended carrying capacity for boaters; guidance on special use permits for commercial outfitters and guides; implementation of a self-registration permit for private boaters; and discussion on managing camping, trails, fishing, wildlife, law enforcement, safety, access and other management concerns.

Two later studies provide additional information on the public's desired recreation experiences within the Chattooga WSR corridor:

- **"**Desired Future Conditions for the Chattooga Watershed: A Summary Study of Diverse Public Opinions" (1995 DFC report) (Maguire 1995)

- "Analysis of Outstandingly Remarkable Values of the Chattooga Wild & Scenic River, 1971 – 1996" (1996 ORV report) (USDA Forest Service 1996).

The 1995 DFC report summarizes numerous written and oral interviews with people in the area near the Chattooga WSR. People were asked to describe their desired future condition of the Chattooga River. Three common themes emerged during the interviews: (a) wilderness and natural landscapes; (b) protection and use of forest resources; and (c) recreation and access. Comments on Chattooga River recreation and management from this study include:

- "Strive for a 'quality' recreation experience more than an 'anything goes' experience."

- "make it available to the public"

- "Grandchildren will say that 'Grandpa had a say-so in what happened here. It looks like he took care of it.'"

The 1995 DFC report notes that many respondents felt that increasing human populations would increase forest management conflicts. The author recommends that the US Forest Service recognize people's fears about changing social and environmental conditions and their regrets about changing their relationship to the land.

The 1996 ORV report concludes that there is a gap in social information. For example, it notes, "People are extremely attached to the river and…these attachments have not been fully explored."

In 2002, Clemson Parks, Recreation, and Tourism management completed two studies on the Chattooga Wild & Scenic River. One was a *Trout Angler Substitution Study* and the other report was titled *Activity or Resource Substitutes, Paddlers Using the Chattooga River* (Bixler and Backlund 2002a and 2002b). Some findings from these two documents include:

- Anglers noted that water quality, scenery, the number of other anglers, and number of fish affected their decision on where to fish. The study notes that anglers identify with the river, feel they belong there and noted that there are few substitutes that the same quality or better.

- Boaters noted that water flow, scenery, difficulty of the river and the number of boaters encountered affect their decision on where to boat. Paddlers expressed a place attachment and that management practices should protect the character of the river.

In August 2002, the US Forest Service amended the 1985 Sumter LRMP. Amendment 14 established allocations on self-guided boating use and limited the number of commercial shuttles.

For the 2004 Sumter Revised Land and Resource Management (RLMP), a FEIS was prepared. Appendix H of the FEIS included an analysis on the Chattooga River. Appendix H "outlines the recreational/social effects of opening up all or part of the Chattooga Wild and Scenic River upstream of Highway 28 to whitewater boating". The FEIS notes "The river is the primary attraction of the trails and sites in the corridor, where visitors look to commune with nature and the river, view the gorges and rapids, take a dip in the cool water, and experience solitude. Opportunities to experience the latter are becoming a rarity"

When the 2004 Sumter Revised Land and Resource Management Plan (RLRMP) continued the prohibition on boating, American Whitewater appealed the decision. the US Forest Service's Washington Office issued a decision on the appeal in April 2005 that directed the three national forests managing the Chattooga WSR to complete a visitor capacity use analysis that considered non-commercial boating opportunities above the Hwy. 28 bridge. The Decision for Appeal (April 4, 2005) is posted on the FMS public Web site at http://fs.usda.gov/scnfs.

Forest Service decision makers met in June 30 to July 1 2005 to develop a methodology to address the appeal direction. Some key decisions from that meeting are:

- To limit the decision to the segment of the Chattooga WSR above highway 28, but disclose cumulative effects for the entire river.
- To Apply the Limits of Acceptable Change Methodology, and
- To list personnel needs and develop some early timelines.

Overview of the Limits of Acceptable Change Process

The Limits of Acceptable Change (LAC) planning framework (Stankey, Cole, Lucas, Petersen, & Frissell, 1985) was selected as the planning framework for conducting the visitor capacity analysis required in the appeal decision, and the US Forest Service used it to guide several public meetings with stakeholders and users in October, November, and December 2005. The general steps of the LAC process include the following:

1. **Identify issues and concerns,** with a specific focus on distinctive features and characteristics of the area.
2. **Define and describe opportunity classes**, including qualitative descriptions of resource and social conditions acceptable for each. The designation of opportunity classes generally follows from the recreation opportunity spectrum (ROS) system.
3. **Select indicators of resource and social conditions** (variables that reflect resource health or experiential quality) for each opportunity class.
4. **Inventory existing resource and social conditions,** usually through field assessments or visitor use surveys.
5. **Specify measurable standards for indicators,** defining the limits of acceptable change for each opportunity class.
6. **Identify alternative opportunity zone allocations,** specifying what resource and social conditions are to be maintained or achieved in specific areas.
7. **Identify alternative management actions** to address impact problems (when impacts exceed standards).
8. **Evaluation and selection of a preferred alternative.**
9. **Implement actions and monitor conditions,** providing a feedback system that re-visits the process if actions are unsuccessful at maintaining desired conditions.

In addition to the specific steps in the process, LAC requires public involvement throughout, and consideration of relevant Forest Service laws, mandates, or planning guidelines in eventual decision-making.

When considering capacity issues, it is useful to distinguish “descriptive” from “evaluative” information (Shelby & Heberlein,1986). Descriptive information describes how the system works, showing relationships between the amount of use and the impacts it causes. In contrast, evaluative information focuses on what the system ***should*** provide: which recreation opportunities are desirable, when impacts become unacceptable and which management strategies are appropriate to address them. The most difficult parts of natural resource management are often evaluative decisions about what opportunities to provide, or the standards that define quality. Carefully organized information helps clarify the choices and consequences for different groups.

Starting the Limits of Acceptable Change Process

Starting in 2005, the US Forest Service employed a modified "Limits of Acceptable Change" (LAC) planning framework to address visitor capacity issues (See Table F-1 for list of public meetings and involvement). Over three meetings, workshop participants worked through the LAC process.

- At the first meeting, Forest Service personnel presented an overview of the LAC process. In this meeting, Forest Service personnel asked attendees how they wanted to involved; how they wanted to receive information; comments about the process; issues and opportunities that should be addressed; and any other relevant comments.

- The second meeting in November completed steps 1 to 3. Forest Service personnel asked people what they viewed as the most important recreation activity on a visit and what other recreation activities that they would do. Additional questions included when and where you would go; how many people would be in your group; the most important attribute of the trip; and other concerns. During this meeting, the public identified existing recreation uses.

  For most users, the attraction to the upper segment of the Chattooga WSR is an overall experience and not just one particular recreation activity. Recreationists often indicate they participate in multiple activities. For instance, some people said that trout fishing is their primary activity, but they also included hiking, camping, swimming, meditation and bird-watching among their list of activities. Sharing the Chattooga WSR with not only friends, but with grandchildren was a priority. These desired recreation experiences are listed in Table 3.3.1-1 in Section 3.3.1 Recreation of this Environmental Assessment (EA).

  The public expressed concerns about the impact forest visitors are having on the upper segment of the Chattooga WSR. Some common concerns included a loss of solitude and maintaining a pristine natural appearance. Related concerns the public identified include littering, trampled plants, disturbed wildlife as well as erosion and sedimentation from disturbed areas.

  - At the third meeting in December 2005, participants worked on the steps 4 and 5 of the LAC process and recommended: specific, measurable indicators associated with the overall recreation opportunity ,
  - desired condition (such as number of trail encounters per day) and
  - data needs for those indicators and how that data could be collected.

Each meeting was attended by more than 60 people. Outcomes included:

- Better understanding among participants of the appeal decision on the Sumter Land and Resource Management Plan (2004);
- Descriptions of a commonly held vision for the upper segment of the Chattooga in the context of the entire Chattooga River;
- Descriptions of desired conditions and measurable indicators for various recreational opportunities; and
- Input into the design of the data collection and analysis process necessary to respond to the appeal decision.

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- Descriptions of desired conditions and measurable indicators for various recreational opportunities; and
- Input into the design of the data collection and analysis process necessary to respond to the appeal decision.

In general, visitors to the upper segment of the Chattooga WSR fall into two categories—frontcountry and backcountry. These two distinct groups desire different experiences:

- Frontcountry areas exist within one-quarter mile of four bridges on the upper segment of the Chattooga WSR: Grimshawes/Sliding Rock Bridge, Bullpen Road Bridge, Burrells Ford Bridge and the Highway 28 bridge.These areas offer easy access to the corridor and visitors appear more tolerant of interaction with others there as long as at-one-time use does not overwhelm the natural setting or create high levels of crowding and congestion.

- Backcountry areas lie beyond one-quarter mile of roads and bridges and are referred to by stream reaches: Chattooga Cliffs Reach, Ellicott Rock Reach, Rock Gorge Reach and Nicholson Fields Reach. In these areas, visitors are more interested in opportunities that feature solitude, self-reliance, a sense of remoteness and a primitive setting (angling, boating, hiking, backpacking, hunting, etc.).

Information from the LAC process indicates that opportunities solitude is one of the most valued, if not *the* most valued quality of the recreation experience in the upper segment of the Chattooga WSR Corridor. Solitude is also a component of the Recreation ORV, as well as part of the Wilderness Act goal of "outstanding opportunities for solitude." The public indicated that these opportunities are not only highly valued in the backcountry, but also at the greatest risk of being lost. People expressed concern that overuse could lead to a loss of opportunities for solitude and remoteness. Some current users are concerned that providing additional boating on the Chattooga River (above Hwy. 28) would create overuse or have a ripple effect leading to the US Forest

Service allowing other currently prohibited recreation uses in the upper segment of the Chattooga River.

Table F-1 Summary of Public Involvement.

Limits of Acceptable Change (LAC) and Public Involvement			
Location	**Date**	**Number of Attendees**	**Topic**
	April 15,2004	N/A	American Whitewater Association appeals 2004 Sumter LRMP
	April 4, 2005	N/A	Washington Office issues Appeal decision
Walhalla, SC	October 13, 2005	Over 100	Kick off meeting to start public involvement process and present LAC overview.
Clayton, GA	November 17, 2005	Over 60	Groups from the public worked on the first three steps of the LAC process
Walhalla, SC	December 1, 2005	Over 60	Groups from the public worked on the next two steps of the LAC process
Walhalla, SC	July 27, 2006	Over 100	The Upper Chattooga River, Visitor Capacity Analysis Plan presented
Clayton, GA	June 18, 2007	62	Findings from the Upper Chattooga River, Visitor Capacity Analysis Plan presented
Highlands, NC	June 19, 2007	33	Findings from the Upper Chattooga River, Visitor Capacity Analysis Plan presented
Walhalla, SC	June 21, 2007	43	Findings from the Upper Chattooga River, Visitor Capacity Analysis Plan presented.
Walhalla, SC	July 10, 2007	56	Public comments are recorded at Public Hearing
Walhalla, SC	July 14, 2007	70	Building Blocks for Alternatives presented
FMS Web site	August 14, 2007	N/A	Scoping on Proposed Action started
Clayton, GA	September 29, 2007		Preliminary Alternatives presented to the public
FMS Web site	July 2, 2008	N/A	Comments on 2008 EA
FMS Web site	August 25, 2009	N/A	Decision Notices/Finding of No Significant Impacts signed
FMS Web site	December 18, 2009	N/A	Decision Notices/Finding of No Significant Impacts withdrawn
FMS Web site	December 9, 2010	N/A	Scoping on second Proposed Action
FMS Web site	July 2011	N/A	Comments on 2011 EA

Completing The Upper Chattooga River Visitor Capacity Analysis Plan - In June 2006, the Upper Chattooga Capacity Analysis Plan was developed and describes data collection and analysis approaches to be used as part of the LAC effort. This "capacity analysis plan" (CAP) focuses on social impact issues, but also includes a general discussion of complementary data collection about biophysical impacts from visitor use. This analysis plan is organized with two parts and several appendices.

- Part 1 reviews LAC information needs and identifies potential sources for that information. It includes discussion of methods or sources that were considered but rejected (and the reasons why).

- Part 2 reviews specific methods, including discussion of costs, challenges, and trade-offs between options when those are relevant. "Information elements" to be reviewed include:
    - Literature reviews;
    - Use and impact observation;
    - Expert panels of boaters and anglers;
    - Biophysical baseline inventory/assessment;
    - User surveys; and
    - Trial public boating.

The CAP recognizes certain assumptions and constraints unique to this "decision environment:"

1) methods should be consistent with public input and announcements;
2) methods should not pre-judge any decision;
3) research conducted for the analysis should minimize impacts on current users as much as possible;
4) information collection should be done in ways that avoid or minimize bias; and
5) the analysis plan should be transparent about advantages and disadvantages of different types of information, the ways it might be collected, and how it is likely to be used. Interested parties will be consulted in developing the capacity analysis options, although the US Forest Service will choose the methods and implement the analysis.

On July 27, 2006 in Walhalla, SC, the US Forest Service hosted an information sharing session about the ongoing data collection activities. A proposed capacity and conflict analysis process was presented to more than 100 people at this fourth public meeting. Overview presentations described the various techniques that implemented in a two-phased approach. Then, attendees had an opportunity to visit various information stations in an open house forum to learn more

about the data collection techniques, talk to experts, ask questions, and learn how to participate in some of the data collection activities. Information stations addressed:

- Literature reviews of similar rivers
- Biological and physical data collection
- Flow data
- Existing use observations
- Expert panels

Findings from these Public Meetings - Recreation is one of the outstandingly remarkable values (ORVs) for the Chattooga Wild and Scenic River. The Chattooga WSR offers a wide variety of recreation activities in a high-quality setting ranging from swimming and boating to hiking and excellent trout fishing, all experienced with spectacular scenery. Other activities include backpacking, photography and nature study. Most of these activities take place in largely unmodified natural surroundings with opportunities for remoteness and solitude.

During public involvement opportunities associated with responding to the appeal decision, concerns were raised about impacts to these opportunities in the upper segment of the Chattooga Wild and Scenic River Corridor. Current use levels have led to concerns with litter, the expansion of unauthorized trails and campsites, and the likelihood of unwanted encounters between users.

Capacity and Conflict Analysis - During the next 11 months, the capacity and conflict analysis was conducted and various products were created as a result. The complete list of reports includes:

- ***Chattooga River History Project, Literature Review and Interview Summary*** *(Tetra Tech, 2006)* – a history of Chattooga recreation decision-making that documents the basis for the 1976 boating ban and similar issues in order to help frame issues in the current analysis.
- ***Capacities on other Wild and Scenic Rivers: seven case studies*** *(Diedrich, 2007)* **-** a review of capacity issues on seven W&S with similarities to issues on the Upper Chattooga. This report provides examples of how other planners have interpreted laws and mandates, conducted analyses, or arrived at capacity decisions on other rivers.
- ***Use Estimation Workshop Summary*** *(Berger and CRC, 2007)*– summary of workshop conducted with resource agency personnel to help consolidate and summarize use information by capitalizing on extensive agency knowledge as well as some existing user surveys and creel surveys.
- ***Limited Use Monitoring Summary*** *(Berger, 2007)* – summary of data collected through the use monitoring conducted by the public, Forest Service and contractor of vehicle counts within selected access locations along the Chattooga River Corridor.

- ***Literature Review Report*** *(Louis Berger, 2007)* – Literature review and summary of information from existing studies on the Chattooga or studies /planning from other similar settings; includes the following components:
  - *Recreation-Related Social Impacts and Standards* **-** information related to the relationships between use and impacts and the "evaluative side" of the social impacts issue, including which impacts are most important, tolerances for those impacts, and which management actions tend to be used and supported to address them.
  - *Recreation Related Trail/Site Impacts* - information about relationships between use and biophysical impacts, potential standards for those impacts, and the acceptability of management actions to address them.
  - *Recreation-Related Wildlife Impacts* - information about relationships between recreation use and wildlife impacts, potential standards for those impacts, and the acceptability of management actions to address them.
  - *Recreation Related Flow Preferences* **-** information about opportunities and flow preferences, particularly related to other rivers similar to the Chattooga.
- ***Proxy River Information*** *(USFS 2007)* – summary of management and flow related information for "similar-type" rivers to the Chattooga River as identified through public input.
- ***Biophysical Monitoring Information on the Chattooga River*** *(USFS 2007)* **-** information about current conditions in the corridor, including maps of existing trails, and a summary of other biophysical-related information that is relevant to Chattooga River capacity issues.
- ***Hydrology Issues on the Upper Chattooga River*** *(USFS 2007)* **-** This report summarizes recreation-relevant hydrology information for the upper river, including (1) rating curves and basin areas for staff gages at all bridges; (2) relationships between the Burrells Ford gage and the USGS Highway 76 gage; (3) summary hydrology for the period of record at the Highway 76 gage; and (4) extensions to the Burrells Ford gage.
- ***Expert Panel Field Assessment Report*** *(Louis Berger, 2007)* – report for the expert panel field assessment conducted to gather information about boating and angling opportunities on the upper Chattooga River, with particular attention to boater and angler flow preferences for these flow-dependent activities.

Some of these reports document the 1970's history that led to the boating prohibition above SC Highway 28. The Chattooga River History Project, Literature Review and Interview Summary (Tetra Tech 2006) includes interviews with Forest Service and State employees, who were working during the early 1970s and have personal knowledge of the reasons that the boating prohibition was implemented.

The history project includes a summary of their comments about the conflict.

> The number and severity of boater-angler conflicts is a major issue in need of documentation. All interviewees agreed that after the publishing of the 1971 River Study and the release of the movie *Deliverance,* there was a huge influx of floaters on the Chattooga River. The floaters were largely non-local tourists, 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. Responses from other anglers may have included aggressive displays of frustration over these changes, and may have included shouting, raft-slashing, rock throwing, fistfights, and gunplay….. Most of these conflicts probably took place below Highway 28, although interviewees were not specific about locations or incidents. Some interviewees recalled heavy use at the access points, and physical confrontations apparently were more likely to occur at these congested put-in and take-out areas.
>
> A related controversial issue at the time focused on road closures. All interviewees remember that closures severely limited historical vehicle-based access, as all of non-major roads within the one-quarter mile river corridor were closed (while not specifically required by the WSR Act, these closures undeniably made the river corridor more primitive). From a local user perspective, however, these closures were de facto restrictions on their use and were concurrent with (although not caused by) the influx of non-local users, most of whom were boaters. As a result, angler-boater conflicts may have been confounded or at least exacerbated by the local/non-local resentment focused on road closures….The substantial changes in use and access due to the movie and Wild & Scenic status clearly made some local people feel that "their" river had been taken away, and these frustrations may have played a role in the conflict incidents that apparently occurred.

The history project also includes a summary of their comments on recreation impacts and capacities:

> During the initial WSR Study, mangers asserted that the "Chattooga River [was] not overused". However, even during this initial study, capacity concerns were evident. The study authors recommended that use and impacts be monitored and expressed concern that expected demand for multiple uses of the Chattooga River would increase because of the WSRA designation…Mitigation for this expected increase in demand included recommendations to assess the need for limiting the number of access points, budgeting for other access facility improvements, and monitoring the need for recreation developments to reduce pressure on "more primitive sections of the river"…This preparation for future demand was also helpful. Facility capacity for the river was reportedly adequate into the late 1970's, as there were enough parking lots, trails, etc. to accommodate existing recreational use. According to most documents and interviewees, most capacity concerns focused on social or experiential issues such as encounters or

> conflicts…As stated in several interviews, the USFS was concerned with capacity issues throughout early planning efforts, particularly social impacts that affect solitude. This led to substantial education/regulation programs among lower river boaters, which made up the bulk of the use on those segments. These actions were generally effective because most use occurred via three outfitters whose trips were limited. Throughout the 1980s, there was also more river staff than at present….On the upper river, management attention was lower. While angling creel surveys and occasional university studies addressed aspects of use and impacts in these areas, there was no systematic use or impact monitoring.

The document *"Capacity and Conflict on the Upper Chattooga River: An integrated analysis of the 2006-2007 reports,* often referred to as the Integrated Report (Whittaker and Shelby 2007) summarizes information and findings from these various documents. The report includes a social impacts section which discusses encounters/interactions between user groups, perceived crowding, competition for fishing water, noise levels at campgrounds and potential conflict between recreation uses. Using this information, the three forests are seeking to take appropriate action now to prevent adverse impacts to river values from increasing use levels and to ensure the protection and enhancement of the river's ORVs, to preserve its free-flowing condition and water quality, and to protect its wilderness characteristics.

In addition to these documents used to develop the integrated report, NRLI (2007) developed "Chattooga Wild & Scenic River: A Situation Assessment. This report was developed to help the US Forest Service determine how to best involve interested parties. To develop this report NRLI interviewed 24 people who had been involved in the LAC process and responses were categorized into ten themes. Key issues included river access, acceptable uses, separation of uses, and resource management. Additional concerns included the US Forest Service's decision-making process and the application of data and information to that process. Other issues mentioned were setting of precedent, user safety, trout, and the perception (or misperceptions) that stakeholders hold of one another. One key finding of this report states:

> All of the respondents shared one important value: that protection of the Chattooga River now and in the future is of great importance. Another value shared by many is maintenance of community, whether they are residents in North Carolina, South Carolina, or Georgia.

Members of the public continued to contact the US Forest Service with information and suggestions during this time. Once the Integrated Report was complete, the Francis Marion and Sumter, Nantahala, and Chattahoochee-Oconee National Forests hosted three open houses in June 2007 in South Carolina, North Carolina and Georgia. The three open houses were designed

to present information related to data collection and current project activities on the upper Chattooga Visitor Use Capacity Analysis. Open house stations covered the following topics:

- Current management standards for the upper segment of the Chattooga WSR
- Path forward and timeframe for alternative development, environmental analysis, public involvement and agency decisions
- Biophysical data results
- Social data results
- Flow data results

Public Hearing - The US Forest Service also held a public hearing on July 10, 2007 in Walhalla, SC at which 56 people provided 153 pages of testimony.

Building Block for Alternatives Chattooga River Workshop - On July 14, 2007 the US Forest Service held a public workshop to identify the biophysical and social impacts and opportunities that were most important to people and possible options for dealing with these impacts and opportunities. Approximately 70 people attended this meeting in Walhalla.

With this wealth of comments, ideas and recommendations from the public, as well as data from the Integrated Report, the US Forest Service was ready to develop a preliminary set of alternatives and begin scoping as directed by NEPA. The agency developed six preliminary alternatives that covered a broad range of management actions, including maintaining current management, introducing additional boating in the corridor and restricting all existing users.

Scoping on Proposed Action - During the scoping period from August 14 - September 13, 2007 the public sent in more than 1,200 responses, some of which contained more than 100 individual comments. Based on these comments, the agency modified the preliminary set of alternatives and developed three more for a total of nine. This revised set of preliminary alternatives was presented to the public on September 29, 2007 in Clayton, GA.

Following this tenth public meeting, the US Forest Service developed a final set of alternatives and then incorporated them into a preliminary EA. This preliminary EA was provided to those who responded to the scoping letter and posted on the Francis Marion and Sumter National Forests' web site on July 2, 2008. The agency received more than 3,000 additional comments during a six-week comment period.

Comments on Preliminary EA - The comments received on the preliminary EA addressed a number of areas, but primarily they related to the user capacity analysis, boating on the tributaries, the equitable treatment of boaters, allowing boating below Grimshawes Bridge, the incompatibility of boating with other users, using mean daily flows as an implementation tool for boating, management of large woody debris on the river, the range of the alternatives, the scope of the analysis (should include the entire river), responding adequately to the Chief's appeal decision, the effects of recreational uses on the biophysical resources, and the overall ability to implement the decision. A list of the comments and the agency's responses can be found at http://fs.usda.gov/scnfs.

Decision Notices and Findings of No Significant Impact - The three forest supervisors issued their Findings of No Significant Impact and Decision Notices regarding Managing Recreation Uses on the Upper segment of the Chattooga WSR in August 2009. Those decisions were withdrawn in December 2009 because of inconsistencies between the Biological Assessment/Biological Evaluation and the Findings of No Significant Impact and Decision Notices. Also in 2009, American Whitewater and other boating organizations sued the US Forest Service over the agency's decision notices. For more information on the lawsuit, please visit: http://fs.usda.gov/scnfs.

Scoping on Second Proposed Action In December 2010, the agency reinitiated the NEPA process by sending out a scoping letter asking the public to identify any new information, such as recently released articles or publications, or new concerns that should be incorporated into the analysis or be part of the decision-making process. In that letter, the agency made clear that any comments submitted from 2005 to 2009 would be used as part of the decision-making process. Individuals submitted new information about how people were using the Burrells Ford gauge and some new concerns about adaptive management. The list of comments received and the agency's responses can be found at http://fs.usda.gov/scnfs.

VBA Assessment

To further study the strong sense of attachment visitors and individuals within the zone of influence have to the upper segment of the Chattooga WSR, the agency developed this qualitative assessment of VBAs based on public comments received from 2005–2009. To compare existing VBAs to the baseline conditions in 1971, VBAs are grouped into three categories: commonly held VBAs, hikers and associated uses VBAs and boating VBAs. Many comments are emotionally charged resulting from a strong sense of attachment to the Chattooga WSR and the possibility that recreation opportunities may change. Some of these strong feelings have led to a social value conflict with the belief that boating is an incompatible recreation use on the upper segment. On the other hand, there are strong feelings of being denied equitable access to the upper segment without just cause.

Commonly Held VBAs

The US Forest Service completed an assessment of public comments that were received from 2005 to 2009. One of the common VBAs expressed by many people is a strong sense of attachment to the upper segment of the Chattooga WSR. They also expressed concerns that

increased and uncontrolled recreation could affect this strong sense of attachment. Some commonly held VBAs among all recreation users, regardless of activity, include:

- Solitude, remoteness, pristine conditions and a wilderness experience are very important;
- The protection of the natural resource is paramount;
- Outside development could affect the pristine nature of the upper segment of the Chattooga WSR;
- The upper segment of the Chattooga WSR should be saved for future generations;
- The sense of solitude could be affected by uncontrolled recreation use; and
- People want to experience the upper segment of the Chattooga WSR with their families.

Some specific comments that capture these VBAs include:

- "There are few areas left in this USA that offer solitude and a wilderness experience as pure as the U. Chattooga area."
- "If the upper segment of the Chattooga WSR is opened to private recreational interests, it won't be long before the commercial interests will be granted equal rights."
- "I want those who come after me to discover, explore, enjoy, and leave for others the world that I have been privileged to know… armed with knowledge, we can and need to do all that we can to restore and maintain the balance of nature."

The following comments sum up the enduring sense of attachment and strong land ethic that most recreation users express for the upper segment of the Chattooga WSR:

- "There are many passionate pleas on both sides of this debate and it is obvious that they are driven by a deep love for the unique experience this corridor offers as well as a strong respect for the environment…We all have a common goal that essentially is not at odds. We want to enjoy what the Chattooga has to offer while preserving it for future generations."
- "My father introduced me to the streams of South Carolina and I have spent as much time as possible exploring them ever since."
- "Part of the reason I moved here to Rabun County is the Chattooga River and its wild and scenic status."

Hikers and Associated Uses VBAs (fishing, hiking, camping, hunting and backpacking)

Some current users expressed various beliefs about allowing boating on the upper segment of the Chattooga WSR:

- Overuse would occur and there would be an increase in trash and user impacts;
- People who are fishing and swimming are more negatively impacted by encounters with boaters than the boaters;
- Boaters have different values than other recreation users;
- There is an increased risk to the safety of children swimming in the river;
- There is a potential increase in law enforcement problems;
- Overuse could lead to a loss of solitude, remoteness, pristine conditions and wilderness-type experiences;
- Boaters have other rivers and places to kayak, raft and canoe; and
- Boating has impacted fishing and other recreation uses on the lower river; these problems would occur on the upper segment of the Chattooga WSR if boating were allowed.

The following comments capture these VBAs:

- "An earlier user that does not return because of unsatisfied enjoyment may not be included in a conflict study. I think this might be important when looking at the Chattooga. The lower Chattooga no longer has the capacity for fishing and angling during the peak seasons. There, user conflicts are dominated by the heavier users, commercial vs. private boaters. Unfortunately the original ORV of fishing has been effectively 'zoned' from the lower Chattooga due to overcrowding from boaters and Forest Service policy."
- "The children prefer June through August as they swim and play in the river and slide on the numerous 'sliding rocks' of this Section. My greatest fear on opening up Section 00 for kayaking is that not only will the safety of my children playing on this stretch be compromised, but that the very things that make this section so unique (peace and quiet, diversity of flora and fauna, true unspoiled wilderness) will be destroyed."
- "By allowing boaters access to the section of the Chattooga above Highway 28 bridge, the US Forest Service would destroy any backcountry fly fishing experience left on the river and would forever change the experiences that hikers and fisherman are able to enjoy."
- "Now I know it's not every one of them, but if you fish, you will have it happen to you. It's always the boaters. The boater can come down the river in total enjoyment. Trout fisherman goes to get away. One boat comes by and ruins his experience. I've saved a lot of money not having to pay a psychiatrist by going to the Chattooga River and being by myself. I feel expenses coming if we let this happen."
- "I am concerned that the wilderness setting may be compromised by allowing other recreation users in the area. I particularly feel that by allowing boating in through this area, there may be conflicts and destruction of tranquility that I desire in this area."
- "In fact, the US Forest Service has allowed the growth in boating to displace a lot of anglers on the lower river…Angling, as well, must be protected."

- "Sections II and III are managed to discourage fishing due to documented user conflicts between intense boat traffic and the fisher. Pre 1974 Stocking Points below Long Bottom are no longer stocked per request of the US Forest Service Management Plan."
- "Section one is primarily used by small groups and individuals fishing and hiking for the unique environment that exists in this area, which includes not having to move out of the pools while fishing to allow a caravan of rafts to pass through."

Boater, Canoeist and Kayaker VBAs

Boaters, canoeists and kayakers expressed various beliefs about the current zoning policy on the upper segment of the Chattooga WSR:

- They are denied equitable access;
- They are good stewards of the land; and
- Fishing and boating are compatible uses.

Comments that capture these concerns include:

- "The boating ban on the Chattooga River now in place for 30 years is unfair. I believe it is illegal and just plain wrong."
- "It's now a national issue that could shape the future of wild and scenic rivers and wilderness areas across the United States. I want to emphasize here the indisputable fact that the upper segment of the Chattooga WSR's normal flow regime will naturally segregate anglers and paddlers by time and space. In all other Southeastern streams with shared use, fly guys and paddle dippers manage to co-exist in the same streambed, sometimes with mildly cursory respect."
- "Boating can be part of healthy Chattooga headwaters."
- "I urge you to allow boating above the Hwy. 28 Bridge on the Chattooga River. It is a gem in the crown of this wild and scenic river, and kayakers should be allowed to enjoy the natural beauty of a pristine environment."

Zones of Influence: Socio-Economic

Socio-economic characteristics include lifestyle, social organization, population characteristics, land-use patterns and civil rights. FSH 1909.17, Sections 30-34 defines these terms as follows:

- **Lifestyles** include patterns of work and leisure; customs and traditions; and relationships with family, friends and others. People's lifestyles may be affected by management actions on a national forest through a direct economic relationship, such as special-use permits, or through indirect economic effects where recreational use of the national forest is the foundation for the local tourism industry.
- **Social organization** includes things that satisfy human needs, such as family, school, businesses and city government. The trends of rapid population growth in a region can overwhelm public schools and services. An influx of people with different values can lead to stress among existing residents and conflicts with newcomers.

- **Population characteristics** include the size, rates of change and composition of the population. These characteristics are important when Forest Service actions change the number or type of locally available jobs, community services or housing options.
- **Land-use patterns** include the types, intensity and spatial distribution of land uses. Forest Service actions may affect the location, density and type of land use.
- **Civil rights** include the effects of each alternative on civil rights, minority groups, women and consumers. From FSH 1909.17, 33.26 "The phrase 'civil rights' implies fair and equal treatment under the law, both within the agency and in its relations with the public ([Forest Service Manual] FSM 1703)." FSH 1909.17 provides direction on considering the consequences of management actions or policy on protected groups. The US Forest Service participates in special programs to enhance opportunities for equal participation of women, minorities and the handicapped (FSM 1761 and 1762).

For the purposes of this section, the socio-economic zone of influence is the four-county area surrounding the upper segment of the Chattooga WSR. These four counties fall into three states: Rabun County in northwest Georgia, Oconee County in northeast South Carolina, and Jackson and Macon Counties in southwest North Carolina (see Figure F-1 in Appendix F). This section examines socio-economic information from the 1971 designation study report, as well as information forest visitors and people from the zone of influence reported during the LAC process.

Socio-Economic Conditions in the 1970s and Today

Lifestyles in 1970s: The 1971 study report describes economic and demographic changes that were occurring: Shifts were occurring in employment, but an influx of people from other parts of the country had begun. Farm employment had dropped and manufacturing was increasing. Along with the changes in employment came changes in skill requirements. Tourist-oriented businesses in these counties experienced accelerated growth. The same mountain ranges and cross ranges that once isolated these counties and restricted development became major tourist attractions, attracting vacationers from all over the Southeast.

According to the 1971 study report, Jackson and Macon counties in North Carolina, especially the Highlands-Cashiers area, were a noted tourist destination, "where visitors come to relax and enjoy the cool summer climate and spectacular scenery." Rabun County was not as popular as the Highlands-Cashiers area, but was noted as a popular vacation area for pass-through visitors, summer cottage residents and visitors to summer inns and hotels. Oconee County has only a small area of mountains enclosing the Chattooga River; this land is almost entirely national forest. Oconee's population and development were concentrated in the piedmont section where more suitable development acreage was available. Major recreation attractions located within 50 miles of the Chattooga River at the time included the Highlands-Cashiers resort area, national forest lands, the Great Smoky Mountains National Park and 21 lakes and reservoirs. The 1971 study report notes that the construction of the Keowee-Toxaway Reservoir and the designation of the Chattooga River as wild and scenic would create a demand for supporting travel services.

Only four rivers in the southeastern United States were incorporated in the Wild and Scenic Rivers Act for possible inclusion in the system. The Chattooga River was the only one that flowed through the Southern Appalachians and offered true whitewater opportunities; the other three rivers were located in coastal plains or hill country. The 1971 study report notes that the greatest increase in recreation use would occur in hiking, floating (including canoeing and rafting) and primitive camping.

The 1971 study report noted that designating the Chattooga River would provide an estimated 81,600 visitor days of canoeing and hiking and a total 139,200 visitor days of recreation use. In 1971, recreation facilities were very limited; only one developed trail extended the four miles from Burrells Ford to Ellicott Rock and one campground existed at Burrells Ford. The report notes that that "to see and enjoy the river requires considerable time and effort whether fishing, canoeing, hiking or camping. Numerous undeveloped fisherman trails can be found near the major access points, especially bridges. Old logging roads are used by Jeeps to access spots that are otherwise inaccessible."

The 1971 study report includes a development plan, which identifies potential parking lots, campsites, launch sites and trails miles. Appendices G-K of the 1971 study report includes estimated costs and possible location of recreation facilities. These sections identify closing an estimated 30 miles of Jeep trail and replacing them with 54 miles of hiking trails; they also include adding 13 new parking lots outside the boundary, providing primitive campsites along the river, adding launch sites along sand bars and developing campgrounds outside the proposed corridor that could handle 2,400 people at one time.

Lifestyles Today: Recreation management within the wild and scenic river corridor and the Ellicott Rock Wilderness has some limited lifestyle impacts on local communities, primarily due to the natural amenities and the opportunities for outdoor recreation. Based on past studies, including assessments of public comments, the public indicates that the Chattooga River is critical to the quality of life for many residents and recreationists, not only in the four-county area, but across the Southeast. For people living near the river corridor, nature-based tourism is an economic driver. Direct economic impacts range from guiding whitewater rafting, hunting or fishing trips to indirect impacts such as providing accommodations and food services for tourists.

Lifestyles in rural areas tend to have a more direct relationship with natural resources and public lands than lifestyles in urban areas. Individuals who responded during the LAC process indicate they place a high value on the outdoor recreational experiences offered by the Chattooga River's scenic landscape. The scenic nature of the Chattooga River influences their decision to either recreate nearby or move to the area. The river, trails, mountains, etc. are all important because they enable the residents' recreation lifestyles. The mix of outdoor recreation activities offered on the upper segment of the Chattooga WSR is an important lifestyle characteristic in the neighboring communities.

When they are not working, many residents in the surrounding communities enjoy outdoor recreation activities such as hunting, fishing, hiking, rafting, wildlife viewing, berry picking, bird-watching, etc. These outdoor activities often involve friends or families. These linkages motivate a strong interest in any management action within the Chattooga WSR Corridor that

may affect these social elements. Current forest plan direction meets the demands of many of these groups because it allows user-created campsites along the Chattooga WSR, floating downstream of S.C. Hwy. 28 and hiking and related activities within the entire Chattooga WSR Corridor and Ellicott Rock Wilderness.

For the same reasons that residents appreciate the Chattooga WSR corridor, so do tourists. Research indicates that vacation patterns are shifting nationally and regionally. In general, people are taking more "long weekend trips" in comparison to "traditional two-week vacations" (USFS, 1998). Frontcountry recreation (e.g., picnicking, sightseeing, swimming, etc.) is likely to increase at slightly greater rates than population increases as more people conduct shorter recreation trips closer to home, especially during difficult economic times.

Whittaker and Shelby (2007) conclude:

> Taken together, 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. Within that general increase, however, some activities may increase at slightly higher rates (e.g., frontcountry recreation, day hiking, whitewater boating, and fly fishing), while others may grow more slowly (e.g., frontcountry fishing, backpacking). The actual distribution of use in the Chattooga corridor or across the seasons is less easy to predict, and may have a large influence on whether use increases create unacceptable impacts.

Cordell (2010a, b and c) groups activities together that are similar in either their setting or their primary focus. The seven activity groups include: visiting recreation and historic sites; viewing/photographing nature; backcountry activities; motorized activities; hunting and fishing; non-motorized boating; and snow skiing and snowboarding. While these trends are projected for the entire U.S., they also reflect many activities that are popular in the Chattooga WSR Corridor. Cordell (2010b) reports that from 2000-2008, all five of the viewing/photographing nature activities are showing growth, especially viewing and photographing wildflowers and trees and photographing natural scenery. Participation rates in motorized activities, hunting and fishing, visiting recreation and historic sites, backcountry activities and non-motorized boating in 2010 were approximately the same as in 2000. However, off-road driving showed growth.
Cordell (2010c) reports that just over 20% of the U.S. population participates in some form of non-motorized boating including paddling (canoeing or kayaking) on both freshwater and saltwater, floating (rafting), rowing and sailing. Participation rates in non-motorized boating are relatively high among males, non-Hispanic whites, people between 16 and 44 years old, people with some college to post-graduate education, and high-middle to high income people. Less likely to participate in non-motorized boating are females, blacks, Hispanics, people aged 55 or older, lower income groups, rural residents and people with no college education. During the last ten years, canoeing, rowing and sailing have stayed at the same level. Kayaking and rafting showed moderate growth through the middle years, but by 2008 rafting had dropped back to its 2000 level. Kayaking is the only non-motorized boating activity that grew in popularity through 2008.

Social Organization in 1970s: The 1971 study report includes limited discussion on things that satisfy human needs, such as family, school, businesses and city government. However, it does describe an area economy that had shifted from small-scale poultry farms in the 1930s to large feed manufacturers in the 1960s. As farming declined, large numbers of people left these rural counties to take jobs in urban areas. Textile and small manufacturing plants moved in, which offset some of the migration out.

The 1971 study report notes the natural resources in the 27 counties that comprised the South Highlands area were being developed at an accelerating rate. The South Highlands Council was established to study the region and recommend priorities for environmental conservation and resource development. The report notes that the region, with the exception of several large cities, was dependent on farming and forestry, with limited manufacturing industry. This 27-county area includes:

> **Georgia:** Rabun, Towns, Union, Fannin, Gilmer, Pickens, Habersham, White, Lumpkin, Dawson and Stephens counties.
> **South Carolina:** Oconee, Pickens, Anderson and Greenville counties.
> **North Carolina**: Cherokee, Clay, Macon, Jackson, Transylvania, Henderson, Polk, Graham, Swain, Haywood, Buncombe and Rutherford counties.

The1971 study report states that the rugged country, with its limited development and physiographic, social and economic isolation were seen as reasons to designate the Chattooga as wild and scenic because designating the river would be "a drawing card to the general area" and would "focus attention on the many outstanding features in the Georgia-North Carolina-South Carolina mountain area." The designation of the Chattooga River as wild and scenic was intended to create jobs within the four-county area through increased tourism and outdoor recreation opportunities.

The 1971 study report notes that improvements in the road system led to changes in the economy too. The interstate system provided improved access from the eastern U.S. The Chattooga WSR was accessible and crossed by U.S. 76 and S.C. 28, both major highways. In addition, U.S. 441, a major travel route between the northern U.S. and Florida, had many motels and service stations in Rabun County that catered to pass-through travelers.

The designation of the Chattooga River was anticipated to have limited impact on fire control. The study report notes that most recreation use occurs from May to September when forest fire hazard is low and that fire occurrence in the corridor was small

The 1971 study reports that safety problems with river travel and other recreation activities, such as hunting, fishing, photography and nature study in remote areas, were primarily related to personal injuries. If an injury was sustained then getting help was extremely difficult, therefore placing the burden of safety on the forest visitor. The study report recommends that the US Forest Service caution users about the intrinsic dangers of the area and provide emergency contact information. In addition, it notes that a voluntary check-in and check-out would be needed as use increased.

Waste disposal was a major consideration, especially in the wild sections. "When people are introduced, solid waste disposal becomes a problem. Access points, campsites, and scenic areas will concentrate people and if not controlled will result in depletion of available firewood, water pollution, insensitive disposal of garbage and waste, and a general deterioration of the environment. Recreation use will be regulated on the basis of carrying capacity of the land and water rather than on demand" (1971 study report)

Social Organization Today: Today, most counties are members of local councils of governments (COGs) that produce comprehensive economic development strategies to promote economic development and opportunity, foster effective transportation access, enhance and protect the environment, and balance resources through sound management of development within a "region." In this instance a region refers to areas that have been defined economically, environmentally or geographically as appropriate units for addressing economic development and related challenges.

Oconee County - Oconee County is a member of SC Appalachian Council of Governments (ACOG). The ACOG is a voluntary organization of local governments in Anderson, Cherokee, Greenville, Oconee, Pickens and Spartanburg counties in upstate South Carolina. Created in 1965, the ACOG is a valuable resource for local governments in the areas of public administration, planning, information systems and technology, grants, workforce development and services to the elderly population. The ACOG has produced a Rural Long Range Transportation Plan, 2007–2027 and a Comprehensive Economic Development Strategy, 2007-2012, Oconee County (ACOG 2007). The economic analysis in this strategy for Oconee County highlights that unemployment has doubled in the past seven years (from 3.5% to 7.3%). The county's population increase is due largely to the in-migration of retirees; the new wealth that they have brought with them has accounted for steady growth in retail sales, in spite of the loss of thousands of local textile jobs. Tax revenue generated by industrial businesses has remained fairly constant since 2000; these businesses generate about 8.5% of local tax revenues or pay approximately $2.7 million of taxes annually to Oconee County.

Some of the important opportunities or challenges facing Oconee County are (ACOG 2007):

1) The need for effective planning and zoning;
2) Water and sewer in the I-85 corridor;
3) Factionalism throughout the county which is impacting progress;
4) The general lack of awareness of the importance of economic development;
5) Making long-term development decisions in a timely manner; and
6) Growing tourism/eco-tourism in the county

Jackson and Macon Counties - Jackson and Macon counties are members of the Southwestern Commission Council of Governments (SWCOG) which focuses on regional planning in southwestern North Carolina (Southwestern North Carolina Economic Development District [SWNCEDD] 2010). The SWCOG was established in 1965 and consists of a voluntary organization of these seven counties: Cherokee, Clay, Graham, Haywood, Jackson, Macon and Swain. SWNCEDD produced a Comprehensive Economic Development Strategy in 2010 for the

southwestern North Carolina region (which includes Jackson and Macon counties) as well as a 2006 Jackson County Land Development Plan.

Because both residents and tourists appreciate the natural amenities offered by the Chattooga WSR Corridor, travel and tourism are the major drivers in the growth of the retail/services sector in the seven-county area (see below for more information on comprehensive economic development strategies). The SWNCEDD Report indicates that in 2005, travel and tourism's impact was $14 billion statewide; it has continued to grow since. Travel and tourism is the largest industry in western North Carolina and it is expected to be the largest state industry early in the 21st century (SWNCEDD 2010).

The most popular tourist destination in North Carolina is the Blue Ridge Parkway which travels through Jackson County. Jackson County is 50 miles from Asheville, 111 miles from Knoxville, 50 miles from Gatlinburg and only 150 miles from Atlanta. It is also convenient to upstate South Carolina and less than three hours from North Carolina's largest city, Charlotte.

Similarly Macon County advertises itself as the "Southern Gateway" to the North Carolina mountains; it is centrally located two hours north of Atlanta and upstate South Carolina (Greenville/Spartanburg) and two hours east of Knoxville, Tennessee. It is also easily accessed from many other metropolitan areas via I-40 and I-85 (SWNCEDD 2010). However, the SWCOG (SWNCEDD 2010) notes that the southern portions of Jackson and Macon counties (Glenville-Cashiers and Highlands) have only narrow, curvy two-lane access. Regionally, a concerted effort toward developing pedestrian-friendly and bicycle-friendly communities has begun by adding bike lanes and repairing sidewalks.

Rabun County - Rabun County was selected by Georgia Power for a comprehensive economic assessment (GMRDC 2011) that was developed in early 2011. Some highlights in the community assessment note a 22% decline in employment from its peak in 2005; manufacturing is down 64% since 2002. This assessment notes that tourism is the biggest job generator in Rabun County, but its potential is not being fully met. Currently Rabun County is capturing only a small percentage of through-traffic and has no destination marketing campaign. Tourism marketing is not coordinated; specifically, cities market on their own and there is uncertainty over tourism marketing roles among different entities, such as the chamber of commerce, the county visitor bureau and the cities. Recommendations from the community assessment include developing a unified plan for destination marketing and better coordination of marketing efforts. Estimates in the economic assessment (GMRDC 2011) indicate that a 20% increase in tourists would create 300 jobs and $8 million in income in Rabun County (GMRDC 2011).

Road system and information technologies improvement, as well as the natural amenities in the four-county area surrounding the upper segment of the Chattooga WSR serve as a draw for retirees and have led to an increase in nature-based tourism, as well as increase in the number of vacation houses. The Chattooga River is directly accessible by SC 28 and US 76. Today US 23 and US 441 run together, following a north-south route through Rabun County, GA into Jackson and Macon counties, NC; US 76 runs east-west from Oconee County into Rabun County, GA. The interstate system provides links to major metropolitan areas. Broadband and high speed internet are available across the four counties.

Many Americans are attracted to amenity-rich areas due to the higher quality of life they offer (Hill et al. 2009). Often these migrations begin as a day visit or overnight stay, but can eventually turn into permanent migration. These increases in tourism, home construction and other businesses can lead to an increase in job opportunities that enhance the quality of life. Current Forest Service management of the upper segment of the Chattooga WSR Corridor has very few impacts on the four surrounding counties' abilities to provide services, such as sewer, water, schools and other government services. As a tourist and retiree destination, county resources for emergency services and law enforcement may be stretched, particularly from May to October.

In the remote areas surrounding the Chattooga WSR, the emergency services have agreements of mutual aid across the four-county area. However, the emergency services are volunteer organizations that receive limited funding. Search and rescue (SAR) efforts could impact these volunteer organizations' resources, particularly in the more remote sections of the Chattooga Cliffs and Ellicott Rock reaches. The limited access and rugged terrain of these two reaches can hamper SAR efforts. Further downstream, the terrain is flatter, so SAR efforts are less difficult. Whittaker and Shelby (2007) note all three reaches "have at least one Class V and several Class IV rapids…The addition of large woody material from dying Hemlock is likely to add to these risks."

Whittaker and Shelby (2007) also note:

> There are going to be some accidents, injuries, and eventually a fatality…the number of fatalities or serious accidents due to boating is likely to be low, and a few will require SAR responses...If SAR responses or body extraction efforts are required on the Upper segment of the Chattooga WSR, there may be impacts related to access to the scene for staff and equipment. Wilderness designation complicates the use of some equipment and access…Taken together, the number of accidents, fatalities, and SAR responses will probably increase if boating is allowed on the Upper segment of the Chattooga WSR. These responses, in turn are likely to create some localized or access-based impacts, but these will probably be low.

Other services provided by the four surrounding counties on national forest land include routine patrols at recreation facilities. The US Forest Service and the four counties have agreements on cooperative road maintenance to provide more efficient maintenance of county or Forest Service roads that cross national forest land.

Similarly the mix of recreation uses on the upper segment of the Chattooga WSR has limited impacts on the states' ability to satisfy human needs. State agencies enforce hunting and fishing laws and assist with fire control on national forest lands.

Maintenance of recreation facilities, such as litter pick up and hazard tree removal, is completed by Forest Service personnel. Similarly, trail, Forest Service roads and parking lot maintenance is completed by Forest Service personnel, through contracting or volunteers, often with the assistance of non-profit organizations.

Forest plans generally cover a ten to 15-year time period, recognizing that conditions change and new information emerges. Typically the mix of recreation uses on the Chattooga WSR and their impacts on the corridor's resources are evaluated as part of routine planning efforts. These efforts allow Forest Service personnel to evaluate the impacts of changed conditions, such as population growth and demographics, recreation use trends and patterns or changes in things, such as natural resource issues and emerging technologies. Monitoring reports are completed annually to evaluate ongoing impacts and to identify any needs for immediate changes in forest plan direction. In project-level decisions, adaptive management techniques include monitoring protocols and steps to take if undesirable impacts are occurring.

Management of the Chattooga WSR corridor has some limited economic impacts and the ability to satisfy human needs. While the corridor is not managed for timber which can create jobs and revenue for the counties, special-use permits for commercial operations can create jobs. Currently there are three special-use permits on the lower Chattooga River to provide whitewater rafting services. These whitewater rafting services not only provide jobs, but also serve as a draw for nature-based tourism. Requests for special-use permits can include organized recreation events that can serve as a draw for nature-based tourism too.

Population Characteristics in 1970s: The 1971 study report describes the changes in demographics that were occurring as the area was becoming a retirement destination. The population character of Rabun, Jackson and Macon counties was changing as people migrated from Florida, southern South Carolina and southern Georgia, as well as from the Midwest and Northeast. This immigration consisted primarily of retired persons and technical/administrative personnel employed by the increasing industrial development in Little Tennessee Valley in Macon and Rabun counties. The beginning of industrial development in southern Oconee County had a similar influence on the population in 1971.

Population Characteristics Today: The southern piedmont region is undergoing cultural, demographic and environmental transitions that have profound implications. Migration from other US regions and other countries has fueled much of this growth and, therefore, the cultural and ethnic composition of many areas of the region has changed dramatically (Conroy, et al. 2003). Population in the four-county area has nearly doubled since the 1971 study report was published (see Table F-2). Detailed population data and business characteristics are presented in Table F-3 and Tables F-6 to F-8. Data on 2008 racial composition and poverty trends are presented in Tables F-4 and F-5.

The rapid inflow of migrants is closely correlated to the presence of natural amenities. Hill et al. (2009) define a natural amenity as "an attribute that enhances a location as a place of residence and pertains to the physical rather than social or economic environment and excludes man-made structures, such as historical buildings or casinos." The rugged mountains surrounding the Chattooga WSR are one of the natural amenities that draw people to the four-county area. Although the Chattooga WSR flows through only four counties, its economic and social importance extends to a larger area. The Chattooga WSR attracts wild river recreationists from all over the Southeast and the rest of the US.

Table F-2 Population Trends in the Four Counties Surrounding the Upper segment of the Chattooga WSR

	2008*	2000*	1990*	1970**	1960**
Oconee County, SC	71,274	66,215	57,494	40,888	40,204
Jackson County, NC	36,739	33,121	26,846	20,486	17,780
Macon County, NC	33,005	29,811	23,499	14,873	14,935
Rabun County, GA	16,514	15,050	11,648	7,656	7,456

*Source: U.S. Department of Commerce, US Census Bureau.
**Source: USDA Forest Service, Southern Region. 1971. Wild and Scenic Study Report, Chattooga River

Table F-3 Summary of Geographic Characteristics of the Four Counties Surrounding the Upper segment of the Chattooga WSR.

Geography QuickFacts	Oconee County, SC	Jackson County, NC	Macon County, NC	Rabun County, GA
Land area, 2000 square miles	625.41	490.71	516.47	371.05
Persons per square mile, 2000	105.9	67.5	57.8	40.6

Source: U.S. Department of Commerce, U.S. Census Bureau, State and County QuickFacts, March 2010

Some ongoing population changes include:

- Population growth for the four counties from 2000 to 2008 is slightly higher than the national average (7.6% to 10.9% compared to the national average of 8.0%, see Tables in Appendix F). Most of this growth results from people moving from other areas to the "sunbelt." Cultural values may change as this influx occurs.
- The population aged 65 and older is higher than the national average for all four counties (14% to 23% compared to 12.8% for the U.S., see Tables in Appendix F). Retirees tend to have more leisure time to pursue recreational activities. They also tend to prefer frontcountry recreational activities, such as day hiking, frontcountry angling and picnicking rather than backpacking or backcountry angling. The rapid increases in this age group likely will cause increased demand for frontcountry recreation.

Oconee County - The Appalachian Regional Strategic Plan (ACOG 2007) includes information from the seven-county area, which includes Oconee County. This strategic plan describes this area as one of the fastest growing regions in the U.S. with a projected increase of 28 % during the next 25 years. It projects that the new population will tend to be concentrated in the urban areas around Greenville, Spartanburg and Anderson. However, the rural areas of the ACOG will increasingly feel the effects of the expanding influence of development and growth in the region. In addition, more than 21% of the population in Oconee County is between the ages of 65 and 84; the next closest county within the ACOG is just under 18% and the rest are 15% or less.

Jackson County- Jackson County (2006) indicates a population growth greater than the averages for North Carolina or the U.S. The most recent census shows that almost all of the growth in Jackson County, more than 91%, is due to a 2,400% increase in in-migration. The projections for Jackson County indicate a slowing of the growth rate from 23.4% between 1990 and 2000 to 9.5% between 2020 and 2030. By 2030, more deaths than births are expected which will lead to negative natural growth. In addition, it is expected that in-migration of new residents will continue to account for practically all of the anticipated growth. The age group that accounts for

the largest share of growth in Jackson County between 1990 and 2000 is the 45-64 age group, followed by the 18-44 age group.

Macon County- The 2006 population estimates for Macon County are 33,078 and are projected to reach 46,354 in 2030 (Macon County 2008). Population ranges from 3,200 year-round residents to more than 18,000 during the summer and early autumn. In 2000 the population was 29,811 residents, a 26.8% increase from 1990. In comparison, North Carolina saw a 21.35% increase from 1990 to 2000.

Rabun County **-** The 2005 Rabun County Comprehensive Plan describes the rapid growth in population in Rabun County (GMRDC 2011). For example, between 1990 and 2000, the population of Rabun County grew nearly 30%. Nearly three-quarters of the county's population lives within two miles of US 441 or US 76. The total county population is projected to increase from 15,050 in 2000 to 39,290 by 2025. The majority of this growth will come from an influx of retirees and second homeowners making their Rabun County vacation home their permanent residence.

Land-Use Patterns in 1970s: The steeply mountainous lands surrounding the Chattooga River severely limited development and had a profound effect on the area's people and economy. The Chattooga River is described in the 1971 study report as "entrenched by steep, rocky, forested slopes that plunge into deep, narrow gorges. This rugged country isolated the river from development and prevented concentration of populations from locating near the river."

The 1971 study report indicates that 87% of the Chattooga River corridor was national forest land and the remainder was private land. The majority of the private lands occurred above the Chattooga Cliffs with patches of private land scattered along the river in Georgia and South Carolina. The most intensive use of private land occurred on small tracts used for summer homes. Major bridge structures occurred at US 76, S.C. 28, Burrells Ford and Grimshawes.

Except for the resort village of Cashiers on the extreme headwaters and a small area of summer homes along Hwy. 28 in South Carolina, the developed areas, as well as the local population, were located many miles away from the river in narrow fertile valleys between the main mountain ranges and cross ranges and in the lower elevation piedmont. The mountains isolated the river from past development and prevented concentrations of population from locating near the river. Specifically, the 1971 study report says, "The lands directly along the river were not settled even in early settler and Cherokee Indian times. The Cherokees used these lands only as hunting grounds. Major Cherokee villages were 20 miles east and 10 miles west of the river."

Land Use Patterns Today: The rugged landscape is still a limiting factor to development within the Chattooga WSR corridor; development has taken place on the flatter areas outside of the national forests.

- Oconee County has approximately 85,000 acres of national forest that covers the northwestern quarter of the county. While most of Oconee County is Piedmont and relatively flatter, the rugged mountainous area is in the national forest system.

- The Highlands Ranger District covers an area of nearly 105,000 acres in Macon, Jackson and Transylvania counties; Jackson County has 77,236 acres of national forest system lands. Nearly half of Macon County is in national forest system lands with 153,173 acres as of the end of 2009.
- Approximately 60% of Rabun County is in national forests and state parks; approximately 20% is held by Georgia Power and the rest is in private hands. With 148,684 acres (601.70 km^2) of the Chattahoochee National Forest, a national protected area located within its boundaries, Rabun County hosts the largest portion of the Chattahoochee National Forest of any of the 18 counties with land included in the forest.
- Ellicott Rock Wilderness is located at the intersection of North Carolina, South Carolina and Georgia and forms part of the three national forests.

Since 1971, population characteristics have grown and changed tremendously; this has resulted in changed land-use patterns on areas outside of national forest lands. In addition, some regional trends have the potential to affect communities in the area of the upper segment of the Chattooga WSR. The southern piedmont region is undergoing a rapid transition with projected increases in human population density and rates of land-use conversion. Human population growth is particularly rapid and continues to accelerate in urban and suburban areas and the connecting corridors. Growth is particularly rapid along certain urban and neo-urban centers, much of which is associated with the interstate highway system, e.g., I-85, I-40, I-75 and "developmental" highways (Conroy, et al. 2003).

The demand for vacation and retirement homes has resulted in different land-use patterns. Land uses continue to change from a mixture of light residential and industrial, agricultural and lightly managed forest systems to a heavily developed and urbanized landscape and more intensively managed forest systems (Conroy, et al. 2003). The Southern Piedmont is expected to lose more forested land than other regions in the South.

The Southwestern Commission Council of Governments (SWCOG) focuses on regional planning in southwestern North Carolina. ***T***he 2008 Comprehensive Economic Strategy developed by the SWCOG (SWNCEDD 2009) describes the development pressures within the seven-county area of southwestern North Carolina that includes Jackson and Macon counties:

> Pressures to develop seem insatiable. A full 20% of the US population and four of the five fastest growing cities in the US are within a five hour drive. Atlanta, reportedly the fastest sprawling metropolis the earth has ever witnessed, is only two hours south. Unplanned growth threatens to overwhelm the region. Poor air quality and huge stream sediment loads are but two direct impacts. The spiraling financial costs of residential and commercial sprawl (public safety, solid waste, water and sewer, new schools) are growing geometrically, placing extreme pressures on local government budgets.

Civil Rights in 1970s: The 1971 study report includes little discussion on accessibility standards, protected groups or minorities. It does note that Jackson, Macon, and Rabun counties were included in the Appalachian-depressed area. Oconee County, while not experiencing boom conditions, was not included.

Civil Rights Today: On the national forests in or near the upper segment of the Chattooga WSR corridor, visitors will find hardened parking lots and accessible toilets. Accessible parking is located at the Walhalla Fish Hatchery. An accessible overlook at US 76 on the lower Chattooga River also exists.

At the county level, a Hispanic component is growing in all four counties (see Table F-4). In addition, all four counties and three states show increased poverty levels (see Tables F-5). Minority and impoverished population trends are described below (see Tables F- 6 and F-7).

Oconee County: Based on 2008 U.S. Census data, in Oconee County more than 90% of the population is white, 7.9% black, and 2.1% "other" (see Table F-4). Hispanics may be of any race, but are included in race categories. Oconee County reported 3.8% of Hispanic origin.

In 2000, the poverty rate for Oconee County was 10.1% (see Table F-5). In 2008, the poverty rate had risen to 16.1%. The poverty rate for Oconee County is slightly higher than the poverty rates for South Carolina at 15.7% and the US at 13.2%.

Table F-4 2008 Racial Composition for the Four-County Area Bordering the Chattooga Wild and Scenic River

Demographics	Oconee County	South Carolina	Jackson County	Macon County	North Carolina	Rabun County	Georgia
Population,	71,274	4,479,800	36,739	33,005	9,222,414	16,514	9,685,744
White	90.4%	68.7%	84.9%	96.3%	73.9%	96.6%	65.4%
Black	7.9%	28.5%	2.4%	1.8%	21.6%	1.7%	30.0%
American Indian	0.3%	0.4%	10.5%	0.3%	1.3%	0.4%	0.4%
Asian Pacific Islander	0.5%	1.3%	0.7%	0.7%	2.0%	0.5%	3.0%
Reporting two or more races	0.9%	1.1%	1.5%	0.8%	1.2%	0.8%	1.3%
Hispanic or Latino origin (b)	3.8%	4.1%	2.4%	3.1%	7.4%	7.8%	8.0%
White persons not Hispanic	87.0%	65.2%	83.2%	93.4%	67.2%	89.0%	58.1%

(b) Hispanics may be of any race, so also are included in applicable race categories. Source U.S. Census Bureau.

Table F-5 Changes in Poverty Levels from 2000 to 2008 in the Four-County Area Bordering the Chattooga WSR.

State and County	All Ages in Poverty	
	2000	**2008**
South Carolina	12.8	15.5
Oconee County, SC	10.1	16.1
North Carolina	11.7	14.6
Jackson County, NC	14.2	16.9
Macon County, NC	12.5	13.8
Georgia	12.3	14.7
Rabun County, GA	11.7	18.2

Source: U.S. Census data at http://www.census.gov/cgi-bin/saipe/saipe.cgi. Data pulled July 2010

Jackson and Macon Counties- The comprehensive plan for the Southwestern North Carolina Commission analyzed 2000 census data for the seven counties which includes Jackson and Macon counties. The report indicates that the Hispanic population is growing while the black

population is declining. Traditionally, the Hispanic population is undercounted (SWCOG 2010) (see Table F-4).

Socioeconomic data from the 2000 census, when compared to the 2008 data, indicate that southwestern North Carolina is becoming relatively more affluent. According to 2000 U.S. Census data, poverty rates are 12.5% in Macon County and 14.2% in Jackson County. According to 2008 U.S. Census data, poverty rates have risen slightly to 13.8% and 16.9% in Jackson and Macon counties respectively (see Table F-5).

Rabun County- According to the 2005 Comprehensive Economic Plan for Rabun County, in 2000 almost 95% of the county population was white. Blacks made up less than 1% of the total population. According to 2008 U.S. Census data, these percentages have changed slightly: 96.6% white; 1.7% black and 1.7% "other." Approximately 7.8% reported being of Hispanic or Latino origin (see Table F-4).

In 2000, 1,649 persons (11.1%) were living below the poverty level in Rabun County *(GA Mountain Region Development Center 2005)*. According to 2008 U.S. Census data, the poverty rate in Rabun County has risen to 18.2% (see Table F-5).

Table F-6 Summary of Racial Demographics for Four Counties located along the Upper Chattooga River. Source: US Census Bureau State & County QuickFacts

People QuickFacts	Macon County	Jackson County	North Carolina	Oconee County	South Carolina	Rabun County	Georgia	USA
Population, 2008 estimate	33,005	36,739	9,222,414	71,274	4,479,800	16,514	9,685,744	304,059,724
Population, percent change, April 1, 2000 to July 1, 2008	10.7%	10.9%	14.6%	7.6%	11.7%	9.7%	18.3%	8.0%
Population estimates base (April 1) 2000	29,806	33,121	8,046,500	66,215	4,011,809	15,050	8,186,812	281,424,602
Persons under 5 years old, percent, 2008	5.7%	5.6%	7.1%	5.9%	6.8%	6.0%	7.6%	6.9%
Persons under 18 years old, percent, 2008	20.2%	19.3%	24.3%	21.4%	23.8%	22.1%	26.3%	24.3%
Persons 65 years old and over, percent, 2008	23.6%	14.0%	12.4%	18.8%	13.3%	20.3%	10.1%	12.8%
Female persons, percent, 2008	52.4%	51.1%	51.0%	50.9%	51.3%	50.4%	50.8%	50.7%
White persons, percent, 2008 (a)	96.3%	84.9%	73.9%	90.4%	68.7%	96.6%	65.4%	79.8%
Black persons, percent, 2008 (a)	1.8%	2.4%	21.6%	7.9%	28.5%	1.7%	30.0%	12.8%
American Indian and Alaska Native persons, percent, 2008 (a)	0.3%	10.5%	1.3%	0.3%	0.4%	0.4%	0.4%	1.0%
Asian persons, percent, 2008 (a)	0.7%	0.7%	1.9%	0.5%	1.2%	0.4%	2.9%	4.5%
Native Hawaiian and Other Pacific Islander, percent, 2008 (a)	Z	Z	0.1%	Z	0.1%	0.1%	0.1%	0.2%
Persons reporting two or more races, percent, 2008	0.8%	1.5%	1.2%	0.9%	1.1%	0.8%	1.3%	1.7%
Persons of Hispanic or Latino origin, percent, 2008 (b)	3.1%	2.4%	7.4%	3.8%	4.1%	7.8%	8.0%	15.4%
White persons not Hispanic, percent, 2008	93.4%	83.2%	67.2%	87.0%	65.2%	89.0%	58.1%	65.6%
White persons, percent, 2008 (a)	96.3%	84.9%	73.9%	90.4%	68.7%	96.6%	65.4%	79.8%
(a) Includes persons reporting only one race, (b) Hispanics may be of any race, so also are included in applicable race categories								

Table F-7 Statistics on Education and Income for the Four Counties along the Upper Chattooga River. Source: US Census Bureau State & County QuickFacts

People QuickFacts	Macon County	Jackson County	North Carolina	Oconee County	South Carolina	Rabun County	Georgia	USA
Living in same house in 1995 and 2000, pct 5 yrs old & over	58.1%	54.8%	53.0%	59.4%	55.9%	59.8%	49.2%	54.1%
Foreign born persons, percent, 2000	2.6%	1.7%	5.3%	2.4%	2.9%	4.1%	7.1%	11.1%
Language other than English spoken at home, pct age 5+, 2000	3.5%	5.7%	8.0%	3.8%	5.2%	7.2%	9.9%	17.9%
High school graduates, percent of persons age 25+, 2000	77.3%	78.8%	78.1%	73.9%	76.3%	75.4%	78.6%	80.4%
Bachelor's degree or higher, pct of persons age 25+, 2000	16.2%	25.5%	22.5%	18.2%	20.4%	17.6%	24.3%	24.4%
Persons with a disability, age 5+, 2000	6,939	6,742	1,540,365	14,951	810,857	3,453	1,456,812	49,746,248
Housing units, 2008	23,449	24,130	4,201,378	38,000	2,056,127	12,876	4,026,082	129,065,264
Homeownership rate, 2000	81.3%	72.5%	69.4%	78.4%	72.2%	79.5%	67.5%	66.2%
Housing units in multi-unit structures, percent, 2000	4.9%	9.3%	16.1%	7.8%	15.8%	7.1%	20.8%	26.4%
Median value of owner-occupied housing units, 2000	$103,700	$106,700	$108,300	$97,500	$94,900	$112,400	$111,200	$119,600
Households, 2000	12,828	13,191	3,132,013	27,283	1,533,854	6,279	3,006,369	105,480,101
Persons per household, 2000	2.28	2.3	2.49	2.4	2.53	2.35	2.65	2.59
Median household income, 2008	$38,989	$41,506	$46,574	$42,668	$44,695	$37,119	$50,834	$52,029
Per capita money income, 1999	$18,642	$17,582	$20,307	$18,965	$18,795	$20,608	$21,154	$21,587
Persons below poverty level, percent, 2008	13.8%	16.9%	14.6%	16.1%	15.7%	18.2%	14.7%	13.2%

Table F-8 Summary of Business Statistics for the 4 counties along the Upper Chattooga River. Source: US Census Bureau State & County QuickFacts

Business QuickFacts	Macon County	Jackson County	North Carolina	Oconee County	South Carolina	Rabun County	Georgia	USA
Private nonfarm establishments, 2007	1,318	1,028	227,906	1,642	107,893	535	231,810	7,705,018
Private nonfarm employment, 2007	10,444	9,981	3,586,552	20,720	1,648,146	4,449	3,648,418	120,604,265
Private nonfarm employment, percent change 2000-2007	17.8%	20.3%	5.9%	-7.0%	2.9%	-20.9%	4.7%	5.7%
Non-employer establishments, 2007	3,572	3,246	644,873	4,723	287,197	1,850	738,158	21,708,021
Total number of firms, 2002	4,004	3,418	642,597	5,214	292,984	1,915	674,521	22,974,655
Black-owned firms, percent, 2002	F	F	8.1%	F	9.8%	F	13.4%	5.2%
American Indian and Alaska Native owned firms, percent, 2002	F	F	0.9%	F	0.5%	F	0.7%	0.9%
Asian-owned firms, percent, 2002	F	F	2.1%	F	1.5%	F	4.0%	4.8%
Native Hawaiian and Other Pacific Islander owned firms, percent, 2002	F	F	0.0%	F	0.0%	F	0.0%	0.1%
Hispanic-owned firms, percent, 2002	F	F	1.4%	F	1.0%	F	2.7%	6.8%
Women-owned firms, percent, 2002	20.8%	24.0%	27.1%	S	26.2%	21.0%	29.1%	28.2%
Manufacturers' shipments, 2002 ($1000)	156,442	95,115	156,821,943	1,244,950	81,132,781	309,831	126,156,636	3,916,136,712
Wholesale trade sales, 2002 ($1000)	21,749	26,987	104,331,152	D	32,988,974	D	201,091,040	4,634,755,112
Retail sales, 2002 ($1000)	388,495	306,521	88,821,486	590,603	40,629,089	163,822	90,098,578	3,056,421,997
Retail sales per capita, 2002	$12,589	$9,045	$10,686	$8,691	$9,895	$10,547	$10,551	$10,615
Accommodation and foodservices sales, 2002 ($1000)	40,182	42,140	11,237,386	51,562	6,104,316	31,120	12,740,423	449,498,718
Building permits, 2008	253	302	54,652	1,025	25,918	163	35,368	905,359
Federal spending, 2008	261,942	211,780	70,203,029	440,087	38,831,638	234,148	74,164,642	2,771,782,152

FN: Footnote on this item for this area in place of data, NA: Not available, D: Suppressed to avoid disclosure of confidential information, X: Not applicable, S: Suppressed; does not meet publication standards, Z: Value greater than zero but less than half unit of measure shown, F: Fewer than 100 firms

APPENDIX G—MONITORING PLAN

In addition to the current Land Management Plan Monitoring (LMP) requirements for the Chattooga wild and scenic river corridor and Ellicott Rock Wilderness Area, 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 in the EA. The monitoring questions below constitute the LMP monitoring decision. Below each question is the monitoring item and general technique that may be used to collect information. The monitoring element and the techniques used may be changed and will not be considered a plan level decision.

Monitoring Questions

Recreation

Recreation monitoring for all action alternatives would focus on vehicle counts at parking lots to determine if recreation use is changing. In addition, use by type and proportion of visitors in frontcountry and backcountry would be estimated and correlated to vehicle counts. Information would also be collected to determine if the desired levels of solitude as measured by encounters are being achieved.

1. **Are vehicle counts at frontcountry and backcountry parking lots changing?**

   Item: vehicles-at-one time
   Technique: Direct Survey

2. **What is the total recreation use by type of visitor occurring in the frontcountry and backcountry and correlate these findings to vehicle counts?**

   Item: groups-at-one-time in frontcountry, people-at-one-time in frontcountry, groups per day in backcountry, people per day in backcountry, vehicles-at-one time
   Technique: Direct Survey, mechanical counters, systematic observations

3. **How is recreation use impacting opportunities for solitude in the backcountry as measured by encounters?**

   Item: encounters in backcountry
   Technique: Direct Survey, systematic observations

4. **How are the numbers of visitors impacting the desired experience in the frontcountry?**

   Item: perceptions of crowding and congestion
   Technique: Direct Survey, systematic observations

Biophysical

For all action alternatives, large woody debris (LWD) would be monitored annually for the first two years and periodically thereafter, to determine if aquatic habitat and endangered, sensitive and locally rare plant species are being impacted by recreation use or by increased levels of LWD from ongoing hemlock mortality.

1. Are site impacts from recreational use and additional LWD from hemlock mortality affecting endangered, sensitive and locally rare plant species and aquatic habitats?

Item: endangered, sensitive and locally rare plant species, aquatic habitats, LWD
Technique: Direct Survey

Populations of the following plant species would be monitored for the first two years to determine their continual presence:

- *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; and
- *Gymnoderma lineare* (endangered) on the NNF.

Specific requirements for Rock Gnome Lichen *(Gymnoderma lineare)*

1. A botanist familiar with rock gnome lichen identification and the exact location along the main stem of the Chattooga River would annually assess the subpopulation.

2. The evaluation would record the presence of any refuse, any visible destruction of the lichen mat, or any other indication on the level of visitation near the subpopulation on the eastern bank of the Chattooga River.

3. Monitoring would include recording data for the *Gymnoderma lineare* rapid assessment field form as a reference metric for assessing any change in population size or vigor. Data recorded would include the temporary plot sizes, an abundance cover class for each plots and an assessment on the vigor/heath for each plot.

4. The USFS would provide maps of any additional located subpopulations to the Asheville field office (US Fish and Wildlife Service).

5. An annual monitoring report would be supplied to the Asheville field office as part of the more comprehensive annual threatened and endangered species monitoring report.

Site Name: Date: Page____ of ____

GYMNODERMA ASSESSMENT FIELD FORM

Plot Size	Cover class	Health	Comments
____x____ m or cm other___		Healthy ___% Declining ___% Balding ___%	
____x____ m or cm other___		Healthy ___% Declining ___% Balding ___%	
____x____ m or cm other___		Healthy ___% Declining ___% Balding ___%	
____x____ m or cm other___		Healthy ___% Declining ___% Balding ___%	
____x____ m or cm other___		Healthy ___% Declining ___% Balding ___%	
____x____ m or cm other___		Healthy ___% Declining ___% Balding ___%	
____x____ m or cm other___		Healthy ___% Declining ___% Balding ___%	
____x____ m or cm other___		Healthy ___% Declining ___% Balding ___%	
____x____ m or cm other___		Healthy ___% Declining ___% Balding ___%	
____x____ m or cm other___		Healthy ___% Declining ___% Balding ___%	
____x____ m or cm other___		Healthy ___% Declining ___% Balding ___%	

COVERCLASSES: 1=0.1%, 2=0-1%, 3=1-2%, 4=2-5%, 5=5-10%, 6=10-25%, 7=25-50%, 8=50-75%, 9=75-95%, 10=95-100%

HEALTHY - no apparent discoloration (esp. no blackening) of the lichen thallus. **DECLINING** - some discoloration present in the lichen thallus (squamules), but no apparent die-back. **BALDING** - areas of die-back apparent, with portions of rock exposed where the thallus was likely formerly present (particularly when surrounded by living thallus/squamules).

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