United States Department of Agriculture | Forest Service | National Forests in North Carolina
Pisgah National Forest
Pisgah Ranger District | 1001 Pisgah Hwy
Pisgah Forest, NC 27868-7721
828-877-3265

File Code: 1950-1
Date: September 3, 2004

Dear Interested Citizen:

The Decision Notice for Tanasee Forest Management Project has been signed. Enclosed is a copy of the Decision Notice (DN) and the Finding of No Significant Impact (FONSI). The DN and FONSI discuss in detail my decision and rationale for reaching that decision. A "Response to Comments" section has been added to the EA as Appendix G (copy enclosed). Also included is a copy of the EA. Changes to the EA and its associated documents include minor typographic corrections and clarifying language and rationale behind some of the determinations of effect which was added in response to some of the comments received.

This decision is subject to appeal pursuant to 36 CFR 215.11. A written appeal, including attachments, must be postmarked or received within 45 days after the date this notice is published in *The Asheville Citizen-Times*. The Appeal shall be sent to National Forests in North Carolina, ATTN: Appeals Deciding Officer, P.O. Box 2750, Asheville, North Carolina 28802. Appeals may be faxed to (828) 257-4263. Hand-delivered appeals must be received within normal business hours of 8:00 a.m. to 4:30 p.m. Appeals may also be mailed electronically in a common digital format to: **appeals-southern-north-carolina@fs.fed.us.**

Those who meet content requirements of 36 CFR 215.13 may appeal this decision. Appeals must meet content requirements of 36 CFR 215.14. For further information on this decision, contact Randy Burgess, District Ranger, Pisgah Ranger District, 1001 Pisgah Highway, Pisgah Forest, North Carolina 28768, Phone: 828-877-3265; or Karen Compton, Pisgah National Forest Zone NEPA Planner, P.O. Box 128, Burnsville, North Carolina, 28714, Phone: 828-257-4230.

Sincerely,

/s/ Randall Burgess
RANDALL BURGESS
District Ranger

Enclosures

United States
Department of
Agriculture

Southern Region
Forest Service

September 2004

Decision Notice

Tanasee Forest Management Project

Pisgah Ranger District, Pisgah National Forest
Transylvania County, North Carolina

Decision Notice
& Finding of No Significant Impact

Tanasee Forest Management Project

USDA Forest Service
Pisgah Ranger District, Pisgah National Forest
Transylvania County, North Carolina

Introduction

An Environmental Assessment (EA) has been written that documents the results of site-specific analysis concerning the proposed Tanasee Forest Management Project on the Pisgah Ranger District. This Decision Notice (DN) and Finding of No Significant Impact (FONSI) documents my decision to allow timber harvesting, herbicide site preparation, supplemental planting of northern red oak seedlings, release with herbicides, pre-commercial thinning and pruning, pre-harvest understory treatment, road construction and reconstruction, temporary road construction, and creation and maintenance of wildlife openings within the Tanasee Analysis Area.

Decision and Rationale for the Decision

Decision

Based upon my review of the alternatives, I have decided to select Alternative C (Selected Alternative) in the Environmental Assessment for the Tanasee Forest Management Project. The Selected Alternative will:

1. Regenerate approximately 178 acres in six timber stands using the two-aged regeneration harvest. This will occur in stands 118/08, 118/22, 119/03, 119/23, 120/10, and 120/26.

2. Perform natural site preparation with herbicides and handtools in four stands on approximately 91 acres. This will occur in stands 118/08, 119/23, 120/10, and 120/26.

3. Perform artificial site preparation, including planting of northern red oak seedlings, using herbicides and handtools in three stands on approximately 87 acres. This will occur in stands 118/08, 118/22, and 119/23.

4. Perform herbicide release on regenerated stands. Approximately three to four years following harvest, survey stands for adequate stocking and need for competition control. Release young trees from competing vegetation using selective herbicide applications (with active ingredient triclopyr); if needed.

5. Perform pre-commercial thinning and pruning on approximately 401 acres in 13 stands. Pre-commercial thinning would involve treatment with an herbicide whose active ingredient is triclopyr to release tree species desirable for timber, as well as species beneficial to wildlife, and to treat invasive plants. Pruning would consist of cutting back oak trees with multiple sprouts to the single best stem. This will occur in stands 118/02, 118/16, 119/05, 119/07, 119/12, 119/14, 119/21, 120/04, 120/05, 120/06, 120/15, 120/16, and 120/20.

6. Perform pre-harvest understory treatment with herbicides whose active ingredient is triclopyr and manual vine control on approximately 129 acres in five stands. Herbicide application would involve thinline application directly to tree stems as well as injection of individual stems. This will occur in stands 118/01, 118/03, 119/34, 120/18, and 120/27.

7. Construct approximately 0.5 mile of new system road to access stands 118/08 and 120/26.

8. Reconstruct approximately 3.7 miles of existing system road to access the regenerated stands.

9. Construct approximately 0.8 miles of temporary road to access stands 118/08, 118/22, and 120/26.

10. Convert approximately 1.0 miles of existing woods roads and temporary road to 1.7 acres of wildlife openings.

We will reduce impacts by implementing the following mitigation measures:

- Leave a minimum of 25 sqft/acre residual basal area (rba) for 50 feet below SR 1324 in stand 119/23.
- Leave a minimum of 25 sqft/acre rba for 100 feet above Woods Church in stand 119/03.
- Leave a minimum of 20 sqft/acre rba in eastern half of stand 118/08.
- Limit openings to 500 linear feet along SR 1324 in stand 119/23.
- Limit openings to 500 linear feet along Woods Church road in stand 119/03.
- Screen visible roads and landings in stands 119/03 and 119/23.
- Burn or lop and scatter slash to within 4 feet of the ground for 50 feet beyond the edge of the road in stands 119/03 and 119/23.
- If during the implementation of a ground disturbing activity, a previously unknown archeological or historic site is encountered the disturbance would stop immediately. The activity would not be permitted to continue until a forest archeologist surveys and evaluates the site and makes a recommendation to permanently stop, modify, or proceed with the activity using appropriate mitigation measures.

Impacts have also been reduced by incorporation of the following design features into the selected alternative for the protection of aquatic resources:

- Intermittent channels have been mapped by the Pisgah Fisheries Biologist and the Forest Hydrologist. These areas will not be disturbed in the implementation of this project.

- Trees accidentally felled across stream channels (that prevent or block stream flow) will be lifted (when possible) away from the water. If this is not possible, each tree will be pulled away from the water where it fell and temporary decking will be used to support the weight of the tree as it is pulled across the channel. These removals will be perpendicular to the stream channel whenever possible to minimize stream bank disturbance. Bare soil will be seeded and mulched if native vegetation does not start to recolonize the area by the time timber removal from the unit is complete.

- Skid roads will avoid stream crossings and paralleling perennial channels within the designated riparian areas.

- Landings and skid trails will be vegetated as soon as possible after use to avoid off-site soil movement.

- Temporary roads will be constructed to avoid runoff into area streams. In addition, silt fence, straw bales, or brush barriers will be placed along the length of the road where it parallels or crosses a stream as needed to control runoff and stream sedimentation.

Rationale

I selected Alternative C because it meets the purpose and need for action. This alternative provides for a sustainable, healthy ecosystem; meets forest plan direction and standards for vegetation and wildlife management; and helps achieve desired future species and age class composition. I believe Alternative C meets the purpose and need more completely and better protects the resources and addresses issues and concerns than any of the other alternatives. Alternative C would result in less impacts to the watershed in that "this alternative is not likely to contribute to direct or indirect effects on the sediment and streamflow regime of Parker Creek…[and]…would not contribute to cumulative effects in the West Fork French Broad River" (EA, Appendix C, Attachment 6-Hydrological Analysis for Parker Creek p. 4).

Responses to the EA during the comment period were varied. Some felt Alternative B should be selected to provide more early successional habitat, to enhance the future of hard mast production, and to attain the desired conditions on diversity of age classes. Others felt Alternative C still had too many resource impacts. I feel Alternative C provides a balanced action that meets the purpose and need, specifically creating early successional habitat (though less than Alternative B), while creating less resource impacts than Alternative B by reducing road construction and including design features to protect aquatic resources.

Alternative C will improve wildlife habitat for black bear, wild turkey, ruffed grouse, some species of migratory songbirds and other species that utilize early successional habitat. The soil, visual resources, heritage resources, aquatic resources, botanical and wildlife resources, rare species, and human resources will be protected by requiring the implementation of the above mitigation measures and design features.

Alternative C meets the Forest Plan requirements for providing at least 5% of Management Area (MA) 3B in early successional habitat and at least 0.5% of MAs 1-5 in grass/forb openings at any one time. Although it does not achieve the desired condition of 3% of MA 3B in grass/forb habitat, it does make progress toward that goal by providing 1.7% of MA 3B in grass/forb habitat. It provides for a regular and sustained flow of habitats across the forest. Harvesting approximately 178 acres would provide early successional habitat for the next 10-20 years. The conversion of temporary roads to wildlife openings would create additional grass/forb habitat.

Timber harvesting would provide wood products to the regional economy and make progress toward reaching a balanced age class distribution. The pre-harvest understory treatments and pre-commercial thinning would increase the oak component in the understory by allowing more sunlight to reach the forest floor to stimulate growth and development of species such as oak, black cherry, white ash, and hickory. These tree species are desirable for timber production and important in the production of hard and soft mast for wildlife. These activities will assist in achieving desired future species and age class composition.

Other Alternatives Considered

In addition to the Selected Alternative, I considered two other alternatives in detail: Alternative A – No-Action and Alternative B. A comparison of these alternatives can be found in Section 2.6 of the EA.

Alternative A – No Action

I considered the no action alternative (Alternative A) but it does not meet the purpose and need for action. Specifically, Alternative A would not meet the Forest Plan direction for providing at least 5% early successional habitat in MA 3B and would not meet the objective of a healthy, sustainable forest condition because of the age class distribution of the area.

Under Alternative A, current early successional plant communities, found in the 11-20 year old age class, would increase in age. A change in species composition would result as shade tolerant species dominate intolerant ones, assuming the suppression of fire. As the mature trees age, they would become more susceptible to damage, disease, and insect problems, especially the ones that are already showing signs of decline. Hard and soft mast provided for wildlife will also continue to decline.

Alternative B

I also considered Alternative B in my decision. Alternative B met the purpose and need for the project area; however, there are questions concerning the impacts to water quality in and downstream of Parker Creek as a result of the road construction proposed under this alternative. In 1998, North Carolina Department of Environment and Natural Resources Division of Water Quality (DWQ) listed West Fork French Broad River as a 303(d) impaired water. DWQ has determined that, though not a primary cause of impairment, sedimentation is a contributing stressor of impairment of West Fork French Broad River.

The Hydrologic Analysis for Parker Creek determined that "[s]ince the implementation of this alternative would have adverse effects on the existing sediment regime, there is a potential for this alternative to have adverse effects on the West Fork French Broad River….Although the amount of sediment that is likely to transport downstream is small relative to the other sources of sediment within the sub-watershed it could still contribute to stressing protected uses" (EA, Appendix C, Attachment 6 p. 3). Due to the potential impacts to water quality in West Fork French Broad River, I have decided not to select Alternative B.

Other Alternatives Not Considered

I considered an alternative that would have proposed no new system road construction within the project area. It was decided that this alternative addressed some of the concerns about water quality and aquatic habitat; however, it did not meet the purpose and need for the proposal or adequately address the issue of the lack of early successional habitat due to inadequate access to harvest units. This alternative would not have met the Forest Plan standard for providing at least 5% of the project area located in MA 3B in early successional habitat; therefore, this alternative was not considered in detail.

Public Involvement

This project was originally part of the proposed Parker Creek Project. Public input was initially requested on the Parker Creek Project in 1996. An EA was released for Notice and Comment in the summer of 1997 and a Decision Notice signed in June of 1998. This decision was appealed to the Regional Office by Wildlaw acting on behalf of Dr. Speed Rogers. Prior to a ruling on the appeal, the Decision Notice was withdrawn.

Portions of the previous Parker Creek project have gone through additional public involvement and separate environmental analysis and been implemented or approved for implementation over the past five years. These actions are included in the Parker Creek Watershed Rehabilitation and Road Decommissioning Project, the T&T Timber Sale, and the Miser Creek Wildlife Project.

On December 24, 2003, a letter from District Ranger Randall Burgess describing site-specific proposed actions and requesting comments was mailed to 107 individuals, groups, and organizations. Comments were requested by January 30, 2004. Ten letters and/or emails were received as a result of this scoping. In addition, this project has appeared in the Schedule of Proposed Actions for the National Forests in North Carolina, which is published quarterly, since October of 2002.

Alternative C was identified as the preferred alternative on June 23, 2004 when the EA for the Tanasee Forest Management Project was mailed to agencies and individuals who commented on the project proposal. A request for comments was published in the Asheville Citizen Times on June 24, 2004. The formal 30-day notice and comment period ended on July 26, 2004.

Finding of No Significant Impact

1. The actions of Alternative C are consistent with the Land and Resource Management Plan (hereafter, the Forest Plan) for the Nantahala and Pisgah National Forests and the National Forest Management Act. The following paragraphs discuss my reasoning for the finding:

2. The actions of this project are consistent with the forest wide management objectives given in Chapter III (71-76) of the Forest Plan and in the general forest direction. The proposed activities are located in Management Area (MA) 3B. These actions are consistent with the management prescriptions and practices for MA 3B and with general forest direction.

3. The actions of this project are consistent with the Forest Plan because mitigation measures for impacts have been fully applied in the planned actions. The project is feasible and reasonable, and will result in applying management practices that meet the Forest Plan overall direction of protecting the environment while producing goods and services.

4. The actions of this project have met all requirements of the Endangered Species Act and all agreements with the State Natural Heritage Program, in that the impacts to Proposed, Endangered, Threatened, or Sensitive (PETS) species or critical habitat for these species are minor in scope and will not affect the population viability of any PETS species.

5. There are seven known Class II heritage sites within the proposed activity areas. The Class II archeological sites will be protected by excluding them from the treatment areas. The fifteen known Class III sites will not be affected by the approved activities. There are no other known heritage sites within the approved activity area.

6. The actions of this project which alter vegetation comply with the seven requirements of 36 CFR 219.27(b) as discussed below:

a. Prescriptions are best suited to the multiple use goals established for the area; potential environmental, biological, cultural resource, aesthetic, engineering and economic impacts have been considered.

b. Regeneration checks of existing harvested stands in the area show that lands can be restocked within 5 years.

c. Actions were not chosen primarily because they will give the greatest dollar return or the greatest output of timber.

d. Actions were chosen after considering potential effects on residual trees and adjacent stands.

e. No permanent impairment of site productivity is expected from actions.

f. Actions will provide the desired effects on water quality and quantity, wildlife and fish habitat, regeneration of desired tree species, recreation use, and other resource yields.

g. Actions are feasible and practical in terms of transportation requirements, labor, supply and contract administration costs.

7. There are no significant irreversible or irretrievable resource commitments.

I have determined that Alternative C is not a major federal action, individually or cumulatively, and will not affect the quality of the human environment. Therefore, an environmental impact statement will not be prepared. I have considered both context and intensity in my determination that is based on environmental analyses documented in the environmental assessment. I base my finding on the following:

Context: The actions of Alternative C are limited in context. Effects will not go beyond the local area.

Intensity:

1. Both beneficial and adverse impacts have been considered (EA Sections 1.7, 3.1, 3.2, 3.3 and 3.4).

2. There will be no significant effects on public health and safety and implementation will be in accordance with mitigation measures (EA Sections 1.7.9 and 2.5).

3. There will be no significant effects on unique characteristics of the area, because there are no park lands, prime farmlands, wetlands, wild and scenic rivers, or ecologically critical areas in the project area, nor are there local laws or requirements for the protection of the environment (EA Section 1.7.10). Riparian areas will be protected by application of Forest Plan standards and state laws and project design features (EA Appendix C Sections 4.1.2.2 (2) and 4.2.6).

4. The effects on the quality of the human environment are not highly controversial. Concerns expressed by interested publics over environmental effects have been mitigated through application of site-specific mitigation requirements (EA Sections 1.7.9 and 2.5).

5. We have considerable experience with the types of activities to be implemented. The effects analysis shows the effects are not uncertain, and do not involve unique or unknown risks (EA Sections 1.6, 1.7, 3.1, 3.2, 3.3, and 3.4 and EA Appendix C Sections 2.1.3, 2.2.3, 3.1.2, 3.2.3, 3.2.5, 4.1.2, 4.2.3, 4.2.5, 5.2, 5.3, 6.2, and 6.3).

6. This action will have no effect on districts, sites, highways, structures, or objects listed in or eligible for listing in the National Register of Historic Places and will not cause loss or destruction of significant scientific, cultural, or historical resources (EA Section 1.7.3).

7. There are no apparent significant adverse cumulative effects between this project and other past, present and reasonably foreseeable actions. Other Federal, State and private projects have been considered (EA Sections 1.7.1, 1.7.2, 1.7.3, 1.7.4, 1.7.5, 1.7.11, 3.1.4, 3.2.2, 3.2.3, 3.2.4, 3.3.2, 3.3.3, 3.3.4, 3.4.2, and 3.4.3; EA Appendix C Sections 2.2.3, 3.1.2.2, 3.2.3, 4.1.2.3, 5.2, and 6.3).

8. This action is not likely to establish a precedent for future actions with significant effects and does not represent a decision in principle about a future consideration. The project is site specific and effects are expected to remain localized and short-term (EA Sections 1.7, 3.1, 3.2, 3.3 and 3.4).

9. The action will not adversely affect any endangered or threatened species or their habitat that has been determined to be critical under the Endangered Species Act of 1973 (EA Sections 1.7.4, 1.7.5, 3.2.1, 3.2.2, 3.2.3, and 3.2.4; EA Appendix C Sections 2.2, 3.2, 4.2, 6.2 and 6.3).

10. This action will not violate Federal, State or local law or requirements imposed for the protection of the environment. Applicable laws and regulations were considered in this EA (EA Section 1.7.10).

Findings Required by Other Laws and Regulations

My decision to implement the Selected Alternative is consistent with the intent of the long-term goals and objectives listed on pages III-1 and III-2 of Forest Plan Amendment 5. The project was designed to meet land and resource management plan standards and incorporates appropriate land and resource management plan guidelines (EA Section 1.3).

Administrative Review and Contacts

This decision is subject to appeal pursuant to 36 CFR 215.11. A written appeal, including attachments, must be postmarked or received within 45 days after the date this notice is published in *The Asheville Citizen-Times*. The Appeal shall be sent to National Forests in North Carolina, ATTN: Appeals Deciding Officer, P.O. Box 2750, Asheville, North Carolina 28802. Appeals may be faxed to (828) 257-4263. Hand-delivered appeals must be received within normal business hours of 8:00 a.m. to 4:30 p.m. Appeals may also be mailed electronically in a common digital format to:
appeals-southern-north-carolina@fs.fed.us.

Those who meet content requirements of 36 CFR 215.13 may appeal this decision. Appeals must meet content requirements of 36 CFR 215.14. For further information on this decision, contact Randy Burgess, District Ranger, Pisgah Ranger District, 1001 Pisgah Highway, Pisgah Forest, North Carolina 28768, Phone: 828-877-3265; or Karen Compton, Pisgah National Forest Zone NEPA Planner, P.O. Box 128, Burnsville, North Carolina, 28714, Phone: 828-257-4230.

Implementation Date

As per 36 CFR 215.9, if no appeal is received, implementation of this decision may occur on, but not before, the 5th business day following the close of the appeal-filing period (36 CFR 215.15). When an appeal is filed, implementation may occur on, but not before the 15th business day following the date of appeal disposition (36 CFR 215.2).

*/s/Randall Burgess*_____ *9/2/2004*_____

RANDALL BURGESS **Date**
District Ranger
Pisgah Ranger District

APPENDIX G – RESPONSE TO COMMENTS

for the

TANASEE FOREST MANAGEMENT PROJECT

ENVIRONMENTAL ASSESSMENT

Tanasee Forest Management Project

Environmental Assessment

Response to Comments

Interest 1:	**Cumulative Impacts**
Interest 2:	**Economic Analysis**
Interest 3:	**Endangered, Threatened and Sensitive Species**
Interest 4:	**Herbicide Use**
Interest 5:	**Management Indicator Species (MIS)**
Interest 6:	**New Analysis**
Interest 7:	**Roads**
Interest 8:	**Support Alternative C**
Interest 9:	**Sustainable Timber Supply**
Interest 10:	**Tree Marking Prior to Public Comment**
Interest 11:	**Visual Impacts**
Interest 12:	**Water Quality**
Interest 13:	**Wildlife Habitat**

General Discussion

The formal 30-day Notice and Comment period for the Tanasee Forest Management Project Environmental Assessment began June 25, 2004 and ended on July 26, 2004. Nine letters or e-mails were submitted by individuals, agencies, and organizations; however, only eight provided substantive comments.

Substantive Comments

To be eligible to appeal the decision on this proposal, individuals must provide comments that are both timely [36 CFR 215.6(a)] and substantive (36 CFR 215.2). Substantive comments are defined as: "*Comments within the scope of the proposed action, are specific to the proposed action, have a direct relationship to the proposed action and include supporting reasons for the Responsible Official to consider.*" A comment stating support of an alternative without rationale for the support is not considered substantive. Comments below are grouped by Interest. All respondants who provided substantive comments to that Interest are identified.

Interest 1: Cumulative Impacts

Letters and Comments on this Interest:

Western North Carolina Alliance (WNCA)

Comment 1-1:

"The EA also does not provide an adequate analysis of cumulative impacts arising from previous projects in the area….We believe that the Tanasee EA violates the National Environmental Policy Act (NEPA) because its general statements concerning cumulative impacts provide no useful information and fails to take a 'hard look' at these cumulative impacts" (WNCA)

Agency Response to Comment 1-1:

In some place in the EA, cumulative impacts discussions were not very detailed and discussion of impacts from previous projects were incomplete. Clarifying language and rationale behind the determinations have been added to present a more complete discussion of cumulative effects.

Cumulative impacts are analyzed throughout the EA and it's Appendices (See EA Sections 1.7.1, 1.7.2, 1.7.3, 1.7.4, 1.7.5, 1.7.11, 3.1.4, 3.2.2, 3.2.3, 3.2.4, 3.3.2, 3.3.3, 3.3.4, 3.4.2, and 3.4.3; EA Appendix C Sections 2.2.3, 3.1.2.2, 3.2.3, 4.1.2.3, 5.2, 5.3, 6.2, and 6.3).

Interest 2: Economic Analysis

Letters and Comments on this Interest:

Southern Appalachian Biodiversity Project (SABP)

Comment 2-1:

"The measurements that will be used to analyze this issue [sustainable timber supply] do not include the most important timber metric and that is economic analysis." (SABP)

Agency Response to Comment 2-1:

The Economic Considerations of the project are discussed in Section 1.7.7 of the EA and a Financial Efficiency Analysis for Alternatives B and C can be found in Appendix E of the EA.

Interest 3: Endangered, Threatened and Sensitive Species

Letters and Comments on this Interest:

Nathaniel Axtell (NA)

Comment 3-1:

"*I was also a little mystified by the lack of site-specific surveys performed for various endangered, threatened, and sensitive species."* (NA)

Agency Response to Comment 3-1:

All units received site-specific surveys for proposed, endangered, threatened, and sensitive (PETS) plants as well as Forest Concern plant species (EA Appendix C, Sections 2.2.1 and 2.2.2). All PETS wildlife species analyzed in the EA were surveyed for during the numerous field visits to the project area by both USFS and North Carolina Wildlife Resources Commission (NCWRC) biologists (EA Appendix C, Sections 3.2.1 and 3.2.2). USFS Fisheries Biologists conducted aquatic habitat and aquatic species surveys in the proposed project and analysis areas during the summer of 1997 and again in 2003 and 2004 (EA Appendix C, Sections 4.2.1 and 4.2.2).

Aquatic species surveys consisted of qualitative fish, hellbender and aquatic invertebrate surveys. Methods included shocking using a back pack electrofishing machine (which surveys fish and hellbenders) and invertebrate surveys using a Surber Type stream bottom sampler. These samples were taken within the project area streams involving the most impacting activity such as road building involving stream crossings. Samples were also taken in the downstream reaches of the aquatic analysis area. Additional information specifically addressing PETS species, forest concern species, and MIS was obtained from NCWRC biologists, North Carolina Natural Heritage Program (NCNHP) records, and US Fish and Wildlife Service (USFWS) biologists (EA Appendix C, Section 4.1.1).

Comment 3-2:

"There was apparently no attempt to survey for hellbenders, a forest concern species, even though they have been found (by me) a short distance downstream in the West Fork." (NA)

Agency Response to Comment 3-2:

See Agency Response to Comment 3-1.

Hellbenders are surveyed by different measures including backpack electrofishing. None were found during the backpack electrofishing surveys conducted for the Tanasee Project. Even though none were found during project surveys they were still included in the analysis due to existence in the lower reaches of the West Fork of the French Broad. The EA Appendix C (Table 25) acknowledges that Hellbender, *Crytobranchus alleganiensis*, is known to occur within the area. The EA in Appendix C (Section 4.2.5) concludes that "individuals of the Forest concern species list including *Cryptobranchus alleganiensis,* … will not be affected by the implementation of Alternative C, which eliminates the seven stream crossings proposed in Alternative B".

Comment 3-3:

"I'm particularly troubled by the lack of surveys for bog turtles. There are several areas in the Miser Creek area that are ideal habitat for these federally listed species. Building buffers around the bogs within the activity area is great, but that does not ensure that turtles traveling between these boggy spots won't be crushed by logging machinery." (NA)

Agency Response to Comment 3-3:

The EA in Appendix C (Section 3.2.1) acknowledges that Bog Turtle, *Clemmys muhlenbergii*, may occur within the analysis area and there is boggy habitat in the Miser Creek area. Surveys of those bogs have not produced any bog turtles; however, it is still potential habitat. The EA in Appendix C (Section 3.2.3) further concludes that "[a]lthough there is suitable habitat in the project area, care will be taken to protect all bogs that provide suitable habitat for the bog turtle. This will be accomplished by maintaining buffers around the bogs; therefore, there will be no effect to this species should either of these alternatives be implemented". As part of the Miser Creek Wildlife Habitat Improvement Project, we are enhancing the bogs for bog turtles. There will be no concern for bog turtles being crushed by logging equipment since all the logging is well away from the bogs (and the travel corridors, aka creeks, between them). The harvest units on the Miser Creek side of the analysis area are upslope and on the ridge above Miser Creek.

Interest 4: Herbicide Use

Letters and Comments on this Interest:

Southern Appalachian Biodiversity Project (SABP)

Comment 4-1:

"The application of toxic herbicides is an especially troubling practice. The introduction of toxins into our environment is an accident waiting to happen. We oppose the use of herbicides on public lands. Introducing toxins into the food chain, regardless of how innocuous they are believed to be, is a dangerous and irresponsible practice. The sheer volume of herbicide that will be applied is staggering and there seems to be no end in sight." (SABP)

Agency Response to Comment 4-1:

"[N]o adverse affects are not expected to humans or wildlife from the use of triclopyr because any herbicides applied would be done according to the labeling information and at the lowest effective rate to meet project objectives in accordance with guidelines to protect the environment. In addition, all applicable mitigation measures contained in the Vegetation Management in the Appalachian Mountains (VMAM) Final Environmental Impact Statement (FEIS), issued in 1989, would be followed. When labeling and application directions are followed and safety recommendations are implemented, no adverse effects are expected on humans or wildlife" (EA Section 1.7.9).

Interest 5: Management Indicator Species (MIS)

Letters and Comments on this Interest:

Western North Carolina Alliance (WNCA)

Comment 5-1:

"The EA does not provide sufficient population and inventory data concerning PETS and MIS species. It has been established previously in court (Sierra vs. Martin) that such data collection is mandatory. The EA makes cursory references to "field survey results," (p.43), but provides no description of the survey results. The EA appears to dismiss potential impacts to some species based only on habitat surveys, rather than actual population or inventory information. We believe, therefore, that this inadequate analysis violates the Martin decision and governing law." (WNCA)

Agency Response to Comment 5-1:

Much of the information concerning PETS and MIS is contained in Appendix C; Aquatic, Botanical, and Terrestrial Wildlife Analyses Report and Biological Evaluation; please refer to this document for the detailed information on PETS species and MIS. Clarifications and more detailed information has been added to Appendix C to more clearly display the evaluations made to Project-level MIS and forest-wide trends for MIS.

Analysis of population trends for widely distributed species is best accomplished at the Forest level. This is the case for most MIS and threatened, endangered, and sensitive species found on the National Forests in

North Carolina. The Nantahala and Pisgah MIS Report and the FY 2002 and 2003 Monitoring and Evaluation Reports for the National Forests in North Carolina provided information on Forest-level monitoring of population trends for MIS, and for some threatened and endangered species. Project-level MIS for this analysis were selected from those identified in the Forest Plan (FEIS Volume 1 pp. III - 43-52) based on presence in the analysis area, habitat conditions, and special Management Area considerations. Analysis of MIS was conducted for project-level species and forest-wide trends and is included in the Appendix C of the EA in Sections 2.1.2, 2.1.3, 3.1.2.1, 3.1.2.2, 4.1.2.1, 4.1.2.2, and 4.1.2.3.

Specific information concerning the surveys for PETS species can be found in the Appendix C of the EA. Information on plant PETS species surveyed for and results of those surveys can be found in the Appendix C of the EA in Sections 2.2.1 and 2.2.2. Information on wildlife PETS species surveyed for and results of those surveys can be found in the Appendix C of the EA in Sections 3.2.1 and 3.2.2. Information on aquatic PETS species surveyed for and results of those surveys can be found in the Appendix C of the EA in Section 4.2.1 and 4.2.2. In species evaluations by the biologists some species are dropped from consideration and discussion for one of the following reasons: 1) using existing data, there is a lack of suitable habitat for the species in the project area, 2) the species has a well-known distribution that does not include the project area or 3) based on field surveys of potential habitat, no habitat was seen in the activity areas.

See Agency Response to Comments 3-1, 3-2, and 3-3.

Interest 6: New Analysis

Letters and Comments on this Interest:

Nathaniel Axtell (NA)

Comment 6-1:

"*I will only address what I believe to be new analysis. Please refer to my earlier correspondence regarding the old Parker Creek and Tanaseee sales regarding my opinions about your wildlife analysis, heritage resources analyses, soils, early successional habitat, and old growth discussions. Nothing I have read here has changed since the last go-around, when the regional office kicked this sale back to the drawing board."* (NA)

Agency Response to Comment 6-1:

The EA and the biological reports (EA, Appendix C) for this project were completely rewritten and based on new analysis information supplemented with previous survey information. As noted in the response to Comment 3-1, new site specific field surveys were conducted for impacts to wildlife species. In addition, a new wildlife analysis, including an evaluation of early successional habitat, was written for this project which took into effect changes that have occurred in the project area over the past six years. The Nantahala and Pisgah MIS Report (NFsNC, 2001) along with the FY 2002 and 2003 Monitoring and Evaluation Reports for the National Forests in North Carolina were used to determine the forest trends for MIS species.

A new aquatic analysis was written that included survey information collected between 2002 and 2004. New information was used in the Aquatic Analysis including new survey information as well as the listing of the West Fork of the French Broad River as 303(d) impaired waters status beginning in 1998. A Hydrologic Analysis was prepared for this EA in May of 2004 (Appendix C of the EA (Attachment 6)). This new information leads to different conclusions on the effects of the proposed action than the previous EA.

The soils analysis prepared for this EA was conducted using new information since the previous Parker Creek EA was written. The soils analysis was based on data from the draft "Soil Survey US Forest Service Pisgah Ranger District Transylvania, North Carolina March 2004" by Chip Smith, Soil Scientist USDA Natural Resources Conservation Service.

A Scenery Analysis was prepared for this EA in June of 2004 and is located in the project file. The scenery analysis recommended mitigation measures for the protection of visual resources. These mitigation measures can be found in the EA in Sections 1.7.2 and 2.5.

It is true that there was no new analysis on heritage resources. The archeologist determined that all of the areas proposed for treatment had been surveyed and that a new analysis was not necessary. The State Historic Preservation Office (SHPO) concurred with the findings in the original report of no expected impacts due to avoidance of known sites.

Old growth patches required to meet Forest Plan requirements have been previously identified in the project area. No additional stands were proposed for small patch old growth designation associated with this proposal because the old growth designations called for in the Forest Plan have previously been met. David Danley, Forest Botanist, reviewed the current small patch old growth designations and determined that they were appropriately designated.

The major difference between this EA and Parker Creek EA is that the District Ranger has analyzed and selected an alternative (Alternative C) that did not even appear in the Parker Creek EA. Alternative C proposed no clearcutting and less road construction than any of the alternatives in the Parker Creek EA.

Interest 7: Roads

Letters and Comments on this Interest:

Southern Appalachian Biodiversity Project (SABP)

Comment 7-1:

"We agree with the concerns raised about increasing the number and density of roads in the area. We do not support the construction of new roads considering they diminish water quality, fragment the forest, introduce invasive species, and create more access for illegal ATV use." (SABP)

Agency Response to Comment 7-1:

The open road density would remain at 0.5 mi/sqmi which meets the Forest Plan Standard of 0.5 mi/sqmi for Management Area 3B. There are no open roads within Management Area 4C which has a Forest Plan Standard of 0.25 mi/sqmi. The total road density of the analysis area would increase from 1.6 mi/sqmi to 1.7 mi/sqmi. with the Selected Alternative.

"No new roads that would be legally open to the public would be created as a result of this alternative. Persons using any roads illegally and/or for illegal activities will be subject to citations by Forest Service law enforcement personnel. Work is ongoing and will continue to prevent illegal use of roads on Forest Service property" (EA Section 3.3.3).

Comment 7-2:

"It is also important to recognize that the Forest Service cannot afford to build more roads when it cannot take care of the ones it has now." (SABP)

Agency Response to Comment 7-2:

"Since all newly constructed system roads would be maintained as closed as directed in MA 3B, maintenance costs would be small once the timber sale has closed due to only infrequent use of the roads for administrative purposes. Therefore, increases to overall Forest Service road maintenance costs as a result of proposed new road construction would be minimal" (EA Sections 3.3.3 and 3.3.4).

Interest 8: Support Alternative C

Letters and Comments on this Interest:

Stephen G. Boyce (SGB)
Richard Bury (RB)
United States Fish and Wildlife Service (USFWL)

Comment 8-1:

"I hope you can implement all of this plan, Alternative C, as soon as possible." (SGB)

Agency Response to Comment 8-1:

Comment Noted.

Comment 8-2:

"I favor preferred alternative C. The actions appear based in appropriate science. Alternative C is consistent with the purposes for which National Forests were established, and instructions from the Congress contained in the Multiple Use--Sustained Yield Act and the National Forest Management Act." (RB)

Agency Response to Comment 8-2:

Comment Noted.

Comment 8-3:

"We strongly recommend that you reconsider Alternative C." (USFWL)

Agency Response to Comment 8-3:

There seems to be confusion based on the context of your letter. Alternative C is the preferred alternative not Alternative B as you seem to indicate. In your letter you refer to the preferred alternative as requiring "2.3 miles of new road construction and seven stream crossings"; however, these actions describe Alternative B which is not the preferred alternative. Your letter appears to support Alternative C over Alternative B.

Interest 9: Sustainable Timber Supply

Letters and Comments on this Interest:

Southern Appalachian Biodiversity Project (SABP)

Comment 9-1:

"This issue [sustainable timber supply] has been raised under false pretences. To justify logging simply because it hasn't been conducted in the past 15 years is ludicrous." (SABP)

Agency Response to Comment 9-1:

"All of the proposed treatments are located within MA 3B which places an emphasis on a sustainable supply of timber. MA 3B also provides for the habitat needs of wildlife such as wild turkey, deer, a variety of small mammals, and other species that will benefit from a managed forest with limited motorized access. … A desired future condition of timber emphasis areas such as MA 3B is one which provides a sustainable supply of timber by regulating the growth and removal of trees through time" (EA Section 1.3).

"The Tanasee area was chosen for vegetation management over other areas located on the Pisgah Ranger District because the last regeneration entry into this area was almost fifteen years ago for Compartment 120 and nearly 30 years ago for Compartments 118 and 119. The Forest Plan calls for re-entry into MA 3B every 10-15 years (Forest Plan, page III-75). Stands in the project area currently do not meet Forest Plan standards for early successional habitat (Forest Plan, III-29). Treatment is needed to bring vegetation in the project area into compliance with Forest Plan direction. The Proposed Action was developed to use active management to move resources in the project area towards the desired future condition" (EA Section 1.3).

Interest 10: Tree Marking Prior to Public Comment

Letters and Comments on this Interest:

Southern Appalachian Biodiversity Project (SABP)

Comment 10-1:

"In March of 2004 SABP staff members and volunteers discovered trees marked for cutting within the Tanasee timber sale area. We are curious as to why this activity was preformed prior to environmental analysis." (SABP)

Agency Response to Comment 10-1:

These trees were actually marked about six years ago as part of the Parker Creek Timber Sale which was never sold because of a withdrawn decision. Public input was initially requested on the Parker Creek Project in 1996. An EA was released for Notice and Comment in the summer of 1997 and a Decision Notice signed in June of 1998. This decision was appealed to the Regional Office by Wildlaw acting on behalf of Dr. Speed Rogers. Prior to a ruling on the appeal, the Decision Notice was withdrawn. Some of the same stands that were included in the Parker Creek Project are included in the Tanasee Forest Management Project.

Interest 11: Visual Impacts

Letters and Comments on this Interest:

Leonard Harwood (LCH)

Comment 11-1:

"I can not agree with the minimum 20% basal area. I would suggest that maximum be the goal with much in the 15% or even 10% to appreciably benefit wildlife….The 25% where visible from the road in altogether unnecessary in that location." (LCH)

Agency Response to Comment 11-1:

Mitigation measures for the protection of visual quality have been prescribed in several of the units selected for harvesting (EA Sections 1.7.2 and 2.5). These mitigation measures were prescribed by a landscape architect and are required to meet the Visual Quality Objectives (VQOs) assigned by the Forest Plan. The majority of the mitigation measures only apply to portions of stands as needed to meet VQOs.

The residual basal areas prescribed are not percentages of each stand; rather, they are square feet of basal area per acre in each stand. The percentage of each stand that will be left depends on the basal area of the stand prior to harvesting.

Interest 12: Water Quality

Letters and Comments on this Interest:

Nathaniel Axtell (NA)
Leonard C. Hardwood (LCH)
Steve Henson (SH)
Western North Carolina Alliance (WNCA)
North Carolina Wildlife Resources Commission (NCWRC)
Southern Appalachian Biodiversity Project (SABP)

Comment 12-1:

"When a watershed is already maxed out with sediment, and your own hydrologist admits this project will dump more into Parker Creek, how is that exceptable?" (NA)

Agency Response to Comment 12-1:

Brady Dodd, Forest Hydrologist, states in his analysis that under Alternative B, "the implementation of this alternative under current conditions would likely increase the load of sediment transported to the Parker Creek stream channel" (EA Appendix C (Attachment 6, p. 3)). However, Alternative B was not selected by the deciding officer for implementation out of concern for potential impacts to water quality. Mr. Dodd further states that under Alternative C, the selected alternative, "[t]he amount of soil moved to streams would be minimal and with the implementation of Best Management Practices would be further reduced. Since this alternative does not increase road density in the Parker Creek drainage, water runoff is not expected to increase. Therefore, this alternative is not likely to contribute to direct or indirect effects on the sediment and streamflow regime of Parker Creek" (EA Appendix C (Attachment 6, p. 4)).

Comment 12-2:

"The West Fork is already severely degraded and ranked as a 303(d) stream thanks to previous logging, SR 1324, and the lack of care with which the Forest Service has managed its headwaters in the past." (NA)

"The French Broad River is already a severely impaired waterway that has been degraded by sediment in particular." (SABP)

"In our scoping comments for this project, we expressed the overriding concern that the West Fork of the French Broad River is seriously degraded due to poor management, much of it predating Forest Service acquisition." (WNCA)

Agency Response to Comment 12-2:

According to the North Carolina Department of Environment and Natural Resources' (NCDENR) 2004 report title "Water Quality Assessment and Impaired Waters List", "[o]rganic/nutrient enrichment is the primary cause of impairment" of the West Fork of the French Broad River and "[s]edimentation is considered to be a contributing stressor or cumulative cause of impairment" (NCDENR 2004, p. 97).

In February of 2004, the North Carolina Division of Water Quality (NCDWQ) prepared an "Assessment Report: Biological Impairment in the West Fork of the French Broad Watershed". One of the goals of the

assessment was to identify the most likely causes of biological impairment and sources of pollution contributing to those causes. The report summarized the causes of bioassessments as follows: "The impacts of a trout farm discharge upon the aquatic communities in the West Fork French Broad River has been documented since 1990. The discharge, along with degraded riparian habitats in the vicinity of the farm, has affected water chemistry, enriched periphytic growths, degraded benthic community, and artificially stimulated the fish community….Enrichment and degradation of the stream by cattle wastes also cannot be ruled out as a factor affecting the aquatic communities of the upper West Fork French Broad River. DWQ's biologist estimated that less than 25% of the organic loading comes from cattle, and more than 75% from the trout farm (Tracy, 2003) (NCDWQ, 2004 p. 14). Both the trout farm and the cattle farm are located on private land. "The strength of evidence regarding organic/nutrient enrichment points to this as a primary cause of impairment" (NCDWQ, 2004 p, 17). The report goes on to say "[s]tream surveys and habitat assessments indicate that sedimentation is occurring, but has probably not reached a point where it can be considered a primary cause of impairment" (NCDWQ, 2004 pp. 17-18).

Comment 12-3:

"I am puzzled with your reluctance to bridge parker creek, particularly when both the senior Fisheries Biologist and senior Hydrologist approved this action in previous EA's." (LCH)

Agency Response to Comment 12-3:

The West Fork of the French Broad River has been classified as a 303(d) impaired water body since the previous EA for the Parker Creek timber sale was written. This new information leads to different conclusions on the effects of the proposed action than the previous EA.

See Agency Response to Comment 12-2.

Comment 12-4:

"Apparently, some concern has been raised regarding potential sedimentation problems associated with the implementation of Alternative B. Reading the EA reveals much contradiction in assessing the "potential" for sedimentation problems. We believe past experience and the studies conducted at Cowetta Hydrologic Laboratory and other experimental areas have shown that projects such as this are not major contributors to sedimentation problems. Utilizing "best management practices" and proper road design significantly reduce the likely hood of sedimentation problems." (SH)

"The NCWRC feels that the cumulative impacts to the impaired Parker Creek from additional road construction will be minimal if proper erosion control procedures are followed." (NCWRC)

Agency Response to Comment 12-4:

Your observations are correct concerning sedimentation studies and the use of best management practices. However, it is the opinion of the Forest Hydrologist that the implementation of Alternative B "would likely increase the load of sediment transported to the Parker Creek stream channel" and "[s]ince the implementation of this alternative would have adverse effects on the existing sediment regime, there is a potential for this alternative to have adverse cumulative effects on the West Fork French Broad River" (EA Appendix C (Attachment 6 p. 3)).

Comment 12-5:

"… any timber harvesting and its related road construction/reconstruction simply should not be conducted in the West Fork drainage due to the area's highly impaired condition… We feel that the Forest Service should consider only restoration activities here, and should withdraw the timbering prescriptions in this proposal." (WNCA)

Agency Response to Comment 12-5:

The impacts to water quality from the proposed road construction and reconstruction were evaluated in the EA and the Aquatic Analysis (EA Appendix C, Section 4.0). In the Selected Alternative, there are no new stream crossings and no stream crossings that will need to be replaced on the reconstructed roads in the analysis area. The aquatic analysis determined that no long-term, permanent impacts to water quality are expected as a result of Alternative C (See EA Table 3-5 and EA Appendix C, Section 4.0).

Comment 12-6:

"Your office has acknowledged the sedimentation problems in the West Fork, and is to be commended for plans to address these. Alternative C is an important step in the right direction over the original proposal, and we appreciate the apparent response to public concerns that Alternative C seems designed to be [sic] address. The large reduction in new road construction is a great improvement." (WNCA)

Agency Response to Comment 12-6:

Comment Noted.

Comment 12-7:

"The EA (p. 41) discloses that logging and road building cause sediment and pollution and other negative impacts to streams and aquatic habitat, yet provides no modeling data or other quantitative measure of likely impacts or cumulative impacts to the Tanasee area streams." (WNCA)

Agency Response to Comment 12-7:

The EA on page 41 discloses "[t]imber harvesting and road building, especially on steep slopes, may cause sediment, which may decrease water quality and aquatic habitat affecting native brook trout populations". This statement is simply an issue statement that prefaces the discussion of the issue to follow. The discussion of the impacts to Water Quality and Aquatic Habitat can be found in the EA in Section 3.2 and in the EA Appendix C in Section 4.0.

Comment 12-8:

"…it is well-known that species such as mussels and snails are among the more sensitive species to sediment and other water pollution and thus are good indicators of water quality, but the EA does not address these species. We believe that the EA is inadequate because it failed to take a "hard look" at aquatic impacts and analysis." (WNCA)

Agency Response to Comment 12-8:

The Forest Service conducted an Aquatic Analysis for the Tanasee Forest Management Project. This analysis can be found in Section 4.0 of the Appendix C of the EA. No live specimens of freshwater mussels have ever been documented in the West Fork of the French Broad or in any of the aquatic analysis area streams (Section 4.1.1 of Appendix C of the EA). There are no sensitive species of aquatic snails listed in Transylvania County.

Comment 12-9:

"Road reconstruction and new road construction often causes the majority of the sedimentation associated with forest roads. Therefore, if practical, we recommend that these activities occur outside of an October 15 to April 15 spawning period for brown and brook trout." (NCWRC)

Agency Response to Comment 12-9:

Forest Service contacts contain stipulations that prohibit culvert installation and road construction outside of the seeding season which corresponds to the spawning season for brown and brook trout (October 15 to April 15).

Comment 12-10:

"It is stated throughout the EA that road construction and skidder logging will input sediment into the stream and likely damage habitat for native Brook Trout and degrade water quality." (SABP)

Agency Response to Comment 12-10:

Brook and rainbow trout were chosen as project-level management indicator species since they are sensitive to changes in water quality and habitat condition and occur or may occur in streams within the aquatic analysis area where suitable habitat exists. Under Alternative C, the selected alternative, "[p]roposed activities may cause temporary fluctuations in stream turbidity; however, this is not expected to permanently affect habitat or population viability for Threatened and Endangered, Sensitive and Forest Concern Species or project MIS" (EA Section 3.2.4).

In addition, under Alternative C "[T]he amount of soil moved to streams would be minimal and with the implementation of Best Management Practices would be further reduced….this alternative is not likely to contribute to direct or indirect effects on the sediment and streamflow regime of Parker Creek" (EA Section 3.2.4).

The potential negative impacts to water quality described in the EA (Section 3.2.3) and in Appendix C (Sections 4.1.2.2 and 4.1.2.3) refer to Alternative B which was not selected by the deciding official because of his concerns about the potential impacts to water quality. See the "Rationale" Section in the Decision Notice for additional information.

Interest 13: Wildlife Habitat

Letters and Comments on this Interest:

Steve Henson (SH)
North Carolina Wildlife Resources Commission (NCWRC)
Southern Appalachian Biodiversity Project (SABP)

Comment 13-1:

"We strongly support the proposed action – Alternative B as detailed in the EA and hope that you move forward with the project as soon as possible. It is the only alternative considered that addresses the forest plan direction to attain the desired conditions regarding wildlife objectives and diversity of age classes on the landscape." (SH)

Agency Response to Comment 13-1:

Alternative C also meets the desired future conditions regarding early successional habitat. Forest-wide direction in the Forest Plan is to disperse early successional habitat across the landscape according to the following desired conditions: In MA 3B provide at least 5% but not to exceed 15% early successional habitat per compartment. Implementation of Alternative C would result in 5.2% of the Tanasee project area in early successional habitat (EA Section 2.7). In addition, both Alternatives B and C make progress toward a balanced age class distribution in timber suitable management areas (EA Section 3.4.3).

The forest-wide direction in the Forest Plan (III-23) for grass/forb habitat is "provide at least 0.5% of Management Areas 1, 2, 3, 4 and 5 in grass/forb opening at any one time including mowed landings and roads". The Forest Plan (III-74) directs that in Management Area 3B "use a desired density of 3% for permanent grass and forb openings". Implementation of Alternative C would result in at least 0.5% of MAs 1-5 in grass/forb openings at any one time (EA, p. 3); however, it would make progress toward but not meet the desired density of 3% by providing 1.7% of the area in grass/forb habitat.

Comment 13-2:

"A much bigger issue from the NCWRC standpoint is the continuing loss of quality early successional habitat on National Forests in western North Carolina. Grass/forb habitat and early successional habitat are not even close to proposed goals in the Pisgah/Nantahala Land Management Plans." (NCWRC)

Agency Response to Comment 13-2:

See Agency Response to Comment 13-1

Comment 13-3:

"There is no lack of habitat available for early successional dependant species. What is lacking and what is diminishing rapidly are large old contiguous tracts of forest lands with deep interiors….The need for early successional habitat is erroneous and therefore the need to remove timber is unjustified." (SABP)

Agency Response to Comment 13-3:

Forest Plan direction includes providing "early successional habitat across the landscape according to the following desired condition" (Forest Plan, III-31). That desired condition for Management Area (MA) 3B is "[a]t least 5% and not to exceed 15% early successional habitat" (Forest Plan, III-31). All of the units proposed for treatment in this EA are located in MA 3B. Also, see Agency Response to Comment 13-1.

As shown in Figure 1-1 of the EA (Section 1.3), the distribution of age classes in the project area is heavily skewed toward the older age classes. Table 3-10 in the EA (Section 3.4.1) shows that 65% of the project area is currently 80+ years old. Table 3-12 (Section 3.4.3) shows that even after the implementation of Alternative C, the project area will have 59% acreage in age classes over 80 years old.

Old growth designations called for in the Forest Plan have previously been met in the project area. See Section 1.7.6 of the EA for a discussion of Old Growth in the project area.

References and Data Sources

Assessment Report: Biological Impairment in the West Fork French Broad Watershed; French Broad Basin; Transylvania County, NC. February 2004. Collaborative Assessment for Watersheds and Streams (CAWS) Project funded by EPA 104(b)(3) Grant #CP984724-99. Studies conducted by NC Department of Environment and Natural Resources, Division of Water Quality.

National Forests in North Carolina, Monitoring and Evaluation Report. 2002. National Forests in North Carolina, Asheville.

National Forests in North Carolina, Monitoring and Evaluation Report. 2003. National Forests in North Carolina, Asheville.

North Carolina Water Quality Assessment and Impaired Waters List (2004 Integrated 305(b) and 303(d) Report). 2004. Prepared by NC Department of Environment and Natural Resources, Division of Water Quality, Water Section – Planning Branch.

USDA

United States
Department of
Agriculture

Southern Region
Forest Service

Tanasee Forest Management Project

Pisgah Ranger District, Pisgah National Forest
Transylvania County, North Carolina

Environmental Assessment

September 2004

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CHAPTER THREE

Tanasee Forest Management Project
Environmental Assessment

Location of Action:	Compartments 118, 119 and 120 Pisgah Ranger District Pisgah National Forest Transylvania County, North Carolina
Lead Agency:	USDA Forest Service
Responsible Official:	Randall Burgess District Ranger 1001 Pisgah Highway Pisgah Forest, NC 28768 (828) 877-3265
For More Information:	Randall Burgess District Ranger (828) 877-3265 Karen Compton Zone NEPA Planner (828) 257-4230

CHAPTER ONE
1.0 Purpose and Need for the Proposed Action

1.1 Introduction

This environmental assessment (EA) documents the results of site-specific analysis concerning the proposed activities in the Tanasee Project Area on the Pisgah Ranger District, Pisgah National Forest. The EA discusses why the project is needed, the issues of concern, the existing condition of the project area, alternative ways to implement the project so that various interests and concerns are considered, and the expected consequences of each alternative, including a "no action" alternative.

The project area is located approximately 12 miles southwest of Brevard, North Carolina. The proposed actions are within the upper reaches of the French Broad River watershed. The project area is bordered by the Jackson/Transylvania County line and mostly private land to the west and northwest; a mixture of National Forest System lands and private lands along the ridge system of Bald Rock, Bracken Mountain, and Cook Mountain to the north and east; and private land along the West Fork of the French Broad River to the south.

The project area of approximately 3,548 acres is located in Compartments 118, 119, and 120 in the Parker Creek area of Transylvania County. A vicinity map showing the boundaries of the project area is located in Appendix A. The Forest Plan establishes general management direction for specific areas called "Management Areas". The project area is within Management Areas (MAs) 3B and 4C. A map of the MAs is located in Appendix B. The management direction for the two MAs is as follows:

- Management Area 3B: emphasizes sustainable supply of timber, but with few open roads and limited disturbance associated with motorized vehicles. These areas provide for habitat needs of wildlife such as wild turkey, deer, a variety of small mammals, and other species that will benefit from a managed forest with limited motorized access. Recreationists use these areas for hiking, mountain biking, horseback riding, hunting, and other activities. These areas will be managed to soften visual impacts of management activities.

- Management Area 4C: emphasizes visually pleasing scenery and habitats for wildlife requiring older forests. This land is not suitable for timber production at this time in order to meet visual quality objectives, or the lands are not cost efficient for timber production.

The three compartments within the project area contain a total of 3,548 acres, which are allocated into the two MAs as follows:

Table 1-1: Acres in the Project Area by Compartment and Management Area (MA)

Compartment #	MA 3B	MA 4C	Total
118	1,255	8	**1,263**
119	954	200	**1,154**
120	1,131	0	**1,131**
TOTAL	**3,340**	**208**	**3,548**

All actions are being proposed to achieve the goals, objectives, and desired future conditions identified in the Land and Resource Management Plan (hereafter, the Forest Plan) for the Nantahala and Pisgah National Forests issued in April 1987 and as amended. This EA is tiered to the Forest Plan and its Final Environmental Impact Statement (FEIS) and the Vegetation Management in the Appalachian Mountains (VMAM) FEIS issued in July 1989.

1.2 Proposed Action

The following is a general description of the proposed action. A more detailed description of these activities and applicable mitigation measures can be found in Sections 2.2, 2.3 and 2.5.

- Regeneration harvesting in 11 stands on approximately 284 acres.
- Natural site preparation with herbicides and handtools in nine stands on approximately 197 acres.
- Artificial site preparation, including planting of northern red oak seedlings, using herbicides and handtools in three stands on approximately 87 acres.
- Herbicide release of harvested stands with herbicides following site preparation in 11 stands on approximately 284 acres.
- Pre-commercial thinning and pruning including herbicide treatment in 13 stands on approximately 401 acres.
- Pre-harvest understory treatment with herbicides and manual vine control in six stands on approximately 162 acres.
- Conversion of temporary roads to wildlife openings (4 acres) following harvest activities.
- Reconstruction of 3.7 miles of system road.
- Construction of 2.8 miles of new system road.
- Construction of 2.0 miles of temporary road.

1.3 Purpose and Need for the Proposed Action

The purpose of the proposed actions is to provide for a sustainable, healthy ecosystem; to meet Forest Plan direction and standards for vegetation and wildlife management; and to achieve desired future species and age class composition.

Why Here, Why Now?

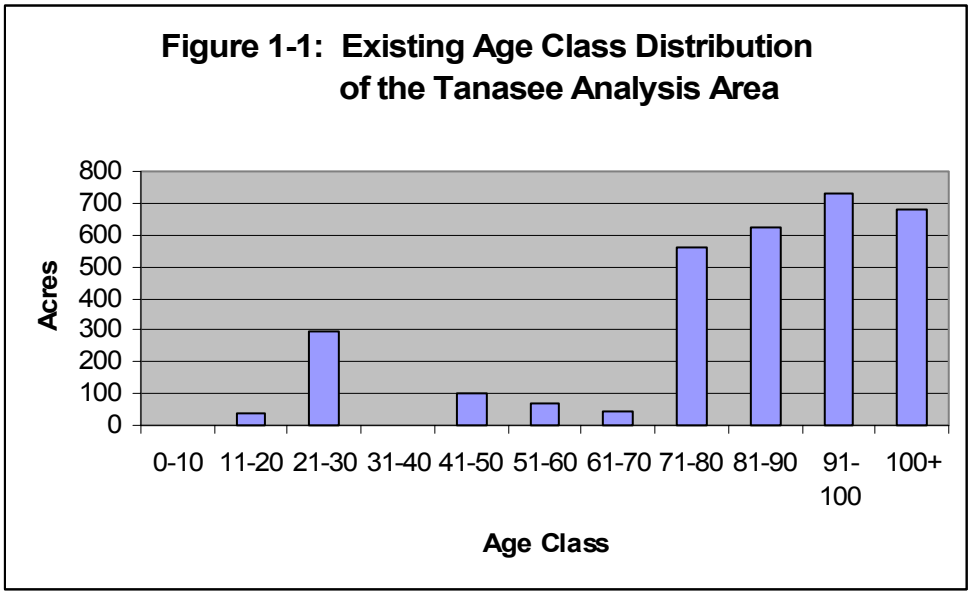
The existing condition of the Tanasee Project area has been evaluated and compared against the desired future condition for the area as described in the Forest Plan. Where resources in the project area are found to be outside the desired future condition, opportunities for moving the resources towards the desired future condition exist. The Tanasee area was chosen for vegetation management over other areas located on the Pisgah Ranger District because the last regeneration entry into this area was almost fifteen years ago for Compartment 120 and nearly 30 years ago for Compartments 118 and 119. The Forest Plan calls for re-entry into MA 3B every 10-15 years (Forest Plan, page III-75). Stands in the project area currently do not meet Forest Plan standards for early successional habitat (Forest Plan, III-29). Treatment is needed to bring vegetation in the project area into compliance with Forest Plan direction. The Proposed Action was developed to use active management to move resources in the project area towards the desired future condition.

All of the proposed treatments are located within MA 3B which places an emphasis on a sustainable supply of timber. MA 3B also provides for the habitat needs of wildlife such as wild turkey, deer, a variety of small mammals, and other species that will benefit from a managed forest with limited motorized access. General direction for MA 3B is to provide conditions for the large group of game and non-game animals that benefit from young to middle-aged forests and cannot tolerate motorized vehicular disturbance. Over 90% of the acreage in the project area is in MA 3B.

Forest-wide direction in the Forest Plan is to disperse early successional habitat across the landscape according to the following desired conditions: In MA 3B provide at least 5% but not to exceed 15% early successional habitat per compartment and provide at least 0.5% of MAs 1-5 in grass/forb openings at any one time. The desired density of grass/forb openings for MA 3B is 3%. The existing grass/forb habitat is 1.6% of the project area. Currently there is no existing early successional habitat and only 5 acres planned in Compartments 118, 119, and 120 as part of the Miser Creek Project. The Forest Plan also directs that timber management practices be used as the primary tool to create desired wildlife habitat in MA 3B (Forest Plan, III-74).

Forest-wide direction calls for a regular and sustained flow of habitats across the Forests through space and time for diversity and viability of plant and animal populations (Forest Plan, III-29). Harvesting Units 118/04,118/08, 118/22, 118/27, 119/03, 119/09, 119/13, 119/23, 119/26, 120/10, and 120/26 would provide early successional habitat for the next 10 to 20 years where the residual stand maintains 30 sqft/acre of basal area or less. The conversion of temporary roads to wildlife openings would create additional wildlife habitat.

A desired future condition of timber emphasis areas such as MA 3B is one which provides a sustainable supply of timber by regulating the growth and removal of trees through time. Harvesting in Units 118/04, 118/08, 118/22, 118/27, 119/03, 119/09, 119/13, 119/23, 119/26, 120/10, and 120/26 would provide wood products to the regional economy and make progress toward reaching a balanced age class distribution. See Figure 1-1 for a chart showing the current distribution of age classes across the analysis area.



Herbicide site preparation and release, if needed, along with supplemental oak planting is expected to result in oak being recruited into the overstory. Pre-harvest understory treatments and pre-commercial thinning would increase the oak component in the understory by allowing more sunlight to reach the forest floor to stimulate growth and development of species such as oak, black cherry, white ash, and hickory. These tree species are desirable for timber production and important in the production of hard and soft mast for wildlife.

1.4 Decision Framework

The District Ranger will use the information in this analysis to decide whether or not the Forest Service will proceed with this project, and if so, how to proceed. Other government agencies, groups, individuals, and Forest Service personnel interested and concerned about the potential outcome of this project will also use this publication as a basis for critiquing the various courses of action. If an action alternative is chosen, Forest Service personnel will use this document to guide in implementation and monitoring.

1.5 Public Involvement

This project was originally part of the proposed Parker Creek Project. Public input was initially requested on the Parker Creek Project in 1996. An EA was released for Notice and Comment in the summer of 1997 and a Decision Notice signed in June of 1998. This decision was appealed to the Regional Office by Wildlaw acting on behalf of Dr. Speed Rogers. Prior to a ruling on the appeal, the Decision Notice was withdrawn.

Portions of the previous Parker Creek project have gone through additional public involvement and been implemented or approved for implementation over the past five years. These actions are included in the Parker Creek Watershed Rehabilitation and Road Decommissioning Project, the T&T Timber Sale, and the Miser Creek Wildlife Project.

On December 24, 2003, a letter from District Ranger Randall Burgess describing site-specific proposed actions and requesting comments was mailed to 107 individuals, groups, and organizations. Comments were requested by January 30, 2004. In addition, this project has appeared in the Schedule of Proposed Actions for the National Forests in North Carolina, which is published quarterly since October of 2002.

1.6 Key Issues Considered and Discussed Throughout this Analysis

The key issues associated with this proposed project were identified through a public participation process, which included input from Forest Service natural resource specialists, other government agencies, private groups and individuals. A Forest Service Interdisciplinary Team (IDT) determined that the following issues are relevant to the decisions to be made concerning the Tanasee Forest Management Project. Issues 1-4 directly influenced the initiation, development, and technical design of the project.

The Council on Environmental Quality (CEQ) regulations specify that environmental analysis focus on significant (key) issues. Issues determined not to be significant (non-key) issues shall be discussed only briefly and eliminated from detailed study [40 CFR 1500.1(b), 1500.2(b), 1500.4(c), 1501.7(3), and 1502.2(b)]. The key issues will be analyzed in Chapter 3 of this EA and will also help frame the decision. Measurements allow resource specialists to quantify and qualify anticipated effects. The non-key issues will be disclosed here in Chapter 1 with appropriate analysis; but, they will not be discussed in Chapter 3. They will not be used to frame the decision because their effects differ little between the action alternatives.

1.6.1 Key Issue #1: Wildlife Habitat

- Early successional and grass/forb habitat are below the levels recommended in the Forest Plan for Management Area 3B in Compartments 118, 119, and 120 which could result in negative impacts to wildlife species dependant upon these habitats.

Measurements: 0-10 year old stands (acres and %)
0-20 year old stands (acres and %)
Grass/forb openings (acres and %)

1.6.2 Key Issue #2: Water Quality and Aquatic Resources

- Timber harvesting and road building, especially on steep slopes, may cause sediment, which may decrease water quality and aquatic habitat affecting native brook trout populations.
- Timber harvesting may cause sediment, which may adversely affect aquatic Federally Threatened or Endangered species; Regionally Sensitive species or species of Forest Concern.
- Local streams and creeks may be negatively affected by the use of herbicide in the project area.

Measurements: Number of stream crossings (#)
MIS and Threatened and Endangered Species Protected (Yes/No)
Miles of road constructed and reconstructed (miles)

1.6.3 Key Issue #3: Road Management/Access

- Adding additional miles to the existing road system may influence the ability of the Forest Service to maintain all of the miles of road on the system.
- Adding additional miles to the existing road system will provide additional access for illegal activities in the area such as ATV riding and poaching of archeological sites and wildlife.

Measurements: Miles of road added to the existing road system
Open Road Density (miles/square mile)
Total Road Density (miles/square mile)

1.6.4 Key Issue #4: Sustainable Timber Supply

- There has been no timber harvesting in the project area in almost fifteen years; therefore, no progress has been made in achieving a balanced age class distribution and the area is not providing a sustainable supply of timber in its timber suitable management areas as directed by the Forest Plan.

Measurements: Age-class distribution for timber suitable areas (acres per 10 year age class)
Acres harvested

1.7 Non-Key Issues Considered

The Tanasee Interdisciplinary Team (IDT) eliminated the following issues (resources) from detailed discussion in this EA as directed by CEQ Regulation 1500.1(b), 1500.2(b) and other sections because the project would cause only inconsequential effects to these issues (resources). Many of these issues are discussed in additional detail in appendices to this document as referenced below.

These issues were raised either through the public participation process or within the Forest Service. The IDT determined that the following issues differed little between alternatives and/or were not selection factors in deciding between the alternatives. Therefore, they are discussed here instead of in the Environmental Consequences chapter of the EA.

1.7.1 Non-Key Issue A: Soil Resources

Harvest related activities may adversely affect sensitive soils

This issue is non-key due to implementation of Forest Plan standards and guidelines and best management practices (BMPs) on soil mapping units identified with erosion hazard.

The following is an analysis of the soils that will be impacted by logging and road construction activities in the proposed Tanasee Forest Management Project. The data used in this analysis comes from the draft "Soil Survey US Forest Service Pisgah Ranger District Transylvania County, North Carolina March, 2004" by Chip Smith, Soil Scientist USDA Natural Resources Conservation Service.

Inventory methods consisted of overlaying stands onto the inventoried soil map units on the blue lined orthoquad maps numbers, 8524, 8525 & 8535 which cover Compartments 118, 119 and 120. Soil characteristics and properties are from the draft soil map unit descriptions of survey results for Transylvania County, NC. Table 1-2 lists the soil map units found during the inventory by Compartment/Stand and road activity.

Table 1-2: Soil Units Identified by Stand and Road Activity

Map Unit	Map Unit Name	Compartment/ Stand	Road Name/Activity
101D	Cullasaja-Tuckasegee complex 15 -30% slopes, stony	C119S23 C119S13	Parker Cr Rd – New construction Parker Cr Rd – New construction
101E	Cullasaja-Tuckasegee complex 30-50% Slopes, stony	C119S13	No activity
121D	Saunook-Tuckasegee complex, 15 – 30% slopes, stony	C119S26 n/a C118S22 C120S10	No activity Parker Cr Rd – New construction Bracken Mtn Rd -Reconstruction Indian Rock Rd - Reconstruction
125D	Brevard-Tate complex, 15 – 30% slopes, stony	C119S03	Woods Church Rd - Reconstruction

337D	Evard-Cowee complex, 15 -30% slopes	C119S09 n/a C118S08 C120S26	No activity Parker Cr Rd - Construction Temporary Rd - Construction Miser Crk Ext. Construction
337E	Evard-Cowee complex, 30 – 50% slopes	C118S08	Temp. Rd - Construction
393D	Chestnut-Edneyville complex, 15 – 30% slopes, stony	C118S22 C118S22 C119S03 C119S13 C119S09 C118S08 C120S26 C120S26	Bracken Mtn Rd – Reconstruction Temporary. Rd - Construction No activity Temporary Rd - Construction Temporary Rd - Construction Miser Cr Rd Ext. – Construction Miser Cr Rd Ext. – Construction Temporary Rd - Construction
393E	Chestnut-Edneyville complex, 30 – 50% slopes, stony	C119S03 C119S23 C119S13 n/a C119S26	No activity Parker Cr Rd - Construction Parker Cr Rd - Construction Parker Cr Rd - Construction No activity
393F	Chestnut-Edneyville complex, 50 -95% slopes, stony	C118S22 C118S08 C120S26	No activity No activity No activity
761D	Porters-Unaka complex, 15 -30% slopes, stony	C118S27	Temporary Rd Construction
761E	Porters-Unaka complex, 30 – 50% slopes, stony	C119S09 C118S04 C118S27 C118S08 C120S26 C120S10	Temporary Rd - Construction Temporary Rd - Reconstruction No activity No activity No activity Indian Rock Rd - Reconstruction
761F	Porters-Unaka complex, 50 – 95% slopes, stony	C119S26 C118S08 C120S26 C120S10	No activity No activity No activity No activity
791F	Unaka-Rock outcrop complex, 50 – 95% slopes, very stony	C118S04	No activity
793F	Ashe-Edneyville complex, 50 - 95% slopes, stony	C120S26	No activity

The following table displays the characteristics of each soil map unit.

Table 1-3: Comparison of Soil Map Unit Characteristics

Map Unit	Name	Characteristics
101D & E	**Cullasaja-Tuckasegee complex**	Both the Cullasaja and Tuckasegee series consist of very deep, well drained soils on moderately steep benches, toe slopes, foot slopes, drainageways and fans in coves in the Southern Appalachian Mountains**.** Both series also receive moisture from surrounding uplands and springs, and local seepage areas are common on them**.** Slopes range from 15% to 50%.
121D	**Saunook-Tuckasegee complex**	The Saunook and Tuckasegee series consists of very deep, well drained, moderately permeable soils on moderately steep benches, fans and toe slopes in coves in the Southern Appalachian Mountains. These soils receive surface and subsurface water from surrounding uplands and seeps and springs are common. Slopes range from 15% to 30%.

125D	**Brevard-Tate complex**	The Brevard and Tate series consists of very deep well drained soils on moderately steep foot slopes, benches, fans and coves of the Southern Appalachian Mountains. These soils receive surface and subsurface water from surrounding uplands and seeps, and springs are possible. Slopes range from 15% to 30%.
337D & E	**Evard-Cowee complex**	The Evard series consists of very deep, well drained, moderately permeable soils on moderately steep ridges and steep side slopes of the Blue Ridge. The Cowee series differs from the Evard in that it consists of moderately deep soils. Slopes range from 15% to 50%.
393D, E & F	**Chestnut-Edneyville complex**	The Chestnut series consists of moderately deep, well drained soils on moderately steep ridges and steep and very steep side slopes of the Southern Appalachian Mountains. The Edneyville series differs from the Chestnut series in that it has very deep soils. Slopes range from 15% to 95%.
761E & F	**Porters-Unaka complex**	The Porters series consists of deep, well drained, moderately permeable soils on moderately steep ridges and steep and very steep side slopes in the Southern Appalachians. The Unaka series consists of moderately deep, well drained, loamy soils. These soil series formed in residuum from granite and gneiss. Slopes range from 30% to 95%.
791F	**Unaka-Rock outcrop**	The Unaka series consists of moderately deep, well drained, loamy soils on very steep side slopes formed in residuum from granite and gneiss. Slopes range from 50% to 95%.
793F	**Ashe-Edneyville complex**	The Ashe series consists of moderately deep, somewhat excessively drained soils on very steep side slopes of the Southern Appalachian Mountains. The Edneyville series consists of very deep well drained soils. Slopes range from 50% to 95%.

Alternative A

There would be no adverse direct or indirect effects to soils with this alternative because no activities are proposed. Any area with current erosion would not be corrected. Soil displacement and compaction related to temporary road construction and landing construction would not occur.

Alternatives B and C

There are no anticipated adverse or long-term effects to soils with either of these alternatives because the soil types in the project area are deep to moderately deep and well-drained (reducing the potential for compaction); would not be taken out of production with system road construction; and would have Forest Plan standards applied to further reduce potential for compaction and long-term damage.

Alternative B proposes 121 acres of cable logging, 163 acres of skidder logging, 2.8 miles of new system road construction, 3.7 miles of system road reconstruction, and 2.0 miles of temporary road construction. Alternative C proposes 34 acres of cable logging, 144 acres of skidder logging, 0.5 miles of new system road construction, 3.7 miles of system road reconstruction, and 0.8 miles of temporary road construction. With any land disturbance, such as timber harvesting, there would be temporary increases in soil loss and sediment yield in the project area. Timber harvesting would result in localized and temporary soil compaction on temporary roads and logging decks. Cable logging is proposed on steep slopes to minimize soil compaction and erosion.

Roads, landings, and skid trails will be seeded for wildlife; therefore, soil erosion is not expected as a potential problem. Cumulatively, implementation of either alternative would not add

noticeable amounts of sediment to current conditions or reduce soil productivity below current conditions.

1.7.2 Non-Key Issue B: Visual Resources

Harvest related activities may adversely affect visual resources

This issue is non-key because scenery mitigation has been incorporated into proposed activities during the planning phase of the project; therefore all activities in both action alternatives would meet assigned Visual Quality Objectives (VQOs) from all viewpoints (VPs) analyzed. A scenery analysis has been completed for the Tanasee Analysis area and is located in the project file.

Management Area 3B has an assigned visual quality objective (VQO) of modification (M) for all sensitivity levels (SL) and distance zones (DZ). Modification VQO must be met within three growing seasons. Refer to the Forest Plan for specific definitions of visual management terminology, and management area standards.

Five VPs were analyzed in the scenery analysis: NC 281 (VP1), SR 1324 (VP 2), SR 1309 (VP 3), Woods Church (VP 4), and Mountain View Church (VP 5). Analysis revealed that proposed activities would not be visible from all analyzed VPs; therefore some do not show-up in the "Viewpoints Potentially Visible" section of Table 1-4. Some of the locations are specific points, while others are segments of road. Some of the views would be seen as the viewer is moving, others are stationary. Views may be filtered or screened by foreground vegetation; others are open and unobstructed. The degree of potential impact varies with these and several other factors such as distance from viewer, viewer position, slope, size, shape and type of proposed harvest or road, landing, etc. All of these factors are considered when determining what activities would meet assigned VQOs or what mitigation would be required.

Alternative A – No Action

Direct and Indirect Effects

All visual management objectives would be met. No changes to the visual landscape would occur as a result of this alternative since no activities are proposed.

Alternatives B and C

Direct and Indirect Effects:

These alternatives propose two-age harvests, pre-harvest understory treatments and pre-commercial thinning. The proposals also include reconstruction of existing system roads, and construction of new system and temporary roads.

The proposed treatments listed below are potentially visible from the viewpoints shown. Proposed treatments not listed below are either not visible from any of the analyzed viewpoints, or would have such minor visual impacts that they would easily meet assigned VQOs.

Table 1-4: Viewpoints Potentially Visible from Units and Proposed Mitigation

Unit #	Alt.	Proposed Treatment	VP	DZ	VQO	MA	Mitigation
118/08	B & C	Two-Age	5	MG	M	3B	4
118/27	B	Two-Age	5	FG	M	3B	3, 7
119/03	B & C	Two-Age	4	FG	M	3B	2, 6, 7, 8
119/23	B & C	Two-Age	2	FG	M	3B	1, 5, 7, 8

VP = viewpoint DZ = distance zone VQO = visual quality objective MA = management area

Mitigation Measures

With implementation of the following mitigation, as specified in the preceding table, proposed activities would meet or exceed their assigned VQOs.

1. Leave a minimum of 25 residual basal area (rba)/ac for 50' below SR 1324.
2. Leave a minimum of 25 rba/ac for 100' above Woods Church road.
3. Leave a minimum of 20 rba/ac throughout stand.
4. Leave a minimum of 20 rba/ac in eastern half of stand.
5. Limit openings to 500 linear feet along SR 1324.
6. Limit openings to 500 linear feet along Woods Church road.
7. Screen visible roads and landings.
8. Burn or lop and scatter slash to within 4 ft. of ground for 50' beyond edge of road.

Cumulative Effects

As previously stated, past timber harvest areas and existing roads are visible on National Forest Lands from analyzed viewpoints. From some VPs, existing harvest areas would not be noticeable to the average viewer. Existing roads and landings may remain visible for many years, but are primarily seen during leaf-off season. With the incorporated mitigation, treatments proposed for some areas will create openings, or the canopy may appear thinner as seen from the specified viewpoints. However, all assigned VQOs will be met even where these proposed treatments would be seen in conjunction with existing modifications.

1.7.3 Non-Key Issue C: Heritage Resources

Harvest related activities may adversely affect heritage resources

This issue is non-key due to site specific field verification and avoidance of identified sites as well as mitigation if previously unknown sites are discovered during implementation.

Archeologists have conducted heritage resource surveys on all areas proposed for treatment in the Tanasee Project Area. A total of twenty-two archeological sites were located. Seven sites were rated Class II and considered potentially eligible for inclusion in the National Register of Historic Places (NRHP). Fifteen sites were rate Class III and are not considered eligible for the NRHP.

One of the Class II sites has been disturbed by artifact collectors, vandals and recreational activities. Despite these impacts, the site still retains sufficient features to qualify as a Class II

site. Efforts have been made to block the illegal access to this site by off highway vehicles and mountain bikes. Every effort will be made to maintain the integrity of these sites after the project has been completed.

Alternative A
There are no expected adverse direct, indirect, or cumulative effects to heritage resources because no ground disturbing activities are proposed under this alternative.

Alternatives B and C

The Class III sites would not be affected by the proposed activities. The seven Class II sites identified by the archeologists would be protected by excluding them from the treatment areas. If during the implementation of a ground disturbing activity, a previously unknown archeological or historic site is encountered the disturbance would stop immediately. The activity would not be permitted to continue until a forest archeologist surveys and evaluates the site and makes a recommendation to permanently stop, modify, or proceed with the activity using appropriate mitigation measures.

There would be no direct, indirect, or cumulative impacts on heritage resources since identified sites would be protected through avoidance of those sites. The State Historic Preservation Office (SHPO) has concurred with these findings.

1.7.4 Non-Key Issue D: Botanical Resources

Harvest related activities may affect botanical resources

This issue is non-key due to site-specific field verification. There would be effects to botanical resources; however, impacts would be localized and not adversely affect the population viability of plants (see also Appendix C, Section 2.0). Although this proposal will likely negatively affect individuals of *Tsuga caroliniana* it will not affect local viability of *Tsuga caroliniana* within the analysis area. Furthermore, the habitat for *Tsuga caroliniana* is not expected to be permanently altered by this proposal and *Tsuga caroliniana* is expected to recover in the proposed activity areas. No mitigation for *Tsuga caroliniana* is recommended.

David Danley and Gary Kauffman, Forest Service Botanists conducted surveys of the proposed units. Surveys were conducted on September 24 and 26 1996; May 5, 6, 7, 9, 12, 13, 21, 24 1997; June 2, 1997; July 11, 1997; June 6 and 12 2002; and April 29, 2004. Site specific botanical surveys include several past proposals including: Parker/Big Creek Timber Sale and Miser Creek Wildlife Project. These visits were intended to determine Natural Plant Community types and to survey for all Federally Threatened and Endangered, Regionally Sensitive, and Forest Concern plant species that may occur within the analysis or project areas. A copy of the Botanical Resources Analysis (BOTA) is in Appendix C (Section 2.0) of this document.

Potentially affected and endangered (T&E), sensitive (S), and Forest Concern (FC) species were identified after (1) reviewing the list of T&E, S and FC of the Pisgah and Nantahala National

Forests and their habitat preferences; (2) consulting element occurrence records of T&E, S and FC plants as maintained by the North Carolina Natural Heritage Programs; (3) consulting with individuals both in the public and private sector who are knowledgeable of the area and its flora; and, (4) conducting field surveys in areas designated for ground disturbing activities.

Of the total of 104 botanical T&E, S, and FC species known to occur in Transylvania County, North Carolina all but 45 species (Appendix C, Table 3) were dropped from the list for further consideration and discussion for one of the following reasons: 1) lack of suitable habitat for the species in the project area, 2) the species has a well-known distribution that does not include the project area, or 3) based on field surveys of potential habitat, no habitat was seen in the activity areas. Habitats, community types and ranges of plant T&E, S and FC species are derived from information in Classification of the Natural Plant Communities of North Carolina (Schafale & Weakley), the Natural Heritage Program's List of Rare Plants of North Carolina (Ameroso) or information obtained through other botanists.

Based upon broad habitat information, 45 plant T&E, S and FC species could occur in the analysis area and only four are known to occur. Table 3 in Appendix C summarizes the list of T&E, S and FC plant species that are: highly likely to occur[1], known to occur, or potentially could occur[2] in the botanical analysis area. *Tsuga caroliniana* (S), *Sanguisorba canadensis* (FC), *Carex biltmoreana* and (S), *Oenothera perennis* (FC) are known to occur within the analysis area. Of these species, only *Tsuga caroliniana* (S) is known to occur within a proposed activity area(s).

There are no direct, indirect, or cumulative effects expected on any of the other 41 T&E, S and FC plant species evaluated for this project because, based on field surveys of the proposed units and consultation with other botanists and local data bases, these species are not known to occur within the botanical analysis or activity area. See Table 3 in Appendix C for additional information on these species.

Sanguisorba canadensis (FC), *Carex biltmoreana* and (S), *Oenothera perennis* (FC) are known to occur within the analysis area; however, they are not known to occur in areas proposed for activity. No direct, indirect, or cumulative impacts to these species are expected to occur because their populations are significantly far enough from proposed activities to be affected by the proposal. See Appendix C (Section 2.2) for additional analysis of these species.

[1] The use of "highly likely to occur" refers to those species that are not documented as occurring in the specified area(s) but are expected to occur there because of documentation of very similar habitat to known populations. For all intents of this document, it should be taken that the species does occur in the specified area until more complete documentation of presence/ absence is known.

[2] In this document, the use of the phases "possibly", "could occur" or "may occur" are taken to mean possible species occurrence in the very broadest of sense. Only very general habitat preferences and species distribution are used to determine if a species may or could occur. This does not imply their existence in an area.

Tsuga caroliniana
Status: Federal: None; NC State, none; Global G3; Forest, sensitive.
Known Forest occurrences: >100 populations are known, not tracked by North Carolina Natural Heritage.

The known local populations of *Tsuga caroliniana* in the analysis area occur mostly along ridges and upper slopes primarily associated with Pine-Oak Heath Community. It was found in scattered populations in the ridge separating Jackson Co. from Transylvania Co. and the ridge southeast of the Pinnacle (stands: 119/09 and 119/13). Doubtless, it occurs in other areas of the activity/analysis areas. *Tsuga caroliniana* is an uncommon component species of xeric plant communities and is likely to be in other areas of the analysis/activity areas containing xeric plant comminutes.

Alternative A
There are no expected adverse direct, indirect, or cumulative effects to *Tsuga caroliniana* because there will be no impacts to individuals of the species with this alternative.

Alternatives B and C
Direct and Indirect Effects
Tsuga caroliniana occurs in proposed activity areas in stands 119/09 and 119/13. Furthermore, any stand with Pine-oak Heath has a likelihood of *Tsuga caroliniana* to be present. Therefore, any alternative that contains one or more of these stands, might negatively affect individuals of *Tsuga caroliniana*.

There is no qualified data available concerning the effects of logging on *Tsuga caroliniana*. However, judging by the recovery of *Tsuga caroliniana* by similar actions (logging) *Tsuga caroliniana* seems to repopulate disturbed sites (positive effect). This is an informal observation reinforced by noticing that *Tsuga caroliniana* often occurs along old skid roads and disturbed ridge tops. Since *Tsuga caroliniana* will have a viable population within the analysis area (in areas that will not be affected by this proposal) and the habitat will be at a lower successional state and will be restored to its current ecological state, it is logical to assume that recovery of *Tsuga caroliniana* will take place over time.

Cumulative effects
Individuals of *Tsuga caroliniana* may be affected by this proposal if they are present in the stands proposed for treatment. In addition, past actions have affected individuals of *Tsuga caroliniana*. It is known that the timber sales: Sand Mountain (Caldwell Co.), Maple Sally (Caldwell and Avery Co.) and Southern Pine Beetle Control (McDowell, Caldwell and Burke Cos.), within the Grandfather Ranger District, have affected individuals of *Tsuga caroliniana*. However, on a Forest-wide scale, this proposal will have very little effect on *Tsuga caroliniana*. There are so many individuals known distributed over such a wide area across the Forest that the species is not monitored in any quantified manner. Therefore, this proposal will have little effect on the total numbers of *Tsuga caroliniana* individuals throughout the Forest but will directly affect some individuals. This proposal (all alternatives) will have no qualitative effect upon the Forest viability of *Tsuga caroliniana.*

Table 1-5 summarizes the effects to Plant T&E, S, and FC species by alternative.

Table 1-5: Summary of Effects and Impacts to Plant T.&E., S. and FC. Species by Alternative

SPECIES	ALT. A No Action	ALT. B	ALT. C
Federally Threatened or Endangered plant species			
None	None	N/A	N/A
Regional Forester's Sensitive plant species			
Carex biltmoreana	None	None, Population significantly far from activity	None, Population significantly far from activity
Tsuga caroliniana	None	Individuals directly effected, Populations will remain viable within local analysis area	Individuals directly effected, Populations will remain viable within local analysis area
Forest Concern plant species			
Sanguisorba canadensis	None	None, Population significantly far from activity	None, Population significantly far from activity
Oenothera perennis	None	None, Population significantly far from activity	None, Population significantly far from activity

1.7.5 Non-Key Issue E: Wildlife Threatened, Endangered, Sensitive and Forest Concern Species

Harvest related activities may affect wildlife threatened, endangered, sensitive and Forest Concern species

This issue is non-key due to site-specific field verification. Implementation of the proposed project would have no negative effects to any federally proposed, endangered or threatened wildlife species, nor is it likely to result in a trend towards federal listing of sensitive species since none were considered for this project (see also Appendix C Section 3.2).

Ten federally threatened or endangered, 33 Region 8 Regional Forester's Sensitive, and 40 Forest Concern (locally rare) wildlife species were originally considered from the Forest's species list. All but 2 federally threatened or endangered, 3 Sensitive and 9 forest concern species were dropped since these were listed by the North Carolina Wildlife Resources Commission (NCWRC), North Carolina Natural Heritage Program (NCNHP), and the US Fish and Wildlife Service (USFWS) as occurring or probably occurring in Transylvania County (see Appendix C). All of these but 1 federally threatened (Bog turtle, *Clemmys muhlenbergii*) and 3 forest concern species (Southern Appalachian woodrat, *Neotoma floridiana haematoreia*; Green salamander, *Aneides aeneus*; Dusky azure, *Celastrina niger*) were dropped from the list for

analysis as a result of the likelihood of occurrence evaluation based on habitat elements and filed records (See Table 1-7).

There are no direct, indirect, or cumulative effects expected on any of the other 10 T&E and FC wildlife species occurring or probably occurring in Transylvania County for this project because, based on likelihood of occurrence evaluation based on habitat elements and filed records these species are not known or expected to occur within the wildlife analysis or activity area. See Appendix C (Section 3.2 and Attachment 2) for additional information on these species.

Proposed, Endangered and Threatened Species

Alternative A

Direct and Indirect Effects

The bog turtle (*Clemmys muhlenbergii*) uses bogs, wet pastures and wet thickets, all of which occur in the project area. Bog turtles are typically found in extensive open wetlands, whereas mountain wetlands in the Southern Blue Ridge are mostly small in area and many are shaded as a result of vegetation succession following draining (Hunter et. al. 1999). It has been postulated that, given interconnected stream systems with suitable habitat, bog turtles can disperse between drainages (Klemens 2001). Since Alternative A will maintain the status quo for the area, it will have no effect on bog turtle.

Alternatives B and C

Direct and Indirect Effects

The bog turtle (*Clemmys muhlenbergii*) uses bogs, wet pastures and wet thickets, all of which occur in the project area. Although there is suitable boggy habitat in the project area, care will be taken to protect all bogs that provide suitable habitat for the bog turtle. This will be accomplished by maintaining a buffer around the bogs; therefore, there will be no direct or indirect effects to this species should either of these alternatives be implemented.

Sensitive Species

There will be no direct or indirect effects on any sensitive species since none were analyzed for this report because none of these species, or their habitat, are known or expected to occur within the project area.

Forest Concern Species

Alternative A

Direct and Indirect Effects

The Southern Appalachian woodrat (*Neotoma floridiana haematoreia)* and green salamander (*Aneides aeneus*) are both associated with rocky places: the eastern woodrat with boulder fields and the green salamander with shaded, moist rock outcrops. This alternative will not affect rocky habitat within the analysis area; therefore, there will be no direct or indirect effects to these species or their habitat.

The dusky azure (*Celastrina nigra*) occurs in shady and moist deciduous woods, where eggs are laid on the host plant *Aruncus dioicus* (goat's beard). Adults feed on flower nectar, including wild geranium. Since this alternative will maintain the status quo for the area, there will be no effect on this species or its habitat.

Alternatives B and C

Direct and Indirect Effects

The eastern woodrat and green salamander are both associated with rocky places: the eastern woodrat with boulder fields and the green salamander with shaded, moist rock outcrops. Although there are suitable rocky habitat in the project area for both of these species, care will be taken to protect all rock outcrops that provide suitable habitat for eastern woodrat and green salamander. This will be accomplished by maintaining a buffer around the rock outcrop; therefore, there will be no direct or indirect effects to these species should either of these alternatives be implemented.

The dusky azure caterpillar's host, *Aruncus*, does not occur in the activity areas where treatments are planned, per Dave Danley, Forest Botanist. No direct or indirect effects on this species or its specialized habitat or life cycle are expected as a result of implementation of this project because it is not expected to occur in the activity area due to the absence of its host plant.

Cumulative Effects

All connected actions in the project area have been identified in the alternatives. Past actions that have occurred within or near the project area include the Johnnies Creek Timber Sale (1992), the Blue Walnut Timber Sale (1996), and the Rich Nut Timber Sale (1999). The NCDOT improvements to SR 1324, the Miser Creek Wildlife Project, Bracken Mill Timber Sale and Tanasee Gap Timber Sale could occur in Compartments 118-120 within the reasonable foreseeable future (5 years) (Table 1-6). The combined effects from all activities within the analysis area, including those that have occurred in the past 12 years and those that may occur in the reasonably foreseeable future, that may directly or indirectly affect forest habitats, individual animals, or species viability in the project area or on the Forest, have been considered cumulative effects in this analysis.

Table 1-6: Major Projects within the Wildlife Analysis Area by Year

1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
A	A	A	A	A	A	A								
				B	B	B	B							
							C	C	C	C				
													D	
											E	E	E	
												F	F	F
												G	G	G

A – Johnnies Creek Timber Sale (Compartments 108-110)
B - Blue Walnut Timber Sale (Compartment 123)
C – Rich Nut Timber Sale (Compartment 125)
D – NCDOT Improvement to SR 1324, Tanasee Gap Road (Compartments 118-119)
E – Miser Creek Wildlife Project (Compartments 118-120)
F – Bracken Mill Timber Sale (Compartments 118, 120); Included in the Tanasee Forest Management Project
G – Tanasee Gap Timber Sale (Compartments 118-119); Included in the Tanasee Forest Management Project

The bog turtle (*Clemmys muhlenbergii*) uses bogs, wet pastures and wet thickets, all of which occur in the project area. Although there is suitable boggy habitat in the project area, care will be taken to protect all bogs that provide suitable habitat for the bog turtle. This will be accomplished by maintaining a buffer around the bogs; therefore, there will be no effect to this species should either of the action alternatives be implemented. The eastern woodrat and green salamander are both associated with rocky places: the eastern woodrat with boulder fields and the green salamander with shaded, moist rock outcrops. Although there are suitable rocky habitat in the project area for both of these species, care will be taken to protect all rock outcrops that provide suitable habitat for eastern woodrat and green salamander. This will be accomplished by maintaining a buffer around the rock outcrop; therefore, there will be no effect to this species should either of these alternatives be implemented. The dusky azure caterpillar's host, *Aruncus*, does not occur in the activity areas where treatments are planned, per Dave Danley, Forest Botanist. No cumulative effects on this species or its specialized habitat or life cycle are expected as a result of implementation of this project.

Implementation of the proposed project will have no negative effect on any federally proposed, endangered or threatened wildlife species, nor is it likely to result in a trend towards federal listing of sensitive species since none were considered for this project. This project will have no impact on any forest concern species if project implementation is in compliance with the Endangered Species Act and Forest Service Manual 2670. Consultation with the U.S. Fish and Wildlife Service is not required. Table 1-7 summarizes the effects of Alternatives A, B, and C on the Proposed Endangered, Threatened, Sensitive and Forest Concern species considered for the analysis of this project.

Table 1-7: Effects to Proposed, Endangered, Threatened, Sensitive and Forest Concern Species by Alternative

Common Name	Status	Alt. A	Alt. B	Alt. C
Bog Turtle	Threatened	No Adverse Effect	No Adverse Effect	No Adverse Effect
So. Appalachian Woodrat	Forest Concern	No Adverse Effect	No Adverse Effect	No Adverse Effect
Green Salamander	Forest Concern	No Adverse Effect	No Adverse Effect	No Adverse Effect
Dusky Azure	Forest Concern	No Adverse Effect	No Adverse Effect	No Adverse Effect

1.7.6 Non-Key Issue F: Old Growth

Harvest related activities may affect old growth

This issue is non-key because old-growth patches required to meet Forest Plan requirement have been previously identified and the potential impacts have been evaluated and determined to be non-significant. There will be no additional stands proposed for small patch old growth designation associated with this proposal because the old growth designation called for in the Forest Plan have previously been met.

The Forest Plan calls for a minimum of 5% of each compartment that is not already part of an old growth area or "patch", to be designated for old growth management. There is one medium patch, the Devil's Courthouse Patch located in the same watershed as the project area; however, there are no large or medium patches located within the Tanasee project area.

According to Amendment 5 of the Forest Plan, the purpose of small patches is to increase biological diversity and provide structural components of old growth at the stand and landscape level. Old growth is usually first described by stand age, but other factors such as location, size of trees, understory components, and adjacent stands are also considered.

Currently, three stands (197 acres) in the project area are designated as "small patch" old growth areas (See Map, Appendix D). All of these areas may not currently meet the definition of "old growth"; however, they have been designated to provide for the future old growth as they age and develop more characteristics of old growth. These areas are described as follows:

- Compartment 118, Stand 12 (75 acres):
  Stand 12 is chestnut and scarlet oak and is about 81 years old
  This stand is located in Management Area 3B

- Compartment 119, Stand 36 (59 acres):
  Stand 36 is dominated by white oak, red oak, and hickory and is about 74 years old
  This stand is located in Management Area 4C

- Compartment 120, Stand 22 (63 acres):
  Stand 22 is chestnut and scarlet oak and is about 102 years old
  This stand is located in Management Area 3B

Although stands 118/12 and 119/36 are not as old as some other stands in the project area, both of these stands display other characteristics such as specific forest types, stand structure, and arrangement of canopy layers and gaps that in the opinion of Dave Danley, Forest Botanist, makes them the best suited stands for future old growth in the project area.

Table 1-8 summarizes the existing areas designated for future old growth.

Table 1-8: Summary of Existing Old Growth Areas in the Tanasee Project Area

Compartment	Total Compartment Acres	Existing Old Growth Acres	% of Compartment
118	1263	75	5.9%
119	1154	59	5.1%
120	1131	63	5.6%

1.7.7 Non-Key Issue G: Economic Considerations

Cable logging and road building may cause a negative economic impact on the value of the timber sale.

This issue is non-key because the Forest Plan has standards and guidelines that determine which ground conditions require the use of cable logging and where road building is necessary to access units. Forest Service policy requires a financial efficiency analysis of timber sale costs and benefits. A financial efficiency analysis that compares estimated Forest Service expenditures with estimated revenues has been completed for this proposal.

Financial efficiency is a way to evaluate how well resources are used to produce benefits. The financial efficiency analysis for the proposed alternatives considers cost incurred and benefits accrued through the implementation of the alternatives. The measure of quantifiable benefits and costs is present net value (PNV), which is the present value of benefits minus the present value of costs. The benefit/cost ratio relates the benefits derived from an activity to the cost of implementing the activity. A benefit/cost ratio equal to one has equal benefits and costs. Costs exceed benefits if the ratio is less than one and benefits exceed costs if the ratio is greater than one. The assumptions used to calculate the PNV's for all alternatives are in the Financial Efficiency Analysis and Economic Assumption report that can be found in Appendix E along with the PNVs and benefit cost ratios for Alternatives B and C.

1.7.8 Non-Key Issue H: Recreation

Harvest related activities may affect recreational opportunities in the area

This issue is non-key because the impacts to the recreational resources and opportunities vary little between action alternatives and are expected to be minimal and temporary in nature.

Recreation use in the project area primarily consists of hunting & fishing. To a lesser degree, horseback riding, hiking & mountain biking occur on gated Forest Service system roads. There are no developed Forest Service recreation areas or system trails in the project area.

All potential impacts to recreation would be of a temporary nature. Hunting opportunities may actually be improved by creation of early successional habitat. Recreation users may encounter an occasional logging truck or logging activity when on system or temporary roads, and views of additional timber harvest areas may be noticeable. No recreation opportunities would be permanently altered or diminished. Recreation management objectives would be met under all alternatives.

1.7.9 Non-Key Issue I: Health and Safety

The use of triclopyr may cause unknown or unwanted health effects to humans and wildlife

This issue is non-key because no adverse affects are expected to humans or wildlife from the use of triclopyr because any herbicides applied would be done according to the labeling information and at the lowest effective rate to meet project objectives in accordance with guidelines to protect the environment. In addition, all applicable mitigation measures contained in the Vegetation Management in the Appalachian Mountains (VMAM) Final Environmental Impact Statement (FEIS), issued in 1989, would be followed. When labeling and application directions are followed and safety recommendations are implemented, no adverse effects are expected on humans or wildlife.

The use of herbicides, whose active ingredient is triclopyr, is proposed for 401 acres of pre-commercial thinning and pruning, site preparation and release on between 178 acres (Alternative C) and 284 acres (Alternative B), and advance oak treatment on between 129 and 162 acres in Alternatives C and B respectively. Herbicides would be applied according to the labeling information and the site-specific conditions for each area where it is applied. Herbicides would be applied at the lowest rate effective in meeting project objectives and according to guidelines for protecting human and wildlife health. Current risk assessments for triclopyr may be found at www.fs.fed.us/foresthealth/pesticide/risk.htm.

Aquatic population and habitats will be protected though implementation of the applicable mitigation measures contained in the Vegetation Management in the Appalachian Mountains (VMAM) FEIS issued in July 1989.

The use of herbicides carries some risks to human health and safety, particularly to the applicator. The risk is reduced by requiring the applicator to be trained in safety precautions, proper use, and handling of herbicides. Other factors reducing the risk of herbicide use to human health and safety are the low level of active ingredient per acre and the placement of notice signs posted in the areas where herbicide is applied. The signs will include information on the herbicide used, when it was applied, and who to contact for additional information. All applicable mitigation measures contained in the VMAM FEIS issued in July 1989 will be followed. An Emergency Spill Plan that outlines procedures to be followed in the event of an accidental spill is included in Appendix F.

1.7.10 Non-Key Issue J: Other Areas of Concern

Proposed activities may adversely affect park lands, prime farmlands, wetlands, wild and scenic rivers, ecologically critical areas, or local laws or requirements imposed for the protection of the environment.

The Tanasee Forest Management Project does not propose actions within park lands, prime farmlands, wetlands, wild and scenic rivers, or ecologically critical areas. It also would not violate local laws or requirements imposed for the protection of the environment.

1.7.11 Non-Key Issue K: Management Indicator Species

Harvest related activities may affect Management Indicator Species (MIS).

This issue is non-key due to site-specific field verification. Implementation of the proposed project would have no negative direct, indirect, or cumulative effects to MIS for the reasons stated in Appendix C, Aquatic, Botanical and Terrestrial Wildlife Analyses Report.
See Appendix C for site-specific analysis of project-level MIS as well as analysis of forest-wide trends for MIS. Specifically see Sections 2.1.2, 2.1.3, 3.1.2.1, 3.1.2.2, 4.1.2.1, and 4.1.2.2.

1.8 Issues Beyond the Scope of this Analysis

The Tanasee Interdisciplinary Team (IDT) has determined that the following issue is beyond the scope of this Environmental Assessment.

1.8.1 Road Closures and Watershed Rehabilitation

> **Issue AA:** We request that one alternative should include road closures and obliteration, watershed rehabilitation, means to eliminate man-made sediment sources, and the conversion of unnatural pine stands to native hardwoods.

Reason this Issue is Beyond the Scope of this Analysis: Over the past several years the district has implemented the Parker Creek Watershed Rehabilitation & Road Decommissioning Project in the analysis area. Approximately 3.5 miles of road were rehabilitated and closed by installing waterbars and sediment traps as well as disking and seeding.

There are some planted pines within the analysis area; however, the majority of these stands have naturally developed into pine-hardwood and hardwood-pine forest types. As part of the T&T White Pine Thinning Project, two white pine stands (119/04 and 119/32) are being thinned followed by understory treatment to encourage hardwood recruitment into the stands.

1.9 Project Record

This EA incorporates by reference the project record (40 CFR 1502.21). The project record contains specialist reports and other technical documentation used to support the analyses and conclusions in this EA. The specialist reports provide additional detailed analysis. This EA incorporates by reference the Nantahala and Pisgah MIS Report. The MIS Report along with Monitoring and Evaluation Reports for the National Forests in North Carolina was used in determining forest population trends for MIS species.

Relying on specialist reports and the project record helps implement the CEQ Regulations' provision that agencies should reduce NEPA paperwork (40 CFR 1500.4), and that NEPA documents be analytic rather than encyclopedic, kept concise, and no longer than absolutely necessary (40 CFR 1502.2). The objective is to furnish enough site-specific information to demonstrate a reasoned consideration of the environmental impacts of the alternatives and how these impacts can be mitigated, without repeating detailed analysis and background information available elsewhere. The project record is located at the Pisgah Ranger District Office in Pisgah Forest, North Carolina.

CHAPTER TWO
2.0 Alternatives

2.1 Introduction

The Alternatives Chapter is the heart of the Environmental Assessment. This chapter describes three alternatives: Alternative A - No Action, Alternative B – Proposed Action, and Alternative C. Based on information and analysis presented in Chapter 3.0 Environmental Consequences, Section 2.7 in this chapter presents the environmental effects in summary form, providing a clear basis for choice among the alternatives for the decision maker and public.

This chapter has these six major sections:

- Descriptions of Proposed Treatments
- Alternatives Considered
    - Alternative A: No Action
    - Alternative B: Proposed Action
    - Alternative C
- Alternatives Considered But Not In Detail
- Mitigation Measures for the Action Alternatives
- Summary Comparison of Actions
- Summary Comparison of Effects

2.2 Descriptions of Proposed Treatments

Several treatments are proposed in more than one alternative. The detailed descriptions below explain how these terms are being used in this Environmental Assessment (EA) and give details on how these treatments would be implemented if selected for implementation based on the analysis in this EA:

Harvesting and Silvicultural Treatments

- Regeneration harvest refers to two-age regeneration harvesting with varying leave basal areas. Specifications for residual leave trees are mast producing with large crowns. Residual trees would be hard mast producing species such as oak and hickory wherever possible.

- Natural Site Preparation with herbicides and handtools is proposed to remove unmerchantable trees following completion of regeneration harvesting. Site preparation would involve treating red maple sprouts, sourwood sprouts, and silverbell with an herbicide whose active ingredient is triclopyr using the streamline method of application.

- Artificial Site Preparation would involve the same treatments as natural site preparation plus the planting of northern red oak seedlings on a 20' X 20' spacing.

- Two to three years following completion of harvest, the regeneration units would be inventoried and monitored for achievement of stocking level and desired species composition (primarily an oak component as defined in this document). At that time, additional follow up treatments with herbicides would be implemented if the desired composition of 20% oaks has not been attained. Release with herbicides would involve treating red maple, silverbell, yellow poplar sprouts and invasive species with an herbicide whose active ingredient is triclopyr using the streamline method of application.

- Pre-harvest understory treatment with an herbicide whose active ingredient is triclopyr and manual vine control is proposed. Application would involve thinline application directly to tree stems as well as injection of individual tree stems. Treatment of shade tolerant species (such as striped maple, sourwood, silverbell, and black gum) allows more sunlight to reach the forest floor to stimulate growth and development of oaks for desired future stand composition. Grape vines directly competing with selected saplings may also be manually clipped in this operation.

- Pre-commercial thinning would involve treatment with an herbicide whose active ingredient is triclopyr to release tree species desirable for timber, as well as species beneficial to wildlife, and to treat invasive plants. Trees would be selected on a 20' x 20' spacing, and would have to be dominant or codominant in the stand, have good form, and have a healthy, vigorous crown. Only competing stems that have crowns touching these selected trees and are at least 50% the height of the selected tree would be cut (dogwoods, redbuds, and other small tree species would not be cut).

- Pruning would consist of cutting back oak trees with multiple sprouts to the single best stem.

Road Construction

- Existing roads, reconstructed roads, and any new roads in the project area will remain gated to prevent public motorized access for the protection of resources. Skid roads and landings would be rehabilitated by applying a seed mixture desirable for wildlife.

2.3 Alternatives Considered

2.3.1 ALTERNATIVE A: No Action

This alternative serves as the no action alternative. No timber harvesting, silvicultural treatments, wildlife habitat improvement, road construction, or other management activity would take place in the project area.

2.3.2 ALTERNATIVE B: Proposed Action

Tables providing additional details concerning the treatments proposed and maps of the areas proposed for treatment follow the description of treatments in Alternative B.

The following treatments are being proposed in Alternative B:

Harvesting and Silvicultural Treatments

- Regeneration harvesting in 11 stands on approximately 284 acres.
- Natural site preparation with herbicides and handtools in nine stands on approximately 197 acres.
- Artificial site preparation, including planting of northern red oak seedlings, using herbicides and handtools in three stands on approximately 87 acres.
- Herbicide release of harvested stands with herbicides following site preparation in 11 stands on approximately 284 acres.
- Pre-commercial thinning and pruning including herbicide treatment in 13 stands on approximately 401 acres.
- Pre-harvest understory treatment with herbicides and manual vine control in six stands on approximately 162 acres.

Road Construction

- Reconstruction of approximately 3.7 miles of existing system road.
- Construction of approximately 2.8 miles of new system road.
- Construction of approximately 2.0 miles of temporary road to access the units.

Wildlife Habitat Improvement

- Conversion of 2.4 miles of existing woods roads and temporary roads to wildlife openings (4.0 acres).

Table 2-1: Alternative B – Proposed Harvest Treatments

Compartment/ Stand Number	Type of Harvest	Logging System	Harvest Acres*
118/04	Two-Age Regeneration	Skyline	21
118/08	Two-Age Regeneration	Skidder/ Skyline	17 (Skidder) 18 (Skyline)
118/22	Two-Age Regeneration	Skidder	36
118/27	Two-Age Regeneration	Skyline	12
119/03	Two-Age Regeneration	Skidder	34
119/09	Two-Age Regeneration	Skyline	27
119/13	Two-Age Regeneration	Skidder	19
119/23	Two-Age Regeneration	Skidder	14
119/26	Two-Age Regeneration	Skyline	27
120/10	Two-Age Regeneration	Skidder	27
120/26	Two-Age Regeneration	Skidder/ Skyline	16 (Skidder) 16 (Skyline)
Total		Skidder	163
Total		Skyline	121
Total	Two-Age Regeneration		284

*Acreage figures are approximate

Table 2-2: Alternative B – Proposed Road Construction**

Road Number	Road Name	System Road Reconstruction	System Road Construct ion	Temporary Road Construction	Total Miles
5077	Miser Creek	1.8	0.5	0	2.3
5077A	Indian Rock	0.3	0	0	0.3
5032	Parker Creek	0	2.3	0	2.3
5034	Woods Cemetery	0.2	0	0	0.2
5035	Bracken Mtn.	1.4	0	0	1.4
n/a	C120S26	0	0	0.3	0.3
n/a	C118S08	0	0	0.4	0.4
n/a	C118S27	0	0	0.2	0.2
n/a	C118S22	0	0	0.1	0.1
n/a	C119S09	0	0	0.6	0.6
n/a	C119S26	0	0	0.4	0.4
TOTAL MILES		**3.7**	**2.8**	**2.0**	**8.5**

**Distance figures are approximate

Table 2-3: Alternative B – Proposed Post Harvest Treatments

Compartment/ Stand Number	Natural Site Preparation Acres*	Artificial Site Preparation and Planting Northern Red Oak Acres*	Herbicide Release+ Acres*
118/04	21		21
118/08	18	17	35
118/22		36	36
118/27	12		12
119/03		34	34
119/09	27		27
119/13	19		19
119/23	14		14
119/26	27		27
120/10	27		27
120/26	32		32
Total	Natural Site Prep 197		
Total		Artificial Site Prep 87	
Total			Herbicide Release 284

*Acreage figures are approximate
+ Release with herbicides would involve the treating of red maple, silverbell, and yellow poplar sprouts with triclopyr using the streamline method of application.

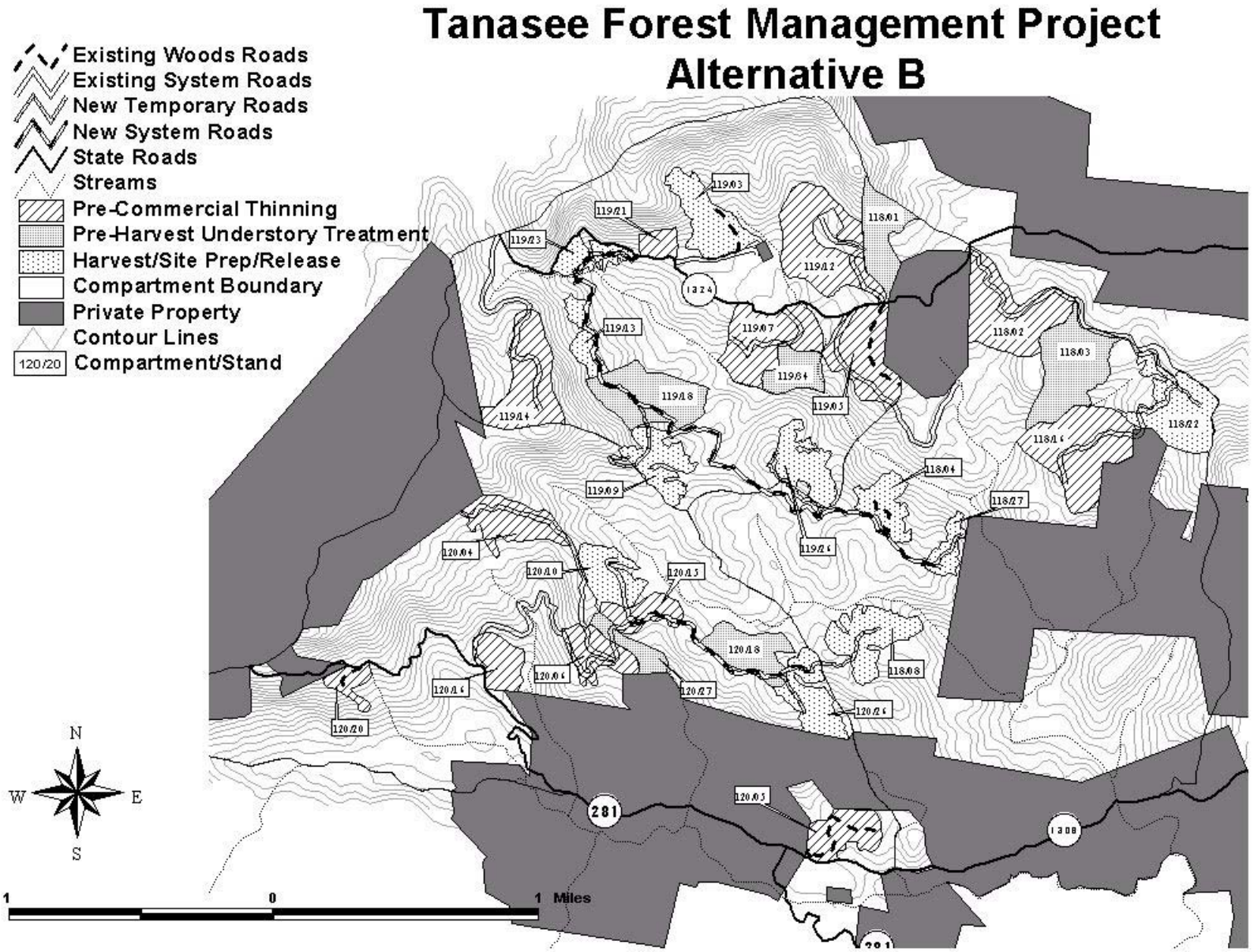
Table 2-4: Alternative B – Proposed Silvicultural Treatments

Compartment/ Stand Number	Silvicultural Treatment	Acres*
118/01	Pre-Harvest Understory Treatment+ and Vine Control++	29
118/03	Pre-Harvest Understory Treatment and Vine Control	39
119/18	Pre-Harvest Understory Treatment and Vine Control	33
119/34	Pre-Harvest Understory Treatment and Vine Control	20
120/18	Pre-Harvest Understory Treatment and Vine Control	31
120/27	Pre-Harvest Understory Treatment and Vine Control	10
Total	Pre-Harvest Understory Treatment and Vine Control	162
118/02	Pre-commercial Thinning** and Pruning^	44
118/16	Pre-commercial Thinning and Pruning	42
119/05	Pre-commercial Thinning and Pruning	37
119/07	Pre-commercial Thinning and Pruning	50
119/12	Pre-commercial Thinning and Pruning	50
119/14	Pre-commercial Thinning and Pruning	46
119/21	Pre-commercial Thinning and Pruning	7
120/04	Pre-commercial Thinning and Pruning	30
120/05	Pre-commercial Thinning and Pruning	30
120/06	Pre-commercial Thinning and Pruning	29
120/15	Pre-commercial Thinning and Pruning	17
120/16	Pre-commercial Thinning and Pruning	12
120/20	Pre-commercial Thinning and Pruning	7
Total	Pre-commercial Thinning and Pruning	401

*Acreage figures are approximate
+Pre-harvest treatment would treat shade intolerant species with herbicides to release oaks in the understory
++Vine Control would consist of cutting grapevine with handtools
**Pre-commercial Thinning would involve treatment with herbicides to release crop trees
^Pruning would consist of cutting back oak sprouts to the single best stem

Table 2-5: Alternative B - Proposed Wildlife Habitat Improvement

Compartment/Stand	Temporary Road (Miles)	Permanent Grass Forb Opening (Acres)
118/04	0.2	0.3
118/08	0.4	0.7
118/27	0.2	0.3
118/22	0.1	0.2
119/03	0.2	0.3
119/09	0.6	1.0
119/26	0.4	0.7
120/26	0.3	0.5
Total	**2.4**	**4.0**


Tanasee Forest Management Project
Alternative B
Existing Woods Roads
Existing System Roads
New Temporary Roads
New System Roads
State Roads
Streams
Pre-Commercial Thinning
Pre-Harvest Understory Treatment
Harvest/Site Prep/Release
Compartment Boundary
Private Property
Contour Lines
120/20 Compartment/Stand
N
W
E
S
1 0 1 Miles
281

2.3.3 ALTERNATIVE C

Tables providing additional details concerning the treatments proposed and maps of the areas proposed for treatment follow the description of treatments in Alternative C.

The following treatments are being proposed in Alternative C:

Harvesting and Silvicultural Treatments

- Regeneration harvesting in six stands on approximately 178 acres.
- Natural site preparation with herbicides and handtools in four stands on approximately 91 acres.
- Artificial site preparation, including planting of northern red oak seedlings, using herbicides and handtools in three stands on approximately 87 acres.
- Herbicide release of harvested stands with herbicides following site preparation in six stands on approximately 178 acres.
- Pre-commercial thinning and pruning including herbicide treatment in 13 stands on approximately 401 acres.
- Pre-harvest understory treatment with herbicides and manual vine control in five stands on approximately 129 acres.

Road Construction

- Reconstruction of approximately 3.7 miles of existing system road.
- Construction of approximately 0.5 mile of new system road.
- Construction of approximately 0.8 mile of temporary road to access the units.

Wildlife Habitat Improvement

- Conversion of 1.0 mile of existing woods roads and temporary roads to wildlife openings (1.7 acres).

Table 2-6: Alternative C – Proposed Harvest Treatments

Compartment/ Stand Number	Type of Harvest	Logging System	Harvest Acres*
118/08	Two-Age Regeneration	Skidder/ Skyline	17 (Skidder) 18 (Skyline)
118/22	Two-Age Regeneration	Skidder	36
119/03	Two-Age Regeneration	Skidder	34
119/23	Two-Age Regeneration	Skidder	14
120/10	Two-Age Regeneration	Skidder	27
120/26	Two-Age Regeneration	Skidder/ Skyline	16 (Skidder) 16 (Skyline)
Total		Skidder	144
Total		Skyline	34
Total	Two-Age Regeneration		178

*Acreage figures are approximate

Table 2-7: Alternative C – Proposed Post Harvest Treatments

Compartment/ Stand Number	Natural Site Preparation Acres*	Artificial Site Preparation and Planting Northern Red Oak Acres*	Herbicide Release+ Acres*
118/08	18		18
118/08		17	17
118/22		36	36
119/03		34	34
119/23	14		14
120/10	27		27
120/26	32		32
Total	Natural Site Prep 91		
Total		Artificial Site Prep 87	
Total			Herbicide Release 178

*Acreage figures are approximate
+ Release with herbicides would involve the treating of red maple, silverbell, yellow poplar sprouts and invasive plants with an herbicide whose active ingredient is triclopyr mixture using the streamline method of application.

Table 2-8: Alternative C – Proposed Road Construction**

Road Number	Road Name	System Road Reconstruct	System Road Construct	Temporary Road Construct	Total Miles
5077	Miser Creek	1.8	0.5	0	2.3
5077A	Indian Rock	0.3	0	0	0.3
5034	Woods Cemetery	0.2	0	0	0.2
5035	Bracken Mtn.	1.4	0	0	1.4
n/a	C120S26	0	0	0.3	0.3
n/a	C118S08	0	0	0.4	0.4
n/a	C118S22	0	0	0.1	0.1
TOTAL MILES		**3.7**	**0.5**	**0.8**	**5.0**

**Distance figures are approximate

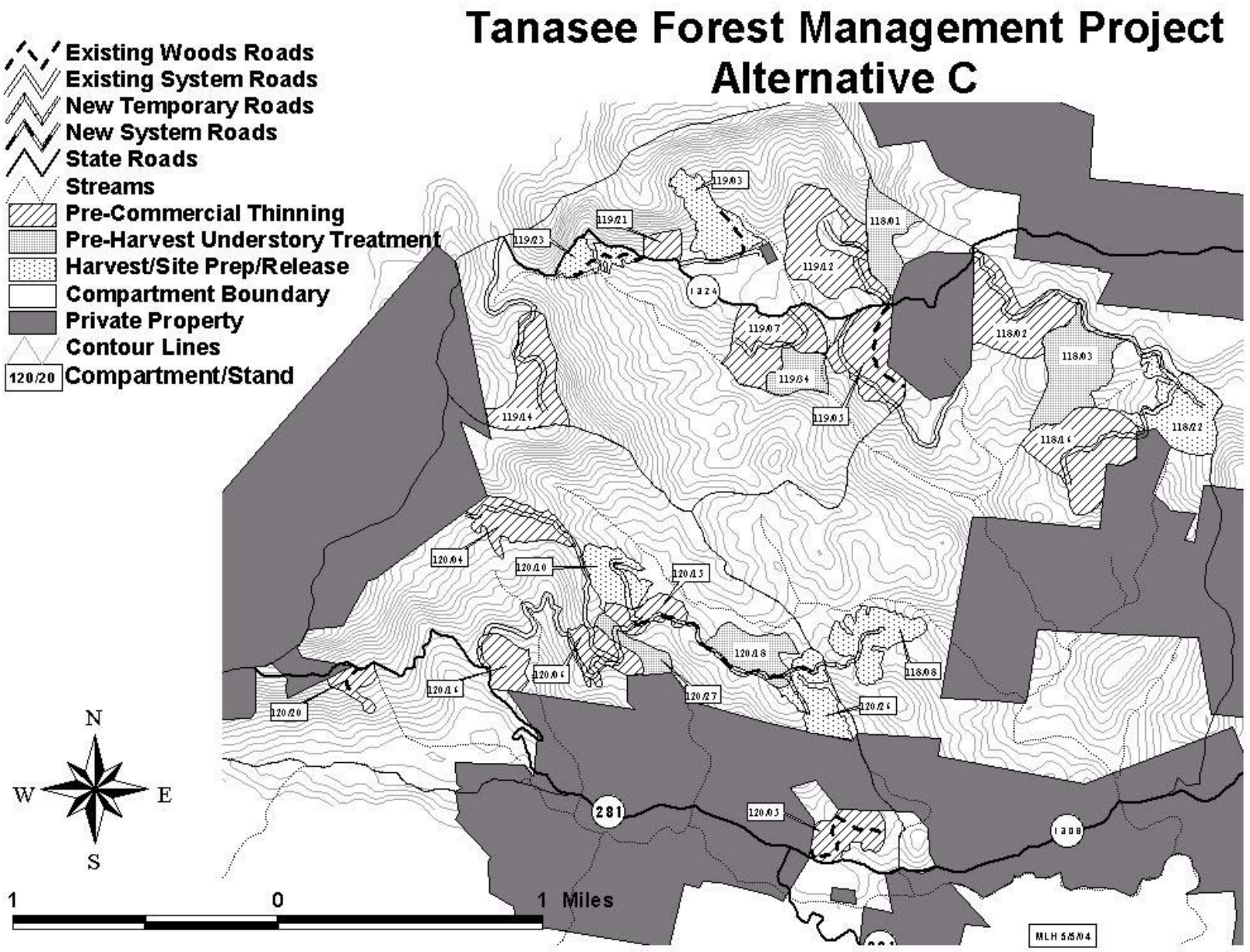
Table 2-9: Alternative C – Proposed Silvicultural Treatments

Compartment/ Stand Number	Silvicultural Treatment	Acres*
118/01	Pre-Harvest Understory Treatment and Vine Control+	29
118/03	Pre-Harvest Understory Treatment and Vine Control	39
119/34	Pre-Harvest Understory Treatment and Vine Control	20
120/18	Pre-Harvest Understory Treatment and Vine Control	31
120/27	Pre-Harvest Understory Treatment and Vine Control	10
Total	Pre-Harvest Understory Treatment and Vine Control	129
118/02	Pre-commercial Thinning++ and Pruning**	44
118/16	Pre-commercial Thinning and Pruning	42
119/05	Pre-commercial Thinning and Pruning	37
119/07	Pre-commercial Thinning and Pruning	50
119/12	Pre-commercial Thinning and Pruning	50
119/14	Pre-commercial Thinning and Pruning	46
119/21	Pre-commercial Thinning and Pruning	7
120/04	Pre-commercial Thinning and Pruning	30
120/05	Pre-commercial Thinning and Pruning	30
120/06	Pre-commercial Thinning and Pruning	29
120/15	Pre-commercial Thinning and Pruning	17
120/16	Pre-commercial Thinning and Pruning	12
120/20	Pre-commercial Thinning and Pruning	7
Total	Pre-commercial Thinning and Pruning	401

*Acreage figures are approximate
+Pre-harvest treatment would treat shade intolerant species with herbicides to release oaks in the understory
++Vine Control would consist of cutting grapevine with handtools
**Pre-commercial Thinning would involve treatment with herbicides to release crop trees
^Pruning would consist of cutting back oak sprouts to the single best stem

Table 2-10: Alternative C - Proposed Wildlife Habitat Improvement

Compartment/Stand	Temporary Road (Miles)	Permanent Grass Forb Opening (Acres)
118/08	0.4	0.7
118/22	0.1	0.2
119/03	0.2	0.3
120/26	0.3	0.5
Total	**1.0**	**1.7**


Tanasee Forest Management Project
Alternative C
Existing Woods Roads
Existing System Roads
New Temporary Roads
New System Roads
State Roads
Streams
Pre-Commercial Thinning
Pre-Harvest Understory Treatment
Harvest/Site Prep/Release
Compartment Boundary
Private Property
Contour Lines
120/20 Compartment/Stand
N
W
E
S
1 0 1 Miles
281

2.4 Alternatives Considered But Not In Detail

An alternative was considered that would have proposed no new system road construction within the project area. It was decided that this alternative addressed some of the concerns about water quality and aquatic habitat; however, it did not meet the purpose and need for the proposal or adequately address the issue of the lack of early successional habitat due to inadequate access to harvest units. Therefore, this alternative was not considered in detail.

2.5 Mitigation Measures and Project Design Features for the Action Alternatives

Mitigation is defined as measures designed to reduce or prevent undesirable effects that could be caused by an action. Mitigation can include avoiding an effect, minimizing the effect by limiting the action, rectifying the effect, reducing the effect, reducing the effect through maintenance, or compensating for the effect (40 CFR 1508.20). The mitigation measures listed here are designed to prevent or reduce adverse effects resulting from alternative implementation. The following mitigation measures are required for Alternatives B and C (see also Appendix C):

- Leave a minimum of 25 sqft/acre residual basal area (rba) for 50 feet below SR 1324 in stand 119/23.
- Leave a minimum of 25 sqft/acre rba for 100 feet above Woods Church in stand 119/03.
- Leave a minimum of 20 sqft/acre rba in stand 118/27 (Alternative B only).
- Leave a minimum of 20 sqft/acre rba in eastern half of stand 118/08.
- Limit openings to 500 linear feet along SR 1324 in stand 119/23.
- Limit openings to 500 linear feet along Woods Church road in stand 119/03.
- Screen visible roads and landings in stands 118/27 (Alternative B only), 119/03, and 119/23.
- Burn or lop and scatter slash to within 4 feet of the ground for 50 feet beyond the edge of the road in stands 119/03 and 119/23.
- If during the implementation of a ground disturbing activity, a previously unknown archeological or historic site is encountered the disturbance would stop immediately. The activity would not be permitted to continue until a forest archeologist surveys and evaluates the site and makes a recommendation to permanently stop, modify, or proceed with the activity using appropriate mitigation measures.

Impacts have also been reduced by incorporation of the following design features into the action alternatives for the protection of aquatic resources:

- Intermittent channels have been mapped by the Pisgah Fisheries Biologist and the Forest Hydrologist. These areas will not be disturbed unless they are one of the seven stream crossing planned with Alternative B.
- Trees accidentally felled across stream channels (that prevent or block stream flow) will be lifted (when possible) away from the water. If this is not possible, each tree will be pulled away from the water where it fell and temporary decking will be used to support the weight of the tree as it is pulled across the channel. These removals will be perpendicular to the stream channel whenever possible to minimize stream bank disturbance. Bare soil will be seeded and mulched if native vegetation does not start to recolonize the area by the time timber removal from the unit is complete.

- ❖ Skid roads will avoid stream crossings and paralleling perennial channels within the designated riparian areas.
- ❖ Landings and skid trails should be vegetated as soon as possible after use to avoid off-site soil movement.
- ❖ Temporary roads should be constructed to avoid runoff into area streams. In addition, silt fence, straw bales, or brush barriers should be placed along the length of the road where it parallels or crosses a stream as needed to control runoff and stream sedimentation.

2.6 Summary Comparison of Actions

Table 2-11: Comparison of Actions

	Alt. A	Alt. B	Alt. C
	No Action	**Proposed Action**	
Wildlife Treatments			
Creating New Wildlife Openings*	0 acres	4.0 acres	1.7 acres
Pre-Commercial Thinning and Pruning (Manual)*	0 acres	401 acres	401 acres
Pre-Harvest Understory Treatment (Herbicide) and Vine Control (Manual)*	0 acres	162 acres	129 acres
Harvesting			
Regeneration Harvesting*	0 acres	284 acres	178 acres
Tractor Logging*	0 acres	163 acres	144 acres
Cable Logging*	0 acres	121 acres	34 acres
Natural Site Preparation and Follow-up Release (Herbicide)*	0 acres	197 acres	91 acres
Artificial Site Preparation and Follow-up Release (Herbicide)*	0 acres	87 acres	87 acres
Supplemental Oak Planting	0 acres	87 acres	87 acres
Roads			
New Road Construction+	None	2.8 miles	0.5 mile
Road Reconstruction+	None	3.7 miles	3.7 miles
Temporary Road Construction+	None	2.0 miles	0.8 mile

*Acreage figures are approximate
+Distance figures are approximate

2.7 Summary Comparison of Effects

Table 2-12: Comparison of Environmental Effects by Key Issue

Issues	Measurements	Alt. A	Alt. B	Alt. C
Key Issue #1: Wildlife Habitat **Early Successional Habitat**	Acres in the 0-10 year old age class in the analysis area	5 ac	289 ac +284	183 ac +178
	% of analysis area in 0-10 year age class	0.1%	8.1% +8.0%	5.2% +5.1%
	Acres in the 0-20 year old age class in the analysis area	42 ac	326 ac +284	220 ac +178
	% of analysis area in 0-20 year age class	1.2%	9.2% +8.1%	6.2% +5.0%
Key Issue #1: Wildlife Habitat **Grass/Forb Habitat**	Acres of grass/forb habitat	57 ac	61 ac +4.0 ac	59 ac +1.7ac
	% of analysis area in grass/forb habitat	1.6%	1.7% +0.1%	1.7% +0.1%
Key Issue #2: Water Quality and Aquatic Habitat	Number of Stream Crossings	0	7	0
	MIS and Threatened and Endangered Aquatic Species Protected	Yes	Yes	Yes
	New System Road Construction (miles)	0 mi	2.8 mi	0.5 mi
	System Road Reconstruction (miles)	0 mi	3.7 mi	3.7 mi

Issues	Measurements	Alt. A	Alt. B	Alt. C
Key Issue #3: Road Management	Miles of road added to the existing road system	0 miles	2.8 miles	0.5 miles
	Open Road Density (miles/square mile)	0.5	0.5	0.5
	Total Road Density (miles/square mile)	1.6	2.1	1.7
Key Issue #4: Sustainable Timber Supply in Timber Management Areas **Age-Class Distribution (Acres in Timber Suitable MAs)**	**Age Class (acres)**			
	0-10 year age class	5	289	183
	11-20 year age class	37	37	37
	21-30 year age class	294	294	294
	31-40 year age class	0	0	0
	41-50 year age class	100	100	100
	51-60 year age class	68	68	68
	61-70 year age class	45	45	45
	71-80 year age class	560	560	560
	81-90 year age class	624	589	589
	91-100 year age class	728	633	660
	100+ year age class	679	525	604
	Total acres	**3140**	**3140**	**3140**
Key Issue #4: Sustainable Timber Supply in Timber Management Areas **Age-Class Distribution (% of Timber Suitable Acres)**	**Age Class (percent of timber suitable ac)**			
	0-10 year age class	0.1%	9.2%	5.8%
	11-20 year age class	1.2%	1.2%	1.2%
	21-30 year age class	9.4%	9.4%	9.4%
	31-40 year age class	0	0	0
	41-50 year age class	3.2%	3.2%	3.2%
	51-60 year age class	2.2%	2.2%	2.2%
	61-70 year age class	1.4%	1.4%	1.4%
	71-80 year age class	17.8%	17.8%	17.8%
	81-90 year age class	19.9%	18.8%	18.8%
	91-100 year age class	23.2%	20.1%	21.0%
	100+ year age class	21.6%	16.7%	19.2%
	Totals	**100%**	**100%**	**100%**
Key Issue #4: Sustainable Timber Supply in Timber Management Areas	Acres Harvested	0	284 ac	178 ac

CHAPTER THREE
3.0 Environmental Consequences

Introduction

This chapter forms the scientific and analytical basis for the comparison of alternatives as required by the National Environmental Policy Act (NEPA). Included in this chapter will be disclosure of direct, indirect, and cumulative effects of the alternatives on the different resources relevant to the key issues. Direct and indirect effects occur at, or near the same time and place as a result of the action [40 CFR 1508.8(a) and (b)]. They have been combined in this chapter, as it is difficult to completely distinguish between the two effects. Cumulative effects result "… *from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency or person undertakes such action. Cumulative impacts can result from individual minor but collectively significant actions taking place over a period of time*" (40 CFR 1508.7). Reports from different resource specialists supplied information for portions of the analysis in this chapter. The analysis area is the anticipated extent of effects by resource and is generally larger than the project area.

The four key issues associated with this proposed project were identified through a public participation process, which included input from Forest Service natural resource specialists, other government agencies, private groups and individuals. These four issues were determined to be relevant to the decisions to be made concerning the Tanasee Project. Other resources and issues (non-key issues) were eliminated from discussion in this chapter as directed by CEQ Regulation 1500.1(b), 1500.2(b) and other sections because the project would only cause inconsequential effects to these issues (resources). These non-key issues and resources are discussed in Section 1.7 of Chapter One of this document.

3.1 Effects Related to Key Issue #1: Wildlife Habitat

Issue Statement: Early successional and grass/forb habitat are below the levels recommended in the Forest Plan for Management Area 3B in Compartments 118, 119, and 120 which could result in negative impacts to wildlife species dependant upon these habitats.

Measurements: 0-10 year old stands (acres and %)
0-20 year old stands (acres and %)
Grass/forb openings (acres and %)

3.1.1 Existing Condition (Wildlife Habitat)

Additional analysis on wildlife habitat is disclosed in Appendix C (Aquatic, Botanical, and Terrestrial Wildlife Analyses Report and Biological Evaluation). Table 3-1 displays the 0-10 year old stands, 0-20 year old stands, and grass/forb openings in the project area by alternative.

Table 3-1: 0-10 Year Old Stands, 0-20 Year Old Stands, and Grass/Forb Openings in the Project Area by Alternative

Measurement	Alternative A	Alternative B	Alternative C
0-10 Year Old Stands (Acres)	5 ac	289 ac	183 ac
0-10 Year Old Stand (%)	0.1%	8.1%	5.2%
0-20 Year Old Stands (Acres)	42 ac	326 ac	220 ac
0-20 Year Old Stands (%)	1.2%	9.2%	6.2%
Grass/Forb Habitat (Acres)	57 ac	61 ac	59 ac
Grass/Forb Habitat (%)	1.6%	1.7%	1.7%

The wildlife resource analysis area used for the Tanasee Project includes Compartments 117 – 125 totaling 9,605 acres of Forest Service land. The analysis area lies in the upper reaches of the West Fork French Broad River drainage. It is bounded on the west by the Jackson County line, on the southwest by the Blue Ridge Divide, on the southeast by U.S. Highway 64, on the east by State Road #1322, and on the north side across Glassmine Mountain and Bracken Mountain to Bald Rock. The forest in this area is a mixture of mature, natural stands and young, managed stands of hardwoods and pines. There are 9,605 acres in the wildlife analysis area, mostly in management area (MA) 3B. Dismal Falls is located in MA13, and there is some MA 4C along Tanasee Ridge. MA 3B uses 80 year rotations for cove and upland hardwoods and 60 years for white and yellow pine.

MA 3B emphasizes managing for a sustainable supply of timber, with few open roads, and provides habitat needs for wildlife such as wild turkey, deer, a variety of small mammals and other species that will benefit from a managed forest with limited motorized access. MA 4C emphasizes providing quality background scenery, few open roads and habitat for wildlife species that prefer a less disturbed and remote setting.

Three species; eastern wild turkey, ruffed grouse, and white-tailed deer; were analyzed to represent wildlife species utilizing early successional habitat in the Tanasee Project area. Since a majority of the analysis area is in MA 3B, the emphasis is on early successional habitat. Management indicator species (MIS) for MA 3B (according to the Forest Plan) are those species that require early successional habitat, such as eastern wild turkey, white-tailed deer, a variety of small mammals, travel corridors and foraging habitat for black bears, and other species that will benefit from a managed forest with limited motorized access. See Appendix C (Sections 3.1.2.1 and 3.1.2.2) for a complete analysis of wildlife MIS. Wildlife which thrive in a young- to middle-aged forest will be favored through appropriate forest management practices.

Eastern Wild Turkey

Timber management is beneficial to wildlife and is good for wildlife if done properly. Small units, 5-10 acres up to 40 acres under some conditions, following the contour of the land, provide good brood habitat for wild turkeys for several years or longer, depending on the site. Insect production increases as the grasses and legumes grow following the disturbance of the soil. As the briars and shrubs grow, the dense stand will become good nesting habitat, giving the hen good protection from predators.

The key to good habitat is to provide for the year-round needs and not convert the entire area into either nesting or brood habitat. Brooding and nesting cover consists of the woodland margins of grasslands, sparse brushlands, recent regeneration areas, and open fields. Hens occasionally use woodlands with low ground cover for nesting, particularly in extensive bottomland hardwoods. Escape cover can be dense pole stands where turkeys skulk, or sapling stands or extensive woodlands where they can avoid harassment.

Clearings produce the food needed during warm months (grass seed, insects, fruit, forage) and serve as breeding, nesting and brood-rearing areas. Clearings also supplement native food year-round when planted. Turkey eat hard mast, forbs, insects and grass seeds in the spring; forbs, insects, soft and hard mast in the summer; hard mast, insects, grass and weed seeds, and grain in the fall; and hard mast, forbs, soft mast, and seeds in the winter.

Ruffed Grouse

Ruffed grouse habitat consists of several early successional vegetation stages. The more important of these habitats are young deciduous forests or deciduous-conifer mixtures, field edges, abandoned homesites, brushy creek bottoms and reverting old fields. Ruffed grouse habitat can be characterized as areas with a very high number of woody plant stems per acre. Additional habitat needs vary with the bird's seasonal needs. Drumming males select logs on sites where the vegetation is open enough to allow good visibility. The area must have sufficient stem density and canopy coverage (regeneration and small sapling size trees) to provide protection from hawks and owls.

Ruffed grouse are ground nesters with hens choosing sites having sparse shrub and ground cover with unobscured visibility. These sites are most often found in pole or small sawtimber stands, but are usually within close proximity of fields, road or trail edges, old homesites, drumming sites, or breaks in the forest canopy such as logged areas or old log landings. Brood cover tends to have higher stem densities and ground cover than drumming habitat. Thus, broods use earlier stages of forest succession than drumming males. Broods are also often found in semi-open areas in early stages of woodland succession. These areas are characterized by diverse herbaceous ground cover that provides a low canopy with openings at ground level through which birds can move and feed. Woody invasion in a clumped pattern provides the insect and plant foods, low overhead cover, and relief from summer heat that brood habitat must supply. Dense stands of grasses and forbs do not provide brood habitat since they restrict movement. Areas with good interspersion of early successional habitats provide the foods necessary throughout the year. Proper woodland and edge management will usually produce the required food species.

White-tailed Deer

White-tailed deer is associated with both early successional habitat and hard-mast production. Deer require hard mast for reproductive success and subsequent fawn survival. Typical foods for white-tailed deer include tender leaves and twigs, acorns, lichens, ferns, greens, fruit, mushrooms, and grain. Browse (leaves, stems, and buds of woody plants) is generally available all year and is a staple food for deer. In the spring, green succulent leaves and stems of both woody and herbaceous species are dominant food items, and yellow poplar flowers, mushrooms and acorns are other important items. In summer, materials from succulent green plants

continued to dominate foods taken. Mushrooms are the next dominant item, followed again by acorns. In fall, acorns are the dominant food item. Other important food items are mushrooms, grapes, apples, sumac and blueberry. Leaves of woody species occur frequently in the deer's diet, but no woody twigs are eaten in the fall. In winter, acorns and grasses appear to be the most common food items. Mushrooms are also important, as are grapes and sumac fruits in early winter. Rhododendron leaves are the dominant food item in more southerly Appalachian Mountains. Woody twigs are browsed during the spring and early summer when this part of the plant is actually more of a succulent.

Several standards are in the Forest Plan for MA 3B that make provisions for early successional habitat: (1) provide not less than 5% and not more than 15% per compartment in the 0-10 year age class. Configuration of 0-10 year-old stands in surrounding project/analysis areas are considered in the analysis, (2) manage habitat primarily for eastern wild turkey, (3) use a desired density of 3% for permanent grass and forb openings, and (4) seed roads with appropriate wildlife seed mixtures.

3.1.2 Alternative A – No Action

Direct and Indirect Effects

Since there are no activities proposed in Alternative A, there will be no increase in habitat for the wild turkey, ruffed grouse, or white-tailed deer.

Cumulative Effects

The activities considered for cumulative effects for wildlife are those described in Section 1.7.5 of this document.

Early successional habitat will gradually decrease in the project area as the few acres in early successional habitat age into mid-successional age classes. Lacking creation of early successional habitat from natural forces such as wind storms or insect and disease attacks, the lack of early successional habitat could have negative cumulative effects on species dependant on that habitat component.

3.1.3 Alternative B – Proposed Action

Direct and Indirect Effects

Eastern Wild Turkey

Alternative B will create 284 acres of early successional habitat (0-10 year age class), thus creating considerable soft mast. Regeneration will eventually help produce greater hard mast crops in the future, which turkey greatly depend on for survival. Hard mast is a critical food for turkeys year-round. Also, this action alternative will increase permanent grass/forb habitat by 4.0 acres. Not only does this habitat provide a food source for turkeys, but grass/forb habitat can provide bugging areas for turkey (especially important for the growing poults), cover for the poults, and hens will nest close to grass/forb openings.

Ruffed Grouse
Alternative B will create 284 acres of early successional habitat (0-10 year age class), thus creating considerable soft mast. Also, this action alternative will increase permanent grass/forb habitat by 4.0 acres. Not only does this habitat provide a food source for grouse, but grass/forb habitat can provide bugging areas for grouse (especially important for the growing chicks), cover for the chicks, and hens will nest close to grass/forb openings.

White-tailed Deer
Alternative B will create 284 acres of early successional habitat (0-10 year age class), thus creating considerable soft mast. Regeneration will eventually help produce greater hard mast crops in the future, which deer depend on for reproductive success and subsequent fawn survival. Also, this action alternative will increase permanent grass/forb habitat by 4.0 acres, which provides an important food source for deer year-round.

3.1.4 Alternative C

Direct and Indirect Effects

Eastern Wild Turkey
Alternative C will create 178 acres of early successional habitat (0-10 year age class), thus creating less soft mast than Alternative B. Regeneration will eventually help produce greater hard mast crops in the future, which turkey greatly depend on for survival. Hard mast is a critical food for turkeys year-round. Also, this action alternative will increase permanent grass/forb habitat by 1.7 acres. Not only does this habitat provide a food source for turkeys, but grass/forb habitat can provide bugging areas for turkey (especially important for the growing poults), cover for the poults, and hens will nest close to grass/forb openings.

Ruffed Grouse
Alternative C will create 178 acres of early successional habitat (0-10 year age class), thus creating less soft mast than Alternative B. Also, this action alternative will increase permanent grass/forb habitat by 1.7 acres. Not only does this habitat provide a food source for grouse, but grass/forb habitat can provide bugging areas for grouse (especially important for the growing chicks), cover for the chicks, and hens will nest close to grass/forb openings.

White-tailed Deer
Alternative C will create 178 acres of early successional habitat (0-10 year age class), thus creating less soft mast than Alternative B. Regeneration will eventually help produce greater hard mast crops in the future, which deer depend on for reproductive success and subsequent fawn survival. Also, this action alternative will increase permanent grass/forb habitat by 1.7 acres, which provides an important food source for deer year-round.

Cumulative Effects

The activities considered for cumulative effects for wildlife are those described in Section 1.7.5 of this document.

The Johnnies Creek, Blue Walnut and Rich Nut Timber Sales are included in the calculation of early successional habitat (<20 years old) in the wildlife analysis area. These sales have resulted in the creation of some early successional habitat; however, the wildlife analysis area (Compartments 117-125) still has only about 1% of its total acreage in the 0-10 year age class. None of these sales were located within the Tanasee project area (Compartments 118-120). Implementation of the proposed project will result in no negative cumulative effects on MIS since no negative direct or indirect effects will occur. Management actions, including past and future regeneration harvesting, will actually increase habitat for black bear, eastern wild turkey, ruffed grouse and white-tailed deer, thus having a positive effect on these species. Management activities will not negatively affect Jordan's salamander since its habitat will be protected during project implementation.

Much of the area was harvested earlier in this century when it was in private ownership. The cessation of harvest under public ownership resulted in a long term decline of early successional habitat through the mid part of this century. Associated with that, species dependent upon such habitat decreased. Timber harvests on National Forest land in the 1960's and early 1970's greatly improved conditions for most game species. Populations of wildlife dependent upon late successional forest habitat were most likely unaffected by these early harvests as their habitat was still abundant. Recreation opportunities and usage began to increase dramatically during this period.

The Forest Service timber harvest in the 1980's continued the gradual reintroduction of early successional habitat into the landscape. The resultant increase in habitat diversity improved conditions for those species dependent upon a variety of successional types. Black bear do well with a mix of both types of habitat while other species such as gray squirrel, pileated woodpecker and many forest interior birds require late successional forests.

This improvement in habitat diversity has resulted in a slight reduction of late successional habitat; however, the gradual maturation of earlier harvests will offset this in the long term, provided a balance of age classes across forest types is maintained. This trend will continue with present and future forest management activities.

Reductions in late successional habitat will continue slowly and at a planned rate until habitat levels stabilize as the forest is harvested at a regulated rate. No adverse impacts are expected from such activities. When past and future projects are considered together across the landscape, approximately 6% of the available habitat for late successional forest species will be modified. An additional 1,200 acres in Compartments 118-120 will be approaching maturity within the next two planning cycles, and approximately 208 acres will remain humanly unaltered since they occur in MA 4C.

3.2 Effects Related to Key Issue #2: Water Quality and Aquatic Resources

Issue Statements: Timber harvesting and road building, especially on steep slopes, may cause sediment, which may decrease water quality and aquatic habitat affecting native brook trout populations.

Timber harvesting may cause sediment, which may adversely affect aquatic Federally Threatened or Endangered species; Regionally Sensitive species or species of Forest Concern.

Local streams and creeks may be negatively affected by the use of herbicide in the project area.

Measurements: Number of stream crossings (#)
MIS and Threatened and Endangered Species Protected (Yes/No)
Miles of road constructed and reconstructed (miles)

3.2.1 Existing Conditions (Water Quality and Aquatic Resources)

Water Quality

The proposed project is within the upper French Broad River watershed (Forest Plan watershed # 31). Principal streams in the aquatic project and analysis areas include Double Branch, Mill Branch, Miser Creek, Parker Creek, two unnamed tributaries (UT) to the West Fork of the French Broad River, and two UTs to Parker Creek.

All waters within the aquatic analysis area have been classified by the North Carolina Division of Water Quality as class C trout waters. The **C** classification denotes waters suitable for aquatic life propagation and survival, fishing, wildlife, secondary recreation, and agriculture. The **Tr** classification denotes waters suitable for natural trout propagation and maintenance of stocked trout. There is limited habitat for fish species within project area waters due to small stream size and restricted flow regimes. Project area waters do however provide habitat for macro-invertebrates.

See the Tanasee Forest Management Aquatics Analysis Report (Appendix C Section 4.0) for detailed descriptions of the aquatic habitat in the project area.

Local water quality data and area resident observations show that the West Fork French Broad River supports some of the highest turbidity levels in western North Carolina during and after rain events. Some of this turbidity is associated with existing old roads and unauthorized off-road vehicle use on the Forest; however, private land uses are also contributing to this situation. Although there is no pre-development aquatic habitat or population data to compare to, it is likely that aquatic habitat quantity and quality have been lost and that aquatic populations have been suppressed since development of the upper French Broad Valley. Two examples of this are the distribution of native salmonid fish (i.e. brook trout) and freshwater mussels within the upper French Broad Valley.

The North Carolina Department of Natural Resources, Division of Water Quality indicates that the West Fork of the French Broad River is listed as 303(d) impaired. The 303(d) list is a comprehensive public accounting of all "impaired" waterbodies that is derived from the "use support" report. This report describes the quality of surface waters, groundwaters, and wetlands. An "impaired" waterbody is one that does not meet water quality uses, such as water supply, fishing or propagation of aquatic life. According to the *North Carolina Water Quality Assessment and Impaired Waters List* report, the West Fork of the French Broad River is on the 303(d) list primarily due to organic/nutrient enrichment with sediment as a contributing stressor or cumulative cause. See Attachment 6 of Appendix C, The *Hydrological Analysis of the Tanasee Forest Management Project*, for further discussion of the West Fork of the French Broad.

Culverts along the Forest Service Roads 5077, 5077A, 5034 and 5035, the roads themselves, and existing old roads and skid trails in the project area are the existing threats to the streams and drainages. Impacts from these sources are limited to down slope movement of sediment from road runoff and culvert fills. It is suspected that much of these sediments are deposited in natural vegetative filters before they reach areas of perennial water (Clinton and Vose, 2003) because most of the roads are closed to all but administrative and fire control traffic (i.e. road disturbance is limited); however, some sediments may enter project area streams from these roads via ditch-lines and culverts (Waters, 1995; pp 24-26). Best Management Practices (BMPs) are used in road construction to minimize the impacts of roads on project area waters. Project plans include reseeding skid roads after use. Reestablishing a ground cover on newly constructed or reconstructed roads can effectively reduce sedimentation from forest roads (Grace, 2002, Swank *et al*., 2001).

Secondary road 1324 (Tanasee Gap Road) is the major existing threat to aquatic habitat and populations. The hydrological analysis (Appendix C, Attachment 6) indicates that the majority of the sediments within the upper section of Parker Creek are derived from SR 1324. Also, there are portions of streams within the aquatic analysis area (downstream of the aquatic project area) where runoff from other state maintained roads and agriculture are affecting area streams. Parker Creek is currently being impacted by a remnant trout raceway dam, two pond outflows and a cattle farm below National Forest Lands.

On National Forest lands, Miser Creek is being impacted by the illegal use by off road vehicles (OHV). USFS Law Enforcement has written citations for this area and continues to monitor use on FS5077 which is gated and closed, however, there is still illegal OHV use in the area. Miser Creek is impacted by development on private property below the National Forest boundary. There are several houses as well as a trout raceway dam located on the downstream section.

Management Indicator Species

Brook trout (*Salvelinus fontinalis*) and rainbow trout (*Oncorhynchus mykiss*) are known to occur within the aquatic analysis area. Brown trout (*Salmo trutta*), blacknose dace (*Rhinichthys atratulus*), bluegill (*Micropterus macrochirus*) and river chub (*Nocomis micropogon)* all occur within aquatic analysis area streams; however, these species' respective habitat exists mostly in the most downstream portion of the analysis area and based on field observations. Brook and rainbow trout were chosen as project-level management indicator species since they are sensitive

to changes in water quality and habitat condition and occur or may occur in streams within the project area and analysis area where suitable habitat exists. Brown trout, blacknose dace and bluegill were not chosen as project level MIS because they exist in the lower reaches of Parker Creek where there are numerous impacts from private lands and therefore would be impossible to monitor for impacts based on implementation of the Tanasee Forest Management Project.

Threatened, Endangered, Sensitive and Forest Concern Species

Forty-four rare aquatic species have been listed by the NCWRC, USFWS, or NCNHP as occurring or potentially occurring in Transylvania County. These species are included in Attachment 5 of Appendix C, which contains occurrence information for rare aquatic species on the Pisgah National Forest. Of the 44 aquatic species included on the original list for analysis, 36 were dropped as a result of a likelihood of occurrence evaluation based on preferred habitat elements and field survey results. Therefore, potential effects of the proposed project on eight rare aquatic species will be analyzed in this report. These species are listed in Table 3-2.

Table 3-2: Known and Potential Threatened and Endangered, Sensitive and Forest Concern Aquatic Species Evaluated

SPECIES	TYPE	HABITAT	OCCURRENCE
Federally Threatened and Endangered Species			
NONE			
2002 Region 8 Regional Forester's Sensitive Species List			
NONE			
SPECIES	**TYPE**	**HABITAT**	**OCCURRENCE**
Forest Concern Species			
Cryptobranchus alleganiensis (Hellbender)	Amphibian	Lotic-large clean substrate streams	Known to occur within the area
Necturus maculosus (Mudpuppy)	Amphibian	Lotic-large clean substrate streams	May occur within the analysis area
Agapetus jocassee (a caddisfly)	Caddisfly	Lotic- erosional	May occur in both project and analysis areas
Ceraclea species 1 (Lenat's ceraclea)	Caddisfly	Lotic and Lentic	May occur in both project and analysis areas
Helicopsyche paralimnella (a caddisfly)	Caddisfly	Lotic- clean substrate streams	May occur in both the project and analysis areas
Waltoncythere acuta (Transylvania crayfish ostracod)	Ostracod	Lotic- clean substrate streams	May occur in both the project and analysis areas
Barbaetis benfieldi (Benfield's bearded sm minnow mayfly)	Mayfly	Lotic- clean substrate streams	May occur in both the project and analysis areas
Serratella spicilosa (spicilose serratellan mayfly)	Mayfly	Lotic – Erosional and Depositional	May occur in both project and analysis areas

3.2.2 Alternative A – No Action

Direct and Indirect Effects-Aquatic Resources, Water Quality; and Riparian Habitat

Implementation of the no action alternative would perpetuate the existing condition described above and in the Aquatic Analysis (Appendix C, Section 4.0). Aquatic habitat quality and quantity and populations would continue in their natural dynamic patterns. It is important to note that natural processes include aspects such as extinction of species and loss of habitat types. There would be no direct or indirect impacts other than those due to existing and natural conditions upon the eight Forest Concern species or the two MIS from implementation of this alternative.

Direct and Indirect Effects-MIS; T&E, S and FC Species

There would be no direct or indirect effects to federally threatened, endangered, or sensitive aquatic species because none are known or expected to occur within the aquatic analysis area according to a likelihood of occurrence evaluation based on preferred habitat elements and field survey results. See Appendix C (Section 4.2.1 and Attachment 5) for additional details on the species evaluation process.

Implementation of Alternative A would perpetuate the existing condition of rare species including the natural fluctuations in population stability and habitat quality and quantity. There would be no direct or indirect impacts other than those due to existing and natural conditions upon the eight Forest Concern species or the two MIS from implementation of this alternative.

Cumulative Effects

Since there would not be direct or indirect effects on water quality from the implementation of this alternative, this alternative would not contribute to cumulative effects in the West Fork French Broad River.

In June of 1999, the District Ranger of the Pisgah Ranger District signed a Decision Memo for "Watershed Rehabilitation & Road Decommissioning" in the Parker Creek and Miser Creek watersheds in Transylvania County. Approximately 3.5 miles of road were rehabilitated by installing waterbars and sediment traps as well as disking and seeding. This has reduced sediment input from these old roads into Parker Creek, Miser Creek, and the West Fork of the French Broad River.

The North Carolina Department of Transportation has plans to improve the section of SR1324 that is assumed in this analysis to be the main cause of adverse affects on the Parker Creek channel. This road may also contribute to adverse cumulative effects in the West Fork French Broad River. During and just following the reconstruction of SR1324 there may be a slight increase in sedimentation to the connected tributaries and to Parker Creek since road fills would be disturbed and culverts installed and replaced. However, a notable reduction in sediment is expected in the long term (> one year) following site stabilization. Since reconstruction of this

road would improve road drainage by increasing the number of ditch relief culverts and reduce road-derived sediment inputs by paving, there is likely to be a beneficial effect on Parker Creek that could extend downstream to the West Fork French Broad River.

There would be no cumulative effects to federally threatened, endangered, or sensitive aquatic species because none are known or expected to occur within the aquatic analysis area. There will be no cumulative effects to the eight forest concern species and two MIS analyzed because no direct and indirect effects are expected as a result of implementation of this alternative.

3.2.3 Alternative B – Proposed Action

Direct and Indirect Effects- Aquatic Resources, Water Quality, and Riparian Areas

Access to the proposed units will involve the creation of 2.8 miles of newly constructed system road, 3.7 miles of road reconstruction, and 2.0 miles of temporary road construction and the development of skid trails and log landings. Riparian areas have been identified as 100 feet on either side of perennial channels and 30 feet on either side of intermittent channels. No activity, including the placement of log landings and skid trails, will occur in riparian areas with the exception of stream crossings.

Stream crossings have been designed so that they are least impacting on the project areas aquatic resources. Streams will be crossed perpendicular to their channel so the access road enters the riparian area, crosses the stream, and exits the riparian area. Road drainage will be designed so it flows off the roaded area and enters into vegetation rather than directly into project area streams. The largest crossing associated with Alternative B is the crossing on Parker Creek (FS5032) in Compartment 119 stand 23. This crossing was evaluated by USFS Engineers and the USFS Hydrologist. It was decided that an arch, open-bottomed culvert should be used to cross Parker Creek. Open-bottomed culverts allow for the movement of aquatic organisms by maintaining habitat under the crossing.

Other culverts associated with access into Compartments 118 and 119 (on FS road 5032) include four perennial crossings and two intermittent crossings. The size of the culverts will be based on an analysis conducted by USFS Engineers. The placement of culverts into these stream crossings will result in the loss of approximately 26 to 34 linear feet of stream bottom. Where feasible, culverts will be buried in stream substrate so that a natural stream bottom can reestablish in the pipe bottom to allow for aquatic organism passage. During these culvert installations a “pulse” of sediments will flush downstream into Parker Creek where some sediments may flush on down into the West Fork of the French Broad River (see Attachment 6-Hydrological Analysis of Appendix C-Aquatic, Botanical and Terrestrial Wildlife Analyses Report).

Table 3-3 summarizes the number of stream crossings and miles of system road construction and reconstruction by alternative.

Table 3-3: Number of New Stream Crossings and Miles of System Road Construction and Reconstruction by Alternative

Measurement	Alternative A	Alternative B	Alternative C
Number of New Stream Crossings	0	7	0
Miles of New System Road Construction	0 miles	2.8 miles	0.5 mile
Miles of System Road Reconstruction	0 miles	3.7 miles	3.7 miles

There is no plan to harvest within the 100 foot riparian area of any analysis or project area streams. However, approximately 0.46 acres of riparian vegetation associated with stream crossings would be impacted by this alternative. There are no other expected direct or indirect effects to riparian habitat with Alternative B with the successful implementation of NC-FPG and LRMP standards. There is the possibility that as trees are cut, they will cross a stream channel or spring. While large woody debris in and adjacent to stream channels is desirable for aquatic habitat diversity, it needs to be of the same scale as the channel size and type. The scales of the trees and stream channels do not match, and it is possible that leaving large tree boles in the channels and across springs could result in flow obstruction, which can lead to accelerated bank scouring and failure, and subsequently, sedimentation of local and downstream channels. To avoid the potential for this habitat loss, trees accidentally felled across stream channels or springs should be removed. "Drag lanes" should not be designated for the removal of these trees to avoid severe bank disturbance. Rather, trees should be removed individually, from where they fell. It is unlikely that pulling individual trees across will result in permanent stream bank damage. Any damage done to the stream banks will most likely be temporary, as there is an abundance of herbaceous vegetation along the banks that will quickly recolonize bare soil.

NC-FPG (Forest Practice Guidelines) and the Forest Plan standards should be applied to the harvest activity. Applications of Forest Plan standards are intended to meet performance standards of the state regulations. Visible sediment, derived from timber harvesting, defined by state regulations should not occur unless there is a failure of one or more of the applied erosion control practices. Should any practice fail to meet existing regulations, additional practices or the reapplication of existing measures will be implemented as specified by state regulations.

The implementation of this alternative under current conditions would likely increase the load of sediment transported to the Parker Creek stream channel. Since flows in Parker Creek are not adequate to transport the fine sediment produced from SR1324 and deposition is occurring to the point of embedding larger substrate and filling pools, the road proposed in the Parker Creek drainage under Alternative B would exacerbate the existing sedimentation problem. This additional sediment loading could add to a further reduction in aquatic habitat quality. As sediment is transported down stream during high streamflows much would be deposited behind the remnant trout raceway dam until capacity of the structure is exceeded or structure failure occurs. At this point, sediment would be more likely to move downstream to the West Fork French Broad River.

Direct and Indirect Effects-MIS, T&E, S and FC Species

Sedimentation of aquatic habitats within the aquatic analysis area could result in the loss of clear-flowing spring habitats and valuable headwater stream origins. Aquatic species utilizing these areas (such as the dragonflies) could be locally lost. Spawning areas for fishes occupying downstream reaches (brook, rainbow, and brown trout and blacknose dace) could also be reduced or lost to sedimentation. Stream gradients and flow regimes within the analysis areas may not be dynamic enough to rely on natural flushing to occur. Therefore, any losses have the potential to be permanent. There may be off-site movement of soil into project area waters from reconstruction and culvert placement. Turbidity and sediment loading can cause mortality by injuring and stressing individuals or smothering eggs and juveniles. Available habitat, including the interstitial space within substrate used as spawning and rearing areas, may be covered with sediments. Episodic fluctuations in turbidity may occur after soil disturbance ends because sediments deposited within the stream bed may be resuspended during high flow events (Swank *et al*. 2001). If habitat complexity is lost through sedimentation, a shift in the aquatic insect community could occur that favors tolerant macroinvertebrates.

Larger, more mobile aquatic species, such as fish and hellbenders are able to temporarily escape the effects of sedimentation by leaving the disturbed area. Eggs and juveniles may be lost to reduced habitat or suffocation. This can result in the loss of or reduced year class strength, which can lead to accelerated population fluctuations and suppressed population levels. Over time, these species will recolonize areas as habitat conditions improve. Smaller less mobile organisms such as crayfish and aquatic insects may not be able to move to more suitable habitat. Populations of these species may decline locally or be lost through reduced productivity. These may recolonize from reaches of undisturbed streams as conditions improve with site rehabilitation. Implementation of the contract clauses, erosion control precautions, and stream crossing methods described above should minimize sediment effects and accelerate site rehabilitation.

The proposed actions in Alternative B may suppress MIS spawning habitat in Parker Creek due to sedimentation; but, is not expected to affect population viability of these species.

The implementation of Alternative B could potentially impact individuals of Forest concern species due to the direct impacts to approximately 210 linear feet of stream. Habitat for rare aquatic insects (listed in Table 3-2) is located in the interstitial space of substrate within streams. Therefore, by impacting 210 linear feet of stream with road construction, there would a direct impact to individuals occupying this habitat as well as an indirect impact due to off-site movement of soil during stream crossing placement. More mobile species such as the hellbender and the mudpuppy (listed in Table 3-2) will emigrate away from disturbed areas. It should be noted that no hellbender or mudpuppy habitat exists within the areas proposed for stream crossings. Therefore, the only potential indirect impact to the hellbender and mudpuppy population would be sediment entering into the lower reaches of Parker Creek and the West Fork of the French Broad (refer to Appendix C Attachment 6).

Aquatic populations and habitats will be protected though implementation of the applicable mitigation measures contained in the Vegetation Management in the Appalachian Mountains (VMAM) FEIS issued in July 1989 for proposed actions that include the application of herbicides.

Table 3-4 summarizes the effects to estimated Forest-wide population trends for the two aquatic MIS evaluated for this project.

Table 3-4: MIS, estimated trend, and biological community or special habitat indicated by the species.

MIS	Alternative A	Alternative B	Alternative C
Brook & Rainbow Trout	Existing habitat and population trends continue.	May suppress spawning habitat in Parker Creek due to sedimentation but not expected to affect population viability trends across the Forest.	May have temporary fluctuations in turbidity. Not expected to permanently affect habitat or population viability across the Forest.

Cumulative Effects

Past projects and events within the analysis area of the Tanasee Forest Management Project include private and previous Forest Service timber projects, including the T and T Timber Sale and the Miser Creek Wildlife Project. Other disturbances within the analysis area include several dams and trout farms on private land within the aquatic analysis area, and southern pine beetle salvage. As mentioned in the existing condition, State Road 1324, Tanasee Gap Road, is causing sedimentation to enter into the headwaters of Parker Creek and Parker Creek tributaries. The North Carolina Department of Transportation (NCDOT) is planning to pave this road. If this road is paved, it is reasonably foreseeable that habitat within Parker Creek and its tributaries will improve. It is expected that the past and on-going activities listed above are contributing to the suppression of spawning habitat within Parker and Miser Creeks.

Implementation of Alternative B may contribute to additional cumulative impacts to Parker Creek and further suppress trout spawning habitat. Please refer to Appendix C (Attachment 6), the Hydrological Analysis, for details regarding sediment transport into the West Fork of the French Broad River.

Since the implementation of this alternative would have adverse effects on the existing sediment regime, there is a potential for this alternative to have adverse cumulative effects on the West Fork French Broad River. Sediment produced at the new road construction could be routed through the Parker Creek channel and transported to the water quality limited reach on the West Fork French Broad River. Movement of fine sediment through the Parker Creek stream network is assumed efficient, evident by the lack of large wood in the channel, limited storage potential, and high flow energy. Although the amount of sediment that is likely to transport downstream is small relative to the other sources of sediment within the sub-watershed it could still contribute to stressing protected uses.

The cumulative effects due to the proposed improvements to SR 1324 by NCDOT would be the same as under Alternative A.

3.2.4 Alternative C

Direct and Indirect Effects- Aquatic Resources, Water Quality, and Riparian Areas

Alternative C drops all new construction of roads within the Parker Creek watershed involving 5 perennial stream crossings and 2 intermittent crossings including one bottomless arch crossing in Parker Creek. With Alternative C, there are no additional stream crossings that will be necessary to replace or newly construct. The existing crossings associated with FSR 5077 in Mill Branch and two tributaries to Mill Branch are in good working condition and will require no work or additional crossings. There will be no harvesting of riparian vegetation associated with road construction. Therefore, approximately 0.46 acres of riparian vegetation associated with stream crossings proposed in Alternative B will remain intact and functioning.

Therefore, Alternative C will have significantly less direct and indirect impacts to the aquatic resources within the project area by affecting less linear footage (approximately 210 linear feet) of stream habitat than is associated with Alternative B. It is however, important to note that neither of the alternatives will have negative impacts on the viability of any of the Forest concern species evaluated for this project (see Table 3-2) as none were found at the locations of the crossings during field surveys and site visits.

This alternative does not propose new construction of Forest Service system roads in the Parker Creek drainage, but rather uses existing and temporary roads to access harvest units along SR1324. Temporary road construction of 0.3 miles is proposed in the Parker Creek drainage. No stream crossings will be replaced or installed under Alternative C. Several of the existing roads do have stream crossings and any sediment produced from the road system would occur during logging operations. The amount of soil moved to streams would be minimal and with the implementation of Best Management Practices would be further reduced. Since this alternative does not increase road density in the Parker Creek drainage, water runoff is not expected to increase. Therefore, this alternative is not likely to contribute to direct or indirect effects on the sediment and streamflow regime of Parker Creek.

Direct and Indirect Effects-MIS, T&E, S and FC Species

Proposed activities may cause temporary fluctuations in stream turbidity; however, this is not expected to permanently affect habitat or population viability for Threatened and Endangered, Sensitive and Forest Concern Species or project MIS. Neither of the alternatives will have negative impacts on the viability of any of the Forest concern species listed in Table 3-2 as none were found at the locations of the crossings during field surveys and site visits.

Cumulative Effects

With the implementation of Alternative C, it is very unlikely that, given the location and types of management proposed, any long-term effects on aquatic species or habitat will be measurable,

and therefore contribute to cumulative effects. There has been a tremendous amount of planning and resource specialist involvement in the planning and design of the units proposed for the Tanasee Forest Management Project. There should be no adverse cumulative effects to the analysis area aquatic resources, based on the Project Design Features included in this analysis (See Appendix C Section 4.2.6).

Since there would not be measurable direct or indirect effects from the implementation of this alternative, this alternative would not contribute to cumulative effects in the West Fork French Broad River.

The cumulative effects due to the proposed improvements to SR 1324 by NCDOT would be the same as under Alternative A.

Table 3-5 summarizes the potential effects to aquatic habitat by alternative.

Table 3-5: Summary of Potential Effects to Aquatic Habitat by Alternative

Issue	Alternative A	Alternative B	Alternative C
Effects on aquatic MIS	Existing habitat and population trends continue.	May suppress spawning habitat in Parker Creek due to sedimentation but not expected to affect population viability.	May have temporary fluctuations in turbidity. Not expected to permanently affect habitat or population viability.
Effects on water quality (Associated with the amount of soil disturbance)	No change from existing condition.	Turbidity and sediment loading is expected in the Parker Creek drainage. Turbidity will cease as site rehabilitation is achieved.	Turbidity and sediment loading would occur at existing water crossings but should diminish downstream and cease with site rehabilitation.
Effects on aquatic habitat and populations	Existing habitat and population trends continue.	May further suppress local habitat in Parker Creek.	No long-term, permanent effects expected.
Effects to riparian areas	Remain in present state. Aquatic habitat will improve, as riparian areas grow older.	Remain in present state except at stream crossings (approximately 0.46 acres). Aquatic habitat would improve, as riparian areas grow older, increasing large woody debris in streams.	Aquatic habitat would improve, as riparian areas grow older, increasing large woody debris in streams.
Effects of herbicide	No impact	No impact	No impact

3.3 Effects Related to Key Issue #3: Road Management/Access

Issue Statements: Adding additional miles to the existing road system may influence the ability of the Forest Service to maintain all of the miles of road on the system.

Adding additional miles to the existing road system will provide additional access for illegal activities in the area such as ATV riding and poaching of archeological sites and wildlife.

Measurements: Miles of road added to the existing road system
Open Road Density (miles/square mile)
Total Road Density (miles/square mile)

3.3.1 Existing Condition (Roads)

The Roads Analysis prepared for the Miser Creek Wildlife Project will be used for this project because the analysis area is the same. The roads analysis area is defined as the Miser Creek and Parker Creek drainages as confined by the western ridge of the Johnnies Creek drainage to the north, the Transylvania–Jackson County line to the west, NC 281 and SR 1309 to the south, and SR 1310 and the eastern ridge of the Parker Creek drainage to the east. An inventory of all the federal, state, and Forest Service roads located within the analysis area was conducted.

Existing System: Primary access to the area is provided by paved, double-lane state secondary roads. North Carolina 281 provides the main access to the southern portion of the area from the nearest towns, Lake Toxaway and Rosman. Secondary Road 1324 connecting to North Carolina 215 provides access to the north from Rosman.

Forest Service System Roads 5077, 5077B, 5077A, provide access into the area from the south and FSR 5034, 5035 and 5036 provides access into the northwestern portions of the Parker Creek drainage. System Road 5324 accesses the North Fork of Tucker Creek drainage. Forest System Road 5034, Woods Cemetery Road, is the only open road in the analysis area and provides access to the Woods Cemetery and Chapel. All are classified as local roads under Forest Service jurisdiction and are maintained by the Forest Service.

There are additional miles of unclassified roads in the area resulting from the Parker Creek, Owens Gap, Miser Creek/Indian Creek, and Johnnies Creek timber sales occurring respectively in 1973, 1980, 1990, and 1992. For the most part these travel ways were temporary roads and have grown up or have been blocked by natural slides or gates. There is some illegal OHV traffic on some of these routes.

Currently there are about 0.2 miles of open Forest Service roads located within the Tanasee Project Area. There are approximately 6.2 miles of closed Forest Service roads located within the boundaries of the project area. The table below lists all of the Forest Service roads and their status within the project area.

Table 3-6: Summary of Forest Service Roads in the Analysis Area

Road Number	Road Name	Miles	Restrictions	Surface	Lanes
5077	Miser Creek	0.7	Closed - gate	Gravel	Single
5077B	Mill Branch	0.5	Closed	Gravel	Single
5077A	Indian Rock	0.3	Closed	Gravel	Single
5035	Bracken Mtn	1.8	Closed - gate	Gravel	Single
5324	North Fork Tucker Creek	2.2	Closed - gate	Gravel	Single
5034	Woods Cemetery	0.2	None	Gravel	Single
5036	Double Head	0.7	Closed	Gravel	Single
TOTAL		6.4			

There are several roads maintained by the North Carolina Department of Transportation located within and along the boundaries of the project area. Approximately 1.4 miles of North Carolina Highway 281; 1.7 miles of Secondary Road 1324, Tanasee Gap road; 0.9 mile of Secondary Road 1310; and 0.1 mile of Secondary Road SR 1311 lie within the boundaries of the project area. In addition, 0.3 mile of Secondary Road 1309 is part of the southern boundary of the project area.

The open road density of the project area is 0.5 miles per square mile (mi/sqmi). The majority of the open roads within the project area are part of the state highway system and cannot be closed. The only open Forest Service road in the analysis area is 0.2 mile of road that provides access the old Woods Chapel and cemetery. The total road density for the project area is 1.6 mi/sqmi.

In addition all roads, particularly open roads, increase risk to invasion by exotic invasive species.

3.3.2 Alternative A – No Action

Direct, Indirect, and Cumulative Effects

There would be no new road construction or road reconstruction under Alternative A. This alternative would not add any mileage to the existing Forest Service road system. The open road density would remain at 0.5 mi/sqmi and the total road density would remain at 1.6 mi/sqmi. The North Carolina Department of Transportation (NCDOT) has plans to improve about 2.0 miles of SR 1324, Tanasee Gap Road, which crosses approximately 1.7 miles of Forest Service property. This proposed project would start about 4 miles west of NC 215 and would continue 10,400 feet to Tanasee Gap at the Jackson and Transylvania County lines. The proposed work is intended to connect the portions of Tanasee Gap road that are currently paved, and to curtail existing erosion and sedimentation problems occurring along the road in this area. The proposed work includes a minimum paving width of 16 feet plus 1-foot ditch on each side (for a total of 18 feet). Up to 15 culverts would be installed or replaced, and headwalls and additional engineered water control mechanisms will be prescribed. Surface disturbance would involve grading, occasional widening, and removal and installation of culverts.

The proposed NCDOT project on SR 1324 would change the surface of the road from gravel to pavement and would widen the road in a few places as well as improve drainage. However, this project would not add addition mileage to the road system in the Tanasee Project area.

There would be no change to access into the analysis area and no cumulative effects concerning management of Forest Service roads in the project area. NCDOT would see some positive cumulative effects to their road management in reduced maintenance costs due to the proposed improvements to SR 1324. The improved conditions would result in a safer road for all users of SR 1324.

3.3.3 Alternative B – Proposed Action

Direct and Indirect Effects

There would be approximately 3.7 miles of system road reconstruction, 2.8 miles of new system road construction and 2.0 miles of temporary road construction under Alternatives B. The table below shows which roads are proposed for work. These roads would be managed as closed to the public and would not change the open road density within the analysis area (See Table 3-8).

Table 3-7: Miles of Road added to the Existing Road System-Alternative B

Road Number	Road Name	System Road Reconstruction	System Road Construction	Temporary Road Construction	Total Miles
5077	Miser Creek	1.8	0.5	0	2.3
5077A	Indian Rock	0.3	0	0	0.3
5032	Parker Creek	0	2.3	0	2.3
5034	Woods Cemetery	0.2	0	0	0.2
5035	Bracken Mtn.	1.4	0	0	1.4
n/a	C120S26	0	0	0.3	0.3
n/a	C118S08	0	0	0.4	0.4
n/a	C118S27	0	0	0.2	0.2
n/a	C118S22	0	0	0.1	0.1
n/a	C119S09	0	0	0.6	0.6
n/a	C119S26	0	0	0.4	0.4
TOTAL MILES		**3.7**	**2.8**	**2.0**	**8.5**

Table 3-8: Road Densities within the Analysis Area by Alternative

	Forest Plan Standard for MA 3B	Alternative A	Alternative B	Alternative C
Open Road Density	0.5 mile/square mile	0.5 mi/sqmi	0.5 mi/sqmi	0.5 mi/sqmi
Total Road Density	None	1.6 mi/sqmi	2.1 mi/sqmi	1.7 mi/sqmi

Cumulative Effects

The cumulative effects resulting from the proposed improvements to SR 1324 by NCDOT would be the same as described under Alternative A.

Under Alternative B, the miles of open Forest Service road within the analysis area would remain at 0.2 miles. The open road density would remain at 0.5 mi/sqmi which meets the Forest Plan Standard of 0.5 mi/sqmi for Management Area 3B. There are no open roads within Management Area 4C which has a Forest Plan Standard of 0.25 mi/sqmi. The total road density of the analysis area would increase from 1.6 mi/sqmi to 2.1 mi/sqmi.

Since all newly constructed system roads would be maintained as closed as directed in MA 3B, maintenance costs would be small once the timber sale has closed due to only infrequent use of the roads for administrative purposes. Therefore, increases to overall Forest Service road maintenance costs of a result of proposed new road construction would be minimal.

No new roads that would be legally open to the public would be created as a result of this alternative. Persons using any roads illegally and/or for illegal activities will be subject to citations by Forest Service law enforcement personnel. Work is ongoing and will continue to prevent illegal use of roads on Forest Service property.

3.3.4 Alternative C

Direct and Indirect Effects

There would be approximately 3.7 miles of system road reconstruction, 0.5 mile of new system road construction and 0.8 mile of temporary road construction under Alternative C. The table below shows which roads are proposed for work. These roads would be managed as closed to the public and would not change the open road density within the analysis area (See Table 3-8).

Table 3-9: Miles of Road added to the Existing Road System-Alternative C

Road Number	Road Name	System Road Reconstruction	System Road Construction	Temporary Road Construction	Total Miles
5077	Miser Creek	1.8	0.5	0	2.3
5077A	Indian Rock	0.3	0	0	0.3
5034	Woods Cemetery	0.2	0	0	0.2
5035	Bracken Mtn.	1.4	0	0	1.4
n/a	C120S26	0	0	0.3	0.3
n/a	C118S08	0	0	0.4	0.4
n/a	C118S22	0	0	0.1	0.1
TOTAL MILES		**3.7**	**0.5**	**0.8**	**5.0**

Cumulative Effects

The cumulative effects resulting from the proposed improvements to SR 1324 by NCDOT would be the same as described under Alternative A. The total road density of the analysis area would increase from 1.6 mi/sqmi to 1.7 mi/sqmi.

Under Alternative C, the miles of open Forest Service road within the analysis area would remain at 0.2 miles. The open road density would remain at 0.5 mi/sqmi which meets the Forest Plan Standard of 0.5 mi/sqmi for Management Area 3B. There are no open roads within Management Area 4C which has a Forest Plan Standard of 0.25 mi/sqmi. The total road density of the analysis area would increase from 1.6 mi/sqmi to 1.7 mi/sqmi.

The cumulative effects to overall Forest Service road maintenance costs of a result of proposed new road construction and illegal use of roads would be the same as under Alternative B.

3.4 Effects Related to Key Issue #4: Sustainable Timber Supply

Issue Statement: There has been no timber harvesting in the project area in almost fifteen years; therefore, no progress has been made in achieving a balanced aged class distribution and the area is not providing a sustainable supply of timber in its timber suitable management areas as directed by the Forest Plan.

Measurements: Age-class distribution for timber suitable areas (acres per 10 year age class)
Harvested Acres

3.4.1 Existing Condition (Sustainable Timber Supply)

The vegetative analysis area is approximately 3,548 acres and is located in Compartments 118, 119, and 120 in the Parker Creek area of Transylvania County.

The majority of the project area is hardwood forest consisting primarily of northern red oak, white oak, hickory, and yellow poplar. There are small acreages of white pine, white pine mixed with upland hardwoods, pitch or virginia pine mixed with oak, chestnut oak, and scarlet oak.

A desired future condition of timber emphasis areas is to produce a sustainable supply of timber by regulating the growth and removal of trees through time. Forest-wide direction calls for a regular and sustained flow of habitats across the Forests through space and time for diversity and viability of plant and animal populations.

The forest is composed of stands that are delineated according to age, forest type, and site conditions. The goal in timber emphasis areas is a balanced age class distribution. The definition of a balanced age class distribution is a fairly even distribution of acres among all of the age classes. Age-class distribution is helpful in describing forest condition. In this analysis, age class distribution will be used as a measurement to reflect how well the different alternatives represent a balanced age class distribution.

Approximately 88% of the Tanasee project area is located in land classes that are managed for timber production. Or stated another way, about 12% of the Tanasee project area is not managed

for timber production. All of the areas proposed for timber harvesting are located within Management Area 3B which places an emphasis on producing a sustainable supply of timber.

There are approximately 3140 acres of forested acres located in timber suitable management areas in the Tanasee Project area. The following table shows the age-class distribution for the forested acres in land classes suitable for timber production in the Tanasee project area.

Table 3-10: Current Age Class Distribution
Base Year 2004, Timber Suitable Areas, Tanasee Project Area

Age Class	Acres	% of Total
0-10 year age class	0	0
11-20 year age class	37	1.2%
21-30 year age class	294	9.4%
31-40 year age class	0	0
41-50 year age class	100	3.2%
51-60 year age class	68	2.2%
61-70 year age class	45	1.4%
71-80 year age class	560	17.9%
81-90 year age class	629	19.9%
91-100 year age class	728	23.2%
100+ year age class	679	21.6%
Total acres	**3140**	**100%**

As indicated in the table, 0% of the analysis area is 0-10 years old, 1% is between 11 and 20 years old, 15% is between 21 and 60 years of age, 19% is between the ages of 61 and 80, 43% is between 80 and 100 years of age, and 22% is over 100 years old. See Figure 1-1 for a graphic display of the existing Age Class Distribution for the project area. The definition of a balanced age class distribution is a fairly even distribution of acres among all of the age classes.

There is a five acre harvest unit planned within the project area as part of the Miser Creek Wildlife Project. There are no other current or planned timber harvests on National Forests lands within the Tanasee project area. There is no knowledge of ongoing or planned timber harvesting on private lands located within the Tanasee project area

3.4.2 Alternative A – No Action

Direct, Indirect, and Cumulative Effects

There are 5 acres of regeneration planned in the project area which are included in the Miser Creek Wildlife Project Decision that have not been implemented. All other timber sales in the vicinity of the analysis area (Compartments 118-120) over the past 12 years have been located outside of the project area. See Table 1-6 in Section 1.7.5 of this EA.

There would be no timber harvested in Alternative A; therefore, there would be no changes to the age class distribution of the project area with the implementation of this alternative. This

alternative would not contribute toward meeting the need of providing a sustainable flow of timber from the national forests, because no timber would be removed.

3.4.3 Alternatives B and C

Direct and Indirect Effects

Regeneration is proposed in Alternatives B and C. The following tables show the changes to the age class distribution under the different alternatives. The changes are shown in acres and in percent of the Tanasee project area represented by each age class. There are 5 acres of regeneration planned for in the Miser Creek Wildlife Project Decision that have not been implemented. The following tables assume implementation of that project.

Table 3-11: Age Class Distribution by Alternative After Proposed Treatments
Shown as acres in Timber Suitable Areas in the Tanasee project area

Age Class (acres)	Alt A	Alt B	Alt C
0-10 year age class	5	289	183
11-20 year age class	37	37	37
21-30 year age class	294	294	294
31-40 year age class	0	0	0
41-50 year age class	100	100	100
51-60 year age class	68	68	68
61-70 year age class	45	45	45
71-80 year age class	560	560	560
81-90 year age class	624	589	589
91-100 year age class	728	633	660
100+ year age class	679	525	604
Total acres	**3140**	**3140**	**3140**

Table 3-12: Age Class Distribution by Alternative After Proposed Treatments
Shown as a percentage of the Timber Suitable Areas in the Tanasee project area

Age Class (percent of timber suitable ac)	Alt A	Alt B	Alt C
0-10 year age class	0.1%	9.2%	5.8%
11-20 year age class	1.2%	1.2%	1.2%
21-30 year age class	9.4%	9.4%	9.4%
31-40 year age class	0	0	0
41-50 year age class	3.2%	3.2%	3.2%
51-60 year age class	2.2%	2.2%	2.2%
61-70 year age class	1.4%	1.4%	1.4%
71-80 year age class	17.8%	17.8%	17.8%
81-90 year age class	19.9%	18.8%	18.8%
91-100 year age class	23.2%	20.1%	21.0%
100+ year age class	21.6%	16.7%	19.2%
Totals	**100%**	**100%**	**100%**

Under Alternatives B and C, the 0-10 year age class would increase to 9.2% and 5.8% respectively. There would be no changes in the 11-80 year old age classes. There would be decreases of 1.1% in Alternatives B and C in the 81-90 year age class. The 91-100 year age class would decrease 3.1% in Alternative B and would decrease 2.2% in Alternative C. There would be a decrease of 4.9% in the 100+ year age class in Alternative B and a decrease of 2.4% in Alternative C.

In general, Alternatives B and C would help meet the objective of a healthy sustainable forest and provide a more balanced age class distribution.

Alternatives B and C would help meet the objective of providing a sustainable flow of timber. Table 3-13 shows the acres of timber proposed for harvesting by alternative. Table 3-14 depicts estimated volume produced by each alternative.

Table 3-13: Harvested Acres by Alternative

	Alt. A	Alt. B	Alt. C
Harvested Acres	0	284 ac	178 ac

Table 3-14: Estimated Timber Volume
In hundred cubic feet (CCF) and million board feet (MBF) for each alternative.

	Alt. A	Alt. B	Alt. C
Volume of timber produced (CCF)	0	4656 CCF	2550 CCF
Volume of timber produced (MBF)	0	2561 MBF	1403 MBF

Alternatives B and C are supported by the science of forest management by integrating research and management to achieve the projects objectives as outlined in the Forest Plan. These alternatives also emphasizes high value hardwood sawtimber as a condition and commodity, high quality hardwood species on highly productive sites and takes advantage of the forests ability to produce large trees of hardwood species such as northern red oak and black cherry.

Cumulative Effects

The only other proposed, planned, or ongoing activities in the Tanasee Project area is the 5 acres of regeneration planned for implementation in 2005 as part of the Miser Creek Wildlife project. That project is reflected in the tables showing the age class distribution for all alternatives after planned treatments (Tables 3-11 and 3-12). There are no additional anticipated cumulative effects to the age class distribution of the Tanasee Project area. Natural events including windstorms and insect or disease infestation could change the age class distribution; however, the effects of such events are unpredictable and would occur across all alternatives.

There would be no effects in addition to those disclosed under direct and indirect effects because there are no other timber harvests currently proposed, planned, or ongoing within the analysis area.

CHAPTER FOUR
4.0 List Of Preparers

Karen Compton – Zone Planner, Pisgah National Forest
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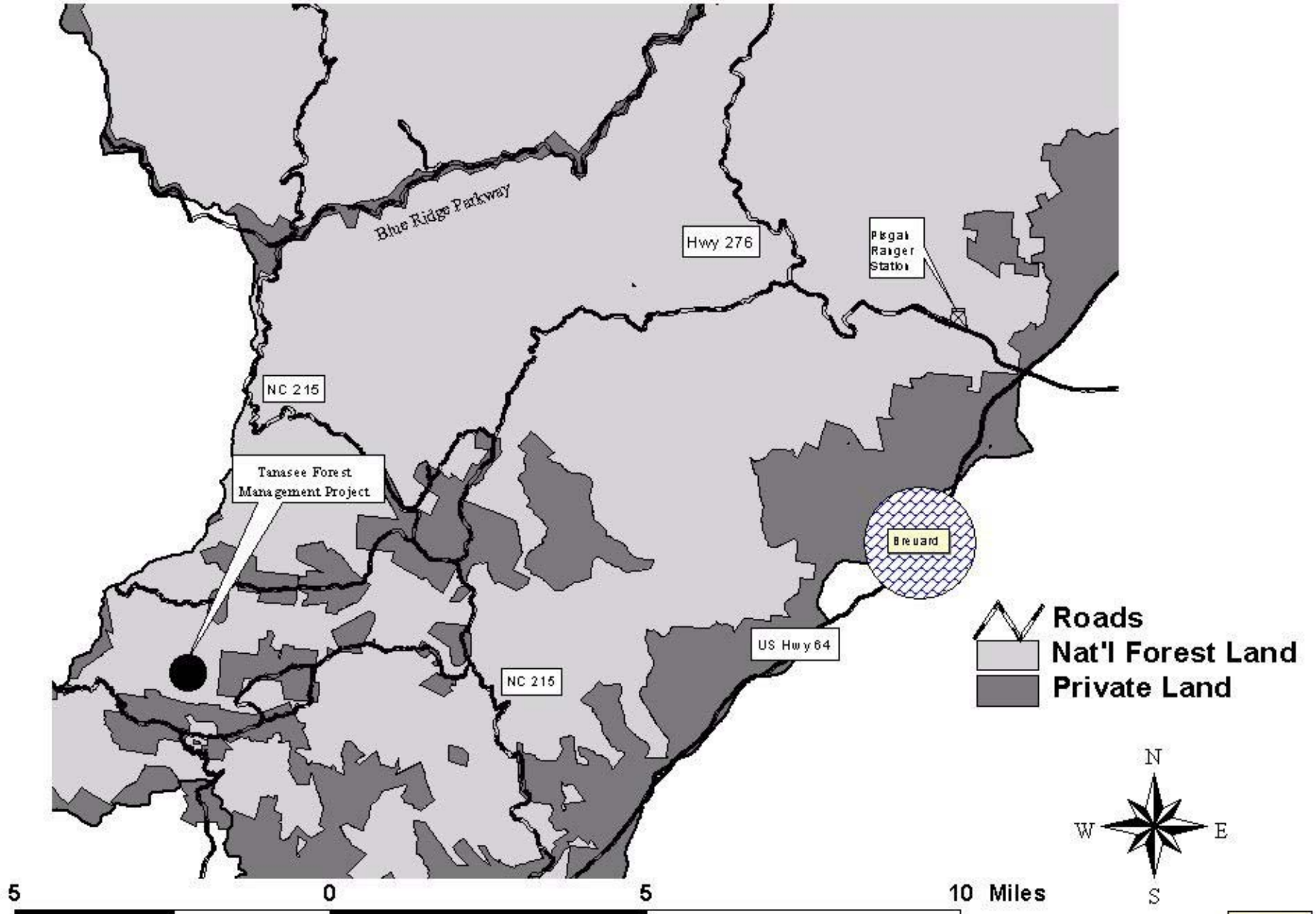
APPENDIX A

TANASEE FOREST MANAGEMENT PROJECT

VICINITY MAP OF PROJECT AREA

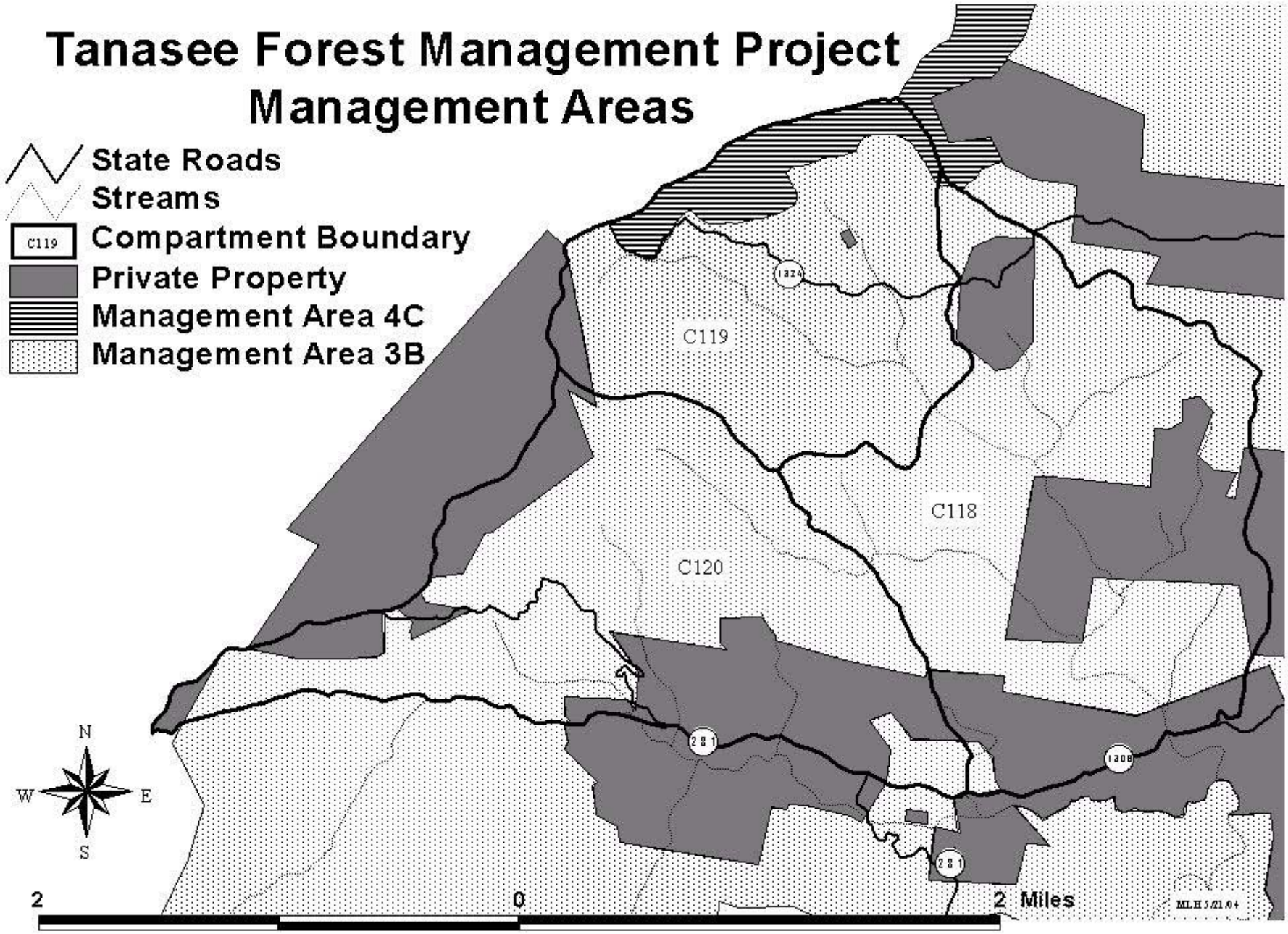
Tanasee Forest Management Project Vicinity Map



APPENDIX B

TANASEE FOREST MANAGEMENT PROJECT

MAP OF MANAGEMENT AREAS


Tanasee Forest Management Project
Management Areas
State Roads
Streams
C119
Compartment Boundary
Private Property
Management Area 4C
Management Area 3B
C119
C118
C120
1324
281
1308
281
N
W
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S
2
0
2 Miles

APPENDIX C

TANASEE FOREST MANAGEMENT PROJECT

AQUATIC, BOTANICAL AND TERRESTRIAL WILDLIFE ANALYSES REPORTS
And
BIOLOGICAL EVALUATION

AQUATIC, BOTANICAL AND TERRESTRIAL WILDLIFE ANALYSES REPORT
AND
BIOLOGICAL EVALUATION

TANASEE FOREST MANAGEMENT PROJECT

PISGAH NATIONAL FOREST

PISGAH RANGER DISTRICT

TRANSYLVANIA COUNTY

NORTH CAROLINA

Table of Contents

1.0 PROJECT DESCRIPTION – TANASEE FOREST MANAGEMENT PROJECT

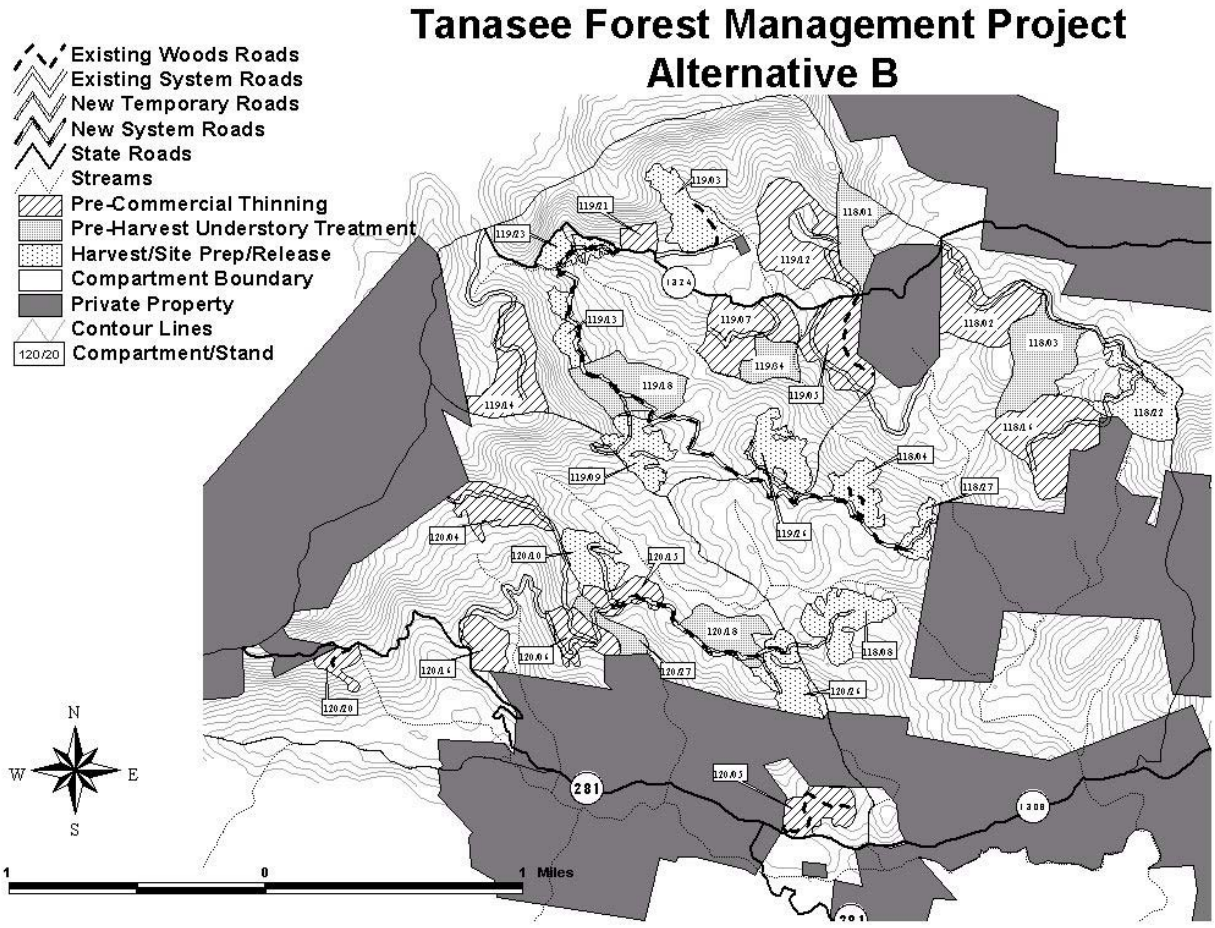
Three alternatives will be analyzed for this proposed project (Table 1). For a more detailed description of each alternative, refer to the Environmental Assessment for the Tanasee Forest Management Project. Alternatives A is the "no action" alternative, and Alternatives B and C are the action alternatives. All numbers (e.g., acres being treated, miles of roading) are correct at the time of this writing of this analysis.

Table 1. Summary of Alternatives (total acreage and miles).

PROPOSED ACTIONS	Alt. A	Alt. B	Alt. C
Total Harvest (ac)	0 ac	284 ac	178 ac
Two-age Harvest	0 ac	284 ac	178 ac
Skyline	0 ac	121 ac	34 ac
Skidder	0 ac	163 ac	144 ac
Clearcut Harvest	0 ac	0 ac	0 ac
Skyline	0 ac	0 ac	0 ac
Skidder	0 ac	0 ac	0 ac
Group Selection	0 ac	0 ac	0 ac
Commercial Thinning	0 mi	0 ac	0 ac
Total Roading (mi)	0 mi	8.5 mi	5.0 mi
Construct system road	0 mi	2.8 mi	0.5 mi
Reconstruct system road	0 mi	3.7 mi	3.7 mi
Construct temporary road	0 mi	2.0 mi	0.8 mi
Cultural Treatments (ac)	0 ac	847 ac	708 ac
Site Prep (H&H *)	0 ac	284 ac	178 ac
Natural	0 ac	197 ac	91 ac
Artificial	0 ac	87 ac	87 ac
Plant harvest areas	0 ac	87 ac NRO	87 ac NRO
Release	0 ac	284 ac	178 ac
PHUT & VC (H&H*)	0 ac	162 ac	129 ac
PCT (H&H*)	0 ac	401 ac	401 ac
Wildlife Habitat Improvement	0 ac	4 ac	1.7 ac

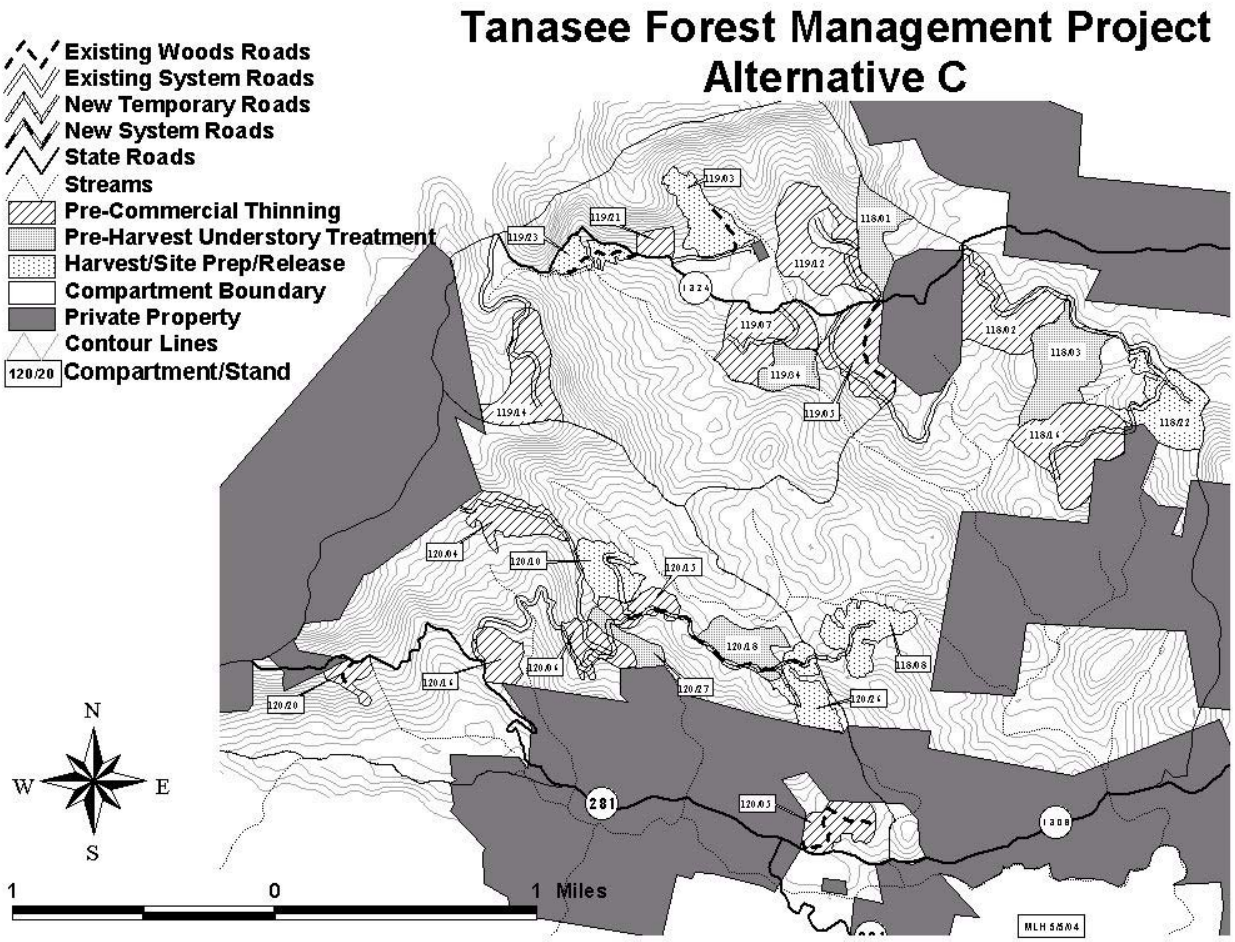
*(H&H) = Herbicide and Handtools

Figure 1. Map of Alternative B, the proposed action.



The proposed action would regenerate 284 acres by the 2-age harvest method over eleven units. These acres will also be site prepared and released subsequent to harvesting. Eighty seven of the 284 acres will be planted to northern red oak. Alternative B includes 162 acres of pre-harvest understory treatment and vine control and 401 acres of pre-commercial thinning, both using herbicide and handtools. Roading includes constructing 2.8 miles of system road and 2.0 miles of temporary road, and reconstructing 3.7 miles of system road. Temporary roads will be seeded to create 4 acres of grass/forb habitat for wildlife.

Figure 2. Map of Alternative C.



Alternative C would regenerate 178 acres by the 2-age harvest method over six units. These acres will also be site prepared and released subsequent to harvesting. Eighty seven of the 178 acres will be planted to northern red oak. Alternative C includes 129 acres of pre-harvest understory treatment and vine control and 401 acres of pre-commercial thinning, both using herbicide and handtools. Roading includes constructing 0.5 miles of system road and 0.8 miles of temporary road, and reconstructing 3.7 miles of system road. Temporary roads will be seeded to create 1.7 acres of grass/forb habitat for wildlife.

2.0 BOTANICAL RESOURCES

2.1 Botanical Community Level and Management Indicator Species (MIS) Evaluation

This section documents the effects of a proposed timber sale and associated proposals to botanical resources within the Tanasee project area. This information and analysis was created to provide the Biological Evaluation (BE) with botanical expertise. The potential direct, indirect and cumulative effects and impacts on Federally endangered, proposed endangered, threatened (T&E), Forest Service Sensitive (S), Forest Concern (FC) and Management Indicator species (MIS) are evaluated. Potential direct and indirect effects to T&E, S, FC and MIS plants were analyzed in the areas where timber harvest or other activities are proposed. Any area subject to disturbance is referred to as the "activity area". Three alternatives were considered in this analysis. The botanical analysis area is located in western Transylvania Co., North Carolina within compartments 118, 119 and 120 of the Pisgah Ranger District, Pisgah National Forest.

Proposed activities may include the following depending upon alternative selected: regeneration harvest, pre-commercial thinning, site preparation, pre-harvest understory treatments, road construction and/or reconstruction (see project proposal for a complete description of acreage, distances, procedures and areas). Details and specifics of the proposal are found within the project proposal of the environmental assessment (EA) of the Tanasee Forest Management Project.

2.1.1 Existing Condition

Plant communities found in the Tanasee Project Area:
The project and analysis area is located to the north of the Blue Ridge escarpment in the upper reaches of the French Broad River drainage. The area has three major streams, Parker Creek, Miser Creek and the French Broad River, that drain towards the southeast. The general elevation of the project area descends to the southeast to the French Broad River (2600 ft.). These streams are surrounded by steep ridges. The higher southwest trending ridges are along the Transylvania/ Jackson Co. line. The summit of these southwest ridges varies from 3590 ft. elevation (at Owens Gap) to 4200 ft. (the summit of Bald Rock). This ridge system is of botanical interest because the underlying granitic domes are sometimes exposed at the surface to form a Granitic Dome/ Rock Out Crop Community. The southeast ridges are lower in elevation and do not contain Granitic Dome/ Rock Out Crops. The topography is typically moderately steep with some flat areas along streams and coves. The analyses area elevation variation is from about 2600-4200 ft. Thus, most of the project area is within 2800-3400 ft. elevation range. This is considered a mid elevation range for the mountains and is important to the analysis of T.&E., S. and FC. plant species. The elevation range within the analyses area greatly diminishes the probability of finding those plant species associated with high elevation communities.

Several natural communities are found within the project area. These communities are: Chestnut-Scarlet Oak Forest, Montane Oak-Hickory slope Forest, Acidic Cove and Slope Forest, Granitic

Dome/ Rock Out Crop, Rocky Bar and Shore, Rich Cove Forest and Anthropogenic. The dominate communities within the analysis area are the: Chestnut-Scarlet Oak Forest, Montane Oak-Hickory Forest and Acidic Cove Forest Communities. These three communities often grade into each other so that a continuum exists between these typic communities. The Granitic Dome/ Rock Out Crop, Rocky Bar and Shore, Rich Cove and Slope Forest and Anthropogenic communities are much less common than the previous communities and usually occur in the project area as smaller "inclusions" within the main community types. All of the natural plant communities affected by this proposal are common to the area and region. No rare or unusual natural communities will be affected by this proposal. The common and possibly effected communities are briefly described and discussed below. (See Schafale and Weakley, 1990 for a detailed description and discussion of other communities not effected by this proposal i.e. Spray zone of Waterfalls, Rocky Shore and Bar, and High Elevation Granitic Dome). The botanical analysis area does not contain a registered special interest area.

Chestnut-Scarlet Oak Forest
Synonymy: Chestnut Oak Forest (Schafale & Weakley), Montane Oak Slope Forest (Newell).

Dominate Species & Physiognomy: The Chestnut-Scarlet Oak Forest Community usually occurs on convex slopes surrounding cove forests. Chestnut oak (*Quercus montana*) and scarlet oak (*Quercus coccinea*) with some black oak (*Quercus velutina*) dominate the tree canopy. Generally a dense shrub layer of mountain laurel *(Kalmia latifolia*), huckleberry (*Gaylussacia baccata*) or blueberry (*Vaccinium sp.*) is found. Herbaceous species are generally few and sparsely distributed. This community type is very common throughout the Forest. Generally the low herbaceous diversity in this community makes this community have a relatively low probability and occurrence of plant T.&E., S. & FC.. The Chestnut-Scarlet Oak Forest Community often grades into Xeric evergreen Forest near ridges and Acidic Cove and Slope Forest in the coves.

The Chestnut-Scarlet Oak Forest Community is found throughout the analysis area usually associated with acidic soils and dryer slopes and ridges. It is one of the most abundant communities in the analysis area. The Chestnut-Scarlet Oak Forest Community has a general low potential for T.&E., S. & FC. species in the analysis area. No T.&E., S. & FC. plants were found in this community. This proposal would cause the Chestnut-Scarlet Oak Forest Community impacted by this to be in an earlier successional stage.

Possible associated T.&E., S. & FC. species in Transylvania Co.:, *Fothergilla major*, *Thermopsis fraxinifolia*, *Thermopsis mollis*, *Tsuga caroliniana*

Associated species:

Acer rubrum
Amelanchier arborea
Amianthium muscitoxicum
Amorpha fructicosa
Antennaria solitaria
Aster patens
Aureolaria laevigata
Baptisia tinctoria
Carex communis
Carex pensylvanica
Castanea dentata
Chrysopsis mariana
Coreopsis major
Dennstaedtia punctilobula
Dicanthelium commutatum
Euphorbia corolata
Galax urceolata
Gaultheria procumbens
Gaylussacia ursina
Goodyera pubescens
Hexastylis shuttleworthii
Hieracium paniculatum
Hypericum hypericoides
Hypoxis hirsuta

Iris cristata
Kalmia latifolia
Leucothoe recurva
Lycopodium digitatum
Lysimachia quadrifolia
Medeola virginiana
Nyssa sylvatica
Oxydendrum arboreum
Pinus strobilis
Viola hastata
Vitis aestivalis
Potentilla canadensis
Quercus coccinea
Quercus prinus
Quercus velutina
Rhododendron minus
Robinia hispida
Robinia pseudoacacia
Rubus allegheniensis
Rubus hispidus
Sassafras albidum
Smilax glauca
Smilax rotundifolia
Solidago arguta
Stellaria pubera
Trillium catesbaei
Vaccinium corymbosum
Vaccinium pallidum
Vicia caroliniana

Montane Oak-Hickory Slope Forest
Synonymy: Montane Oak-Hickory Forest (Schafale & Weakley), Rich Cove and Slope Forest (Newell).

Dominate Species & Physiognomy: Montane Oak-Hickory slope Forest Community can occur most often at mid-slope and upper cove areas. Occasionally, a Montane Oak-Hickory slope Forest Community can occur near ridge tops. This community is characterized by the presence of various oak species, the presence of hickories *(Carya spp*.), a lack of ericaous shrubs, and a rich and diverse herbaceous layer. The associated tree species typically are red oak (*Quercus rubra)* and chestnut oak (*Quercus montana*) predominating with varying amounts of pignut hickory (*Carya glabra*), mockernut hickory (*Carya alba*), white pine (*Pinus strobus*), black gum (*Nyssa sylvatica*), tulip poplar (*Liriodendron tulipifera*) and red maple *(Acer rubrum*). This community has the most open and diverse herbaceous layer of the oak dominated communities seen within the analysis area. Typically New York fern (*Thelypteris noveboracensis*), southern lady fern (*Anthyrium filix-femina*), round-fruited switch grass *(Dicanthelium sphaerocarpon*), naked tick-trefoil (*Desmodium nudiflorum*), *Aster cordifolius* and wavy-leaved aster (*Aster undulatus*) codominate.

Often Montane Oak-Hickory slope Forest Community grades into bordering communities such as a Rich Cove Forest Community lower in the cove and grades into Chestnut Oak Forest higher on the slope.

The Montane Oak-Hickory slope Forest community is found throughout the analysis area usually associated with amphibolite soils. It is one of the most abundant communities in the analysis area. This community grades into or has small inclusions of Rich Cove and Slope Forest and areas classified as Montane Oak-Hickory Slope Forest can contain elements of a "Rich Cove" community. These "Rich Cove" elements are wide spread throughout the analysis area. The Montane Oak-Hickory Forest is found within many of the activity areas. Refer to Table 4 for units with Montane Oak-Hickory Community type. Harvest units with the Montane Oak-Hickory slope Forest Communities are expected be in an early successional stage after harvest. This community has a moderate potential for Sensitive and Forest Concern species in the analysis area.

Possible associated Sensitive or Forest Concern species in Transylvania: *Carex woodii*

Associated species:

Acer pensylvanicum
Acer rubrum
Ageratina altissima
Arundinaria gigantea
Asclepias variegata
Aster divaricatus
Aster undulatus
Botrychium virginianum
Calycanthus floridus
Campanula divaricata
Cardamine diphylla
Carex communis
Carex digitalis
Carex gracillima
Carex laxiflora
Carex muhlenbergii
Carex pensylvanica
Carex rosea
Carya alba
Carya glabra
Carya ovalis
Carya ovata
Pycnanthemum montanum
Pycnanthemum pycnanthemoides
Quercus coccinea
Quercus prinus
Quercus rubra
Trillium catesbaei
Uvularia sessilifolia
Vaccinium pallidum
Vaccinium stamineum
Vicia caroliniana
Agrimonia gryposepala
Amelanchier arborea
Amelanchier laevis
Cimicifuga americana
Clematis virginiana
Conopholis americana
Cornus florida
Cypripedium pubescens
Dennstaedtia punctilobula
Desmodium nudiflorum
Dicanthelium boscii
Dicanthelium clandestinum
Dicanthelium commutatum
Disporum lanuginosum
Euphorbia corolata
Geranium carolinianum
Geum canadense
Goodyera pubescens
Hamamelis virginiana
Houstonia purpurea
Hydrangea arborescens
Ilex opaca
Quercus velutina
Rhododendron calendulaceum
Robinia pseudoacacia
Sanicula canadensis
Sassafras albidum
Silene stellata
Viola blanda
Viola hastata
Viola palmata
Viola rotundifolia
Viola sororia
Angelica venenosa
Arabis laevigata
Arisaema triphyllum
Liriodendron tulipifera
Luzula multiflora
Lycopodium digitatum
Lysimachia quadrifolia
Maianthemum canadense
Medeola virginiana
Melanthium latifolium
Monarda clinopodia
Muhlenbergia tenuiflora
Nyssa sylvatica
Oxydendrum arboreum
Pinus strobilis
Podophyllum peltatum
Polygonatum biflorum
Polystichum acrostichoides
Potentilla canadensis
Prenanthes altissima
Prenanthes serpentaria
Prunus serotina
Smilax glauca
Smilax rotundifolia
Solidago arguta
Solidago caesia
Stellaria pubera
Thaspium barbinode
Vitis aestivalis
Zizia sp.

Acidic Cove and Slope Forest.
Synonymy: Acidic Cove Forest, Hemlock Forest (Schafale & Weakley), Alluvial Forest (Newell).

Dominate Species & Physiognomy: This forest community is dominated by cove hardwood species such as oaks (*Quercus montana*), tulip poplar (*Liriodendron tulipifera*), black birch (*Betula lenta*), white pine (*Pinus strobus*) and eastern hemlock (*Tsuga canadensis*). The distinguishing feature of this community is the dominance of evergreen Ericaous shrubs such as *(Rhododendron maximum*) and doghobble (*Leucothoe fontaniana*) or mountain laurel (*Kalmia latifolia*) in the midlayer. The herbaceous layer is usually very poorly developed with sparse and nondiverse species. Generally, the low herbaceous diversity in this community makes this community have a relatively low probability and occurrence of Forest Concern or Sensitive plant species. The Acidic Cove and Slope Forest community is very common throughout the Forest. It typically occurs at low to mid elevations in coves and lower slopes.

The Acidic Cove and Slope Forest community is found throughout the analysis area usually associated with acidic soils. It is one of the most abundant communities in the analysis area. The Acidic Cove Forest occurs in many of the proposed activity areas (See Table 4). The Acidic Cove and Slope Forest community has a general low potential for Forest Concern or Sensitive plant species in the analysis area. No Forest Concern or Sensitive plant species were found in this community. All but one of the potentials for Forest Concern or Sensitive plant species in the Acidic Cove and Slope Forest community is a non vascular (moss) species. Currently, a very limited amount of data exists for these species.

Possible associated Forest Concern or Sensitive plant species in Transylvania Co., *Bryocrumia vivicolor*, *Bryoxiphium norvegicum*, *Drepanolejeunea appalachiana, Hexastylis rhombiformis*, *Hydrothera venosa*, *Entodon sullvantii Macrocoma sullivantii*, *Plagiochila caduciloba*.

Associated Species:

Acer pensylvanicum
Acer rubrum
Amelanchier laevis
Anemone quinquefolia
Betula lenta
Chimaphila maculata
Clethra acuminata
Cornus florida
Galax urceolata
Goodyera pubescens
Hamamelis virginiana
Hexastylis shuttleworthii
Kalmia latifolia
Leucothoe fontanesiana
Liriodendron tulipifera
Magnolia acuminata
Magnolia fraseri
Medeola virginiana
Mitchella repens
Nyssa sylvatica
Oxydendrum arboreum
Pinus strobilus
Quercus prinus
Rhododendron maximum
Robinia pseudoacacia
Sassafras albidum
Smilax glauca
Smilax herbacea
Smilax rotundifolia
Tsuga canadensis
Viola rotundifolia

Rich Cove and Slope Forest.
Synonymy: Rich Cove Forest (Schafale & Weakley).

Dominate Species & Physiognomy: The Rich Cove and Slope Forest community occurs typically in coves and lower slopes. Soil nutrients and/or soil pH is thought to influence the relative high fertility and plant diversity of this community (Newell). More mesic conditions exist in this community than the surrounding, often xeric, upper slopes. A wide variety of plant species usually exist in this community. The distinctive and diverse mixture of tree species often include: basswood (*Tilia americana*), red oak (*Quercus rubra)*, buckeye (*Aesculus flava*), american ash (*Fraxinus americana*), fire cherry (*Prunus serotina*), tulip poplar (*Liriodendron tulipifera*), and black birch (*Betula lenta*). A feature of this community is the practical absence of Ericaous shrubs such as *(Rhododendron maximum*) in the midlayer. The open under story of Rich Cove Community includes: dogwood (*Cornus florida*), striped maple (*Acer pensylvanicum*), and *Magnolia* species. The herbaceous layer is lush and usually rich in species diversity. Typically, Rich Cove and Slope Forest have greater than 4 herb species per square meter. Only the Rich Oak-Hickory Slope Forest Community can be as herbaceously diverse, although not as “lush”, as a Mixed Deciduous Rich Cove and Slope Forest.

The Rich Cove and Slope community is found in limited areas within the analysis area usually associated with amphibolite soils. The largest extent of this community is located in the upper

reaches of Parker Creek below Tanasee Gap. (Stands 8, 13, 19 and 23 in compartment 119). Although this community does not occupy a large percentage of the analysis area, this community grades into Montane Oak-Hickory Slope Forest and areas classified as Montane Oak-Hickory Slope Forest can contain elements of a "Rich Cove" community. These "Rich Cove" elements are wide spread throughout the analysis area. Harvest units with the Rich Cove and Slope Forest are expected to be in an early successional stage after harvest. The net effect of this proposal upon the Rich Cove and Slope community will increase the number of Rich Cove and Slope early succession acres. This community has the highest potential for Sensitive and Forest Concern plant species in the analysis area.

Possible associated Sensitive and Forest Concern plant species in Transylvania Co.: *Aconitum reclinatum*, *Botrychium jenmanii*, *Botrychium oneidense*, *Calystegia catesbiana* ssp. sericata, , *Carex peduculata, Carex projecta Carex woodii*, *Entodon sullvantii*, *Hexastylis rhombiformis*, *Plagiochila austinii Juglans cinerea*, and *Trillium rugelii*.

Associated Species:

Acer pensylvanicum
Acer rubrum
Actaea pachypoda
Adiantum pedatum
Aesculus flava
Ageratina altissima
Agrostis perennans
Carex blanda
Carex digitalis
Carex pensylvanica
Carex virescens
Carya alba
Carya cordiformis
Caulophyllum thalictroides
Cimicifuga racemosa
Clematis virginiana
Clintonia umbellulata
Collinsonia canadensis
Conopholis americana
Coreopsis major
Cornus florida
Cypripedium pubescens
Dennstaedtia punctilobula
Desmodium nudiflorum
Desmodium paniculatum
Dicanthelium boscii
Dicanthelium latifolium
Erigeron pulchellus
Festuca subverticillata
Fraxinus americana
Galearis spectabilis
Galium circaezans
Galium lanceolatum
Goodyera pubescens
Halesia tetraptera
Amelanchier laevis
Amphicarpaea bracteata
Anemone quinquefolia
Arabis laevigata
Aralia nudicaulis
Arisaema triphyllum
Aristolochia macrophylla
Hamamelis virginiana
Houstonia purpurea
Hydrangea arborescens
Hydrophyllum virginianum
Impatiens pallida
Laportea canadensis
Lilium michauxii
Lindera benzoin
Liriodendron tulipifera
Lysimachia quadrifolia
Medeola virginiana
Monarda clinopodia
Monarda didyma
Obolaria virginica
Orobanche uniflora
Osmorhiza claytonii
Osmorhiza longistylis
Panax quinquefolius
Parthenocissus quinquefolia
Podophyllum peltatum
Polygonatum biflorum
Polygonum virginianum
Potentilla canadensis
Prenanthes altissima
Prunus serotina
Pycnanthemum montanum
Pyrularia pubera
Quercus prinus
Aster acuminatus
Aster divaricatus
Aster undulatus
Betula lenta
Botrychium virginianum
Cardamine concatenata
Carex aestivalis
Quercus rubra
Ranunculus hispidus
Robinia pseudoacacia
Rubus allegheniensis
Sanicula canadensis
Sanicula odorata
Sassafras albidum
Silene stellata
Smilax glauca
Smilax pulverulenta
Smilax rotundifolia
Solidago arguta
Solidago caesia
Stellaria pubera
Thalictrum clavatum
Thalictrum dioicum
Thelypteris noveboracensis
Tilia americana
Tradescantia subaspera
Trillium erectum
Trillium vaseyi
Uvularia grandiflora
Viola blanda
Viola canadensis
Viola sororia
Zizia aurea
Zizia trifoliata

2.1.2 MIS Evaluated and Rationale

An assessment and analysis of botanical community or habitat changes and the associated botanical MIS affiliated with this project implementation are given in this section. This project MIS analysis is directly linked to the Forest-wide trends and analysis given in the Nantahala/ Pisgah Forests MIS Report (Unpublished, FY 2001, National Forests in North Carolina, Asheville), and the Forest Plan (FEIS, Volume 1, pp. III-40 through III-45). Its purpose is to provide the decision maker with the background information necessary to evaluate this (local) project and how it may affect Forest trends of habitat and natural communities across the Forest. Table 2 lists all the Forest botanical MIS, approximate quantity, associated community and selection for analysis for this project. Selection and analysis for this project is dependent upon the presence of the representative community that may be affected by the proposed action(s) of the project. If the species is not selected because of lack of habitat within the affected project area, it will not be discussed further. Each community and associated MIS selected for analysis are discussed below.

Table 2. Botanical MIS in the Tanasse Project Area

REPRESENTATIVE BIOLOGICAL COMMUNITY OR HABITAT	FOREST WIDE ESTIMATE	BOTANICAL MIS	ESTIMATED CHANGE (Project effects) & Selection Alt. B	ESTIMATED CHANGE (Project effects) & Selection Alt. C
Fraser Fir, Red Spruce Forest	14,700 Ac.	Fraser fir	Not affected by project. Not selected	Not affected by project. Not selected
Grassy and Heath Balds	18 Occurrences	mountain oat grass, Catawba rhododendron	Not affected by project. Not selected	Not affected by project. Not selected
Northern Hardwood Forest	52,000 Ac.	twisted stalk	Not affected by project. Not selected	Not affected by project. Not selected
Carolina Hemlock Bluff Forests	6 Occurrences	Carolina hemlock	Not affected by project. Not selected	Not affected by project. Not selected
Cove Forests	Rich=107,500 acres Acidic=174,500 ac. other=2800 ac.	ginseng, black cherry, buckeye basswood	44 acres affected (29 ac. rich 15 ac. acidic)	7 acres affected

Oak and Oak/Hickory Forests	High Elevation Red Oak= 40,500 ac. Mesic Oak/ Hickory=383,340 ac. Dry-mesic Oak-Hickory=217,000 ac. /Static	red oak, white oak, hickory species	240 acres affected 160 ac. mesic 80 ac. dry-mesic.	171 acres affected 131 ac. mesic 41 ac. dry-mesic.
White Pine Forests	17,600 ac.	white pine	Not affected by project. Not selected	Not affected by project. Not selected
Yellow Pine mid-successional communities	13,400 ac.	Virginia pine	Not affected by project. Not selected	Not affected by project. Not selected
Xeric Yellow Pine Forests	17,400 ac.	table mt. pine, turkey beard, pitch pine	Not affected by project. Not selected	Not affected by project. Not selected
Reservoirs	36,000 ac.	no botanical MIS	Not affected by project. Not selected	Not affected by project. Not selected
Forested Seep Wetlands	22,000 ac.	golden saxifrage, umbrella leaf, mountain lettuce	<1 acre	<1 acre
Bogs	10 occurrences	sphagnum mosses	Not affected by project. Not selected	Not affected by project. Not selected
Barren and Glades	1 occurrence (300 ac.)	prairie dropseed	Not affected by project. Not selected	Not affected by project. Not selected
Shaded Rock Outcrops and Cliffs	66,282 ac.	alum roots saxifrages	<1 acre	<1 acre
Open Rock Outcrops and Cliffs	141 occurrences (800 ac.)	Biltmore sedge, mountain oat-grass, wretched sedge	Not affected by project. Not selected	Not affected by project. Not selected
Alluvial Forests	21,000 ac.	no botanical MIS	Not affected by project. Not selected	Not affected by project. Not selected
Invasive Exotic Plant Species	2684 miles of road construction <25 years	Japanese honeysuckle, Japanese grass, Chinese privet, periwinkle	2.8 miles of new road	.5 miles of new road

2.1.3 Effects to Plant Communities and Associated Botanical MIS

Cove Forest
Depending upon the action alternative selected, this proposal would temporarily convert 7 acres (Alternative C) or 44 acres (Alternative B) of (Rich) Cove Forest to an earlier succession stage of (Rich) Cove Forest by harvest. Both alternatives would affect <.1% of the 107,500 acres of Rich Cove Forest within the Forests. The proposed action would have an insignificant impact on the Cove Forests in the Nantahala/Pisgah Forests because the proposed action would affect <.1% of the total amount of cove forests within the Nantahala/Pisgah Forests and the proposed action does not convert communities. Ginseng, black cherry, buckeye and basswood were selected as MIS for this community. The action is not expected to significantly influence the Forest-wide trends or population numbers in black cherry (Sections 4.45, 4.46, 4.47 & 4.48, MIS report) buckeye or basswood. Locally (within harvest units) ginseng, black cherry, buckeye and basswood are expected to have a temporary decrease of larger mature individuals and an increase in seedlings. This would become less apparent as succession continues.

Oak Hickory Forest
Depending upon the action alternative selected, this proposal would temporarily convert 171 acres (Alternative C) or 240 acres (Alternative B) of Oak Hickory Forest to an earlier succession stage of Oak Hickory Forest by harvest. Regardless of the selected action alternative, it would affect <.1% of the 640,840 acres of Oak Hickory Forest within the Forests. The proposed action would have an insignificant impact on the Oak Hickory Forest in the Nantahala/Pisgah Forests because the proposed action would affect <.1% of the total amount of Oak Hickory Forest within the Nantahala/Pisgah Forests and the proposed action does not convert communities. Red oak, white oak and hickory species were selected as MIS for this community. The action is not expected to significantly influence the Forest-wide trends or population numbers of Red oak, white oak and hickory species (Sections 4.44, 4.45 and 4.50 MIS report). Locally (within harvest units) Red oak, white oak and hickory species are expected to have a temporary decrease of larger mature individuals and an increase in seedlings. This would become less apparent as succession continues.

Invasive Exotic Plant Species
Potential habitat for exotic invasive species can increase with an increase in disturbance. While disturbance from tree removal and creation of wildlife fields can offer some increased habitat for exotic invasive plants, new road is the prime habitat for many exotic invasive plants. Therefore, a good measure of habitat for comparison of potential changes of exotic invasive plants is the creation of miles of new roads (Nantahala/ Pisgah Forests MIS Report, Section 4.58).

Forest wide, 2,684 miles of road construction has occurred within the Pisgah/Nantahala National forest within the last 25 years or 107.3 miles per year. Alternative B would contribute 2.8 miles of new road construction or increase exotic plant species habitat by 3% of the yearly average. On the other hand, Alternative C would contribute .5 miles of new road construction or increase exotic plant species habitat by about 0.5% of the yearly average. Both action alternatives would

not significantly contribute to an undesirable Forest-wide trend in exotic plant species habitat. The "no action alternative" would not increase exotic plant species habitat.

Two species of invasive non-native plants, bittersweet (*Celastrus orbiculatus)* and Plume Grass (*Miscanthus sinensis*) were detected in the area (Compartment 118, Stands 02, 03) that could invade new areas. **Recommendations given here to mitigate the possible effect of invasive plant species to this proposal: Remove, by chemical or hand treatment, all individuals of bittersweet and Plume Grass known in the analysis area.** Currently, bittersweet populations are confined to areas along a road in two stands. Untreated, this population is expected to rapidly expand. See discussion in Section 2.2.3 Effects of Alternatives by Species (Effects to Native and Non-native Plant Species found in the Area) for additional information on invasive exotic plant species.

2.2 Botanical Threatened, Endangered and Sensitive Species Evaluation

2.2.1 Species Evaluated and Rationale

Proposed, Endangered and Threatened Species, Sensitive and Forest Concern Species Considered

Potentially affected T.&E., S. and FC. plant species were identified after (1) reviewing the list of T.&E., S. and FC. plant species of the Pisgah and Nantahala National Forests and their habitat preferences; (2) consulting element occurrence records of T.&E., S. and FC. plants as maintained by the North Carolina Natural Heritage Programs; (3) consulting with individuals both in the public and private sector who are knowledgeable of the area and its flora; and, (4) conducting field surveys in areas designated for ground disturbing activities. Other disciplines may employ different definitions to analyze this proposal. The field surveys were conducted by a meander search pattern to survey all the variation in habitat within the unit. The surveys were conducted until all of the habitats within the unit were surveyed and no new plant species were added to the unit species list after a minimum of 20 minute's search was made (timed meander search) (Goff & Rockow). Focused attention was given during the surveys to habitats within the units that may be associated with plant T.&E., S. and FC. species (i.e., rock outcrops, seeps, etc.). The intensity of the coverage varied depending on the extent of any likely T.&E., S. and FC. species habitat, complexity of vegetation, and/or presence of indicator species. Some areas were virtually devoid of herbaceous vegetation and required very little intensive survey while other areas required considerably more time to adequately survey. Although the search was focused on the possibility of occurrences of the T.&E., S. and FC. plants listed in Table 3, all T.&E., S. and FC. plant species were searched for during the surveys. Some species may have been overlooked; however, the survey was conducted so that a T.&E., S. or FC. plant species would not be overlooked due to phenology or time of the year that the species could reasonably be detected. Table 4 summarizes the habitats and/or community(s) in the activity area specified and the occurrence of plant T.&E., S. and FC. species.

Of the total of 104 plant T.&E., S. and FC. species known to occur in Transylvania Co. NC., all but 45 species (Table 3) were dropped from the list for further consideration and discussion for one of the following reasons: 1) lack of suitable habitat for the species in the project area, 2) the

species has a well-known distribution that does not include the project area, or 3) based on field surveys of potential habitat, no habitat was seen in the activity areas. Habitats, community types and ranges of plant T.&E., S. and FC. species are derived from information in Classification of the Natural Plant Communities of North Carolina (Schafale & Weakley), the Natural Heritage Program's List of Rare Plants of North Carolina (Ameroso) or information obtained through other botanists. Based upon broad habitat information, 45 plant T.&E., S. and FC. species could occur in the analysis area and only four are known to occur.

Table 3 summarizes the list of T.&E., S. and FC. plant species that are: highly likely to occur[1], known to occur, or potentially could occur[2] in the botanical analysis area. Only *Tsuga caroliniana* (S.) is known to occur in the proposed activity areas.

Table 3. Potential Plant T.&E., S. or FC. species in Tanasee activity or analysis areas.

SPECIES	TYPE	HABITAT	OCCURRENCE
Federally Threatened or Endangered plant species **(T, E)**			
N/A			None known to occur in activity area or in the botanical analysis area.
2002 Region 8 Regional Forester's Sensitive Species Plant List **(S)**			
Aconitum reclinatum	Vascular plant	Rich Cove Forest	Not known to occur within botanical analysis or activity area.
Aneura sharpii	Liverwort	Spray Zone of Waterfalls	Not known to occur within botanical analysis or activity area.
Botrychium jenmanii	Vascular plant	Rich Cove Forest	Not known to occur within botanical analysis or activity area.
Carex biltmoreana	Vascular plant	Granitic Dome	Occurs in botanical analysis area but not known to occur in activity area.
Drepanolejeunea appalachana	Liverwort	Acidic Cove Forest, Spray Cliff	Not known to occur within botanical analysis or activity area.
Fothergilla major	Vascular plant	Pine-Oak Heath, Chestnut Oak Forest	Not known to occur within botanical analysis or activity area.

[1] The use of "highly likely to occur" refers to those species that are not documented as occurring in the specified area(s) but are expected to occur there because of documentation of very similar habitat to known populations. For all intents of this document, it should be taken that the species does occur in the specified area until more complete documentation of presence/ absence is known.

[2] In this document, the use of the phases "possibly", "could occur" or "may occur" are taken to mean possible species occurrence in the very broadest of sense. Only very general habitat preferences and species distribution are used to determine if a species may or could occur. This does not imply their existence in an area.

Hexastylis rhombiformis	Vascular plant	Acidic Cove Forest	Not known to occur within botanical analysis or activity area.
Houstonia longifolia var glabra	Vascular plant	Granitic Dome	Not known to occur within botanical analysis or activity area.
Hydrotheryri venosa	Lichen	Aquatic, on rocks in streams	Not known to occur within botanical analysis or activity area.
Juglans cinerea	Vascular plant	Rich Cove Forest	Not known to occur within botanical analysis or activity area.
Lysimachia fraseri	Vascular plant	Acidic Cove Forest	Not known to occur within botanical analysis or activity area.
Plagiochila caduciloba	Liverwort	Spray zone of waterfalls, Acidic Cove Forest	Not known to occur within botanical analysis or activity area.
Plagiochila austinii	Liverwort	Rich Cove Forest, Spray zone of waterfalls.	Not known to occur within botanical analysis or activity area.
Plagiochila echinata	Liverwort	Acidic Cove Forest	Not known to occur within botanical analysis or activity area.
Plagiochila virginica var.caroliniana	Liverwort	Spray zone of waterfalls, Acidic Cove Forest	Not known to occur within botanical analysis or activity area.
Radula sullvantii	Liverwort	Spray zone of waterfalls	Not known to occur within botanical analysis or activity area.
Radula voluta	Liverwort	Spray zone of waterfalls	Not known to occur within botanical analysis or activity area.
Thermopsis fraxinifolia	Vascular plant	Pine-Oak Heath	Not known to occur within botanical analysis or activity area.
Trillium rugellii	Vascular plant	Rich Coves. Rich bottom lands	Not known to occur within botanical analysis or activity area.
Tsuga caroliniana	Vascular plant	Chestnut Oak Forest	Occurs in botanical analysis and possible activity areas.
Forest Concern Plant Species **(FC)**			
Asplenium monanthes	Vascular plant	Spray zone of waterfalls	Not known to occur within botanical analysis or activity area.

Aster avitis	Vascular plant	Granitic Dome	Not known to occur within botanical analysis or activity area.
Bartramidula wilsonii	Moss	Spray Zone of Waterfalls	Not known to occur within botanical analysis or activity area.
Brycrumia vivicolor	Moss	Spray Zone of Waterfalls	Could occur in analysis area based upon habitat.
Bryum riparium	Moss	Spray zone of waterfalls	Could occur in analysis area based upon habitat. Not known to occur within botanical analysis or activity area.
Calystegia catesbiana	Vascular plant	Rich Cove Forest	Could occur in analysis area based upon habitat. Not known to occur within botanical analysis or activity area.
Camphylopus atrovirens	Moss	Granitic Dome	Could occur in analysis area based upon habitat. Not known to occur within botanical analysis or activity area.
Carex pedunculata	Vascular plant	Rich Cove Forest	Could occur in analysis area based upon habitat. Not known to occur within botanical analysis or activity area.
Carex projecta	Vascular plant	Acidic Cove Forest, Rich Cove Forest	Could occur in analysis or activity area based upon habitat. Not known to occur within botanical analysis or activity area.
Carex woodii	Vascular plant	Rich Cove Forest, Montane Oak-Hickory Forest	Could occur in analysis or activity area based upon habitat. Not known to occur within botanical analysis or activity area.
Cirriphyllum piliferum	Moss	Spray zone of waterfalls	Could occur in analysis area based upon habitat. Not known to occur within botanical analysis or activity area.
Drepanolejeunea appalachiana	Liverwort	Spray zone of waterfalls	Could occur in analysis area based upon habitat. Not known to occur within botanical analysis or activity area.
Entodon sullvantii	Moss	Acidic Cove Forest	Could occur in analysis area based upon habitat. Not known to occur within botanical analysis or activity area.
Homalia trichomanoides	Moss	Forest Concern	Could occur in analysis area based upon habitat. Not known to occur within botanical analysis or activity area.
Huperzia porophila	Vascular plant	Spray zone of waterfalls	Could occur in analysis area based upon habitat. Not known to occur within botanical analysis or activity area.

Macrocoma sullvantii	Moss	Acidic Cove Forest	Could occur in activity area or analysis area based upon habitat. Not known to occur within botanical analysis or activity area.
Oenothera perennis	Vascular plant	Bogs, wet open areas.	Occurs in botanical analysis area but not known to occur in activity area.
Panicum lithophrium	Vascular plant	High Elevation Granitic Dome	Could occur in activity area or analysis area based upon habitat. Not known to occur within botanical analysis or activity area.
Phegopteris connectilis	Vascular plant	Spray zone of waterfalls	Could occur in activity area or analysis area based upon habitat. Not known to occur within botanical analysis or activity area.
Plagiochila echinata	Liverwort	Acidic Cove Forest	Could occur in analysis area based upon habitat. Not known to occur within botanical analysis or activity area.
Plagiochila virginica	Liverwort	Spray zone of waterfalls, Acidic Cove Forest	Could occur in analysis area based upon habitat. Not known to occur within botanical analysis or activity area.
Plathyypnidium pringlei	Moss	Spray zone of waterfalls	Could occur in analysis area based upon habitat. Not known to occur within botanical analysis or activity area.
Sangusorba canadensis	Vascular plant	Spray zone of waterfalls	Known to occur in analysis area but not activity area. No habitat within activity area. Will not be affected by proposal.
Spartina pectinata	Vascular plant	Spray zone of waterfalls	Could occur in analysis area based upon habitat. Not known to occur within botanical analysis or activity area.
Thermopsis mollis	Vascular plant	Pine-Oak Heath	Could occur in analysis area based upon habitat. Not known to occur within botanical analysis or activity area.
Trichomanoides petersii	Vascular plant	Acidic Cove Forest	Could occur in analysis area based upon habitat. Not known to occur within botanical analysis or activity area.

Table 4. Natural Communities and plant T.&E., S. & FC. species by stand

Compartment /Stand(s)	Proposed activity(s)	NATURAL COMMUNITIES OR HABITAT	OCCURRENCE of PLANT T.&E., S. & FC.
118/01	Pre-harvest treatment	Montane Oak-Hickory slope Forest at the bottom and Chestnut-Scarlet Oak Forest near top	No plant T.&E., S. & FC. known.
118/02	Pre-commercial thinning	Chestnut-Scarlet Oak Forest w/ some Montane Oak-Hickory slope Forest	No plant T.&E., S. & FC. known.
118/03	Pre-harvest treatment	Chestnut-Scarlet Oak Forest w/ some Montane Oak-Hickory slope Forest	No plant T.&E., S. & FC. known.
118/04	Two-age Regeneration	Montane Oak-Hickory slope Forest, w/ Chestnut-Scarlet Oak Forest	No plant T.&E., S. & FC. known.
118/08	Two-age Regeneration	Montane Oak-Hickory slope Forest, w/ Chestnut-Scarlet Oak Forest	No plant T.&E., S. & FC. known.
118/16	Pre-commercial thinning	Montane Oak-Hickory slope Forest	No plant T.&E., S. & FC. known.
118/22	Two-age Regeneration	Montane Oak-Hickory slope Forest	No plant T.&E., S. & FC. known.
118/27	Two-age Regeneration	Montane Oak-Hickory slope Forest	No plant T.&E., S. & FC. known.
119/03	Two-age Regeneration	Montane Oak-Hickory slope Forest	No plant T.&E., S. & FC. known.
119/05	Pre-commercial thinning	Mostly Chestnut-Scarlet Oak Forest w/ Montane Oak-Hickory slope Forest	No plant T.&E., S. & FC. known.
119/07	Pre-commercial thinning	Acidic Cove and Slope Forest	No plant T.&E., S. & FC. known.
119/09	Two-age Regeneration	Rich Cove and Slope Forest at the bottom and Chestnut-Scarlet Oak Forest near top	*Tsuga caroliniana*, no other T.&E., S. & FC. known.
119/12	Pre-commercial thinning	Chestnut-Scarlet Oak Forest	No plant T.&E., S. & FC. known.
119/13	Two-age Regeneration	Rich Cove and Slope Forest at the bottom and Chestnut-Scarlet Oak Forest near top	*Tsuga caroliniana*, no other T.&E., S. & FC. known.

119/14	Pre-commercial thinning	Mostly Chestnut-Scarlet Oak Forest w/ Montane Oak-Hickory slope Forest	No plant T.&E., S. & FC. known.
119/18	Pre-harvest treatment	Rich Cove and Slope Forest at the bottom and Chestnut-Scarlet Oak Forest near top.	No plant T.&E., S. & FC. known.
119/21	Pre-commercial thinning	Mostly Chestnut-Scarlet Oak Forest w/ Montane Oak-Hickory slope Forest	No plant T.&E., S. & FC. known.
119/23	Two-age Regeneration	Mostly Montane Oak-Hickory slope Forest some Rich Cove Forest	No plant T.&E., S. & FC. known.
119/26	Two-age Regeneration	Acidic Cove and Slope Forest, Montane Oak-Hickory slope Forest	No plant T.&E., S. & FC. known.
119/34	Pre-harvest treatment	Chestnut-Scarlet Oak Forest	No plant T.&E., S. & FC. known.
120/04	Pre-commercial thinning	Chestnut-Scarlet Oak Forest	No plant T.&E., S. & FC. known.
120/05	Pre-commercial thinning	Acidic Cove and Slope Forest	No plant T.&E., S. & FC. known.
120/06	Pre-commercial thinning	Mostly Chestnut-Scarlet Oak Forest w/ Montane Oak-Hickory slope Forest	No plant T.&E., S. & FC. known.
120/10	Two-age Regeneration	Montane Oak-Hickory slope Forest	No plant T.&E., S. & FC. known.
120/15	Pre-commercial thinning	Acidic Cove and Slope Forest, Montane Oak-Hickory slope Forest	No plant T.&E., S. & FC. known.
120/16	Pre-commercial thinning	Montane Oak-Hickory slope Forest	No plant T.&E., S. & FC. known.
120/18	Pre-harvest treatment	Montane Oak-Hickory slope Forest and Chestnut-Scarlet Oak Forest	No plant T.&E., S. & FC. known.
120/20	Pre-commercial thinning	Montane Oak-Hickory slope Forest and Chestnut-Scarlet Oak Forest	No plant T.&E., S. & FC. known.
120/26	Two-age Regeneration	Montane Oak-Hickory slope Forest and Chestnut-Scarlet Oak Forest	No plant T.&E., S. & FC. known.

120/27	Pre-harvest treatment	Montane Oak-Hickory slope Forest and Chestnut-Scarlet Oak Forest	No plant T.&E., S. & FC. known.
Various	Existing Road Reconstruction	Anthropogenic	No plant T.&E., S. & FC. known.
Various	Road Construction & Wildlife Habitat	Montane Oak Forest, Rich Cove Forest, Chestnut-Scarlet Oak Forest	No plant T.&E., S. & FC. known.

2.2.2 Existing condition

Tsuga caroliniana (S.), *Sanguisorba canadensis* (FC.), *Carex biltmoreana* and (S.), *Oenothera perennis* (FC.) are known to occur within the analysis area. Of these species only *Tsuga caroliniana* (S.) is known to occur within a proposed activity area(s). The possible effects to each of these species are discussed below. Unknown or potential populations of Sensitive and Forest Concern plant species are not discussed further because there is no known effect to them. Table 3 summarizes the potential effects.

New Surveys or Inventories Conducted

A summary of the field surveys is provided in Table 4. This table lists the habitats, natural communities and T.&E., S. and FC. plant species found in each unit and the areas associated road reconstruction/construction.

A list of 321 plant species noted during the surveys is provided in Attachment 1. This is not intended as an exhaustive list of the plant species in the analysis area. A larger area was surveyed than is within the proposed activity areas. Field visits were conducted by Forest Botanist David Danley. Gary Kauffman, Forest Botanist, field reviewed compartment 119. Proposed stands were visited during the survey schedule given below:

Sept 24, 1996 Compartment 119
Sept 26, 1996 Compartments 120
May 5, 1997 Compartments 119
May 6, 1997 Compartment 118
May 9, 1997 Compartments 120
May 12, 1997 Compartment 119
May 13, 1997 Compartments 120
May 21, 1997 Compartment 121
May 24, 1997 Compartments 121,
June 2, 1997 Compartment 119
July 11, 1997 Compartments 118, 120
June 6, 12 2002 Compartments 120
April 29, 2004 Compartments 118, 119

Site specific botanical surveys include several past proposals including: Parker/Big Creek Timber sale and Miser Creek Wildlife/Timber Sale proposal.

Inventories not completed

None.

2.2.3 Effects of Alternatives by Species

General Effects to Plant and Natural Communities Common to Action Alternatives

Timber harvest, wildlife openings, temporary road construction and road construction:
The general potential effects to plant species including T.&E., S. and FC. plant species that are exposed to logging activities such as moving heavy equipment, skidding logs, and road construction are direct impacts of damaging individual plants and the indirect effects of modifying the habitat. Some of the expected indirect effects of timber removal are an initial increase in light and temperature, reduced humidity, and decreased soil surface moisture. These effects may have a positive affect or negative affect depending upon the particular plant species. Some weedy and early succession species such as Rubus, are expected to increase in the activity area. T.&E., S. and FC. plant species may be negatively affected by the competition of these species. The long term effect of rotational logging practices upon the general plant communities are poorly understood. There is some evidence that the repopulation of some herbaceous plant species in mixed mesophyitic communities may take more than a hundred years after logging. Most species are expected to recover faster than that. See the Forest Plan, Standards and Guides for a description of these methods. The only known plant T.&E., S .and FC. species to be effected by this action is *Tsuga caroliniana*. (See discussion of *Tsuga caroliniana*).

Site preparation and timber stand improvement (TSI):
Timber stand improvement and advanced oak treatment procedures will have an insignificant effect on non target species. The procedures, using chain saws or herbicide, select individual plants for treatment and generally do not indirectly, unfavorably affect adjacent individual plants. For example, during a controlled demonstration of herbicide use for timber stand improvement and advanced oak treatments on the Pisgah Ranger District, herbicide use seemed to have a positive effect on herbaceous plant species. Evidently, the effect of the increase in light (produced by killing the target tree) outweighed possible toxic effect of residual herbicides and increased the kinds and numbers of herbaceous species near the target tree. Timber stand improvement and advanced oak treatment procedures will change the tree composition (the desired effect) of the community to favor oak species.

Sensitive Species

Tsuga caroliniana
Status: Federal: None; NC State, none; Global G3; Forest, sensitive.
Known Forest occurrences: >100 populations are known, not tracked by North Carolina Natural Heritage.

The known local populations of *Tsuga caroliniana* in the analysis area occur mostly along ridges and upper slopes primarily associated with Pine-Oak Heath Community. It was found in scattered populations in the ridge separating Jackson Co. from Transylvania Co. and the ridge southeast of the Pinnacle (stands 119/09 and 119/13). Doubtless, it occurs in other areas of the activity/analysis areas. *Tsuga caroliniana* is an uncommon component species of xeric plant

communities and is likely to be in other areas of the analysis/activity areas containing xeric plant communities.

Direct and Indirect Effects
Tsuga caroliniana occurs in proposed activity areas: in stands 119/09 and 119/13. Furthermore, any stand with Pine-oak Heath has a likelihood of *Tsuga caroliniana* to be present. Therefore, any alternative that contains one or more of these stands, might negatively affect individuals of *Tsuga caroliniana*.

There is no qualified data available concerning the effects of logging on *Tsuga caroliniana*. However, judging by the recovery of *Tsuga caroliniana* by similar actions (logging) *Tsuga caroliniana* seems to repopulate disturbed sites (positive effect). This is an informal observation reinforced by noticing that *Tsuga caroliniana* often occurs along old skid roads and disturbed ridge tops. Since *Tsuga caroliniana* will have a viable population within the analysis area (in areas that will not be affected by this proposal) and the habitat will be at a lower successional state and will be restored to its current ecological state, it is logical to assume that recovery of *Tsuga caroliniana* will take place over time.

Cumulative Effects
Individuals of *Tsuga caroliniana* may be affected by this proposal if they are present in the stands proposed for treatment. In addition, past actions have affected individuals of *Tsuga caroliniana*. It is known that the timber sales: Sand Mountain (Caldwell Co.), Maple Sally (Caldwell and Avery Co.) and Southern Pine Beetle Control (McDowell, Caldwell and Burke Cos.), within the Grandfather Ranger District, have affected individuals of *Tsuga caroliniana*. However, on a Forest-wide scale, this proposal will have very little effect on *Tsuga caroliniana*. There are so many individuals known distributed over such a wide area across the Forest that the species is not monitored in any quantified manner. Therefore, this proposal will have little effect on the total numbers of *Tsuga caroliniana* individuals throughout the Forest but will directly affect some individuals. This proposal (all alternatives) will have no qualitative effect upon the Forest viability of *Tsuga caroliniana.*

Conclusion
Although this proposal will likely negatively affect individuals of *Tsuga caroliniana* it will not affect local viability of *Tsuga caroliniana* within the analysis area. Furthermore, the habitat for *Tsuga caroliniana* is not expected to be permanently altered by this proposal and *Tsuga caroliniana* is expected to recover in the proposed activity areas. No mitigation for *Tsuga caroliniana* is recommended.

Carex biltmoreana
Status: Federal, 3C; NC State, Significantly Rare S3; Global G-3; Forest, sensitive.
Known Forest occurrences: At least 30 populations of *Carex biltmoreana* exist on the Nantahala/Pisgah National Forests. Populations are known from the Highlands Ranger District, Tusquitee Ranger District, Wayah Ranger District and Pisgah Ranger District. One (mega) local population is known within the analysis area. This site is generally well protected from any proposed management activity. Additional western North Carolina sites are known on private

and Federal Lands. This species is more a southern Appalachian endemic restricted to wet granitic domes and rock outcrops. It occurs irregularly south to South Carolina.

The local (Bald Rock) population of *Carex biltmoreana* was found in a Granitic Dome/ Rock Out Crop Community along the ridge separating Jackson and Transylvania Cos. It is a large population of thousands of rhizomatous individuals. It is highly likely that more populations of *Carex biltmoreana* exist in the analysis area, but not in the proposed activity area, along the western boundary in granitic domes. This species is somewhat difficult to identify and is not showy.

There is no direct information known about the possible effects, positive or negative, timber harvest may have upon *Carex biltmoreana*. The species is long rhizomatous. This rhizome may help protect the plant from above ground disturbance. This suggests that disturbance may not have a negative effect upon individual *Carex biltmoreana* plants provided that the rhizome portion of the plant survives to repopulate the disturbed areas. It is expected that the proposal will have very little effect upon *Carex biltmoreana*. Most of the local population and habitat is excluded from the proposed activity areas. The population(s) of *Carex biltmoreana* will not be effected by any of the alternatives of the proposed action because the populations are significantly far enough away from the proposed action(s).

Forest Concern Species

Sanguisorba canadensis
Status: Federal, none; NC State, Significantly Rare; Global G-5; Forest, Concern.
Known Forest occurrences: 10 other sites are known on the Forest: including one in Clay Co. and one in Macon Co. It is also known from Alleghany, Ashe, Buncombe, Clay, Haywood, Henderson Jackson, Macon, Transylvania, Watauga and Yancey Cos. on private land. This site is a new record (Danley & Kauffman, 2002). There are fewer than 26 current populations known in North Carolina.

The local (Miser Creek) population was found in Compartment 118 in the Spray Zone of an unnamed waterfall along Miser Creek. The population is small consisting of a few individuals.

The population of *Sanguisorba canadensis* will not be effected by any of the alternatives of the proposed action because the populations are significantly far enough away from the proposed action(s).

Oenothera perennis
Status: Federal, none; NC State, Candidate State Historical, Global G-5; Forest, Concern.
Known Forest occurrences: three other sites are known on the Forest: one in Clay Co., one in Compartment 110 of Transylvania Co. and one in Macon Co. It is also known from Ashe and Jackson Cos. on private land and historically from Avery Co. This site is a new record (Danley 2002). *Oenothera perennis* has scattered populations in the southeastern US. It is found from Alabama, South Carolina to West Virginia. There are fewer than 6 current populations known in North Carolina.

The local (Miser Creek) population was found in Compartment 118 in two sub populations within sections of wildlife fields (fields 2 and 8). Field #2 has a population of about 100. Field #8 has a large population of *Oenothera perennis* containing an estimated 800-1000 individuals. This appears to be the largest population of *Oenothera perennis* known within the Pisgah/Nantahala NFs. The entire population exists within the anthropogenic "wildlife field habitat". Thus, the population appears to greatly benefit from the current mowing maintenance of these fields. An attempt was made to locate a population in a more "natural" open bog habitat. However, none were located. Because of the nature of the site, existence of this population is dependent upon maintenance of the current condition.

None of these populations will be affected by any of the alternatives of the proposed action because the populations are significantly far enough away from the proposed action(s).

Table 5. Summary of effects and impacts to plant T.&E., S. and FC. species by alternative

SPECIES	ALT. "A" No Action	ALT. "B"	ALT. "C"
Federally Threatened or Endangered plant species			
None	None	N/A	N/A
Regional Forester's Sensitive plant species			
Carex biltmoreana	None	None, Population significantly far from activity	None, Population significantly far from activity
Tsuga caroliniana	None	Individuals directly effected, Populations will remain viable within local analysis area	Individuals directly effected, Populations will remain viable within local analysis area
Forest Concern Species plant species			
Sanguisorba canadensis	None	None, Population significantly far from activity	None, Population significantly far from activity
Oenothera perennis	None	None, Population significantly far from activity	None, Population significantly far from activity

Watch List Species

Several North Carolina watch list species were found within possible activity areas: *Carex ruthii, Smilax biltmoreana* and *Panax trifolius*. These species may be impacted by action proposals but their populations are considered relatively large and this proposal would not affect forest wide viability. *Kergia montana* (watch list species) was found in the botanical analysis area but not activity areas. *Carex ruthii, Smilax biltmoreana* and *Kergia montana* were recently (2002) removed from the Regional Forester's Sensitive species list because field data indicated that they were found not to be a viability concern. No further analysis is made.

Effects to Native and Non-native Plant Species found in the Activity Area

It is expected that there will be a temporary increase of ruderal (weedy) species of plants. These species are often prevalent during the initial stages of succession. This is particularly true near constructed roads and log landings. A high percentage of these ruderal species are non-native. There are 124 species of non-native plant species documented as occurring on the Pisgah and Nantahala National Forests (Danley and Kauffman). An increase of non-native plant species in the proposed activity area is expected. Many of these species, both native and non-native, have benefits for wildlife and erosion control. However, as succession progresses, most ruderal species tend to become much less prevalent and generally do not persist in the area. Most ruderal plant species are expected to decrease to nonsignificant population levels within ten years after the initial disturbance.

The **persistence** of most non-native plant species is not considered desirable to natural ecosystem health. There are primarily two ways in which non-native plant species may persist in the forested ecosystems. A non-native plant species may persist by the introduction of an "invasive non-native species" to the ecosystem or by modification of the ecosystem in such a way that an invasive species becomes dominant. Out of the 124 species of non-native plants known to occur on the Pisgah and Nantahala National Forests, 11 of these are currently recognized as having aggressive invasive qualities that can dominate local communities (Danley and Kauffman). The proliferation of these species can have a devastating and long lasting effect on natural communities and native species. Kudzu, *Pueraria montana*, is a familiar example of this sort of non-native persistent species. Consideration was given to the possible effect this proposal may have on invasive non-native species. It is not expected that this proposal will cause non-native invasive plant species to spread. Two species of invasive non-native plants, bittersweet (*Celastrus orbiculatus)* and Plume Grass (*Miscanthus sinensis*) were detected in the area (Compartments 118, Stands 02, 03) that could invade new areas. **Recommendations given here to mitigate the possible effect of invasive plant species to this proposal: Remove, by chemical or hand treatment, all individuals of bittersweet and Plume Grass known in the analysis area.** Currently, bittersweet populations are confined to areas along a road in two stands. Untreated, this population is expected to rapidly expand.

The other way in which non-native plants may persist in the area is by continual disturbance. For example, a maintained road shoulder or wildlife field often has persistent ruderal and non-native plant species. These areas are often maintained in an early successional state for wildlife or human benefit. Therefore, it is expected that this proposal could slightly increase the persistence of non-native vegetation in the analysis area. To mitigate this effect, **it is recommenced that native plants be utilized in wildlife improvement and roadside erosion control plantings**. It is recognized that erosion control and wildlife production are the primary goals of seeding areas and some non-native plant species may be highly beneficial to accomplish these goals. However, the presidential executive order [Executive order 11987, Title 3- The President] recognizes the need to reduce the impact of non-native species by reducing the amount in which non-native plant species are planted on federal property. All the goals of erosion control, wildlife production and encouragement of native plant species may be met by planting native plant species or a suitable mixture of native and non-native mixture of species.

2.2.4 Mitigation Measures

None.

2.3 Author of Section 2

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May 19, 2004
Amended August 20, 2004

3.0 TERRESTRIAL WILDLIFE RESOURCES

3.1 Terrestrial Wildlife Community Level and Management Indicator Species (MIS) Evaluation

3.1.1 Existing Condition

This report documents the findings of a wildlife analysis of the proposed Tanasee Forest Management Project of the Pisgah Ranger District, Transylvania County, North Carolina. The wildlife analysis area includes 9,605 acres of Forest Service land in Compartments 117-125. The project area includes Compartments 118-120, (totaling 3,548 acres). This proposed project is analyzed to determine effects on Federally threatened or endangered, Regional Forester's (Region 8) Sensitive or Forest (Nantahala/Pisgah) concern (locally rare) terrestrial wildlife species and management indicator species (MIS) resulting from changed habitat conditions associated with project implementation as they apply to both public and private lands.

The Land and Resource Management Plan (LRMP) for the Nantahala and Pisgah National Forests includes practice standards for the Forests including wildlife habitat for MIS. The standards are intended to protect, manage, and where possible, enhance wildlife resources. This analysis will focus on the potential effects of the proposed activities which would most likely affect wildlife resources.

The analysis area lies in the upper reaches of the West Fork French Broad River drainage. It is bounded on the west by the Jackson County line, on the southwest by the Blue Ridge Divide, on the southeast by U.S. Highway 64, on the east by State Road #1322, and on the north side across Glassmine Mountain and Bracken Mountain to Bald Rock. The forest in this area is a mixture of mature, natural stands and young, managed stands of hardwoods and pines. There are 9,605 acres in the analysis area, mostly in management area (MA) 3B. Dismal Falls is located in MA13, and there is some MA 4C along Tanassee Ridge. MA 3B uses 80 year rotations for cove and upland hardwoods and 60 years for white and yellow pine.

Management Area 3B emphasizes managing for a sustainable supply of timber, with few open roads, and provides habitat needs for wildlife such as wild turkey, deer, a variety of small mammals and other species that will benefit from a managed forest with limited motorized

access. Management Area 4C emphasizes providing quality background scenery, few open roads and habitat for wildlife species that prefer a less disturbed and remote setting.

Presently, there are 5 acres of early succession (0-10 year age class) planned in the project area as part of the Miser Creek Wildlife Project. Up to approximately 470 of the suitable acres should be in the 0-10 year age class per decade dispersed across the project area. This will provide hard and soft mast production, insect production, sustained hard mast, structural diversity, viability and provision for early successional habitat. MAs 4C and 13 are considered unsuitable for timber harvest, as well as certain forested stands in MA 3B with land class codes of 690 or above (minimum management level). There are approximately 57 acres in permanent grass forb openings located in Compartments 118-120. Within the project area, Compartment 118 contains 27 acres of permanent grass/forb openings, which is 71% of the desired 38 acres (3% of the total compartment acreage); Compartment 119 contains 11 acres of permanent grass/forb openings, which is 31% of the desired 35 acres (3% of the total compartment acreage); Compartment 120 contains 19 acres of permanent grass/forb openings, which is 56% of the desired 34 acres (3% of the total compartment acreage) for wild turkey.

About 89% of the project area is in hard mast producing forest types with 27% of those acres being of prime mast producing age (40-80 years old). About 7% of the project area is in pine and pine/hardwood forest types (Table 6).

Table 6. Forest types by age class (numbers in acres) in the project area.

Forest Type	0-10 years	11-40 years	41-80 years	81+ years	Total
3 White Pine	0	26	73	0	99
10 White Pine-Upland Hardwood	0	40	0	38	78
15 Pitch Pine-Oak	0	0	0	25	25
16 Virginia Pine-Oak	0	0	36	0	36
41 Cove Hardwoods-White Pine-Hemlock	0	73	0	0	73
42 Upland Hardwoods-White Pine	0	46	115	63	224
45 Chestnut Oak-Scarlet Oak-Yellow Pine	0	0	0	38	38
50 Yellow Poplar	0	0	20	0	20
52 Chestnut Oak	0	0	90	69	159
53 White Oak-Northern Red Oak-Hickory	0	121	452	649	1222
54 White Oak	0	0	8	35	43
55 Northern Red Oak	5	0	0	65	70
56 Yellow Poplar-White Oak-Northern Red Oak	0	17	20	274	311
59 Scarlet Oak	0	0	0	369	369
60 Chestnut Oak-Scarlet Oak	0	8	159	552	719
Total	0	331	973	2177	3481

Currently, Dismal Falls is located in Compartment 121, and there are no hiking trails within this analysis area.

3.1.2 Effects of alternatives

This portion of the wildlife analysis discloses the effects of each alternative in light of the issues and indicators mentioned in the Environmental Assessment for the Tanasee Forest Management Project related to terrestrial wildlife resources.

A general discussion of the environmental impacts that would result from undertaking the activities found in each alternative are documented in Chapters II and IV of the Final Environmental Impact Statement for the Land and Resources Management Plan 1986-2000 for the Nantahala and Pisgah National Forests, as amended.

Three alternatives will be analyzed for this proposed project (Table 7). For a more detailed description of each alternative, refer to the Environmental Assessment for the Tanasee Forest Management Project. Alternatives A is the "no action" alternative, and Alternatives B and C are the action alternatives. All figures (e.g., acres being treated, % of early successional habitat, miles of roading) are correct at the time of this writing of this wildlife analysis.

Table 7. Summary of Alternatives (total acreage and miles).

PROPOSED ACTIONS	Alt. A	Alt. B	Alt. C
Total Harvest (ac)	0 ac	284 ac	178 ac
Two-age Harvest	0 ac	284 ac	178 ac
Skyline	0 ac	121 ac	34 ac
Skidder	0 ac	163 ac	144 ac
Clearcut Harvest	0 ac	0 ac	0 ac
Skyline	0 ac	0 ac	0 ac
Skidder	0 ac	0 ac	0 ac
Group Selection	0 ac	0 ac	0 ac
Commercial Thinning	0 mi	0 ac	0 ac
Total Roading (mi)	0 mi	8.5 mi	5.0 mi
Construct system road	0 mi	2.8 mi	0.5 mi
Reconstruct system road	0 mi	3.7 mi	3.7 mi
Construct temporary road	0 mi	2.0 mi	0.8 mi
Cultural Treatments (ac)	0 ac	847 ac	708 ac
Site Prep (H&H *)	0 ac	284 ac	178 ac
Natural	0 ac	197 ac	91 ac
Artificial	0 ac	87 ac	87 ac
Plant harvest areas	0 ac	87 ac NRO	87 ac NRO
Release	0 ac	284 ac	178 ac
PHUT & VC (H&H*)	0 ac	162 ac	129 ac
PCT (H&H*)	0 ac	401 ac	401 ac
Wildlife Habitat Improvement	0 ac	4 ac	1.7 ac

*(H&H) = Herbicide and Handtools

The following are specific consequences that would result from each of the proposed alternatives.

3.1.2.1 MIS Evaluated and Rationale

According to the LRMP, there are 30 terrestrial wildlife MIS. Table 8 shows the biological communities and/or special habitats that these 30 MIS are associated with.

Table 8. Biological communities/special habitats and associated MIS (Tables III-8 and III-9 on pages III-49 – III-52; LRMP, Final Supplement to the Final Environmental Impact Statement Volume I) for MIS considered in this analysis.

Biological Communities/ Special Habitats	**MIS**
Fraser fir forests	Fraser fir, golden-crowned kinglet, Carolina northern flying squirrel
Red Spruce/fraser fir forests	Golden crowned kinglet, Carolina northern flying squirrel, solitary vireo
Northern hardwood forests	Carolina northern flying squirrel, twisted stalk, solitary (blue-headed) vireo
Carolina hemlock bluff forests	Golden-crowned kinglet, Carolina hemlock
Cove forests	Ginseng, black cherry, buckeye, basswood, solitary (blue-headed) vireo
Yellow pine mid-successional communities	Pine warbler (low elevation shortleaf/Virginia pine)
Xeric yellow pine forests	Pine warbler (pine/oak/heath low elevation habitats) pitch pine, table mountain pine, turkey beard, mid-successional)
Mountain ponds and ephemeral pools	Spotted salamander (vernal pools)
Shaded rock outcrops and cliffs	Green salamander (granitic gneiss rock outcrops with crevices and mesic conditions), Jordan's salamander, alumroots, saxifrages
Open rock outcrops and cliffs	Raven, peregrine falcon, Biltmore sedge, wretched sedge, mountain oat-grass
Caves	Bats (all cave-using species)
Alluvial forests	Two-lined salamander (mid-late successional stages), raccoon (all forest types), mink
Old Forest Communities (100+ years old)	Black bear (dens, low levels of disturbance), bats (roosting and foraging habitats in mature forests), pileated woodpecker (cavities, foraging habitat), lung lichens
Early successional (0-10 years old)	White-tailed deer (all communities and elevations), eastern wild turkey (all communities), ruffed grouse (early and mid-successional all communities) rabbits, rufous-sided (eastern) towhee, bobcat, field sparrow (brushy, riparian thickets)
Early successional (11-20)	Rufous-sided (eastern) towhee, ruffed grouse (early and mid-successional all communities)
Soft mast producing species	Wild grape (*vitus spp.)*, cedar waxwing (all communities soft mast)
Hard mast-producing species (>40 yrs)	Black bear, wild turkey, gray squirrel, white-tailed deer
Cove forests	Ginseng, black cherry, buckeye, basswood, solitary (blue-headed) vireo
Mixed pine/hardwood forest types (successional stage and hard mast)	Black bear, eastern wild turkey, gray squirrel, white-tailed deer
Contiguous areas with low disturbance (< 1 mile open travelway/4 square miles	Black bear (all communities)

Biological Communities/ Special Habitats	MIS
Contiguous areas with moderate disturbance levels (<1 mile open travelway/2 square miles)	Eastern wild turkey (all communities)
Large contiguous forest areas	Ovenbird (in breeding range, moderately productive sites), northern parula warbler (in breeding range, requires cover and riparian habitats) veery, solitary (blue-headed) vireo
Permanent grass/forb openings	Eastern wild turkey, eastern meadowlark, rabbit
Den trees (>36" dbh)	Black bear (large dens)
Snags and dens (>22" dbh)	Pileated woodpecker, raccoon (moderate sized dens)
Small snags and dens	Gray squirrel, white-breasted nuthatch, yellow-bellied sapsucker (breeding populations)
Downed woody debris – all sizes (foraging and cover habitats)	Black bear (all communities), pileated woodpecker, ruffed grouse (down logs for drumming),Jordan's salamanders
Shaded rock outcrops and cliffs	Green salamander (granitic gneiss rock outcrops with crevices and mesic conditions), Jordan's salamander, alumroots, saxifrages
Old Forest Communities (100+ years old)	Black bear (dens, low levels of disturbance), bats (roosting and foraging habitats in mature forests), pileated woodpecker (cavities, foraging habitat), lung lichens
Early successional (0-10 years old)	White-tailed deer (all communities and elevations), eastern wild turkey (all communities), ruffed grouse (early and mid-successional all communities) rabbits, rufous-sided (eastern) towhee, bobcat, field sparrow (brushy, riparian thickets)
Early successional (11-20)	Rufous-sided (eastern) towhee, ruffed grouse (early and mid-successional all communities)
Hard mast-producing species (>40 yrs)	Black bear, wild turkey, gray squirrel, white-tailed deer
Mixed pine/hardwood forest types (successional stage and hard mast)	Black bear, eastern wild turkey, gray squirrel, white-tailed deer
Contiguous areas with low disturbance (< 1 mile open travelway/4 square miles	Black bear (all communities)
Contiguous areas with moderate disturbance levels (<1 mile open travelway/2 square miles)	Eastern wild turkey (all communities)
Permanent grass/forb openings	Eastern wild turkey, eastern meadowlark, rabbit
Downed woody debris – all sizes (foraging and cover habitats)	Black bear (all communities), pileated woodpecker, ruffed grouse (down logs for drumming), Jordan's salamanders

Based on surveys of the area and associated habitats for the MIS (Table 9), the following five species were chosen for further analysis in this document: black bear, eastern wild turkey, ruffed grouse, white-tailed deer, and Jordan's salamander.

Table 9. Description of habitat types for five MIS known to occur within the project area.

MIS	Habitat Description
Black Bear (*Ursus americanus*)	requires hard-mast production to sustain reproduction and cub survival; prefers large elevated tree cavities for dens (trees>36" d.b.h.) and early successional habitat or areas of sufficient fruit production under tree canopies for spring and summer foraging; uses areas with large, down woody materials and root mats
Eastern Wild Turkey (*Meleagris gallopavo*)	large areas moderately free from the disturbance of motorized vehicles and intensive timber harvesting; needs grass/forb openings
Ruffed Grouse (*Bonasa umbellus*)	strongly associated with mid-successional (5-20 years) forest habitats characterized by thick, shrubby growth; often uses downed woody debris of various sizes for drumming.
White-tailed Deer (*Odocoileus virginianus*)	associated with both early successional habitat and hard-mast production; uses stems and leaves of woody and herbaceous green plants, fungi, and fruits; require hard mast for reproductive success and subsequent fawn survival.
Jordan's Salamander (*Plethodon jordani*)	represents shaded rock outcrop communities, in addition to those used by the green salamander; associated with moist, heavily forested slopes, with moss-covered logs and rock outcrops.

Table 10 provides the rationale for the other 25 terrestrial wildlife MIS that were not chosen for further analysis.

Table 10. Reason for non-selection of MIS for further analysis.

Species	Rationale for Non-selection
Golden-crowned kinglet	Biological community/special habitat this species represents does not occur within the project area. This species will not be affected; therefore, there will be no change to forest-wide population trends.
Solitary (blue-headed) vireo	Some of the biological community/special habitat this species represents does not occur within the project area. Although this species does occur in cove forests which are present in the project area, this species is common across the landscape in many forest types. This species will not be affected by management activities; therefore, there will be no change to forest-wide population trends.
Carolina northern flying squirrel	Biological community/special habitat this species represents does not occur within the project area. This species will not be affected; therefore, there will be no change to forest-wide population trends.
Pine warbler	Biological community/special habitat this species represents does not occur within the project area. This species will not be affected; therefore, there will be no change to forest-wide population trends.
Spotted salamander	Biological community/special habitat this species represents does not occur within the project area. This species will not be affected; therefore, there will be no change to forest-wide population trends.
Green salamander	In the MIS section, discussion of the biological community/special habitat this species represents will be covered by the discussion of effects to Jordan's salamander. More detailed discussion of the green salamander is found in the Forest Concern section since the green salamander is a forest concern species for the project.

Species	Rationale for Non-selection
Raven	Biological community/special habitat this species represents does not occur within the project area. This species will not be affected; therefore, there will be no change to forest-wide population trends.
Peregrine falcon	Biological community/special habitat this species represents does not occur within the project area. This species will not be affected; therefore, there will be no change to forest-wide population trends.
Bats	Biological community/special habitat this species represents does not occur within the project area. This species will not be affected; therefore, there will be no change to forest-wide population trends.
Blue Ridge two-lined salamander	Biological community/special habitat this species represents does not occur within the project area. This species will not be affected; therefore, there will be no change to forest-wide population trends.
Raccoon	Biological community/special habitat this species represents does not occur within the project area. This species will not be affected; therefore, there will be no change to forest-wide population trends.
Mink	Biological community/special habitat this species represents does not occur within the project area. This species will not be affected; therefore, there will be no change to forest-wide population trends.
Pileated woodpecker	Biological community/special habitat this species represents will be covered by the discussion of effects to black bear.
Rufous-sided (Eastern) towhee	Biological community/special habitat this species represents will be covered by the discussion of effects to eastern wild turkey, white-tailed deer and ruffed grouse.
Bobcat	Biological community/special habitat this species represents will be covered by the discussion of effects to eastern wild turkey, white-tailed deer and ruffed grouse.
Field sparrow	Biological community/special habitat this species represents will be covered by the discussion of effects to eastern wild turkey, white-tailed deer and ruffed grouse.
Cedar waxwing	Biological community/special habitat this species represents will be protected in accordance with LRMP standards and guidelines. Populations will not be affected by management activities; therefore, there will be no change to forest-wide population trends.
Gray squirrel	Biological community/special habitat this species represents will be covered by the discussion of effects to eastern wild turkey, black bear, and white-tailed deer.
Ovenbird	Biological community/special habitat this species represents will not change through management activities. Populations will not be affected by management activities; therefore, there will be no change to forest-wide population trends.
Northern parula warbler	Biological community/special habitat this species represents will not change through management activities. Populations will not be affected by management activities; therefore, there will be no change to forest-wide population trends.
Veery	Biological community/special habitat this species represents will not change through management activities. Populations will not be affected by management activities; therefore, there will be no change to forest-wide population trends.
Eastern meadowlark	Biological community/special habitat this species represents will be covered by the discussion of effects to eastern wild turkey.
Rabbit	Biological community/special habitat this species represents will be covered by the discussion of effects to eastern wild turkey, white-tailed deer and ruffed grouse.

White-breasted nuthatch	Biological community/special habitat this species represents will be protected in accordance with LRMP standards and guidelines. Populations will not be affected by management activities; therefore, there will be no change to forest-wide population trends.
Yellow-bellied sapsucker	Biological community/special habitat this species represents will be protected in accordance with LRMP standards and guidelines. Populations will not be affected by management activities; therefore, there will be no change to forest-wide population trends.

3.1.2.2 Effects of Alternatives on MIS

Direct and Indirect Effects:

Alternative A - No Action

Since a majority of the analysis area is in MA 3B, the emphasis is on early successional habitat. Management indicator species for MA 3B (according to the LRMP) are those species that require early successional habitat, such as eastern wild turkey, white-tailed deer, a variety of small mammals, travel corridors and foraging habitat for black bears, and other species that will benefit from a managed forest with limited motorized access. Wildlife which thrive in a young- to middle-aged forest will be favored through appropriate forest management practices.

Several standards are in the LRMP that make provisions for early successional habitat: (1) provide not less than 5% and not more than 15% per compartment in the 0-10 year age class. Configuration of 0-10 year-old stands in surrounding project/analysis areas are considered in the analysis, (2) manage habitat primarily for eastern wild turkey, (3) use a desired density of 3% for permanent grass and forb openings, and (4) seed roads with appropriate wildlife seed mixtures.

Five MIS are known to occur within the proposed project area, including black bear (travel corridors), eastern wild turkey, ruffed grouse, white-tailed deer, and Jordan's salamander. These MIS were chosen because the project area is predominantly in MA 3B. According to the LRMP, the general direction for MA 3B is to provide conditions for the large group of game and nongame animals that benefit from young- to middle-aged forests and cannot tolerate motorized vehicular disturbance. Habitat is to be emphasized for the black bear (travel corridors), eastern wild turkey, ruffed grouse, and white-tailed deer. Under the standards for MA 3B in the LRMP, habitat is to be managed primarily for eastern wild turkey. Jordan's salamanders were also chosen as an MIS for this project because of the presence of rock outcrops throughout the area, particularly along Tanasee Ridge. The habitat requirements for each of these species vary, and some requirements overlap (Table 9).

Black Bear

The quality and quantity of habitat available for bear is dependent upon two factors: (1) the availability of food and shelter, which is directly related to habitat diversity, and (2) the amount

of disturbance that animals are likely to encounter from humans, which is related to the amount of roads and trails in an area and the level of use of those facilities.

Black bears are highly adaptable and very opportunistic. An ongoing study of black bears in the Pisgah Bear Sanctuary by Dr. Roger Powell with North Carolina State University found that black bears will den in various locations, not just large "old growth" hollow trees. Only 39% of the bears were indeed denning in hollow trees. About 36% den in small caves, and as much as 12% of the bears will den in nests with no overhead cover. Two bear dens were actually found in clearcuts, where the nests were in or near stands of blackberry which were difficult to approach and therefore well protected. According to Dr. Powell in his annual report (1 May 93-30 April 94) to the Forest Service, he states that if clearcuts provide many well protected den sites, this aspect of habitat will be important to bears.

The wildlife analysis area is not in a black bear patch, but it is in an area of the district that is considered high quality bear habitat. This means that all the bear habitat objectives (minimum size of 10,000 acres and meeting the desired condition of less than 1/4 mile of open road per square mile) have been met except that the open road density is exceeded (up to ½ mile/mi^2). Since most of the project area is in MA 3B (NOT a black bear emphasis area), travel corridors and foraging areas are the objectives for bear "management".

The diversity of habitat and the availability of food is more critical, due to the lack of early successional habitat (particularly 0-10 year age classes) within the project area. Early successional habitat provides a great deal of soft mast and large downed woody material for foraging. Black bears eat primarily grasses and forbs in the spring, soft mast which includes blackberries, blueberries, and buckberries in the summer and fall, and hard mast in the fall. Since the no action alternative maintains the status quo, there will be no increase in forage for the black bear. The following table displays the amount of early successional habitat that will be present under each alternative, with Alternative A displaying the amount of early successional habitat that exists presently within the project area.

Table 11. Acres of early successional habitat created by each alternative in the project area.

Alternative	Acres in early successional habitat, stands <20 years old in the project area. {0-10 age class in ( )}
A	42 (5)
B	331 (289)
C	220 (183)

The quality of habitat is affected by the amount of human-bear interaction, which is related to the amount of roads and trails and the degree to which they are used. This part of the district is an area where bears are hunted. Because of the old roads that occur throughout the project area that are inaccessable to street-legal vehicles, poaching does occur (with the use of illegal all-terrain vehicles or ATVs). Since the no action alternative will maintain the status quo for the area, illegal ATV use will continue to disturb bears and allow access for poachers.

Eastern Wild Turkey
Timber management is beneficial to wildlife and is good for wildlife if done properly. Small units, 5-10 acres up to 40 acres under some conditions, following the contour of the land, provide good brood habitat for wild turkeys for several years or longer, depending on the site. Insect production increases as the grasses and legumes grow following the disturbance of the soil. As the briars and shrubs grow, the dense stand will become good nesting habitat, giving the hen good protection from predators. The key is to provide for the year-round needs and not convert the entire area into either nesting or brood habitat. Brooding and nesting cover consists of the woodland margins of grasslands, sparse brushlands, recent regeneration areas, and open fields. Hens occasionally use woodlands with low ground cover for nesting, particularly in extensive bottomland hardwoods. Escape cover can be dense pole stands where turkeys skulk, or sapling stands or extensive woodlands where they can avoid harassment.

Clearings produce the food needed during warm months (grass seed, insects, fruit, forage) and serve as breeding, nesting and brood-rearing areas. Clearings also supplement native food year-round when planted. Turkey eat hard mast, forbs, insects and grass seeds in the spring; forbs, insects, soft and hard mast in the summer; hard mast, insects, grass and weed seeds, and grain in the fall; and hard mast, forbs, soft mast, and seeds in the winter. Since the no action alternative maintains the status quo, there will be no increase in habitat for the wild turkey.

Ruffed Grouse
Ruffed grouse habitat consists of several early successional vegetation stages. The more important of these habitats are young deciduous forests or deciduous-conifer mixtures, field edges, abandoned homesites, brushy creek bottoms and reverting old fields. Ruffed grouse habitat can be characterized as areas with a very high number of woody plant stems per acre. Additional habitat needs vary with the bird's seasonal needs. Drumming males select logs on sites where the vegetation is open enough to allow good visibility. The area must have sufficient stem density and canopy coverage (regeneration and small sapling size trees) to provide protection from hawks and owls.

Ruffed grouse are ground nesters with hens choosing sites having sparse shrub and ground cover with unobscured visibility. These sites are most often found in pole or small sawtimber stands, but are usually within close proximity of fields, road or trail edges, old homesites, drumming sites, or breaks in the forest canopy such as logged areas or old log landings. Brood cover tends to have higher stem densities and ground cover than drumming habitat. Thus, broods use earlier stages of forest succession than drumming males. Broods are also often found in semi-open areas in early stages of woodland succession. These areas are characterized by diverse herbaceous ground cover that provides a low canopy with openings at ground level through which birds can move and feed. Woody invasion in a clumped pattern provides the insect and plant foods, low overhead cover, and relief from summer heat that brood habitat must supply. Dense stands of grasses and forbs do not provide brood habitat since they restrict movement. Areas with good interspersion of early successional habitats provide the foods necessary throughout the year. Proper woodland and edge management will usually produce the required food species. Since the no action alternative maintains the status quo, there will be no increase in habitat for the ruffed grouse.

White-tailed Deer
White-tailed deer is associated with both early successional habitat and hard-mast production. Deer require hard mast for reproductive success and subsequent fawn survival. Typical foods for white-tailed deer include tender leaves and twigs, acorns, lichens, ferns, greens, fruit, mushrooms, and grain. Browse (leaves, stems, and buds of woody plants) is generally available all year and is a staple food for deer. In the spring, green succulent leaves and stems of both woody and herbaceous species are dominant food items, and yellow poplar flowers, mushrooms and acorns are other important items. In summer, materials from succulent green plants continued to dominate foods taken. Mushrooms are the next dominant item, followed again by acorns. In fall, acorns are the dominant food item. Other important food items are mushrooms, grapes, apples, sumac and blueberry. Leaves of woody species occur frequently in the deer's diet, but no woody twigs are eaten in the fall. In winter, acorns and grasses appear to be the most common food items. Mushrooms are also important, as are grapes and sumac fruits in early winter. Rhododendron leaves are the dominant food item in more southerly Appalachian Mountains. Woody twigs are browsed during the spring and early summer when this part of the plant is actually more of a succulent. Since the no action alternative maintains the status quo, there will be no increase in habitat for the white-tailed deer.

Jordan's Salamander
Jordan's salamander is an MIS representing rock outcrops. Since this alternative will maintain the status quo for the area, rocky habitat within the analysis area will not be affected; therefore, there will be no effect to this species or its habitat.

Alternative B – Proposed Action

Black Bear
Please see discussion about black bear habitat in 3.1.2.2 Effects of Alternatives on MIS, Alternative A – No Action, Black Bear above. Alternative B will create 284 acres of early successional habitat (0-10 year age class), thus creating considerable soft mast. Regeneration will eventually help produce greater hard mast crops in the future, which bears greatly depend on for survival. Bears fatten themselves on the fat and protein-rich acorns before entering hibernation in late fall. Also, this action alternative will increase permanent grass/forb habitat by 4.0 acres, which is the primary food source for bears in the spring when they emerge from hibernation. This alternative will also build more road than Alternatives A or C; however, these roads would be managed as closed to general vehicular traffic and would begin from existing roads that are gated. This increased roading will result in some minor changes to the habitat, but these will not be enough to affect the overall habitat quality in the analysis area for use as travel corridors and foraging. Access to the area for law enforcement presence will help curtail the poaching that is presently occurring.

Eastern Wild Turkey
Please see discussion about black bear habitat in 3.1.2.2 Effects of Alternatives on MIS, Alternative A – No Action, Eastern Wild Turkey above. Alternative B will create 284 acres of early successional habitat (0-10 year age class), thus creating considerable soft mast. Regeneration will eventually help produce greater hard mast crops in the future, which turkey greatly depend on for survival. Hard mast is a critical food for turkeys year around. Also, this

action alternative will increase permanent grass/forb habitat by 4.0 acres. Not only does this habitat provide a food source for turkeys, but grass/forb habitat can provide bugging areas for turkey (especially important for the growing poults), cover for the poults, and hens will nest close to grass/forb openings.

Ruffed Grouse
Please see discussion about black bear habitat in 3.1.2.2 Effects of Alternatives on MIS, Alternative A – No Action, Ruffed Grouse above. Alternative B will create 284 acres of early successional habitat (0-10 year age class), thus creating considerable soft mast. Also, this action alternative will increase permanent grass/forb habitat by 4.0 acres. Not only does this habitat provide a food source for grouse, but grass/forb habitat can provide bugging areas for grouse (especially important for the growing chicks), cover for the chicks, and hens will nest close to grass/forb openings.

White-tailed Deer
Please see discussion about black bear habitat in 3.1.2.2 Effects of Alternatives on MIS, Alternative A – No Action, White-tailed Deer above. Alternative B will create 284 acres of early successional habitat (0-10 year age class), thus creating considerable soft mast. Regeneration will eventually help produce greater hard mast crops in the future, which deer depend on for reproductive success and subsequent fawn survival. Also, this action alternative will increase permanent grass/forb habitat by 4.0 acres, which provides an important food source for deer year around.

Jordan's Salamander
Jordan's salamander is an MIS representing rock outcrops. Since this alternative will protect rocky habitat within the project area, there will be no effect to this species or its habitat.

Alternative C

Black Bear
Please see discussion about black bear habitat in 3.1.2.2 Effects of Alternatives on MIS, Alternative A – No Action, Black Bear above. Alternative C will create 178 acres of early successional habitat (0-10 year age class), thus creating less soft mast than Alternative B. Regeneration will eventually help produce greater hard mast crops in the future, which bears greatly depend on for survival. Bears fatten themselves on the fat and protein-rich acorns before entering hibernation in late fall. Also, this action alternative will increase permanent grass/forb habitat by 1.7 acres, which is the primary food source for bears in the spring when they emerge from hibernation. This alternative will also build less road than Alternative B; and as with Alternative B, these roads would be managed as closed to general vehicular traffic and would begin from existing roads that are gated. Some increased roading will result in some minor changes to the habitat, but these will not be enough to affect the overall habitat quality in the analysis area for use as travel corridors and foraging. Access to the area for law enforcement presence will help curtail the poaching that is presently occurring.

Eastern Wild Turkey
Please see discussion about black bear habitat in 3.1.2.2 Effects of Alternatives on MIS, Alternative A – No Action, Eastern Wild Turkey above. Alternative C will create 178 acres of early successional habitat (0-10 year age class), thus creating less soft mast than Alternative B. Regeneration will eventually help produce greater hard mast crops in the future, which turkey greatly depend on for survival. Hard mast is a critical food for turkeys year around. Also, this action alternative will increase permanent grass/forb habitat by 1.7 acres. Not only does this habitat provide a food source for turkeys, but grass/forb habitat can provide bugging areas for turkey (especially important for the growing poults), cover for the poults, and hens will nest close to grass/forb openings.

Ruffed Grouse
Please see discussion about black bear habitat in 3.1.2.2 Effects of Alternatives on MIS, Alternative A – No Action, Ruffed Grouse above. Alternative B will create 178 acres of early successional habitat (0-10 year age class), thus creating less soft mast than Alternative B. Also, this action alternative will increase permanent grass/forb habitat by 1.7 acres. Not only does this habitat provide a food source for grouse, but grass/forb habitat can provide bugging areas for grouse (especially important for the growing chicks), cover for the chicks, and hens will nest close to grass/forb openings.

White-tailed Deer
Please see discussion about black bear habitat in 3.1.2.2 Effects of Alternatives on MIS, Alternative A – No Action, White-tailed Deer above. Alternative C will create 178 acres of early successional habitat (0-10 year age class), thus creating less soft mast than Alternative B. Regeneration will eventually help produce greater hard mast crops in the future, which deer depend on for reproductive success and subsequent fawn survival. Also, this action alternative will increase permanent grass/forb habitat by 1.7 acres, which provides an important food source for deer year around.

Jordan's Salamander
Jordan's salamander is an MIS representing rock outcrops. Since this alternative will protect rocky habitat within the project area, there will be no effect to this species or its habitat.

Table 12 represents the changes to the forest-wide estimates to the biological communities/special habitats from the alternatives.

Table 12. Biological Communities/Special Habitats, Forest-wide estimates and changes from the alternatives.

Biological Community/Special Habitat	Forest-wide Estimate	Estimated Changes		
		Alt. A – No Action	Alt. B – Proposed Action	Alt. C
Shaded rock outcrops and cliffs	66,282 acres (high probability)	None Affected	None Affected	None Affected
Old Forest Communities (100+ years old)	171,000 ac	None	Decrease by 154 acres	Decrease by 75 acres
Early successional (0-10 years old)	26,800 ac (yr 2000) 2040 ac (5 yr av) downward trend	None	Increase by 284 acres	Increase by 178 acres
Early successional (11-20)	46,290 ac (yr 2000) Peak of upward trend	None	None	None
Hard mast-producing species (>40 yrs)	681,000 ac increasing trend	None	Decrease by 284 acres	Decrease by 178 acres
Mixed pine/hardwood forest types (successional stage and hard mast)	52,521 increasing trend	None	None	None
Contiguous areas with low disturbance (< 1 mile open travelway/4 square miles	160,832 ac	None	None	None
Contiguous areas with moderate disturbance levels (<1 mile open travelway/2 square miles)	576,240 ac	None	None	None
Permanent grass/forb openings	3,000 ac	None	Increase 4.0 acres	Increase 1.7 acres
Den trees (>36” dbh)		None	None	None
Down Woody Material	High Accumulation Small wood: 18,000 Large wood: 386,000 Low Accumulation (approx: 600,000)	None	Some Accumulation Small wood: Increase on 284 acres	Some Accumulation Small wood: Increase on 178 acres

Cumulative Effects:

All connected actions in the project area have been identified in the alternatives. Past actions that have occurred within or near the project area include the Johnnies Creek Timber Sale (1992), the Blue Walnut Timber Sale (1996), and the Rich Nut Timber Sale (1999). The NCDOT improvements to SR 1324, the Miser Creek Wildlife Project, Bracken Mill Timber Sale and Tanasee Gap Timber Sale will occur in Compartments 118-120 within the reasonable foreseeable future (5 years) (Table 13).

Table 13. Major projects within the analysis area by year.

1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
A	A	A	A	A	A	A								
				B	B	B	B							
							C	C	C	C				
													D	
											E	E	E	
												F	F	F
												G	G	G

A – Johnnies Creek Timber Sale (Compartments 108-110)
B - Blue Walnut Timber Sale (Compartment 123)
C – Rich Nut Timber Sale (Compartment 125)
D – NCDOT Improvement to SR 1324, Tannassee Gap Road (Compartments 118-119)
E – Miser Creek Wildlife Project (Compartments 118-120)
F – Bracken Mill Timber Sale (Compartments 118, 120)
G – Tanasee Gap Timber Sale (Compartments 118-119)

The combined effects from all activities within the analysis area, including those that have occurred in the past 12 years and those that may occur in the reasonably foreseeable future, that may directly or indirectly affect forest habitats, individual animals, or species viability in the project area or on the Forest, have been considered cumulative effects in this analysis. The Johnnies Creek, Blue Walnut and Rich Nut Timber Sales are included in the calculation of early successional habitat (<20 years old) in the analysis area. However, because these sales were implemented several years ago, they do not contribute to the 0-10 age class. Implementation of the proposed project will result in no negative cumulative effects on MIS since no negative direct or indirect effects will occur. Management actions, including past and future regeneration harvesting, will actually increase habitat for black bear, eastern wild turkey, ruffed grouse and white-tailed deer, thus having a positive effect on these species. Management activities will not negatively affect Jordan's salamander since its habitat will be protected during project implementation.

Much of the area was harvested earlier in this century when it was in private ownership. The cessation of harvest under public ownership resulted in a long term decline of early successional habitat through the mid part of this century. Associated with that, species dependent upon such habitat decreased. Timber harvests on National Forest land in the 1960's and early 1970's greatly improved conditions for most game species. Populations of wildlife dependent upon late successional forest habitat were most likely unaffected by these early harvests as their habitat was still abundant. Recreation opportunities and usage began to increase dramatically during this period.

The Forest Service timber harvest in the 1980's continued the gradual reintroduction of early successional habitat into the landscape. The resultant increase in habitat diversity improved conditions for those species dependent upon a variety of successional types. Black bear do well with a mix of both types of habitat while other species such as gray squirrel, pileated woodpecker and many forest interior birds require late successional forests.

This improvement in habitat diversity has resulted in a slight reduction of late successional habitat; however, the gradual maturation of earlier harvests will offset this in the long term, provided a balance of age classes across forest types is maintained. This trend will continue with present and future forest management activities.

Reductions in late successional habitat will continue slowly and at a planned rate until habitat levels stabilize as the forest is harvested at a regulated rate. No adverse impacts are expected from such activities. When past and future projects are considered together across the landscape, approximately 6% of the available habitat for late successional forest species will be modified. An additional 1,200 acres in Compartments 118-120 will be approaching maturity within the next two planning cycles, and approximately 208 acres will remain humanly unaltered since they occur in MA 4C.

The following table and narrative are the rationale for how the project-level MIS relate to population trends across the Nantahala/Pisgah National Forests. Table 14 gives the estimated forest-wide population trends for MIS, the biological community or special habitat associated by the species.

Table 14. MIS, estimated trend, and biological community or special habitat indicated by the species

Species	Estimated Population Trend	Biological Community or Special Habitat					
		1	2	3	4	5	6
Black Bear	Increase	Old Forest Communities	Hard mast-producing species	Mixed Pine/hardwood forest types	Contiguous areas with low disturbance	Den trees (>36 dbh)	Downed woody debris- all sizes
White Tailed Deer	Static to increasing	Early-successional (0-10)	Hard mast-producing species	Mixed pine/hardwood forest types			
Eastern Wild Turkey	Static to increasing	Hard mast-producing species	Mixed pine/hardwood forest types	Contiguous areas with moderate disturbance	Permanent grass/forb openings		
Ruffed Grouse	Static to increasing	Early successional (0-10)	Early successional (11-20)	Downed woody debris			
Jordan's Salamander	Static	Shaded rock outcrops and cliffs					

*See the Nantahala and Pisgah Unpublished MIS Report and the FY 2002 and 2003 Monitoring and Evaluation Reports for the National Forests in North Carolina.

Shaded rock outcrops and cliffs – The current forest-wide trend for this biological community is static. Shaded rock outcrops and cliffs are protected when management activities are implemented. Thus, this project will not affect the forest-wide trend nor the species associated with it because shaded rock outcrops and cliffs are protected in the project area.

Old Forest Communities (100+ years old) – The current forest-wide trend for this special habitat is increasing due to the aging of younger stands. Project implementation may decrease this special habitat by as much as 154 acres within the project area. Forest-wide, this 154 acre decrease represents a 0.09% change. However, younger stands will continue to age into these older forest communities. Therefore, the project will not change the forest-wide trend nor the species associated with it because the change is negligible, and younger forest communities will continue to age into older forest communities.

Early-successional (0-10 years old) – The current forest-wide trend for this special habitat is decreasing due to the reduction in the levels of harvesting. This project will increase early successional (0-10) habitat by as much as 284 acres. Forest-wide, this 284 acre increase represents a 1.0% positive change. However, this small increase will only slightly slow the downward habitat trend and not change the population trends of those species associated with it.

Early successional (11-20 years old) – The current forest-wide trend for this special habitat is at the peak of an upward trend. Implementation of this project will have no effect on this habitat; therefore, there will be no change in this trend nor the population trend of those species associated with it.

Hard mast-producing species (>40 yrs) – The current forest-wide trend for this special habitat is increasing due to past timber harvesting. This project will decrease hard mast-producing species by as much as 284 acres. Forest-wide, this 284 acres decrease represents a 0.04% change. However, younger trees will continue to age into older mast producing stands. Therefore, the project will not change the forest-wide trend nor the species associated with it because the change is negligible, and younger trees will continue to age into older mast producing stands.

Mixed Pine/hardwood forest types (successional stage and hard mast) – The current forest-wide trend for this special habitat is increasing. Implementation of this project will have no effect on this habitat; therefore, there will be no change in this trend nor the population trend of those species associated with it.

Contiguous areas with low disturbance (<1 mile open travelway/4 square miles) - The current forest-wide trend for this special habitat is static. Implementation of this project will have no effect on this habitat; therefore, there will be no change in this trend nor the population trend of those species associated with it.

Contiguous areas with moderate disturbance levels (<1 mile open travelway/2 square miles) - The current forest-wide trend for this special habitat is static. Implementation of this project will

have no effect on this habitat; therefore, there will be no change in this trend nor the population trend of those species associated with it.
Permanent grass/forb openings - The current forest-wide trend for this special habitat is static. This project will increase the amount of grass/forb habitat by as much as four acres. Forest-wide, this 4 acre increase represents a 0.1% change. The project will not change the forest-wide trend nor the species associated with it because the change is negligible.

Den trees (>36" dbh) - The current forest-wide trend for this special habitat is static. Implementation of this project will have no effect on this habitat; therefore, there will be no change in this trend nor the population trend of those species associated with it.

Downed woody debris – all sizes (foraging and cover habitats) – The current forest-wide trend for this special habitat is decreasing due to the reduction in levels of timber harvesting. Implementation of this project may increase the amount of small wood on up to 284 acres. Forest-wide, this 284 acre increase represents a 1.5% positive change. However, this small increase will only slightly slow the downward habitat trend and not change the population trends of those species associated with it.

3.1.3 Other Management Opportunities to Provide for Biodiversity

Other Management Opportunities to Provide for Biodiversity

1. Maintain existing and new roads as closed to minimize disturbance to eastern wild turkey and black bear.
2. Retain snags at a rate of two snags per acre in harvest units where present, or reserve green trees for snag recruitment.
3. Retain all active den trees.
4. Develop up to 3% (106 acres) in permanent grass/forb openings for eastern wild turkey management.
5. Designate at least 5% of the total acres in each compartment as old growth.
6. Remove timber along proposed and existing closed roads to contribute to the 3% permanent grass/forb openings for eastern wild turkey where there is no conflict with visuals.
7. Use wildlife preferred seed/shrub mixtures for seeding roads, banks, and landings.
8. Convert temporary roads into permanent linear wildlife openings in accordance with LRMP direction.

Habitat Diversity

Since a majority of the analysis area is in MA 3B, the emphasis is on early successional habitat. Management indicator species for MA 3B (according to the LRMP) are those species that require early successional habitat, such as eastern wild turkey, white-tailed deer, a variety of small mammals, travel corridors and foraging habitat for black bears, and other species that will benefit from a managed forest with limited motorized access. Wildlife which thrive in a young- to middle-aged forest will be favored through appropriate forest management practices.

Several standards are in the LRMP that make provisions for early successional habitat: (1) provide not less than 5% and not more than 15% per compartment in the 0-10 year age class. Configuration of 0-10 year-old stands in surrounding project/analysis areas are considered in the analysis, (2) manage habitat primarily for eastern wild turkey, (3) use a desired density of 3% for permanent grass and forb openings, and (4) seed roads with appropriate wildlife seed mixtures.

None of the project area is currently in a designated Forest Interior Bird Patch (FIBP), as presented in the recent LRMP amendment. The analysis area is considered to be "a mix of habitats." This means that habitat quality for forest interior species varies due to the amount and location of larger canopy openings or edge. Canopies are considered open until a regenerated stand is about 15-20 years old. Approximately 6% of the analysis area (9% of the project area) is currently "open." Under all of the action alternatives, canopy openings would remain below 10%, creating openings at approximately 7-9% in the analysis area. The analysis area is adjacent to a FIBP on the Roy Taylor Forest of the Highlands Ranger District. FIBPs are considered to be habitats with minimal edge. This means that optimal conditions for forest interior species are provided by minimizing canopy openings and edge effects over a large area.

One of our objectives for this area is to manage for a mix of habitats. Birds requiring different habitat types were found during our breeding bird surveys. Many birds, such as red-eyed vireos, woodpeckers, black and white warblers, and yellow-billed cuckoos require a mature forest setting. Other birds, such as white-breasted nuthatches, eastern wood-pewees and dark-eyed juncos like mature forest with open understories; whereas, ovenbirds, hooded warblers, woodthrushes and acadian flycatchers like mature forests with dense understories. Rufous-sided towhees and indigo buntings are just a couple of species we found that prefer early successional habitat.

Breeding bird abundance for 1-3 years following harvest is low but rises steadily with age in hardwood stands. After clearcutting in pine-oak habitat, a much higher density of winter birds occurs after shrubs and other hardwoods regrow than during the first few years after cutting. In general, stands with little vertical layering support few breeding birds. As vertical layering increases in forest stands, so does the diversity and number of songbirds. Breeding birds are found in greatest numbers along forest edges rather than toward the interior of stands, whether they be recently regenerated areas or mature stands.

Table 15 shows the overall age class distribution for all stands within the project area. This table indicates that most of the project area is deficient in early successional habitat in the forested environment. Following current trends, a shortage in early successional habitat will persist given the present rate of management activity. Even after several more decades of management, the age class distribution will still be heavily skewed toward the upper age classes. Through time, the younger age classes will migrate upwards and the area will remain predominately forested and deficient in early successional habitat.

Table 15. Acres in Compartments 118, 119, and 120 by 10 year age classes.

AGE CLASS											
ALT	0-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	101+
A	5	37	294	0	100	68	45	760	707	728	742
B	289	37	294	0	100	68	45	760	672	633	588
C	183	37	294	0	100	68	45	760	672	660	667

Under Alternatives B, about 8% of the canopy will be opened, which is still below the 10% for "habitat with limited edge", a more restrictive goal than our goal for a "mix of habitats" for the project area. Alternative C will create canopy openings at about 5%, and under Alternative A, canopy openings will remain at the current 0.1%. Since our emphasis in the project area for MA 3B is early successional habitat, Alternative B would better fulfill this goal than Alternative C.

Also, the project area is near a FIBP on the Roy Taylor Forest of the Highlands Ranger District. FIBPs are considered to be habitats with minimal edge. This means that optimal conditions for forest interior species are provided by minimizing canopy openings and edge effects over a large area. Since having a "mix of habitats" in the area is our goal, this will be met, even with Alternatives B and C having higher percentages of canopy openings.

Late successional habitat is related to the habitat needs of certain types of wildlife, such as bear, pileated woodpeckers, gray squirrels, and forest interior birds such as white-breasted nuthatches and cerulean warblers. For certain wildlife species, large trees are as much of a requirement as old trees, so size was a consideration in determining the availability of some late successional habitat. For other types of habitat, age alone was considered. Late successional habitat is also needed for overall habitat diversity and for plant species, as well as for visuals, aesthetics and recreation. In accordance with the revised standards and guides found in the amended LRMP, stands to be managed as old growth have been designated in each compartment.

3.2 Terrestrial Wildlife Threatened, Endangered and Sensitive Species Evaluation

3.2.1 Species Evaluated and Rationale

Ten federally threatened or endangered, 33 Region 8 Regional Forester's Sensitive, and 40 Forest Concern (locally rare) wildlife species were originally considered from the Forest's species list. All but 2 federally threatened or endangered, 3 Sensitive and 9 forest concern species were dropped since these were listed by the North Carolina Wildlife Resources Commission (NCWRC), North Carolina Natural Heritage Program (NCNHP), and the US Fish and Wildlife Service (USFWS) as occurring or probably occurring in Transylvania County (see Attachment 2). All of these but 1 federally threatened and PETS and 3 forest concern species were dropped from the list for analysis as a result of the likelihood of occurrence evaluation based on habitat elements and filed records (Table 16).

Table 16. Likelihood of occurrence of PETS and Forest Concern wildlife species within the analysis area in Transylvania County, North Carolina.

SPECIES	STATUS	LIKELIHOOD OF OCCURRENCE	EVALUATION CRITERIA*
Bog Turtle (*Clemmys muhlenbergii*)	Threatened	May occur	1, 3, 4
Southern Appalachian (eastern) Woodrat (*Neotoma floridana haematoreia*)	Forest Concern	May occur	1, 4
Green Salamander (*Aneides aeneus*)	Forest Concern	May occur	1, 4
Dusky Azure (*Celastrina niger*)	Forest Concern	May occur	1, 4

* 1 = Recent survey data within project area (<5 year old)
  2 = Historical survey data within project area (>5 years old)
  3 = Vicinity records (NCWRC, NCNHP, USFWS)
  4 = Suitable habitat exists within project area, but no records
  5 = No suitable habitat exists within project area

3.2.2 Existing Condition

The bog turtle (*Clemmys muhlenbergii*) is the only federally listed species that could occur in the project area. This species uses bogs, wet pastures and wet thickets, all of which occur in the analysis area. Bog turtles are typically found in extensive open wetlands, whereas mountain wetlands in the Southern Blue Ridge are mostly small in area and many are shaded as a result of vegetation succession following draining (Hunter et. al. 1999). The amount of floodplain habitats that have been converted into agricultural lands or urban areas suggest that mountain wetlands have been reduced by >90% (Petranka 2002). In western North Carolina, bog turtles are mostly associated with Nikwasi and Toxaway soils, both of which occur on the Pisgah Ranger District, but may be found in other soils typical of wet, boggy conditions. A recent soil survey by the USDA Natural Resources Conservation Service indicates that soils in Miser Creek are Whiteside-Sylva, a poor to moderately well drained moist soil complex (C.Smith and D.Manning pers.comm.). The presence of bog turtles has not been confirmed in the analysis area. However, records exist near Lake Toxaway and northeast of Rosman. It has been postulated that, given interconnected stream systems with suitable habitat, bog turtles can disperse between drainages (Klemens 2001).

Several large rock outcrops exist in the project area that are suitable for green salamander (*Aneides aeneus*) and eastern woodrat (*Neotoma floridana haematoreia*), although neither species was found. Dusky azure (*Celastrina nigra*) occurs in shady and moist deciduous woods, where eggs are laid on the host plant *Aruncus dioicus* (goat's beard). Adults feed on flower nectar, including wild geranium. The caterpillar's host, *Aruncus*, does not occur in the project area, per Dave Danley, Forest Botanist.

New Surveys or Inventories Conducted

Forest prescriptions and preliminary habitat surveys were conducted in 1996 by Ted Oprean, Pisgah Ranger District prescription forester.

Wildlife habitat surveys were conducted on 14, 16 April 1997 and 26 February, 15 May, 8, 9 June and 14 July 1998 by Mae Lee Hafer, Forest Service wildlife biologist.

Site visits were conducted on 6 March 2002 by Mae Lee Hafer, Chris Kelly (USFS Ecologist), and Joffrey Brooks and Keith Robertson (NCWRC); on 6 June 2002 by Mae Lee Hafer, Chris Kelly, and Joffrey Brooks; and on 15 November 2002 by Chris Kelly, Lorie Stroup (USFS Fisheries Biologist) and Chris McGrath (NCWRC Nongame Biologist).

Bird surveys were conducted by Chris Kelly in June 2002; small mammal, butterfly, grasshopper, and herptile surveys were conducted by Chris Kelly and Mae Lee Hafer in September and November 2002. All species analyzed in this document were surveyed for, although none were found during the surveys.

Additional information on threatened, endangered, sensitive, and forest concern wildlife species and MIS was obtained from North Carolina Wildlife Resources Commission (NCWRC), US Fish and Wildlife Service (USFWS), and North Carolina Natural Heritage Program (NCNHP) records.

3.2.3 Effects of Alternatives by Species

Three alternatives will be analyzed for this proposed project (Table 7). For a more detailed description of each alternative, refer to the Environmental Assessment for the Tanasee Forest Management Project. Alternatives A is the "no action" alternative, and Alternatives B and C are the action alternatives. All figures (e.g., acres being treated, % of early successional habitat, miles of roading) are correct at the time of this writing of this wildlife analysis.

Proposed, Endangered and Threatened Species

Direct and Indirect Effects:

<u>Alternative A</u> - No Action

The bog turtle (*Clemmys muhlenbergii*) uses bogs, wet pastures and wet thickets, all of which occur in the project area. Bog turtles are typically found in extensive open wetlands, whereas mountain wetlands in the Southern Blue Ridge are mostly small in area and many are shaded as a result of vegetation succession following draining (Hunter et. al. 1999). It has been postulated that, given interconnected stream systems with suitable habitat, bog turtles can disperse between

drainages (Klemens 2001). Since Alternative A will maintain the status quo for the area, it will have no effect on bog turtle.

Alternatives B and C

The bog turtle (*Clemmys muhlenbergii*) uses bogs, wet pastures and wet thickets, all of which occur in the project area. Although there is suitable boggy habitat in the project area, care will be taken to protect all bogs that provide suitable habitat for the bog turtle. This will be accomplished by maintaining a buffer around the bogs; therefore, there will be no effect to this species should either of these alternatives be implemented.

Sensitive Species

There will be no direct or indirect effects on any sensitive species since none were analyzed for this report because none of these species, or their habitat, are known or expected to occur within the project area.

Forest Concern Species

Direct and Indirect Effects:

<u>Alternative A</u> - No Action

The eastern woodrat and green salamander are both associated with rocky places: the eastern woodrat with boulder fields and the green salamander with shaded, moist rock outcrops. Since this alternative will maintain the status quo for the area, rocky habitat within the analysis area will not be affected; therefore, there will be no effect to these species or their habitat.

The dusky azure (*Celastrina nigra*) occurs in shady and moist deciduous woods, where eggs are laid on the host plant *Aruncus dioicus* (goat's beard). Adults feed on flower nectar, including wild geranium. Since this alternative will maintain the status quo for the area, there will be no effect on this species or its habitat.

Alternatives B and C

The eastern woodrat and green salamander are both associated with rocky places: the eastern woodrat with boulder fields and the green salamander with shaded, moist rock outcrops. Although there are suitable rocky habitat in the project area for both of these species, care will be taken to protect all rock outcrops that provide suitable habitat for eastern woodrat and green salamander. This will be accomplished by maintaining a buffer around the rock outcrop; therefore, there will be no effect to these species should either of these alternatives be implemented.

The dusky azure caterpillar's host, *Aruncus*, does not occur in the activity areas where treatments are planned, per Dave Danley, Forest Botanist. No direct or indirect effects on this species or its specialized habitat or life cycle are expected as a result of implementation of this project.

Cumulative Effects:

Please refer to the Cumulative Effects discussion in Section 3.1.2.2 Effects of Alternatives on MIS above. The bog turtle (*Clemmys muhlenbergii*) uses bogs, wet pastures and wet thickets, all of which occur in the project area. Although there is suitable boggy habitat in the project area, care will be taken to protect all bogs that provide suitable habitat for the bog turtle. This will be accomplished by maintaining a buffer around the bogs; therefore, there will be no effect to this species should either of the action alternatives be implemented. The eastern woodrat and green salamander are both associated with rocky places: the eastern woodrat with boulder fields and the green salamander with shaded, moist rock outcrops. Although there are suitable rocky habitat in the project area for both of these species, care will be taken to protect all rock outcrops that provide suitable habitat for eastern woodrat and green salamander. This will be accomplished by maintaining a buffer around the rock outcrop; therefore, there will be no effect to this species should either of these alternatives be implemented. The dusky azure caterpillar's host, *Aruncus*, does not occur in the activity areas where treatments are planned, per Dave Danley, Forest Botanist. No cumulative effects on this species or its specialized habitat or life cycle are expected as a result of implementation of this project.

3.2.4 Consultation History

Informal consultation with the US Fish and Wildlife Service occurred on the Parker Creek Forest Management Project. At that time, the USFWS did not have any concerns about the project, as planned, including Alternative IV (which is the current Alternative B in the Tanasee Forest Management Project).

Also, several US Forest Service personnel were consulted while working on the analysis for this project:
Sheryl Bryan, former Fisheries Biologist, Pisgah National Forest
Dave Danley, Botanist, Pisgah National Forest
Charley Bolen, former Silviculturist, Pisgah Ranger District
Ted Oprean, Prescription Forester, Pisgah Ranger District
Richard Burns, former Forest Service Hydrologist

3.2.5 Determination of Effect

Implementation of the proposed project will have no negative effect on any federally proposed, endangered or threatened wildlife species, for the reasons stated above,nor is it likely to result in a trend towards federal listing of sensitive species since none were considered for this project. This project will have no impact on any forest concern species if project implementation is in

compliance with the Endangered Species Act and Forest Service Manual 2670. Consultation with the U.S. Fish and Wildlife Service is not required. Table 17 summarizes the effects of Alternatives A, B, and C on the Endangered and Forest Concern species considered for the analysis of this project.

Table 17. Effects to Endangered and Forest Concern Species by Alternative

COMMON NAME	Alternative A	Alternative B	Alternative C
Bog Turtle	No adverse effect	No adverse effect	No adverse effect
Southern Appalachian Woodrat	No adverse effect	No adverse effect	No adverse effect
Green Salamander	No adverse effect	No adverse effect	No adverse effect
Dusky Azure	No adverse effect	No adverse effect	No adverse effect

3.2.6 Mitigation Measures

Mitigation Measures

Protect rock outcrops which are potential habitat for green salamanders, Southern Appalachian woodrats, and Jordan's salamanders. This may be achieved during lay out of the harvest units by having a wildlife biologist establish buffers around rock outcrops. Otherwise, none are recommended since some species would benefit from activities proposed in the action alternatives.

3.3 Author of Section 3

Mae Lee A. Hafer
Wildlife Biologist
National Forests in North Carolina
May 12, 2004
Amended August 19, 2004

4.0 AQUATIC RESOURCES

4.1 Aquatic Community Level and Management Indicator Species (MIS) Evaluation

This analysis addresses project area waters and analysis area waters. Project area waters are defined as those in the area of potential site-specific impacts on aquatic habitat and populations. The analysis area encompasses waters downstream that potentially could be impacted by project activities, in addition to project area waters.

The Land and Resource Management Plan (LRMP) for the Nantahala and Pisgah National Forests includes standards and desired future conditions for the forests, including riparian areas and their aquatic resources. The standards are intended to protect, manage, and enhance riparian and aquatic resources of the Forests. This analysis will focus on the potential effects of the proposed and associated activities on aquatic resources. Activities that do not have the potential

to directly, indirectly, or cumulatively affect aquatic resources or have aquatic resources within or adjacent to them will not be considered in this analysis. The proposed project was analyzed to determine effects on aquatic proposed, endangered, threatened, and sensitive (PETS) species; forest concern species; and management indicator species (MIS). This analysis also addresses direct, indirect, and cumulative effects of project implementation.

4.1.1 Existing Condition

Scale of analysis

The proposed project is within the upper French Broad River watershed (LRMP watershed # 31). Principal streams in the aquatic project and analysis areas (Table 18) include Double Branch, Mill Branch, Miser Creek, Parker Creek, two unnamed tributaries (UT) to the West Fork of the French Broad River, and two UTs to Parker Creek.

Table 18. Aquatic resources included in this AQUA.

Water Body	Within Project Area (miles)	Within Analysis Area (miles)
Double Branch (from Woods Church to the confluence Parker Creek)	0.3	0.6
Parker Creek (From Tanasee Gap downstream to the confluence with the West Fork French Broad)	0.4	4.7
Un-named Tributary 1 to Parker Creek	0.1	0.1
Un-named Tributary 2 to Parker Creek	0.3	0.4
Miser Creek (From its origin downstream to the confluence with Parker Creek)	1.0	2.3
Mill Branch (from its origin downstream to the confluence with West Fork French Broad)	0.1	1.0
Un-named Tributary to Mill Branch	0.2	0.2
West Fork French Broad (from the confluence of Mill Branch downstream to the Confluence with Parker Creek)	0.0	2.8
Un-named Tributary 1 to West Fork French Broad	0.1	0.4
Un-named Tributary 2 to West Fork French Broad	0.0	0.3
TOTAL	2.5	12.8

Aquatic Project Area

The aquatic project area, or area of potential site-specific impacts on aquatic habitat and populations, considered in this analysis includes portions of Double Branch, Mill Branch, Miser Creek, Parker Creek, and their tributaries adjacent to or immediately downstream of proposed activities. The aquatic project area contains approximately 2.5 miles of stream and is highlighted in Attachment 3.

Aquatic Analysis Area

The aquatic analysis area, or area of this effects analysis, includes the above stream reaches and downstream to a portion of the West Fork French Broad River. The aquatic analysis area was determined without regard to ownership boundaries and may include both public and private lands. The aquatic analysis area contains approximately 12.8 miles of stream and is highlighted in Attachment 3.

Amount and Quality of Habitat

Existing data for aquatic resources within an aquatic analysis area are used to the extent relevant to the project proposal. These data exist in two forms: general inventory and monitoring of forest aquatic resources and data provided by cooperating resource agencies from aquatic resources on or flowing through the forest. Both of these sources are accurate back to approximately 1980 and are used regularly in project analyses. Data collected prior to 1980 is used sparingly (mostly as a historical reference). Project-specific surveys are conducted to obtain reliable data where none exist.

Project information was obtained from Ted Oprean, U.S. Forest Service (USFS) Forester. Sheryl Bryan, National Forests in North Carolina Fisheries Biologist and Lorie Lewis Stroup, USFS Fisheries Biologist, conducted aquatic habitat, aquatic species surveys in the proposed project and analysis areas during the summer of 1997 and again in 2003 and 2004. The surveys consisted of examining streams within the aquatic project area, noting habitat quality, quantity, and suitability for rare aquatic and management indicator species, as well as existing impacts and their source.

Additional information specifically addressing aquatic PETS species, forest concern species, and MIS was obtained from NCWRC biologists, North Carolina Natural Heritage Program (NCNHP) records, and US Fish and Wildlife Service (USFWS) biologists.

The proposed project is within the upper French Broad River watershed (LRMP watershed # 31). Principal streams in the aquatic project and analysis areas include Double Branch, Mill Branch, Miser Creek, Parker Creek, two unnamed tributaries (UT) to the West Fork of the French Broad River, and two UTs to Parker Creek.

All waters within the aquatic analysis area have been classified by the North Carolina Division of Water Quality as class C trout waters. The **C** classification denotes waters suitable for aquatic life propagation and survival, fishing, wildlife, secondary recreation, and agriculture. The **Tr** classification denotes waters suitable for natural trout propagation and maintenance of stocked trout.

The 1997 habitat evaluations within Parker Creek are characterized by cobble, gravel, and sand substrate, with occasional bedrock outcrops and boulder deposits. Stream width is approximately 6-8', and gradient is low to moderate. Undercut banks are infrequent, and large woody debris (LWD) is noticeably absent (with the exception of several small debris jams). Pool habitat is shallow and infrequent. Aquatic habitat within Parker Creek is dominated by shallow runs and riffles. Riparian vegetation is dominated by rhododendron and other woody

vegetation. A natural bedrock barrier exists on Parker Creek approximately 2,000 feet downstream of its confluence with Double Branch. No fish were found above this barrier within Parker Creek. The 2003-2004 habitat surveys (Table 19) within Parker Creek were performed using the Basinwide Estimation Technique (BVET) developed by the Center for Aquatic Technology Transfer (Doloff, Hankin and Reeves).

Table 19. Habitat Inventory for Parker Creek (2003-2004).

Primary Habitat Variables	**Parker Creek**
Stream order	2
Length surveyed (m)	6823
Pool:riffle ratio	1:1
Maximum pool depth (mean, cm)	50.4
Average pool depth (mean, cm)	26.7
Pool Percent Fines (mean %)	43
LWD/km (all sizes)[1]	147
LWD/km (large)[1]	4

[1] Large Woody Debris (LWD)

The dominant substrate within Parker Creek according to the 2003-2004 BVET surveys was cobble. The "pool percent fines" listed above in the pool habitat of Parker Creek averaged at 43%.

In 1997 aquatic habitat within Double Branch was characterized by bedrock, cobble, and sand substrate and moderate gradient. The stream is small (1-2 feet wide), with shallow, frequent pools. Undercut banks and LWD contribute minimally to aquatic habitat quality. Riparian vegetation is dominated by patchy rhododendron and woody vegetation. Another site visit to Double Branch was made in 2002 and again in 2004 to verify that the above observations were current. Substrate within Double Branch remains dominated by bedrock, cobble and sand. There has been a change in a small section of riparian vegetation on the lower section of Double Branch adjacent to SR 1324 where diseased white pine trees have been removed. These trees were removed to protect the stability of the stream banks of Double Branch and allow the more stream beneficial hardwoods to establish.

The 1997 survey results of Miser Creek are similar to Parker Creek in aquatic habitat quality and quantity. Habitat within Miser Creek was re-evaluated in 2002 by USFS Fisheries Biologist Lorie Stroup. These surveys included three visually estimated sites. The upper site is located just below Compartment 120 stand 10. Substrate within this section is dominated by small boulders and secondarily cobble, sand and gravel. The second and third sites are located adjacent to Compartment 120 stand 18. These locations contain primarily small cobble and sand. In summary, the habitat within Miser Creek consists of mainly riffle areas with infrequent, shallow pools. Average channel width is approximately 2 meters.

Mill Branch and the unnamed tributary to Mill Branch were evaluated by USFS Fisheries Biologists Sheryl Bryan and Lorie Stroup in May of 2004. Substrate within Mill Branch and its tributary is the same dominated by bedrock and large boulders. The gradient of Mill Branch within the project area is 15-20%.

Aquatic habitat within the West Fork French Broad River (within the aquatic analysis area) is dominated by bedrock and boulder substrate with frequent sand and gravel deposits. Gradient is moderate, with frequent pools and LWD. Shallow run and riffle habitats are also common. Riparian vegetation is dominated by hemlock, white pine, laurel, and rhododendron. Brown and rainbow trout occur in these reaches, while transitional species such as smallmouth bass and catfish occur just downstream.

Local water quality data and area resident observations show that the West Fork French Broad River supports some of the highest turbidity levels in western North Carolina during and after rain events. Some of this turbidity is associated with existing old roads and unauthorized off-road vehicle use on the Forest; however, private land uses are also contributing to this situation. Although there is no pre-development aquatic habitat or population data to compare to, it is likely that aquatic habitat quantity and quality have been lost and that aquatic populations have been suppressed since development of the upper French Broad Valley. Two examples of this are the distribution of native salmonid fish (i.e. brook trout) and freshwater mussels within the upper French Broad Valley.

Today, brook trout are largely confined to less-developed headwater reaches, above natural migration barriers within the West Fork French Broad River drainage. Historically, this species was the only salmonid present in area streams. Its range has largely been affected by the introduction of rainbow and brown trout during the development of the upper French Broad Valley.

Freshwater mussels were once abundant throughout the upper French Broad Valley. Today, considerable effort is being given to locating live mussel populations in this area. Some dead shells have been found as recently as 1997 in muskrat middens, but most recent surveys have been unsuccessful in locating live mussels (personal communication Mark Cantrell, US Fish and Wildlife Service). This loss of an entire community is attributed largely to historic effects on chemical water quality. While these land uses have been removed from the area and water quality is greatly improved, the freshwater mussel community has not recovered.

Culverts along the Forest Service Roads 5077, 5077A, 5034 and 5035, the roads themselves, and existing old roads and skid trails in the project area are the existing threats to the streams and drainages. Impacts from these sources are limited to down slope movement of sediment from road runoff and culvert fills. It is suspected that much of these sediments are deposited in natural vegetative filters before they reach areas of perennial water (Clinton and Vose, 2003) because most of the roads are closed to all but administrative and fire control traffic (i.e. road disturbance is limited); however, some sediments may enter project area streams from these roads via ditch-lines and culverts (Waters, 1995; pp 24-26). Best Management Practices (BMPs) are used in road construction to minimize the impacts of roads on project area waters. Project plans include reseeding skid roads after use. Reestablishing a ground cover on newly constructed or reconstructed roads can effectively reduce sedimentation from forest roads (Grace, 2002, Swank *et al*., 2001).

State road 1324 (Tanasee Gap Road) is the major existing threat to aquatic habitat and populations. The hydrological analysis (Attachment 6) indicates that the majority of the sediments within the upper section of Parker Creek are derived from this state road (1324). Also, there are portions of streams within the aquatic analysis area (downstream of the aquatic project area) where runoff from other State maintained roads and agriculture are affecting area streams. Parker Creek is currently being impacted by a remnant trout raceway dam, two pond outflows and a cattle farm below National Forest Lands.

On National Forest lands, Miser Creek is being impacted by the consistent illegal use by off road vehicles (OHV). USFS Law Enforcement have written citations for this area and continue to monitor use on (FS5077) which is gated and closed, however, there is still illegal OHV use in the area. Miser Creek is impacted by development on private property below the National Forest boundary. There are several houses as well as a trout raceway dam located on the downstream section.

The North Carolina Department of Natural Resources, Division of Water Quality indicates that the West Fork of the French Broad River is listed as 303(d) impaired. The 303(d) list is a comprehensive public accounting of all "impaired" waterbodies that is derived from the "use support" report. This report describes the quality of surface waters, groundwaters, and wetlands. An "impaired" waterbody is one that does not meet water quality uses, such as water supply, fishing or propagation of aquatic life. According to the *North Carolina Water Quality Assessment and Impaired Waters List* report, the West Fork of the French Broad River is on the 303(d) list primarily due to organic/nutrient enrichment with sediment as a contributing stressor or cumulative cause. See Attachment 6, The *Hydrological Analysis of the Tanasee Gap Forest Health Project*, for further discussion of the West Fork of the French Broad.

There is limited habitat for fish species within project area waters due to small stream size and restricted flow regimes. Project area waters do however, provide habitat for macroinvertebrates.

4.1.2 Effects of Alternatives

The Environmental Assessment contains a complete list of project issues and a detailed description of each alternative for the Tanasee Forest Management Project.

Examples of direct effects of a proposed action on aquatic species include, but are not limited to, activities such as crushing individual insects, fish, or redds during stream crossing installation. Such effects are more likely to occur to less mobile aquatic organisms such as aquatic insects, freshwater mussels, and fish eggs and larvae, whereas more mobile species such as crayfish, aquatic salamanders, and juvenile and adult fish are often able to escape direct effects by simply leaving the area. Direct effects may also include changes in the quality, quantity, or diversity of habitat available resulting from sedimentation. It is important to note that effects on aquatic habitats from management activities can be positive or negative, depending on the nature of the proposed actions and site-specific conditions.

Examples of indirect effects of a proposed action on aquatic species include, but are not limited to, altered reproductive or foraging success and increased occurrence of disease as a result of sedimentation, degraded water quality, and altered community structure as a result of migration. Indirect effects may also include changes in the quality, quantity, or diversity of habitat available resulting from changes in riparian vegetation. Specifically, the transport of large woody debris (LWD), an integral component of aquatic habitat diversity, to stream channels is a function of riparian vegetation structure and composition. The LRMP does not allow vegetation management within the riparian zone of perennial streams unless it is specifically for the enhancement of riparian values. This standard was designed to allow vegetation along streams to become old and decadent and to serve as a long-term source of LWD to stream channels. However, areas exist across the Forests where vegetation can be managed within designated riparian areas to facilitate LWD transport and serve as a short-term source of habitat improvement.

Cumulative effects on aquatic species and habitat are the integration of any direct or indirect effects into the existing condition. Most often, cumulative effects are seen as a degradation or improvement of an already impacted situation, but they can also be the first step in the degradation or improvement process. Cumulative effects on aquatic habitats and populations from management activities can be positive or negative, depending on the nature of the proposed actions and site-specific conditions.

Sedimentation of aquatic habitats within the project area may occur with the maintenance of existing system roads, the reconstruction of roads and skid trails, and the construction of a new road. Sediment loading and turbidity can result in the loss of interstitial habitat within the substrate and cause direct mortality by the crushing or smothering of less mobile organisms such as aquatic invertebrates, fish eggs and juveniles.

Selection of Management Indicator Species

Table 20. Management Indicator Species as stated by the Nantahala & Pisgah LRMP (FEIS, Volume 1 p. III-50) and analyzed in the Management Indicator Species Report, 2001.

Warmwater streams	Index of biotic integrity, smallmouth bass, freshwater mussels, spotfin chub
Reservoirs	Index of biotic integrity, largemouth bass, bluegill
Coldwater streams	Brook, brown, and rainbow trout; sculpin, blacknose dace
Coolwater streams	Smallmouth bass, white sucker, moxostoma spp., index of biotic integrity

Miser Creek and Parker Creek were included in the 1994 - 1995 Trout Distribution Surveys conducted by the USFS and the NCWRC (Table 21). Project specific surveys were conducted by Sheryl Bryan and Lorie Stroup, USFS Fisheries Biologists, in May of 2004. The stream channels of these two creeks are narrow and have shallow water within the aquatic project area; therefore, little fish habitat exists.

Table 21: Species data from 1994-1995 Trout Distribution Surveys, USFS project site surveys and NCWRC surveys.

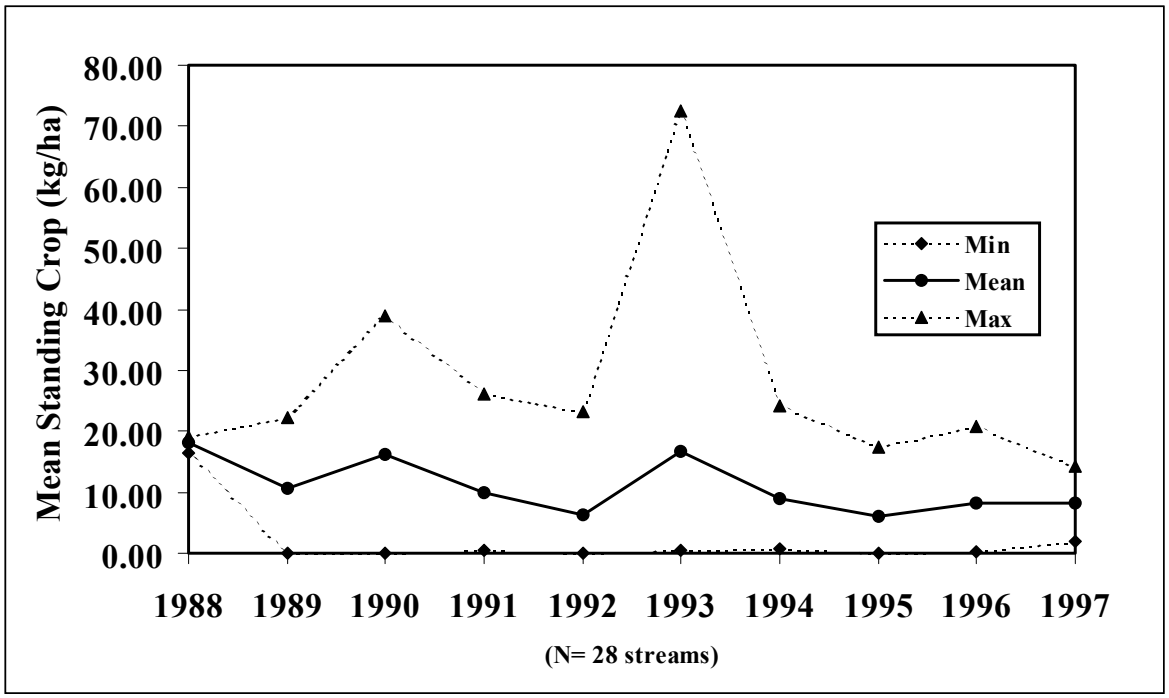
Stream	Year	Species found
Miser Creek	1995	Rainbow trout, brook trout and brown trout
Parker Creek	1995 2004	Brown trout, brook trout, rainbow trout, blacknose dace Bluegill, Swannanoa darters, and river chubs

Brook trout (*Salvelinus fontinalis*) and rainbow trout (*Oncorhynchus mykiss*) are known to occur within the aquatic analysis area. Brown trout (*Salmo trutta*), blacknose dace (*Rhinichthys atratulus*), bluegill (*Micropterus macrochirus*) and river chub (*Nocomis micropogon)* all occur within aquatic analysis area streams; however, these species' respective habitat exists mostly in the most downstream portion of the analysis area and based on field observations. Brook and rainbow trout were chosen as project-level management indicator species since they are sensitive to changes in water quality and habitat condition and occur or may occur in streams within the project area and analysis area where suitable habitat exists. Brown trout, blacknose dace and bluegill were not chosen as project level MIS because they exist in the lower reaches of Parker Creek where there are numerous impacts from private lands and therefore would be impossible to monitor for impacts based on implementation of the Tanasee Forest Management Project.

4.1.2.1 Effects of Alternatives on Management Indicator Species

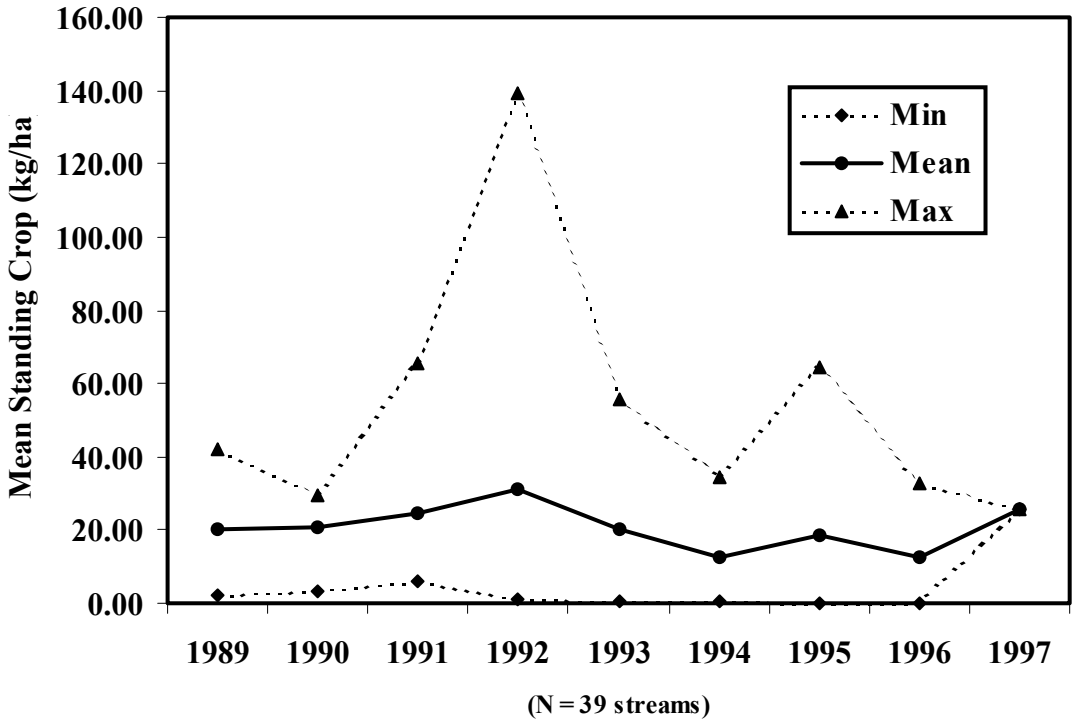
Since 1988, brook trout populations have been monitored in a total of 28 streams across the Nantahala and Pisgah National Forests. Brook trout mean standing crop has ranged from 5.98 kg/ha to 18.15 kg/ha since 1988, with a mean standing crop over this time period of 10.89 kg/ha (Figure 3).

Figure 3. Brook trout standing crop (kg/ha), 1988-1997, from 28 streams across the Nantahala and Pisgah National Forests.



Since 1989, rainbow trout populations in 39 streams across the Nantahala and Pisgah National Forests have been monitored by the USFS and NCWRC. Figure 4 summarizes a preliminary analysis of this data. Rainbow trout mean standing crop has ranged from 12.48 kg/ha to 30.94 kg/ha, with a mean standing crop over this time period of 20.69 kg/ha. Sixty-seven percent of the annual estimates are within one standard deviation of the mean standing crop over the monitoring period (i.e. between 14.80 kg/ha and 26.58 kg/ha). This indicates that there is perhaps not as much variability in rainbow trout populations over time as once thought. Rainbow trout population age-class structure does exhibit considerable variability over time and is discussed below.

Figure 4. Rainbow trout (*Oncorhynchus mykiss*) population trends across the Nantahala and Pisgah National Forests, 1989-2000.



Monitoring data indicate fish populations are not static over time, but oscillate around some mean value, with some species or age classes supporting higher standing crops when environmental conditions are suitable or lower standing crops when conditions are adverse. Aquatic community structure is opportunistic in that as standing crops of one species or age class decline, standing crops of other species or age classes increase relative to their habitat requirements and the new habitat available from the declining stock. This give and take has proven to be cyclic, and, in the absence of catastrophic events (e.g. prolonged drought, successive floods, long-term sedimentation), fish communities will exhibit this cyclic pattern.

Based on a preliminary analysis of the monitoring data, there appears to be no difference in population dynamics across the forests. It is important to remember that different streams have the inherent capability to support varying population levels, and that ultimately habitat quality and quantity and environmental variables control the fate of fish populations. Forest management activities, as well as natural events such as droughts and floods, have the potential to affect part of a fish population (e.g. spawning success may be affected by sedimentation), and that these effects may be long- or short-term, depending on the duration and magnitude of the event. It is possible to lose a year class of brook trout if spawning habitat is temporarily reduced during a poorly timed culvert installation, as well as during a spring flood. Very rarely does the loss of one-year class affect long-term population viability. The successive loss of year classes;

however, can result in long-term declines in fish standing crops. Environmental variables, man-induced land uses, or both can cause successive year class failures.

Table 22. MIS, estimated trend, and biological community or special habitat indicated by the species.

Estimated Population Trends

MIS	Alternative A	Alternative B	Alternative C
Brook & Rainbow Trout	Existing habitat and population trends continue.	May suppress spawning habitat in Parker Creek due to sedimentation but not expected to affect population viability trends across the Forest.	May have temporary fluctuations in turbidity. Not expected to permanently affect habitat or population viability across the Forest.

4.1.2.2 Effects of Alternatives on Aquatic Resources

This discussion assumes that all Forest Service timber sale contract clauses, North Carolina Best Management Practices (BMP), and any other required management practices relating to water quality would be implemented successfully. Should an implemented contract clause or BMP fail during project implementation, immediate corrective action should be taken to lessen impacts to aquatic resources.

(1) Effects of Access on Aquatic Resources

(*i*) Alternative A (No Action).
Direct and Indirect Effects. Implementation of the no action alternative would perpetuate the existing condition described above. Aquatic habitat quality and quantity and populations would continue in their natural dynamic patterns. It is important to note that natural processes include aspects such as extinction of species and loss of habitat types. There would be no direct or indirect impacts other than those due to existing and natural conditions upon the eight Forest Concern species or the two MIS from implementation of this alternative.

(*ii*) Alternative B.

(a) Direct Effects. Access to the proposed units will involve the creation of 2.8 miles of newly constructed road, 3.7 miles of road reconstruction, and 2.0 miles of temporary road construction and the development of skid trails and log landings. Riparian areas have been identified as 100 feet on either side of perennial channels and 30 feet on either side of intermittent channels. No

activity, including the placement of log landings and skid trails, will occur in this area with the exception of stream crossings.

Stream crossings have been designed so that they are least impacting on the project areas aquatic resources. Streams will be crossed perpendicular to their channel so the access road enters the riparian area, crosses the stream, and exits the riparian area. Road drainage will be designed so it flows off the roaded area and enters into vegetation rather than directly into project area streams. The largest crossing associated with Alternative B is the crossing on Parker Creek (FS5032) in Compartment 119 stand 23. This crossing was evaluated by USFS Engineers and USFS Hydrologist. It was decided that an arch, open-bottomed culvert should be used to cross Parker Creek. Open-bottomed culverts allow for the movement of aquatic organisms by maintaining habitat under the crossing.

Other culverts associated with access into Compartments 118 and 119 (on FS road 5032) include four perennial crossings and two intermittent crossings. The size of the culverts will be based on a watershed analysis conducted by USFS Engineers. The placement of culverts into these stream crossings will result in the loss of approximately 26 to 34 linear feet of stream bottom. Where feasible, culverts will be buried in stream substrate so that a natural stream bottom can reestablish in the pipe bottom to allow for aquatic organism passage. During these culvert installations a "pulse" of sediments will flush downstream into Parker Creek where some sediments may flush on down into the West Fork of the French Broad River (see Attachment 6-Hydrological Analysis).

More mobile aquatic species such as aquatic salamanders, crayfish and fish will emigrate downstream away from the disturbed area. The loss of less mobile individuals such as macroinvertebrates will likely occur during the placement of culverts. It is unlikely that the less mobile fish species within the aquatic analysis area will be impacted due to their absence within the project area. Also, it has been noted by both USFS Fisheries Biologists, Sheryl Bryan and Lorie Stroup that spawning habitat is suppressed within the Parker Creek and Miser Creek drainages due to lack of interstitial space valuable for juveniles and eggs as well as other aquatic organisms.

Sedimentation of aquatic habitats within the aquatic analysis area could result in the loss of clear-flowing spring habitats and valuable headwater stream origins. Aquatic species utilizing these areas (such as the dragonflies) could be locally lost. Spawning areas for fishes occupying downstream reaches (brook, rainbow, and brown trout and blacknose dace) could also be reduced or lost to sedimentation. Stream gradients and flow regimes within the analysis areas may not be dynamic enough to rely on natural flushing to occur. Therefore, any losses have the potential to be permanent.

Access to the other compartments and stands include the roads proposed for Alternative B. These roads include; FSR 5034, FSR 5035, FSR 5077, FSR 5077A, and FSR 5077B. There are no new stream crossings associated with these roads. Where there are existing crossings, no additional work will be necessary as they are in good working condition.

(b) Indirect Effects. There may be off-site movement of soil into project area waters from road reconstruction and culvert placement. Turbidity and sediment loading can cause mortality by injuring and stressing individuals or smothering eggs and juveniles. Available habitat, including the interstitial space within substrate used as spawning and rearing areas, may be covered with sediments. Episodic fluctuations in turbidity may occur after soil disturbance ends because sediments deposited within the stream bed may be resuspended during high flow events (Swank *et al*. 2001). If habitat complexity is lost through sedimentation, a shift in the aquatic insect community could occur that favors tolerant macroinvertebrates. Larger, more mobile aquatic species, such as fish and hellbenders are able to temporarily escape the effects of sedimentation by leaving the disturbed area. Eggs and juveniles may be lost to reduced habitat or suffocation. This can result in the loss of or reduced year class strength, which can lead to accelerated population fluctuations and suppressed population levels. Over time, these species will recolonize areas as habitat conditions improve. Smaller less mobile organisms such as crayfish and aquatic insects may not be able to move to more suitable habitat. Populations of these species may decline locally or be lost through reduced productivity. These may recolonize from reaches of undisturbed streams as conditions improve with site rehabilitation. Implementation of the contract clauses, erosion control precautions, and stream crossing methods described above should minimize sediment effects and accelerate site rehabilitation.

Stream crossings have been evaluated (and in some cases relocated) so that any special habitat or "island" of dense populations of aquatic insects are avoided. Also, in order to protect the continuity of habitat within Parker Creek, the crossing associated with FS5032 has been prescribed as an arch, open bottom culvert.

Access may also cross ephemeral streams or spring seeps that feed these streams and others in the project area. If heavy rains occur while these ephemeral crossings are exposed, bare soil can be transported down slope to intermittent and ephemeral stream channels. Temporary stream crossings should be used across ephemeral channels to avoid the potential for sedimentation of down slope aquatic resources. These crossings could include the use of temporary bridges (e.g. simple log stringers or pre-fabricated decking) or culverts, or channel armor (e.g. stone or brush).

(*iii*) Alternative C
Direct and Indirect Effects. Alternative C drops all new construction of roads within the Parker Creek watershed involving 5 perennial stream crossings and 2 intermittent crossings including one bottomless arch crossing in Parker Creek. With Alternative C, there are no additional stream crossings that will be necessary to replace or newly construct. The existing crossings associated with FSR 5077 in Mill Branch and two tributaries to Mill Branch are in good working condition and will require no work or additional crossings.

Therefore, Alternative C will have significantly less direct and indirect impacts to the aquatic resources within the project area by affecting less linear footage (approximately 210 linear feet) of stream habitat than is associated with Alternative B. It is however, important to note that neither of the alternatives will have negative impacts on the viability of any of the Forest concern

species listed in Table 25 as none were found at the locations of the crossings during field surveys and site visits.

(2) Effects of Timber Harvest on Aquatic Resources, Water Quality, and Riparian Areas (Table 23):

(*i*) Alternative A (No Action).
Direct and Indirect Effects. Since no harvesting is proposed with this alternative, the existing condition including the natural fluctuations in population stability and habitat quality and quantity would continue. There would be no direct or indirect impacts other than those due to existing and natural conditions upon the eight Forest Concern species or the two MIS from implementation of this alternative.

(*ii*) Alternatives B.
Direct and Indirect Effects. NC-FPG and the LRMP standards should be applied to the harvest activity. Applications of LRMP standards are intended to meet performance standards of the state regulations. Visible sediment, derived from timber harvesting, defined by state regulations should not occur unless there is a failure of one or more of the applied erosion control practices. Should any practice fail to meet existing regulations, additional practices or the reapplication of existing measures will be implemented as specified by state regulations.

There is no plan to harvest within the 100 foot riparian area of any analysis or project area streams. However, approximately 0.46 acres of riparian vegetation associated with stream crossings would be impacted by this alternative. There are no other expected direct or indirect effects with Alternative B assuming the successful implementation of NC-FPG and LRMP standards. There is the possibility that as trees are cut, they will cross a stream channel or spring. While large woody debris in and adjacent to stream channels is desirable for aquatic habitat diversity, it needs to be of the same scale as the channel size and type. The scales of the trees and stream channels do not match, and it is possible that leaving large tree boles in the channels and across springs could result in flow obstruction, which can lead to accelerated bank scouring and failure, and subsequently, sedimentation of local and downstream channels. To avoid the potential for this habitat loss, trees accidentally felled across stream channels or springs should be removed. "Drag lanes" should not be designated for the removal of these trees to avoid severe bank disturbance. Rather, trees should be removed individually, from where they fell. It is unlikely that pulling individual trees across will result in permanent stream bank damage. Any damage done to the stream banks will most likely be temporary, as there is an abundance of herbaceous vegetation along the banks that will quickly recolonize bare soil.

(*iii*) Alternative C.
Direct and Indirect Effects. Under Alternative C, there will be no harvesting of riparian vegetation associated with road construction. Therefore, approximately 0.46 acres of riparian vegetation associated with stream crossings proposed in Alternative B will remain intact and functioning.

Table 23. Summary of potential effects to aquatic resources by project alternatives**.**

Issue	Alternative A	Alternative B	Alternative C
Effects on aquatic MIS	Existing habitat and population trends continue.	May suppress spawning habitat in Parker Creek due to sedimentation but not expected to affect population viability.	May have temporary fluctuations in turbidity. Not expected to permanently affect habitat or population viability.
Effects on water quality (Associated with the amount of soil disturbance)	No change from existing condition.	Turbidity and sediment loading is expected in the Parker Creek drainage. Turbidity will cease as site rehabilitation is achieved.	Turbidity and sediment loading would occur at existing water crossings but should diminish downstream and cease with site rehabilitation.
Effects on aquatic habitat and populations	Existing habitat and population trends continue.	May further suppress local habitat in Parker Creek.	No long-term, permanent effects expected.
Effects to riparian areas	Remain in present state. Aquatic habitat will improve, as riparian areas grow older.	Remain in present state except at new stream crossings (approximately 0.46 acres). Aquatic habitat would improve, as riparian areas grow older, increasing large woody debris in streams.	Aquatic habitat would improve, as riparian areas grow older, increasing large woody debris in streams.
Effects of herbicide	No impact	No impact	No impact

(3) Effects of Other Activities (Table 23):

(*i*) Use of herbicides. In Alternatives B and C the use of herbicide methods for silvicultural treatments is analyzed in detail in the Vegetation Management in the Appalachian Mountains Environmental Impact Statement (VMAM). Included in this document is a detailed analysis of the effects of silvicultural treatments on aquatic resources. Please refer to this document for a description of such effects. It should be noted that no herbicide will be used in the 100 foot designated riparian area of any perennial streams within the Tanasee Forest Management Project. No herbicide will be sprayed within the 30 foot designated riparian area of any intermittent

streams within the project area. There are no expected direct or indirect effects with herbicide use under Alternatives B and C assuming the successful implementation the mitigation measures listed in the VMAM.

4.1.2.3 Cumulative Effects to Aquatic Resources

Past projects and events within the analysis area of the Tanasee Forest Management Project include private and previous Forest Service timber projects, including the T and T Timber Sale and the Miser Creek Wildlife Project. Other disturbances within the analysis area include several dams and trout farms on private land within the aquatic analysis area, and southern pine beetle salvage. As mentioned in the existing condition, State Road 1324, Tanasse Gap Road, is causing sedimentation to enter into the headwaters of Parker Creek and Parker Creek tributaries. The North Carolina Department of Transportation (NCDOT) is planning to pave this road. If this road is paved, it is reasonably foreseeable that habitat within Parker Creek and its tributaries will improve. It is expected that the past and on-going activities listed above are contributing to the suppression of spawning habitat within Parker and Miser Creeks.

Implementation of Alternative B may contribute to additional cumulative impacts to Parker Creek and further suppress trout spawning habitat. Please refer to Attachment 6, the Hydrological Analysis, for details regarding sediment transport into the West Fork of the French Broad River.

With the implementation of Alternative C, it is very unlikely that, given the location and types of management proposed, any long-term effects on aquatic species or habitat will be measurable, and therefore contribute to cumulative effects. There has been a tremendous amount of planning and resource specialist involvement in the planning and design of the units proposed for the Tanasee Forest Management Project. There should be no adverse cumulative effects to the analysis area aquatic resources, based on the Project Design Features included in this analysis (See Section 4.2.6).

Table 24. Effects on Forest-wide Aquatic Habitat.

Aquatic Habitat	Amount across the Nantahala & Pisgah	Effects analysis
Reservoirs	36,000 acres	None affected because there is no reservoir habitat present.
Warmwater streams	210 mi.	None affected because there is no warmwater habitat present.

Coolwater streams	400 mi.	Approximately 1 mile of the West Fork of the French Broad River could have temporary fluctuations in turbidity with Alternative B. No coolwater stream habitat expected to be impacted by Alternatives A or C.
Coldwater streams	5,060 mi	Alternative B will impact approximately 210 linear feet of coldwater stream with the installation of culverts. Alternative C has no stream crossings associated with the project thus no impacts to habitat will exist.

4.2 Aquatic Threatened, Endangered and Sensitive Species Evaluation

4.2.1 Species Evaluated and Rationale

Forty-four rare aquatic species have been listed by the NCWRC, USFWS, or NCNHP as occurring or potentially occurring in Transylvania County. These species are included in Attachment 4, which contains occurrence information for rare aquatic species on the Pisgah National Forest. Of the 44 aquatic species included on the original list for analysis, 36 were dropped as a result of a likelihood of occurrence evaluation based on preferred habitat elements and field survey results. Attachment 5 summarizes this process.

The Transylvania County rare species list includes a freshwater mussel, Appalachian elktoe (*Alasmidonta raveneliana*), a federally listed species, but it does not exist in the West Fork of the French Broad River (Personal communication with US Fish and Wildlife Service, 2004). Sensitive species listed for Transylvania County include the Oconee stream crayfish (*Cambarus chaugaensis*), and the mountain river crusier (*Macromia margarita*). The Oconee stream crayfish has never been documented as occurring in this watershed. The only area in Transylvania County it has been documented is the Horsepasture River (LRMP watershed number 76) which flows into Lake Jocassee. The mountain river cruiser was not picked up in project area surveys and was not found during the 2002, 2003 surveys of the odonates on the Pisgah and Nantahala National Forests by the Department of Biology of the Virginia Commonwealth University. Since these species are not present within the project or analysis areas, nor in the Upper French Broad River watershed, they will not be included in this analysis.

Therefore, potential effects of the proposed project on two aquatic MIS and eight rare aquatic species will be analyzed in this report. These species are listed in Table 22 (MIS) and Table 25 (rare aquatic species).

Table 25. Known and potential threatened and endangered species, sensitive species, and Forest concern species evaluated for this project.

SPECIES	*TYPE*	*HABITAT*	*OCCURRENCE*
Federally Threatened and Endangered Species			
NONE			
2002 Region 8 Regional Forester's Sensitive Species List			
NONE			
Forest Concern Species			
Cryptobranchus alleganiensis (Hellbender)	Amphibian	Lotic-large clean substrate streams	Known to occur within the area
Necturus maculosus (Mudpuppy)	Amphibian	Lotic-large clean substrate streams	May occur within the analysis area
Agapetus jocassee (a caddisfly)	Caddisfly	Lotic- erosional	May occur in both project and analysis areas.
Ceraclea species 1 (Lenat's ceraclea)	Caddisfly	Lotic and Lentic	May occur in both project and analysis areas.
Helicopsyche paralimnella (a caddisfly)	Caddisfly	Lotic- clean substrate streams	May occur in both the project and analysis areas.
Waltoncythere acuta (Transylvania crayfish ostracod)	Ostracod	Lotic – clean Substrate streams	May occur in both the project and analysis areas.
Barbaetis benfieldi (Benfield's bearded sm minnow mayfly)	Mayfly	Lotic – clean Substrate streams	May occur in both the project and analysis areas.
Serratella spicilosa (spicilose serratellan mayfly)	Mayfly	Lotic – Erosional and Depositional	May occur in both project and analysis areas.

4.2.2 Existing Condition

Brook, brown, and rainbow trout, blacknose dace, and Swannanoa darters are known to occur within the lower reaches of Parker Creek. Qualitative fish surveys in May of 2004 by USFS Fisheries Biologists Sheryl Bryan and Lorie Stroup. Just below the USFS boundary on private land is a remnant fish hatchery dam on Parker Creek. Below this dam bluegill and river chubs were collected. Above the dam on USFS property, only brown trout were collected. Aquatic insects were also collected from Parker Creek during this survey. Stone, caddis and mayflies were abundant. Two odonates were also collected during the effort. None of these specimens are listed as Forest concern or sensitive species.

There is a natural bedrock barrier on Double Branch upstream of its confluence with Parker Creek. Brook trout occur above this barrier, while no fish were found in Double Branch below this barrier. No rare species of aquatic macroinvertebrates were collected in Double Branch during a 2002 site visit for the T and T Timber Sale (which also included Double Branch).

A natural bedrock barrier exists on Miser Creek above the private property line. Brook trout occur within Miser Creek above the private property line, while brown and rainbow trout, blacknose dace, and Swannanoa darters occur below this point. Surveys conducted by the USFS, Trout Unlimited, the NCWRC and Western Carolina University confirmed that these brook trout were of mixed genetic origin, indicating that the brook trout were of northern (non-native) genetic strain. Blacknose dace were observed at this site during the 2002 surveys. No trout were found within the project area. Aquatic Macroinvertebrate surveys were conducted in May of 2004 by USFS Fisheries Biologists Sheryl Bryan and Lorie Stroup. No rare specimens were collected.

No fish were found in Mill Branch on Forest Service land. Aquatic Macroinvertebrate surveys from May of 2004 indicated very little habitat for aquatic species. Mayflies and caddisfly larve cases were found. None of these were rare taxa.

The USFS contracted odonate surveys for the Pisgah and Nantahala National Forests through Virginia Commonwealth's Department of Biology, aquatic macroinvertebrate laboratory. During their August 2002 and 2003 surveys in the North Fork of the French Broad River, an adjacent sub-watershed of the French Broad, the following species of odonates were collected and species verified by Dr. Leonard A. Smock.

North Fork of the French Broad River (site located at the junction of 64 and 215): Adult Odonata species list.

Aeshnidae:	*Boyeria vinosa* (Fawn Darner)
Gomphidae:	*Gomphus exilis* (Lancet Clubtail)
	Gomphus rogersi (Sable Clubtail)
	Lanthus vernalis (Southern Pygmy Clubtail)
Cordulegastridae:	*Cordulegaster maculate* (Twin-spotted Spiketail)

It is important to note that the types of surveys used are intended to provide information on what fish and invertebrate species are present in the stream at the time of the survey, and may not reflect the seasonal dynamics of many species. Generally, these surveys are conducted at the time of year when the project is expected to be implemented to more accurately determine what species could be present during project implementation. It is also important to note that the techniques used do not sample the entire population, but rather what is present at the sample site. It is possible to miss species due to habitat distribution and the natural patchiness of aquatic populations, and to equipment efficiency. However, if there is reason to believe that a species occurs that was not sampled during the surveys (e.g. the existence of historic records or presence suitable habitat and nearby records), it is included in the analysis.

4.2.3 Effects of Alternatives by Species

No federally threatened or endangered or sensitive species exist within the project area. Effects to eight Forest Concern species are listed in Table 26.

Implementation of Alternative A would perpetuate the existing condition of rare species including the natural fluctuations in population stability and habitat quality and quantity. There would be no direct or indirect impacts other than those due to existing and natural conditions upon the eight Forest Concern species or the two MIS from implementation of this alternative.

The implementation of Alternative B could potentially impact individuals of Forest concern species due to the direct impacts to approximately 210 linear feet of stream. Habitat for rare aquatic insects (listed in Table 26) is located in the interstitial space of substrate within streams. Therefore, by impacting 210 linear feet of stream with road construction, there would a direct impact to individuals occupying this habitat as well as an indirect impact due to off-site movement of soil during stream crossing placement. More mobile species such as the hellbender and the mudpuppy (listed in Table 26) will emigrate away from disturbed areas. It should be noted that no hellbender or mudpuppy habitat exists within the areas proposed for stream crossings. Therefore, the only potential indirect impact to the hellbender and mudpuppy population would be sediment entering into the lower reaches of Parker Creek and the West Fork of the French Broad (refer to Attachment 6).

The implementation of Alternative C is not expected to impact rare species individuals or population viability across the Forest since there are no new stream crossings or harvesting of riparian vegetation along road corridors with this alternative.

Table 26. Effects of alternatives by species.

SPECIES	**Alternative A**	**Alternative B**	**Alternative C**
Federally Threatened and Endangered Species			
NONE			
2002 Region 8 Regional Forester's Sensitive Species List			
NONE			
Forest Concern Species			
Cryptobranchus alleganiensis (Hellbender)	No Impact	*May impact	Will not impact individuals or change population viability across the Forest
Necturus maculosus (Muddpuppy)	No Impact	*May impact	Will not impact individuals or change population viability across the Forest
Agapetus jocassee (a caddisfly)	No Impact	*May impact	Will not impact individuals or change population viability across the Forest
Ceraclea species 1 (Lenat's ceraclea)	No Impact	*May impact	Will not impact individuals or change population viability across the Forest
Helicopsyche paralimnella (a caddisfly)	No Impact	*May impact	Will not impact individuals or change population viability across the Forest
Waltoncythere acuta (Transylvania crayfish ostracod)	No Impact	*May impact	Will not impact individuals or change population viability across the Forest
Barbaetis benfieldi (Benfield's bearded sm minnow mayfly)	No Impact	*May impact	Will not impact individuals or change population viability across the Forest
Serratella spicilosa (spicilose serratellan mayfly)	No Impact	*May impact	Will not impact individuals or change population viability across the Forest

*May impact individuals. Will not affect viability across the forest.

4.2.4 Consultation History

The USDI Fish and Wildlife Service was not formally consulted for the Tanasee Forest Management Project because no threatened or endangered species habitat exists within the analysis areas. Personal communication with Alan Ratzlaff and Marella Bunsick with the USDI Fish and Wildlife Service was made regarding the existing freshwater mussel surveys of the West Fork of the French Broad River.

Also, several US Forest Service personnel were consulted while working on the analysis for this project:
Sheryl Bryan, Fisheries Biologist, National Forests in North Carolina;
Ted Oprean, USFS Silviculturalist, Pisgah Ranger District;
Mae Lee Hafer, National Forests in NC Wildlife Biologist;
Micky Clemmons, NCWRC Stream Restoration Coordinator (former District Fisheries Biologist);
Scott Loftis, NCWRC District Fisheries Biologist;
Mark Davis, former NCWRC Habitat Conservation Biologist;
Mark Cantrell, USFWS Biologist;
Dave Danley, USFS Botanist;
Richard Burns, former USFS Hydrologist;
Brady Dodd, National Forests in NC Hydrologist;
Marella Buncick, USFWS Biologist;
Charley Bolen, USFS Forester;
Donley Hill, USFS Fisheries Biologist;
Larry Hayden, USFS Planner/Resource Coordinator;
Max Riddle, USFS Timber Sale Administrator;
Michael Hutchins, USFS Pisgah Zone NEPA Planner;
Karen Compton, USFS NEPA Planner

4.2.5 Determination of Effect

Implementation of any alternative considered under the current proposal for the Tanasee Forest Management Project will not affect threatened, endangered, or proposed aquatic species, for the reasons stated above, nor will suitable habitat be affected. Consultation with the U.S. Fish and Wildlife Service is not required. Implementation of any alternative proposed for the Tanasee Forest Management Project will have no negative impacts on aquatic sensitive or Forest concern species, for the reasons stated above, nor will project implementation result in a trend toward listing for any species.

Individuals of Forest concern species *Cryptobranchus alleganiensis, Necturus maculosus, Agapetus jocassee, Ceraclea species 1, Helicopsyche paralimnella, Barbaetis benfieldi, Waltoncythere acuta* and *Serratella spicilosa* may be affected by the implementation of either Alternative B but will not affect the viability of these species across the Forest. Individuals of the Forest concern species list including *Cryptobranchus alleganiensis, Necturus maculosus,*

Agapetus jocassee, Ceraclea species 1, Helicopsyche paralimnella, Barbaetis benfieldi, Waltoncythere acuta and *Serratella spicilosa* will not be affected by the implementation of Alternative C, which eliminates the seven stream crossings proposed in Alternative B. Project design features have been designated to protect sensitive aquatic habitats. These design features are a part of the project design and not dependant upon Knutsen Vandenburg funding (monies designated for the improvement of resources generated from sales receipts) for implementation. This design is reasonable and can be implemented.

4.2.6 Mitigation Measures and Project Design Features for the Protection of Resources

Mitigation measures are management actions that are required to maintain compliance with environmental laws and regulations: NEPA, NFMA, and the LRMP EIS. These measures are required in any action alternative to achieve the determination of effect below. Use of the mitigation measures will protect aquatic habitat in the project area for the eight Forest Concern species. Aquatic habitat in the analysis area and further downstream (including MIS habitat) would also be protected.

Management opportunities, while not legally required, are actions that, when implemented, will result in improved resource condition or minimize potential effects.

No mitigation measures or management recommendations will be required for the Tanasee Forest Management Project as the project has been designed to include the following protection measures. It may also be noted that some of the below are listed as requirements of USFS Timber Sale Contract Clauses listed in the Nantahala and Pisgah National Forests Land and Resource Management Plan.

Project Design Features for the Protection of Aquatic Resources

1. Intermittent channels have been mapped during a field visit with USFS Hydrologist, USFS Fisheries Biologist and the Pisgah Ranger District Silviculturalist. These areas will not be disturbed unless they are one of the seven crossings planned with Alternative B.

2. Trees accidentally felled across stream channels (that prevent or block stream flow) will be lifted (when possible) away from the water. If this is not possible, each tree will be pulled away from the water where it fell and temporary decking will be used to support the weight of the tree as it is pulled across the channel. These removals will be perpendicular to the stream channel whenever possible to minimize stream bank disturbance. Bare soil will be seeded and mulched if native vegetation does not start to recolonize the area by the time timber removal from the unit is complete.

3. Skid roads will avoid stream crossings and paralleling perennial channels within designated riparian areas.

4. Landings and skid trails should be vegetated as soon as possible after use to avoid off-site soil movement.

5. Temporary roads (if needed) should be constructed to avoid runoff into area streams. In addition, silt fence, straw bales, or brush barriers should be placed along the length of the road where it parallels or crosses a stream as needed to control runoff and stream sedimentation.

4.3 Author of Section 4

Lorie L. Stroup
Fisheries Biologist
Pisgah National Forest
May 15, 2004
Amended August 19, 2004

5.0 SUMMARY OF EFFECTS TO FOREST CONCERN SPECIES

5.1 Introduction

This section incorporates the species level evaluations from Sections 2.2, 3.2, and 4.2 of the Aquatic, Botanical and Terrestrial Wildlife Analysis Report. This section summarizes the information for all Forest Concern Species.

Species identified by the National Forests in North Carolina as Forest Concern occur or are likely to occur on the Forests and are identified by the North Carolina Natural Heritage Program as significantly rare. These species may require special management to maintain their continued existence on the Forests. Potentially affected species were identified from information on habitat relationships, element occurrence records of Forest Concern species as maintained by the North Carolina Natural Heritage Program and field data on the project area.

5.2 Determination of Effect

Botanical Forest Concern Species

The populations of *Sanguisorba canadensis* and *Oenothera perennis* will not be effected by any of the alternatives of the proposed action because the populations are significantly far enough away from the proposed action(s). There will be no cumulative effects on any forest concern plant species from the activities associated with the action alternatives (Section 2.2 of the Aquatic, Botanical and Terrestrial Wildlife Analysis Report).

Terrestrial Wildlife Forest Concern Species

Both of the action alternatives will have no impact on the eastern woodrat and green salamander, which are both associated with rocky places: the eastern woodrat with boulder fields and the green salamander with shaded, moist rock outcrops. Although there are suitable rocky habitat in the project area for both of these species, care will be taken to protect all rock outcrops that provide suitable habitat for eastern woodrat and green salamander. This will be accomplished by maintaining a buffer around the rock outcrop; therefore, there will be no effect to these species should either of these alternatives be implemented.

The dusky azure caterpillar's host, *Aruncus*, does not occur in the activity areas where treatments are planned, per Dave Danley, Forest Botanist. No direct or indirect effects on this species or its specialized habitat or life cycle are expected as a result of implementation of either action alternative **(**Section 3.2 of the Aquatic, Botanical and Terrestrial Wildlife Analysis Report**)**.

Aquatic Forest Concern Species

Individuals of Forest concern species *Cryptobranchus alleganiensis, Necturus maculosus, Agapetus jocassee, Ceraclea species 1, Helicopsyche paralimnella, Barbaetis benfieldi, Waltoncythere acuta* and *Serratella spicilosa* may be affected by the implementation of either Alternative B but will not affect the viability of these species across the Forest. Individuals of the Forest concern species list including *Cryptobranchus alleganiensis, Necturus maculosus, Agapetus jocassee, Ceraclea species 1, Helicopsyche paralimnella, Barbaetis benfieldi, Waltoncythere acuta* and *Serratella spicilosa* will not be affected by the implementation of Alternative C, which eliminates the seven stream crossings proposed in Alternative B. Habitats for the benthic macroinvertebrate species are common across their range. No risk to aquatic population viability of these Forest Concern species would occur as a result of this project (Section 4.2 of the Aquatic, Botanical and Terrestrial Wildlife Analysis Report).

5.3 Summary of Effects Determination

The project may impact individuals of *Cryptobranchus alleganiensis, Necturus maculosus, Agapetus jocassee, Ceraclea species 1, Helicopsyche paralimnella, Waltoncythere acuta, Barbaetis benfieldi,* and *Serratella spicilosa,* but will not impact their viability across the Forest. No cumulative effects on species viability across the Forest will result from this project.

5.4 Author of Section 5

Prepared By:

Mae Lee A. Hafer June 8, 2004

Wildlife Biologist Date
National Forests in North Carolina

Amended August 23, 2004

6.0 BIOLOGICAL EVALUATION

6.1 Introduction

This section incorporates the species level evaluations from Sections 2.2, 3.2, and 4.2 of the Aquatic, Botanical and Terrestrial Wildlife Analysis Report. This section summarizes the information for all Threatened, Endangered and Sensitive Species.

Endangered, threatened, and sensitive species considered in this analysis are those included in the National Forests in North Carolina (TES) species list (January, 2002). All TES species that might occur on the Pisgah National Forest were considered. Potentially affected species were identified from information on habitat relationships, element occurrence records of TES species as maintained by the North Carolina Natural Heritage Program and field data on the project area.

6.2 Determination of Effect

Botanical Threatened, Endangered and Sensitive Species

Seven federally-endangered and seven federally threatened species are either known to occur, or may occur, on the Nantahala and Pisgah National Forests. This includes species known from the mountains of North Carolina only from historical records (> 20 yr since last observed), and records from both private and public lands.

One hundred forty-nine sensitive plant species are either known to occur, or may occur, on the Nantahala and Pisgah National Forests. Regional sensitive species are designated by the Region 8 office of the U. S. Forest Service, and exhibit regional viability concerns. This includes species known from the mountains of North Carolina only from historical records (> 20 yr since last observed), and records from both private and public lands.

The three alternatives of the Tanasee Forest Management Project will have no effect on any federally threatened or endangered plant species. Consultation with the U. S. Fish and Wildlife Service is not required. For additional details see Section 2.2 of the Aquatic, Botanical and Terrestrial Wildlife Analysis Report.

Some individuals of Regionally Sensitive *Tsuga caroliniana* may be negatively affected by this proposal but this proposal is not expected to cause loss of viability of this species in the project area or the Forest. Furthermore, the habitat for *Tsuga caroliniana* is not expected to be permanently altered by this proposal and *Tsuga caroliniana* is expected to recover in the proposed activity areas (Section 2.2 of the Aquatic, Botanical and Terrestrial Wildlife Analysis Report).

Terrestrial Wildlife Threatened, Endangered and Sensitive Species

The project will have no negative effect on any federally proposed, endangered or threatened terrestrial wildlife species. The bog turtle (*Clemmys muhlenbergii*) uses bogs, wet pastures and wet thickets, all of which occur in the project area. Although there is suitable boggy habitat in the project area, care will be taken to protect all bogs that provide suitable habitat for the bog turtle. This will be accomplished by maintaining a buffer around the bogs; therefore, there will be no effect to this species should either of these alternatives be implemented. The project will not impact any sensitive species since none exist in the project area. No cumulative effects on species viability across the Forest will result from this project. Consultation with the U.S. Fish and Wildlife Service is not required. For additional details see Section 3.2 of the Aquatic, Botanical and Terrestrial Wildlife Analysis Report.

Aquatic Threatened, Endangered and Sensitive Species

The project will have no effect on any federally listed aquatic species or their habitat. The project will have no impact on any sensitive aquatic species or their habitat. Consultation with the U.S. Fish and Wildlife Service is not required. For additional details see Section 4.2 of the Aquatic, Botanical and Terrestrial Wildlife Analysis Report.

6.3 Summary of Effects Determination

The project will have no effect on any other federally proposed or listed botanical, terrestrial wildlife, or aquatic species. The project may impact individuals of *Tsuga caroliniana,* but it will not impact their viability across the Forest. This project will not impact any other sensitive species. No cumulative effects on species viability across the Forest will result from this project. Consultation with the U.S. Fish and Wildlife Service is not required.

6.4 Author of Section 6

Prepared By:

Mae Lee A. Hafer — June 8, 2004

Wildlife Biologist — Date
National Forests in North Carolina

Amended August 23, 2004

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8.0 ATTACHMENTS

ATTACHMENT 1

Species of vascular plants noted during surveys

TREES:

Acer pensylvanicum
Acer rubrum
Aesculus flava
Alnus serrulata
Amelanchier arborea
Amelanchier laevis
Betula lenta
Carya alba
Carya cordiformis
Carya glabra
Carya ovata
Clethra acuminata
Crataegus pruinosa
Fagus grandifolia
Fraxinus americana
Halesia tetraptera
Hamamelis virginiana
Ilex opaca
Juniperus virginiana
Liriodendron tulipifera
Magnolia acuminata
Magnolia fraseri
Nyssa sylvatica
Oxydendrum arboreum
Pinus rigida
Pinus strobilis
Pinus virginiana
Prunus americana
Prunus serotina
Quercus alba
Quercus coccinea
Quercus prinus
Quercus rubra
Quercus velutina
Robinia pseudoacacia
Salix sericea
Sassafras albidum
Tilia americana
Tsuga canadensis

SHRUBS:

Amorpha glabra
Aristolochia macrophylla
Calycanthus floridus
Castanea dentata
Castanea pumila
Ceanothus americanus
Celastrus scandens
Cornus amomum
Cornus florida
Gaylussacia ursina
Hedra helix
Hydrangea arborescens
Hypericum mutilum
Ilex verticillata
Kalmia latifolia
Lindera benzoin
Pieris floribunda
Pyrularia pubera
Rhododendron calendulaceum
Rhododendron maximum
Rhododendron minus
Rhus copallina
Rhus hirta
Robinia hispida
Rosa multiflora
Rubus allegheniensis
Rubus canadensis
Rubus odoratus
Rumex crispus
Sambucus canadensis
Smilax glauca
Smilax herbacea
Smilax rotundifolia
Toxicodendron radicans
Vaccinium pallidum
Vaccinium stamineum
Viburnum nudum
Vitis aestivalis
Vitis labrusca
Xanthorhiza simplicissima

HERBS:

Achillea millefolium
Actaea pachypoda
Ageratina altissima
Agrimonia gryposepala
Agrostis perennans
Agrostis stolonifera
Ambrosia artemisiifolia
Amphicarpaea bracteata
Aster umbellatus
Anemone quinquefolia
Angelica venenosa
Antennaria plantaginifolia
Anthoxanthum odoratum
Arabis laevigata
Aralia nudicaulis
Aralia spinosa
Arisaema triphyllum
Aster undulatus
Aristolochia serpentaria
Arnoglossum muhlenbergii
Aruncus dioicus
Arundinaria gigantea
Asclepias variegata
Aster acuminatus
Aster divaricatus
Aster patens
Astilbe biternata

Aureolaria laevigata
Baptisia tinctoria
Campanula divaricata
Cardamine concatenata
Cardamine hirsuta
Carex aestivalis
Carex annectens
Carex biltmoreana
Carex blanda
Carex communis
Carex debilis
Carex digitalis
Carex folliculata
Carex gracillima
Carex gynandra
Carex intumescens
Carex laxiflora
Carex leptalea
Carex manhartii
Carex muhlenbergii
Carex pensylvanica
Carex prasina
Carex ruthii
Carex scabrata
Carex striatula
Carex virescens
Carex vulpinoidea
Caulophyllum thalictroides
Chimaphila maculata
Chrysopsis mariana
Cimicifuga americana
Cimicifuga racemosa
Cirsium horridulum
Clematis virginiana
Clintonia umbellulata
Collinsonia canadensis
Conopholis americana
Conyza canadensis
Coreopsis major
Coronilla varia
Cypripedium acaule
Cypripedium pubescens
Dactylis glomerata
Danthonia compressa
Danthonia sericea
Daucus carota
Desmodium nudiflorum
Desmodium paniculatum
Dicanthelium boscii
Dicanthelium clandestinum
Potentilla canadensis
Prenanthes altissima
Dicanthelium commutatum
Dicanthelium sphaerocarpon
Dioscorea oppositifolia
Dioscorea quaternata
Diphylleia cymosa
Disporum lanuginosum
Draba verna
Drosera rotundifolia
Dulichium arundinaceum
Epigaea repens
Erigeron pulchellus
Eragrostis spectabilis
Erythronium americanum
Eupatorium album
Eupatorium fistulosum
Eupatorium perfoliatum
Eupatorium rotundifolium
Euphorbia corolata
Festuca subverticillata
Fragaria virginiana
Galax urceolata
Galearis spectabilis
Galium circaezans
Galium latifolium
Geranium carolinianum
Geranium maculatum
Geranium molle
Geum canadense
Glechoma hederacea
Glyceria striata
Goodyera pubescens
Helenium autumnale
Heuchera villosa
Hexastylis shuttleworthii
Hieracium caespitosum
Hieracium paniculatum
Hieracium scabrum
Hieracium venosum
Holcus lanatus
Houstonia caerulea
Hydrophyllum virginianum
Hypericum gentianoides
Hypoxis hirsuta
Impatiens capensis
Impatiens pallida
Iris cristata
Iris verna
Juncus acuminatus
Juncus dichotomus
Juncus effusus
Juncus tenuis
Krigia montana
Krigia virginica
Lactuca canadensis
Lamium amplexicaule
Lamium purpureum
Laportea canadensis
Lespedeza cuneata
Lespedeza repens
Lespedeza violacea
Leucanthemum vulgare
Lilium superbum
Lindernia dubia
Linum striatum
Lobelia inflata
Lobelia siphilitica
Luzula multiflora
Lysimachia quadrifolia
Maianthemum canadense
Maianthemum racemosum
Medeola virginiana
Melampyrum lineare
Mitchella repens
Mitella diphylla
Monarda clinopodia
Monarda didyma
Monarda fistulosa
Monotropa hypopithys
Monotropa uniflora
Muhlenbergia tenuiflora
Nuttallanthus canadensis
Obolaria virginica
Oenothera fruticosa
Onoclea sensibilis
Orobanche uniflora
Osmorhiza longistylis
Oxalis dillenii
Oxypolis rigidior
Panax quinquefolius
Pedicularis canadensis
Phlox nivalis
Phytolacca americana
Piptochaetium avenaceum
Plantago rugelii
Plantago virginica
Platanthera clavellata
Poa annua
Poa autumnalis
Poa compressa
Polygonatum biflorum

Prenanthes trifoliolata
Prunella vulgaris
Pycnanthemum montanum
Pycnanthemum pycnanthemoides
Pycnanthemum tenuifolium
Ranunculus hispidus
Ranunculus recurvatus
Rumex acetosella
Salvia lyrata
Sanicula canadensis
Sanicula odorata
Saxifraga michauxii
Saxifraga micranthidifolia
Schizachyrium scoparium
Scripus polyphyllus
Senecio anonymus
Senecio aureus
Silene stellata
Silphum compositum
Sisyrinchium angustifolium
Smallanthus uvedalius
Smilax biltmoreana
Smilax pulverulenta
Solidago arguta
Solidago caesia
Sorghastrum nutans
Stellaria graminea
Stellaria pubera
Taraxacum officinale
Thalictrum clavatum
Thalictrum dioicum
Thaspium barbinode
Thaspium trifoliatum
Tiarella cordifolia
Tradescantia subaspera
Trifolium aureum
Trifolium dubium
Trifolium pratense
Trifolium repens
Trillium catesbaei
Trillium erectum
Trillium vaseyi
Tussilago farfara
Uvularia grandiflora
Uvularia sessilifolia
Vernonia noveboracensis
Vicia caroliniana
Viola blanda
Viola canadensis
Viola hastata
Viola palmata
Viola rotundifolia
Viola sororia
Zizia aurea

ATTACHMENT 2

Nantahala & Pisgah National Forests Threatened and Endangered, Sensitive & Concern Species List – Transylvania County (14)*

	TYPE	SCIENTIFIC NAME	COMMON NAME	HABITAT/RANGE	FOR	COUNTIES	NC	FED	GLOB
Federally Threatened and Endangered Species									
	Mammal	*Corynorhinus townsendii virginianus*	Virginia Big-eared Bat	Roosts in caves (and rarely in mines), especially in limestone areas	P	Av Wa Ya	E	E	G4T2
*	Mammal	*Glaucomys sabrinus coloratus*	Carolina Northern Flying Squirrel	High elevation forests, mainly spruce-fir	NP	Av Bun Gr Ha Ja Mc Mi Sw Tr Wa Ya	E	E	G5T1
	Mammal	*Myotis grisescens*	Gray Bat	Roosts in caves; forages mainly over open water	P	Bun Ha	E	E	G3
	Mammal	*Myotis sodalis*	Indiana Bat	Roots in hollow trees or under loose bark (warmer months), in caves (winter)	NP	Ch Gr Ja Mac Mi Ru Sw	E	E	G2
	Mammal	*Puma concolor cougar*	Eastern Cougar	Extensive forests, remote areas	NP	Bun Ha Sw Ya	E	E	G5TH
	Bird	*Haliaeetus leucocephalus*	Bald Eagle	Mature forests near large bodies of water (for nesting)	NP	Ha Mc	E	T	G4
*	Reptile	*Clemmys muhlenbergii*	Bog Turtle	Bogs, wet pastures, wet thickets	NP	As Av Bun Ch Cl Gr He Ja Mac Mc Mi Tr Wa Ya	T	T (S/A)	G3
	Spider	*Microhexura montivaga*	Spruce-fir Moss Spider	In moss of spruce-fir forests (endemic to North Carolina and adjacent Tennessee)	NP	Av Ca Mi Sw Ya	SR	E	G1
	Beetle	*Nicrophorus americanus*	American Burying Beetle	Sites with abundance of small vertebrate carrion	P		SR	E	G2G3
	Terrestrial Gastropod	*Patera clarki nantahala*	Noonday Globe	Nantahala Gorge (endemic to this site)	N	Sw	T	T	G?T1 [G2T1]
2002 Region 8 Regional Forester's Sensitive Species									
	Mammal	*Microtus chrotorrhinus carolinensis*	Southern Rock Vole	Rocky areas at high elevations, forests, or fields	NP	Av Ha Ja Mac Sw Ya	SC	FSC	G4T3
	Mammal	*Myotis leibii leibii*	Eastern Small-footed Bat	Roosts in hollow trees, rock outcrops, bridges (warmer months), in caves and mines (winter)	NP	Av Bun Gr He Ja Ru Sw Ya	SC	FSC	G3
	Mammal	*Sorex palustris punctulatus*	Southern Water Shrew	Stream banks in montane forests	NP	Av Bun Cl Ha Mac Sw Wa	SC	FSC	G5T3
*	Bird	*Falco peregrinus*	Peregrine Falcon	Cliffs (for nesting)	NP	Av Bun Bur Ha Ja Mad Ru Tr Ya	E	-	G4
	Bird	*Lanius ludovicia migrans*	Migrant Loggerhead Shrike	Fields and pastures (breeding season only)	NP		SC	FSC	G4T3Q
*	Bird	*Thryomanes bewickii altus*	Appalachian Bewick's Wren	Woodland borders or openings, farmlands or brushy fields, at high Elevations (breeding season only)	NP	As Av Bun Ha Ja Mac Tr	E	FSC	G5T2Q
	Amphibian	*Desmognathus*	Santeetlah Dusky	stream headwaters and seepage areas; southwestern	N	Gr Ja Sw	SR	-	G3Q

	TYPE	SCIENTIFIC NAME	COMMON NAME	HABITAT/RANGE	FOR	COUNTIES	NC	FED	GLOB
		santeetlah	Salamander	mountains					
	Amphibian	*Eurycea junaluska*	Junaluska Salamander	Forests near seeps and streams in the southwestern mountains	N	Ch Cl Gr	SC	-	G2Q
	Amphibian	*Plethodon aureolus*	Tellico Salamander	Forests in the Unicoi Mountains	N	Ch Gr	SR	-	G2G3Q
	Amphibian	*Plethodon welleri*	Weller's Salamander	High elevation forests in northern mountains, mainly in spruce-fir, and to a lesser degree in northern hardwood forests	P	Av Mi Wa Ya	SC	-	G3
	Spider	*Hypochilus coylei*	A lampshade spider	Rock outcrops (apparently endemic to southern mountains of NC)	P	Bun He Po Ru	SR	-	G3?
	Spider	*Hypochilus sheari*	A lampshade spider	Rock outcrops (apparently endemic to Buncombe, McDowell, and Yancey counties, NC)	P	Bun Mc Ya	SR	-	G2G3
	Spider	*Nesticus cooperi*	Lost Nantahala Cave Spider	Caves and along Nantahala River (apparently endemic to Swain County, NC)	N	Mac Sw	SR	-	G1G2
	Spider	*Nesticus crosbyi*	a nesticid spider	Spruce-fir forests (apparently endemic to Mount Mitchell)	P	Bun Ya	SR	-	G1?
	Spider	*Nesticus mimus*	a nesticid spider	rocky areas; known from Grandfather Mtn. and Table Rock	P	Av Bur	SR	-	G2
	Spider	*Nesticus sheari*	a nesticid spider	on the ground in moist or rich forests (apparently endemic to Graham County, NC)	N	Gr	SR	-	G2?
	Spider	*Nesticus silvanus*	a nesticid spider	Habitat not indicated (apparently endemic to southern mountains of NC)	N		SR	-	G2?
	Moth	*Semiothisa fraserata*	Fraser Fir Angle	spruce/fir forests with fraser fir	NP		SR	-	GU
	Butterfly	*Callophyrs irus*	Frosted Elfin	Open woods and borders, usually in dry situations; host plant-lupines (*Lupinus*) and wild indigos (*Baptisia*)	NP	Bun Ch Po	SR	-	G3
	Butterfly	*Speyeria idalia*	Regal Fritillary	Wet or dry meadows, bogs, open hilltops; host plants-violets (*Viola*)	P	As Av	SR	-	G3
	Grasshopper	*Melanoplus divergens*	Divergent Melanoplus	Glades and balds, 1800-4717 feet	NP		SR	-	G2G3
	Grasshopper	*Melanoplus serrulatus*	Serrulate Melanoplus	Valleys and lower slopes, Nantahala Mountains	N		SR	-	G1G3
	Grasshopper	*Scudderia septentrionalis*	Northern Bush Katydid	Forests	NP		SR	-	G3?
	Grasshopper	*Trimerotropis saxatilis*	Rock-loving Grasshopper	Lichen-covered rock outcrops	NP		SR	-	G2G3
	Beetle	*Trechus carolinae*	A ground beetle	Black Mountains	P	Ya	SR	-	G1?
	Beetle	*Trechus luculentus unicoi*	A ground beetle	Beneath rocks and moss in wet ravines and near seeps and springs	N	Gr	SR	-	G2T2?

	TYPE	SCIENTIFIC NAME	COMMON NAME	HABITAT/RANGE	FOR	COUNTIES	NC	FED	GLOB
	Beetle	*Trechus mitchellensis*	A ground beetle	Under rocks, logs, and other ground cover, Black Mountains	P	Bun Mc Ya	SR	-	G1?
	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	NP	Ha Ja	SR	-	G1?
*	Beetle	*Trechus satanicus*	A ground beetle	Under rocks, logs, and other ground cover, Devil's Cou Graveyard Fields	P	Ha Tr	SR	-	G1?
	Terrestrial Gastropod	*Helicodiscus triodus*	Tallus Coil	Found under leaves and in limestone rubble on wooded hillsides; also in caves	P	Mad	SR	-	G2
	Terrestrial Gastropod	*Pallifera hemphilli*	Black Mantleslug	High elevation forest, mainly spruce-fir	NP	Av Bun Ha Ja Mi Sw Ya	SC	-	G3
	Terrestrial Gastropod	*Paravitrea placentula*	Glossy Supercoil	Leaf litter on wooded hillsides	NP	Mad Mi Sw	SC	-	G3
	Terrestrial Gastropod	*Ventridens coelaxis*	Bidentate Dome	leaf litter on mountainsides, usually at higher elevations	P	Av Mad Wa	SC	-	G3
2002 NF's NC Forest Concern Species									
*	Mammal	*Corynorhinus rafinesquii*	Rafinesque's Big-eared Bat	Roosts in old buildings, hollow trees, caves, mines, and beneath bridges, usually near water	NP	Bun Bur Ch Gr Mac Mad Sw Tr	SC	FSC	G3G4
*	Mammal	*Neotoma floridana haematoreia*	Eastern Woodrat-Southern Appalachian population	Rocky places in deciduous or mixed forests, in southern mountains and adjacent Piedmont	NP	Bun Bur Ha He Ja Mac Mad Mc Po Ru Sw Tr	SC	FSC	G5T4Q
*	Mammal	*Sorex dispar*	Long-tailed Shrew	High elevation forests with talus or rocky slopes	NP	Av Bun Gr Ha Ja Mac Sw Tr Wa Ya	SC	FSC	G5T?
*	Bird	*Aegolius acadicus pop. 1*	Northern Saw-whet Owl	Spruce-fir forests or mixed hardwood/spruce forests (for nesting) [breeding season only]	NP	Av Bun Gr Ha Ja Mac Mi Sw Tr Wa Ya	SC	-	G5
	Bird	*Catharus guttatus*	Hermit Thrush	Spruce-fir forests (for nesting) [breeding season only]	NP	Av Ha Mi Sw Ya	SR	-	G5
*	Bird	*Coccyzus erythropthalmus*	Black-billed Cuckoo	Deciduous forests, mainly at higher elevations [breeding season and habitat only]	NP	As Av Bun Bur Ca Ha He Ja Mc Mi Tr Wa	SR	-	G5
	Bird	*Contopus cooperi*	Olive-sided Flycatcher	Montane conifer forests (mainly spruce-fir) with openings or dead trees [breeding season only]	NP	Ha Mac Mc Mi Sw Ya	SC	-	G5
*	Bird	*Dendroica cerulea*	Cerulean Warbler	Mature hardwood forests; steep slopes and coves in mountains [breeding season only]	NP	Bun Cl Gr Ha Mac Mc Ru Tr Wa	SR	-	G4
	Bird	*Dendroica magnolia*	Magnolia Warbler	Spruce-fir forests, especially in immature stands [breeding season only]	NP	Av Bun Gr Ha Ja Mc Mi Wa Ya	SR	-	G5
	Bird	*Shyrapicus varius appalachiensis*	Appalachian Yellow-bellied Sapsucker	Mature, open hardwoods with scattered dead trees [breeding season only]	NP	Av Bun Cl Gr Ha Ja Mac Mi Sw Wa Ya	SR	-	G5T?

	TYPE	SCIENTIFIC NAME	COMMON NAME	HABITAT/RANGE	FOR	COUNTIES	NC	FED	GLOB
	Bird	*Vermivora pinus*	Blue-winged Warbler	Low elevation brushy fields and thickets	NP	As Bun Ch Gr Mac	SR	-	G5
	Bird	*Vireo gilvus*	Warbling Vireo	Groves of hardwoods along rivers and streams [breeding season only]	NP	As Av Bun Mac Wa	SR	-	G5
	Reptile	*Sternotherus minor*	Loggerhead Musk Turtle	Streams and rivers in Mississippi drainage	N	Ch Mad	SC	-	G5
*	Amphibian	*Ambystoma talpoideum*	Mole Salamander	Breeds in fish-free semipermanent woodland ponds; forages in adjacent woods	NP	Bun Ch He Mac Tr	SC	-	G5
*	Amphibian	*Aneides aeneus*	Green Salamander	Damp, shaded crevices of cliffs or rock outcrops in deciduous forests (southern forests)	NP	He Ja Mac Ru Tr	E	-	G3G4
	Amphibian	*Eurycea longicauda longicauda*	Longtail Salamander	Moist woods and floodplains; small ponds for breeding	NP	Gr Ha Mad Wa	SC	-	G5T5
	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	N	Cl			
	Spider	*Nesticus species nova 2*	A nesticid spider	Rocky talus fields along the Chattooga River and rock crevices of Whiteside Mountain	N	Mac			
	Moth	*Hepialus sciophanes*	a ghost moth	Spruce-fir forests	NP		SR	-	GU
	Moth	*Itame subcessaria*	Barred Itame	High elevation forests with gooseberries	NP		SR	-	G4?
	Butterfly	*Autochton cellus*	Golden-banded Skipper	Moist woods near streams; host plant-hog peanut (*Amphicarpa bracteata*)	NP	Bur Gr Mac Mad Mi Sw	SR	-	G4
*	Butterfly	*Celastrina niger*	Dusky Azure	Rich, moist deciduous forests; host plant-goat's beard (*Aruncus dioicus*)	NP	Bun Cl Gr Ha Mac Mi Po Sw Tr	SR	-	G4
	Butterfly	*Phyciodes batesii maconensis*	Tawny Crescent	Rocky ridges, woodland openings, at higher elevations; host plants- Asters, mainly *Aster undulatus*	NP	Bun Cl Gr Ha Ja Mac Sw	SR	-	G4T1T3
	Grasshopper	*Melanoplus cherokee*	Cherokee Melanoplus	Woodlands, 1800-5100 feet	NP		SR	-	G4
	Grasshopper	*Melanoplus viridipes eurycerus*	Green-legged Melanoplus	Woodlands and forest edges	NP		SR	-	G4G5T?
	Grasshopper	*Melanoplus acrophilus acrophilus*	A short-winged Melanoplus	Shrubby areas, 3600-5000 feet elevation	NP				
	Terrestrial Gastropod	*Glyphyalinia junaluskana*	Dark Glyph	Moist leaf litter in deciduous woods on mountainsides	N	Ch Gr Mac Sw	SC	-	G? [G3]
	Terrestrial Gastropod	*Glyphyalinia pentadelphia*	Pink Glyph	Pockets of moist leaves in upland woods	N	Ch Cl Gr Mac Sw	SC	-	G? [G3]
	Terrestrial Gastropod	*Haplotrema kendeighi*	Blue-footed Lancetooth	Mountainsides in leaf litter, usually above 2000 feet elevation	N	Mac Sw	SC	-	G? [G2]
	Terrestrial	*Helicodiscus*	Spiral Coil	Leaf litter on wooded hillsides	N	Gr Sw	SC	-	G?

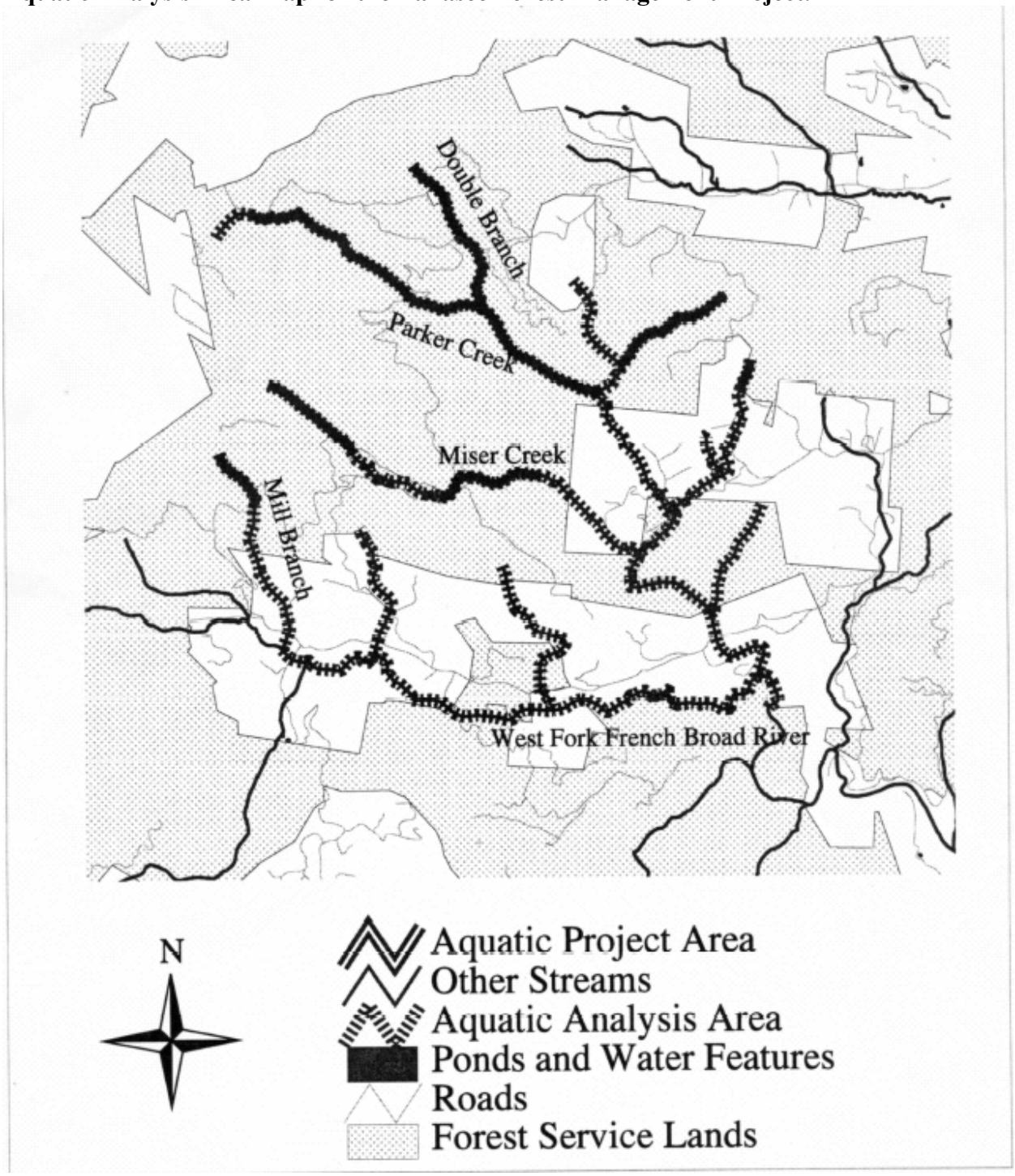
	TYPE	SCIENTIFIC NAME	COMMON NAME	HABITAT/RANGE	FOR	COUNTIES	NC	FED	GLOB
	Gastropod	*bonamicus*							[G2]
	Terrestrial Gastropod	*Helicodiscus fimbriatus*	Fringed Coil	Leaf litter and under rocks on wooded hillsides	N	Ch Gr	SC	-	G? [G3]
	Terrestrial Gastropod	*Appalachina chilhoweensis*	Queen Crater	Under leaf litter or in rock piles	NP	Gr Ha Mad Sw	SC	-	G? [G2]
	Terrestrial Gastropod	*Patera clarki*	Dwarf Proud Globe	Under leaf litter on wooded mountainsides	N	Ch Cl Gr Ja Mac Sw	SC	-	G? [G2]
	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	NP	Ha Ja Sw	T	-	G? [G2]
	Terrestrial Gastropod	*Fumonlelix orestes*	Engraved Covert	In crevices in rock ledges; high elevations in the Plott Balsam Mountains	NP	Ha Ja	T	-	G? [G2]
	Terrestrial Gastropod	*Paravitrea lacteodens*	Ramp Cove Supercoil	Habitat unknown-probably leaf litter on mountainsides	N	Gr	SC	-	G? [G1Q]
	Terrestrial Gastropod	*Paravitrea lamellidens*	Lamellate Supercoil	Pockets of deep, moist leaf litter on wooded hillsides or in ravines	NP	Ch Gr Ha Mac Sw Ya	SC	-	G? [G3]
	Terrestrial Gastropod	*Paravitrea umbilicarus*	Open Supercoil	Pockets of deep, moist leaf litter on wooded hillsides or in ravines	N	Ch Gr Mac	SC	-	G? [G3]
	Terrestrial Gastropod	*Ventridens collisella*	Sculptured Dome	In moist leaf litter on wooded hillsides, throught to only be found at Lower elevations	P	Mi	SR	-	G4
	Terrestrial Gastropod	*Zonitoides patuloides*	Appalachian Gloss	Pockets of deep, moist leaves on mountainsides and in ravines	N	Mac Sw	SC	-	G? [G2]

County Codes

As=Ashe Av=Avery Bun=Buncombe Bur=Burke Ca=Caldwell Ch=Cherokee Cl=Clay Gr=Graham Ha=Haywood
He=Henderson Ja=Jackson Mac=Macon Mad=Madison Mc=McDowell Mi=Mitchell Po= Polk Ru=Rutherford Sw=Swain
Tr=Transylvania Wa=Wautauga Ya=Yancey

ATTACHMENT 3

Aquatic Analysis Area Map for the Tanasee Forest Management Project.



ATTACHMENT 4

Nantahala and Pisgah National Forest Aquatic Rare Species List.

Rare Aquatic Species List - Nantahala & Pisgah National Forests							
Updated:	10-Jan-03						
Animal	**Animal**			**Global**	**USFWS**	**NCWRC**	
Group	**Subgroup**	**Scientific Name**	**Common Name**	**Rank**	**Status**	**Status**	**Comments**
Threatened , Endangered, & Proposed Species							
Fish	minnow/chub	*Cyprinella monacha*	spotfin chub	G2	T	T	
Mollusk	mussel	*Alasmidonta raveneliana*	Appalachian elktoe	G1	E	E	
Mollusk	mussel	*Pegius fabula*	littlewing pearlymussel	G1	E	E	
Sensitive Species (January 1, 2002 Regional Forester list)							
Crustacean	crayfish	*Cambarus chaugaensis*	Oconee stream crayfish	G2		SR (PSC)	
Crustacean	crayfish	*Cambarus georgiae*	Little Tennessee River crayfish	G1		SR (PSC)	
Crustacean	crayfish	*Cambarus parrishi*	Hiwassee Headwaters crayfish	G1	FSC	SR (PSC)	
Crustacean	crayfish	*Cambarus reburrus*	French Broad crayfish	G3			
Crustacean	other	*Caecidotea carolinensis*	Bennett's Mill Cave water slater	G1G2	FSC	SR(PE)	
Crustacean	other	*Stygobromus carolinensis*	Carolina seep scud/Yancey sideswimmer	G1G2	FSC	SR(PT)	check taxonomy
Fish	darter	*Etheostoma acuticeps*	Sharphead darter	G2G3		T	
Fish	darter	*Etheostoma vulneratum*	Wounded darter	G3		SC	
Fish	darter	*Percina burtoni*	Blotchside logperch	G2		E	
Fish	darter	*Percina macrocephala*	Longhead darter	G3	FSC	SC	extirpated
Fish	darter	*Percina squamata*	Olive darter	G2	FSC	SC	
Insect	dragonfly	*Macromia*	Mountain	G2G3	FSC	SR	

		margarita	river cruiser				
Insect	dragonfly	*Ophiogomphus edmundo*	Edmund's snaketail	G1	FSC	SR	
Insect	dragonfly	*Ophiogomphus howei*	Pygmy snaketail	G3	FSC	SR	
Mollusk	mussel	*Alasmidonta varicosa*	Brook floater	G3	FSC	T(PE)	
Mollusk	mussel	*Fusconaia barnesiana*	Tennessee pigtoe	G2G3		E	
Mollusk	mussel	*Lasmigona holstonia*	Tennessee Heelsplitter	G3	FSC	E	
Forest Concern Species (as tracked by the NCNHP)							
Amphibian	salamander	*Cryptobranchus alleganiensis*	hellbender	G4	FSC	SC	
Amphibian	salamander	*Necturus maculosus*	mudpuppy	G5		SC	historical
Crustacean	crayfish	*Cambarus hiwasseensis*	Hiwassee crayfish	G3	FSC	W2	propose sensitive?
Crustacean	crayfish	*Cambarus species 1*	Chattahoochee crayfish	G3		W3	propose sensitive?
Crustacean	ostracod	*Cymocythere clavata*	Oconee crayfish ostracod	G?	FSC	SR (PSC)	
Crustacean	ostracod	*Dactylocythere isabelae*	Catawba crayfish ostracod	G?	FSC	SR(PE)	
Crustacean	ostracod	*Dactylocythere prinsi*	Whitewater crayfish ostracod	G?	FSC	SR(PE)	
Crustacean	ostracod	*Waltoncythere acuta*	Transylvania crayfish ostracod	G?	FSC	SR (PSC)	
Crustacean	other	*Skistodiaptomus carolinensis*	Carolina skistodiaptomus	G?	FSC	SR (PSC)	
Fish	bass/sunfish	*Lepomis megalotis*	longear sunfish	G5		SR	historical
Fish	bass/sunfish	*Micropterus coosae*	redeye bass	G5		SR	historical
Fish	catfish	*Noturus eleutherus*	mountain madtom	G4		SC	historical
Fish	catfish	*Noturus flavus*	stonecat	G5		E	
Fish	darter	*Etheostoma inscriptum*	turquoise darter	G4		SC	
Fish	darter	*Etheostoma jessiae*	blueside darter	G4Q		SC	historical
Fish	darter	*Etheostoma simoterum*	snubnose darter	G5		SC	historical
Fish	darter	*Percina*	tangerine	G3		W2	propose

		aurantiaca	darter				sensitive?
Fish	darter	*Percina caprodes*	logperch	G5		T	
Fish	darter	*Percina sciera*	dusky darter	G5		E	historical
Fish	minnow/chub	*Clinostomus species 1*	smoky dace	G2Q		SC	
Fish	minnow/chub	*Cyprinella labrosa*	thicklip chub	G3		W2	propose sensitive?
Fish	minnow/chub	*Cyprinella zanema (population 1)*	Santee chub	G2T3Q		SR	
Fish	minnow/chub	*Erimystax insignis*	blotched chub	G3		W2	propose sensitive?
Fish	minnow/chub	*Hybopsis rubrifrons*	rosyface chub	G4		T	
Fish	minnow/chub	*Luxilis chrysocephalus*	striped shiner	G5		T	
Fish	minnow/chub	*Notropis lutipinnis*	yellowfin shiner	G4Q		SC	
Fish	minnow/chub	*Phenacobius crassilabrum*	fatlips minnow	G3		W2	propose sensitive?
Fish	other	*Aplodinotus grunniens*	freshwater drum	G5		T	
Fish	other	*Cottus carolinae*	banded sculpin	G5		T	
Fish	other	*Hiodon tergisus*	mooneye	G5		SC	
Fish	other	*Ichthyomyzon bdellium*	Ohio lamprey	G3G4		SR	
Fish	other	*Lampetra appendix*	American brook lamprey	G4		T	
Fish	other	*Polydon spathula*	paddlefish	G4	FSC	E	historical
Fish	other	*Stizistedion canadense*	sauger	G5		SR	
Fish	sturgeon	*Acipenser fulvescens*	lake sturgeon	G3	FSC	SC	historical
Fish	sucker	*Capoides velifer*	highfin carpsucker	G4G5		SC	
Fish	sucker	*Carpoides carpio*	river carpsucker	G5		SC	historical
Fish	sucker	*Moxostoma species 1*	sicklefin redhorse	G2G3Q	FSC	SR	
Insect	caddisfly	*Agapetus jocassee*	a caddisfly	G?	FSC	SR	
Insect	caddisfly	*Ceraclea mentiea*	a caddisfly	G?		SR	
Insect	caddisfly	*Ceraclea slossonae*	a caddisfly	G?		SR	
Insect	caddisfly	*Ceraclea species 1*	Lenat's caddisfly	G?	FSC	SR	

Insect	caddisfly	*Ceratopsyche bifida*	a caddisfly	G?		SR	
Insect	caddisfly	*Goera fuscula*	a caddisfly	G?		SR	
Insect	caddisfly	*Helicopsyche paralimnella*	a caddisfly	G?		SR	
Insect	caddisfly	*Hydropsyche carolina*	a caddisfly	G?		SR	
Insect	caddisfly	*Hydroptila englishi*	a caddisfly	G?		SR	
Insect	caddisfly	*Madeophylax altus*	Mount Mitchell caddisfly	G?	FSC	SR	
Insect	caddisfly	*Matrioptila jeanae*	a caddisfly	G?		SR	
Insect	caddisfly	*Matrioptila jeanae*	a caddisfly	G?		SR	
Insect	caddisfly	*Micrasema burksi*	a caddisfly	G?		SR	
Insect	caddisfly	*Micrasema sprulesi*	a caddisfly	G?		SR	
Insect	caddisfly	*Neophylax fuscus*	a caddisfly	G?		SR	
Insect	caddisfly	*Palaeagapetus celsus*	a caddisfly	G?		SR	
Insect	caddisfly	*Psilotreta frontalis*	a caddisfly	G?		SR	
Insect	caddisfly	*Psychomyia normada*	a caddisfly	G?		SR	
Insect	caddisfly	*Rhyacophila amicus*	a caddisfly	G?		SR	
Insect	caddisfly	*Rhyacophila melita*	a caddisfly	G?		SR	
Insect	caddisfly	*Rhyacophila mycta*	a caddisfly	G?		SR	
Insect	caddisfly	*Rhyacophila vibox*	a caddisfly	G?		SR	
Insect	caddisfly	*Wormadia thyria*	a caddisfly	G3?		SR	
Insect	dragonfly	*Aeshna tuberculifera*	black-tipped darner	G4		SR	
Insect	dragonfly	*Cordulegaster erronea*	tiger spiketail	G4		SR	
Insect	dragonfly	*Dromogomphus spoiliatus*	flag-tailed spinyleg	G4G5		SR	
Insect	dragonfly	*Gomphis consanguis*	Cherokee clubtail	G2G3		SR	propose sensitive?
Insect	dragonfly	*Gomphus abbreviatus*	spine-crowned clubtail	G3G4		SR	
Insect	dragonfly	*Gomphus abbreviatus*	spine-crowned clubtail	G3G4		SR	
Insect	dragonfly	*Gomphus*	moustache	G4		SR	

		adelphus	d clubtail				
Insect	dragonfly	*Gomphus borealis*	beaverpon d clubtail	G4		SR	
Insect	dragonfly	*Gomphus descriptus*	harpoon clubtail	G4		SR	
Insect	dragonfly	*Gomphus lineatifrons*	splendid clubtail	G4		SR	
Insect	dragonfly	*Gomphus parvidens parvidens*	piedmont clubtail	G4T?		SR	
Insect	dragonfly	*Gomphus ventricosus*	skillet clubtail	G3		SR	propose sensitive?
Insect	dragonfly	*Gomphus viridifrons*	green-faced clubtail	G3		SR	propose sensitive?
Insect	dragonfly	*Lanthus parvulus*	Northern pygmy clubtail	G3G4		SR	
Insect	dragonfly	*Ophiogomphus aspersus*	brook snaketail	G3G4		SR	
Insect	dragonfly	*Ophiogomphus mainensis*	Maine snaketail	G4		SR	
Insect	dragonfly	*Stylurus amnicola*	riverine clubtail	G3G4		SR	
Insect	dragonfly	*Stylurus scudderi*	zebra clubtail	G3G4		SR	
Insect	dragonfly	*Sympetrum obtrusum*	white-faced meadowh awk	G5		SR	
Insect	dragonfly	*Tachopteryx thoreyi*	gray petaltail	G4		SR	historical
Insect	mayfly	*Anthopotamus verticus*	a mayfly	G?		SR	
Insect	mayfly	*Baetisca laurentina*	a mayfly	G?		SR	
Insect	mayfly	*Barbaetis benfieldi*	Benfield's bearded small minnow mayfly	G2G3		SR	propose sensitive?
Insect	mayfly	*Danella lita*	a mayfly	G?		SR	
Insect	mayfly	*Drunella longicornis*	a mayfly	G?		SR	
Insect	mayfly	*Ephemerella berneri*	a mayfly	G?		SR	
Insect	mayfly	*Heterocleon petersi*	a mayfly	G?		SE	
Insect	mayfly	*Litobrancha recurvata*	a burrowing mayfly	G?		SR	
Insect	mayfly	*Macdunnoa brunnea*	a mayfly	G?		SR	
Insect	mayfly	*Serratella spiculosa*	spicilose serratellan	GH	FSC	SR	historical

			mayfly				
Insect	stonefly	*Attaneuria ruralis*	a stonefly	G?		SR	
Insect	stonefly	*Bolotoperla rossi*	a stonefly	G?		SR	
Insect	stonefly	*Diploperla morgani*	a stonefly	G?		SR	
Insect	stonefly	*Isoperla frisoni*	a stonefly	G?		SR	
Insect	stonefly	*Megaleuctra williamsae*	Williams' rare winter stonefly	G2		SR	propose sensitive?
Insect	stonefly	*Pteronarcys proteus*	a giant stonefly	G?		SR	
Insect	stonefly	*Shipsa rotunda*	a stonefly	G?		SR	
Insect	stonefly	*Zapada chila*	a stonefly	G?		SR	
Mollusk	mussel	*Alasmidonta viridis*	slippershell mussel	G4G5		E	
Mollusk	mussel	*Elliptio dilatata*	spike	G5		SC	
Mollusk	mussel	*Epioblasma capsaeformis*	oyster mussel	G2	E	EX	historical/extirpated
Mollusk	mussel	*Fuscinaia subrotunda*	long-solid	G3		EX	historical/extirpated
Mollusk	mussel	*Lampsilis fasciola*	wavy-rayed lampmussel	G4		SC	
Mollusk	mussel	*Medionidus conradicus*	Cumberland moccasinshell	G3G4		EX	historical/extirpated
Mollusk	mussel	*Pleurobeme oviforme*	Tennessee clubshell	G3	FSC	SR	propose sensitive?
Mollusk	mussel	*Ptychobranchus fasciolaris*	kidneyshell	G4G5		EX	historical/extirpated
Mollusk	mussel	*Quadrula pustulosa*	pimpleback	G5		EX	historical/extirpated
Mollusk	mussel	*Toxolasma lividus*	purple lilliput	G2	FSC	EX	extirpated
Mollusk	mussel	*Villosa constricta*	notched rainbow	G3G4		SR (PSC)	
Mollusk	mussel	*Villosa iris*	rainbow	G5		SC	
Mollusk	mussel	*Villosa vanuxemensis*	mountain creekshell	G4		T	
Mollusk	snail	*Goniobasis interrupta*	knotty elimnia	G?	FSC	E	
Mollusk	snail	*Leptoxis virgata*	smooth mudalia	G2	FSC	SR	propose sensitive?

ATTACHMENT 5

Rare Species Analysis for the Tanasee Forest Management Project

Rare Species List - Transylvania County List Updated 01/02/2002			
Common Name	**Scientific Name**	**Type**	**Likelyhood of Occurrence**
Threatened, Endangered, or Proposed Species			
Appalachian elktoe	*Alasmidonta raveneliana*	mussel	Not Likely to Occur (5)
Sensitive Species (based on January 1, 2002 Regional Forester's list)			
Oconee stream crayfish	*Cambarus chaugaensis*	crayfish	Not likely to Occur (5)
mountain river cruiser	*Macromia margarita*	dragonfly	Not likely to Occur (5)
Forest Concern Species			
hellbender	*Cryptobranchus alleganiensis*	amphibian	Known to Occur (1,4)
mudpuppy	*Necturus maculosus*	amphibian	May Occur (4)
a caddisfly	*Agapetus jocassee*	caddisfly	May Occur (4)
Lenat's ceraclea	*Ceraclea species 1*	caddisfly	May Occur (4)
a caddisfly	*Helicopsyche paralimnella*	caddisfly	May Occur (4)
black-tipped darner	*Aeshna tuberculifera*	dragonfly	Not Likely to Occur (1)
tiger spiketail	*Cordulegaster erronea*	dragonfly	Not Likely to Occur (1)
flag-tailed spinyleg	*Dromogomphus spoliatus*	dragonfly	Not Likely to Occur (1)
spine-crowned clubtail	*Gomphus abbreviatus*	dragonfly	Not Likely to Occur (1)
moustached clubtail	*Gomphus adelphus*	dragonfly	Not Likely to Occur (1)
beaverpond clubtail	*Gomphus borealis*	dragonfly	Not Likely to Occur (1)
Cherokee clubtail	*Gomphus consanguis*	dragonfly	Not Likely to Occur (1)
harpoon clubtail	*Gomphus descriptus*	dragonfly	Not Likely to Occur (1)
splendid clubtail	*Gomphus lineatifrons*	dragonfly	Not Likely to Occur (1)
piedmont clubtail	*Gomphus parvidens parvidens*	dragonfly	Not Likely to Occur (1)
skillet clubtail	*Gomphus ventricosus*	dragonfly	Not Likely to Occur (1)
green-faced clubtail	*Gomphus viridifrons*	dragonfly	Not Likely to Occur (1)

Northern pygmy clubtail	*Lanthus parvulus*	dragonfly	Not Likely to Occur (1)
brook snaketail	*Ophiogomphus aspersus*	dragonfly	Not Likely to Occur (1)
Maine snaketail	*Ophiogomphus mainensis*	dragonfly	Not Likely to Occur (1)
riverine clubtail	*Stylurus amnicola*	dragonfly	Not Likely to Occur (1)
zebra clubtail	*Stylurus scudderi*	dragonfly	Not Likely to Occur (1)
white-faced meadowhawk	*Sympetrum obtrusum*	dragonfly	Not Likely to Occur (1)
gray petaltail	*Tachopteryx thoreyi*	dragonfly	Not Likely to Occur (1)
turquoise darter	*Etheostoma inscriptum*	Fish	Does Not Occur (2)
rosyface chub	*Hybopsis rubrifrons*	Fish	Does Not Occur (2)
redeye bass	*Micropterus coosae*	Fish	Does Not Occur (2)
yellowfin shiner	*Nortopis lutipinnis*	Fish	Does Not Occur (2)
tangerine darter	*Percina aurantiaca*	Fish	Does Not Occur (2)
Benfield's bearded sm minnow mfly	*Barbaetis benfieldi*	mayfly	May Occur (4)
Spicilose serratellan mayfly	*Serratella spicilosa*	mayfly	May Occur (4)
oyster mussel	*Epioblasma capsaeformis*	mussel	Does Not Occur (1)
long-solid	*Fusconaia subrotunda*	mussel	Does Not Occur (1)
Cumberland moccasinshell	*Medionidus conradicus*	mussel	Does Not Occur (1)
kidneyshell	*Ptychobranchus fasciolaris*	mussel	Does Not Occur (1)
pimpleback	*Quadrula pustulosa*	mussel	Does Not Occur (1)
purple lilliput	*Toxolasma lividus*	mussel	Does Not Occur (1)
rainbow	*Villosa iris (nebulosa)*	mussel	Does Not Occur (1)
mountain creekshell	*Villosa vanuxemensis*	mussel	Does Not Occur (1)
Oconee crayfish ostracod	*Cymocythere clavata*	ostracod	Not likely to Occur (5)
Transylvania crayfish ostracod	*Waltoncythere acuta*	ostracod	May Occur (4)
EVALUATION CRITERIA:			
1 = Recent survey data within or downstream the aquatic analysis area (<5 yrs old)			
2 = Historical survey data within or downstream the aquatic analysis area (>5 yrs old)			
3 = Vicinity records (within or downstream the analysis area, not necessarily within project area)			
4 = Suitable habitat present, but no vicinity records			
5 = No suitable habitat present or vicinity records within analysis area, but species may be present in county 6 = Extirpated species listed for river system			

ATTACHMENT 6

Hydrological Analysis for Parker Creek
Tanasee Forest Management Project

Pisgah Ranger District
Pisgah National Forests
Transylvania County

By Brady Dodd, USFS Hydrologists
National Forests in North Carolina

May 25, 2004

Hydrological Analysis for Parker Creek
By Brady N. Dodd, Hydrologist

Existing Condition

The Parker Creek stream channel is a major headwater tributary to the West Fork French Broad River, of the French Broad River sub-basin. The West Fork French Broad River is listed on the North Carolina 303(d) list of impaired waters because of organic and nutrient enrichment as of 2004. Sedimentation is considered a contributing stressor or cumulative cause of impairment (NCDENR 2004). An impaired stream is one that does not fully support its designated uses because of significant degradation. The State's antidegradation policy requires that at a minimum, existing water uses and level of water quality necessary to protect the existing uses, shall be maintained and protected. Section 303 of the Clean Water Act (1977) requires that recovery plans be developed to bring "water quality limited" waterbodies into compliance with State standards. Although a recovery plan for the West Fork French Broad River drainage has not yet been developed, all activities that would affect a "water quality limited" waterbody must address the issue and should be consistent with, and supportive of, water quality recovery.

The Parker Creek stream channel is characterized by cobble, gravel, and sand substrate, with occasional bedrock and boulder outcrops. Stream width is approximately 6-8', and gradient is low to moderate. Undercut banks are infrequent, and large woody debris (LWD) is noticeably absent (with the exception of several small debris jams). Rhododendron and other woody species dominate riparian vegetation. Aquatic habitat within Parker Creek is dominated by shallow runs and riffles. Pool habitat is shallow and infrequent. Fine sediment is common on the streambed, and was found to embed larger substrate on riffles and fill pools during the latest habitat (BVET) and channel stability surveys (spring 2004).

Fine sediment (e.g., sand) in streams of North Carolina is natural to a given extent. A stable stream channel can efficiently process a range of amounts and sizes of sediment within a morphologic capacity defined by basin characteristics. When sediment inputs increase and exceed the capacity of the stream to move that sediment, it will begin to fall out of suspension and deposit in places that it would not under a more natural sediment load. This process is called aggradation, and can result in embedding or covering of larger substrate and filling of pools.

The Parker Creek stream channel is currently experiencing an increase in sediment loading because of erosion associated primarily with the section of State Road (SR) 1324 extending from about the Tanasee Gap area to the Double Branch crossing. Road-derived sediment (gravel and sand size material) is present in many of the tributary channels that are hydrologically connected to SR1324. This road-derived sediment is both deposited within these tributaries and transported down to Parker Creek. Bank erosion is occurring in these tributaries as deposition causes channel widening and flow energy to be directed to channel banks. Additionally, road runoff increases the amount of storm flow in the channels and increases the "flashiness" of flow, thereby increasing stream energy available for channel erosion. At the tributary confluence with the Parker Creek channel, gradient lessens and deposition of sediment is often extensive on the Parker Creek floodplain. Since the floodplain is relatively narrow in this reach of Parker Creek, much of the sediment transported from the road and eroded from the tributary channels is transported to the Parker Creek channel. The addition of sediment to the Parker Creek channel has exceeded its natural carrying capacity and deposition on the streambed has occurred.

Currently, no open Forest Service roads exist in the headwaters of Parker Creek. Several closed roads and skid trails are present in the drainage. A watershed restoration project was completed in Parker Creek in 1999 that addressed drainage and sediment issues on 1.75 miles of closed road. This work had beneficial impacts to the water resource, but several sites remain that are contributing to sedimentation to Parker Creek.

Parker Creek is dammed just below the first Forest Service property boundary going downstream. This dam appears to have trapped and stored a large volume of the sediment coming from the drainage. Fine sediment deposition behind this dam is extensive, and storage capacity is near its limit.

Effects Analysis

Direct and indirect effects to stream channels will be analyzed at specific stream reaches within the Parker Creek drainage. Cumulative Watershed Effects (CWE) will be analyzed at the West Fork French Broad River, within the West Fork French Broad River 6th field sub-watershed. Below the West Fork French Broad River, it is assumed that if effects from the proposed activities did occur, they would be masked or diluted to the point that ties with potential site disturbance would not be apparent. As a result, the effects analysis does not extend below this location.

Alternative A (no action)
Direct and Indirect Effects:
Since the present watershed condition will not be altered by this alternative, no direct or indirect effects are expected from this alternative.

Cumulative Effects:
Since there would not be direct or indirect effects from the implementation of this alternative, this alternative would not contribute to cumulative effects in the West Fork French Broad River.

The North Carolina Dept. of Transportation has plans to improve the section of State Road 1324 that is assumed in this analysis to be the main cause of adverse affects on the Parker Creek channel. This road may also contribute to adverse cumulative effects in the West Fork French Broad River. During and just following the reconstruction of SR1324 there may be a slight increase in sedimentation to the connected tributaries and to Parker Creek since road fills would be disturbed and culverts installed and replaced. However, a reduction in sediment is expected in the long term (> one year) following site stabilization. Since reconstruction of this road would improve road drainage by increasing the number of ditch relief culverts and reduce road-derived sediment inputs by paving, there is likely to be a beneficial effect on Parker Creek that could extend downstream to the West Fork French Broad River.

Alternative B
Direct and Indirect Effects:
This alternative proposes to construct 2.3 miles of Forest Service system road in the Parker Creek drainage. A portion of the proposed construction would occur downslope from the SR 1324 where tributaries to Parker Creek are unstable due to runoff and sedimentation from the State road above. A road crossing on Parker Creek would also be constructed. Although Best Management Practices would be implemented, construction of the road would create an additional pulse of sediment into these tributary streams and directly into Parker Creek. Since the proposed road would be managed as closed year round, sediment production from the road is expected to diminish as the new road prism and crossings vegetate. Small sources of sediment are likely to persist associated with road ditches and road-stream crossings following stabilization. Storm water runoff would increase from the new road because of the newly compacted surface. This increase could add to channel instability in the tributaries to Parker Creek.

Therefore, the implementation of this alternative under current conditions would likely increase the load of sediment transported to the Parker Creek stream channel. Since flows in Parker Creek are not adequate to transport the fine sediment produced from SR1324 and deposition is occurring to the point of embedding larger substrate and filling pools, the road proposed in the Parker Creek drainage under Alternative B would exacerbate the existing sedimentation problem. This additional sediment loading could add to a further reduction in aquatic habitat quality. As sediment is transported down stream during high streamflows much would be deposited behind the dam until capacity of the structure is exceeded or structure failure occurs. At this point, sediment would be more likely to move downstream to the West Fork French Broad River.

Cumulative Effects:
Since the implementation of this alternative would have adverse effects on the existing sediment regime, there is a potential for this alternative to have adverse cumulative effects on the West Fork French Broad River. Sediment produced at the new road construction could be routed through the Parker Creek channel and transported to the water quality limited reach on the West Fork French Broad River. Movement of fine sediment through the Parker Creek stream network is assumed efficient, evident by the lack of large wood in the channel, limited storage potential, and high flow energy. Although the amount of sediment that is likely to transport downstream is small relative to the other sources of sediment within the sub-watershed it could still contribute to stressing protected uses.

The North Carolina Dept. of Transportation has plans to improve the section of State Road 1324 that is assumed in this analysis to be the main cause of adverse affects on the Parker Creek channel. This road may also contribute to adverse cumulative effects in the West Fork French Broad River. The proposed State project would improve road drainage by increasing the number of ditch relief culverts and reduce road-derived sediment inputs by paving. During and just following the reconstruction of SR1324 there may be a slight increase in sedimentation to the connected tributaries and to Parker Creek since road fills would be disturbed and culverts installed and replaced. However, a notable reduction in sediment is expected in the long term (> one year) following site stabilization.

Alternative C
Direct and Indirect Effects:
This alternative does not propose new construction of Forest Service system roads in the Parker Creek drainage, but rather uses existing and temporary roads to access harvest units along SR1324. Temporary road construction is proposed for 0.3 miles, but without stream crossings. Several of the existing roads do have stream crossings and any sediment produced from the road system would occur during logging operations. The amount of soil moved to streams would be minimal and with the implementation of Best Management Practices would be further reduced. Since this alternative does not increase road density in the Parker Creek drainage, water runoff is not expected to increase. Therefore this alternative is not likely to contribute to direct or indirect effects on the sediment and streamflow regime of Parker Creek.

Cumulative Effects:
Since there would not be direct or indirect effects from the implementation of this alternative, this alternative would not contribute to cumulative effects in the West Fork French Broad River.

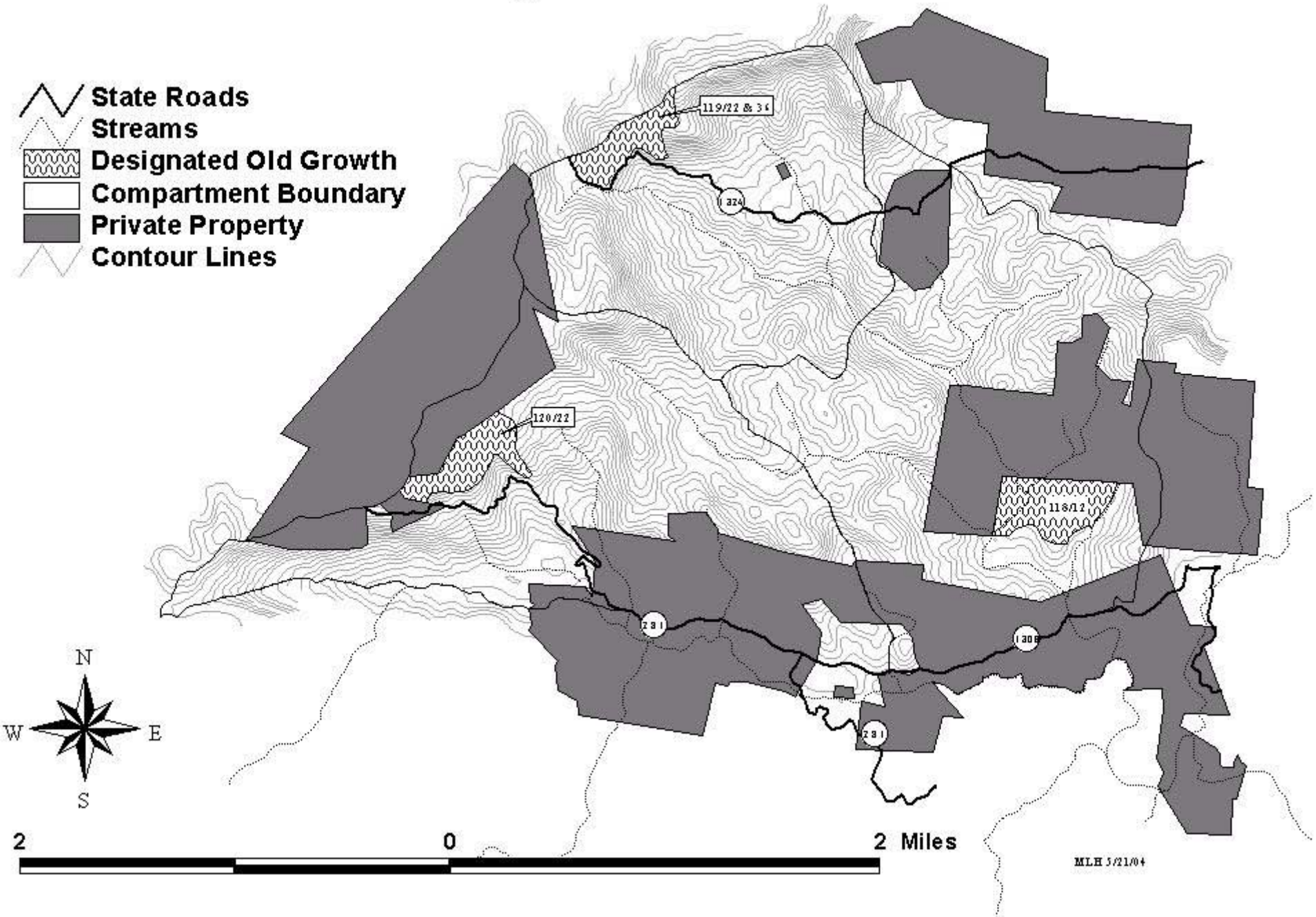
The North Carolina Dept. of Transportation has plans to improve the section of State Road 1324 that is assumed in this analysis to be the main cause of adverse affects on the Parker Creek channel and may contribute to adverse cumulative effects in the West Fork French Broad River. Since reconstruction of this road would improve road drainage by increasing the number of ditch relief culverts and reduce road-derived sediment inputs by paving, there is likely to be a beneficial effect on Parker Creek and the West Fork French Broad River. During and just following the reconstruction of SR1324 there may be a slight increase in sedimentation to the connected tributaries and to Parker Creek since road fills would be disturbed and culverts installed and replaced. However, a notable reduction in sediment is expected in the long term (> one year) following site stabilization. Therefore, there is likely to be a beneficial effect on water quality and aquatic habitat on Parker Creek and the West Fork French Broad River following this work. Proposed by the State.

APPENDIX D

TANASEE FOREST MANAGEMENT PROJECT

MAP OF EXISTING SMALL PATCH OLD GROWTH

Tanasee Forest Management Project
Designated Old Growth



APPENDIX E

TANASEE FOREST MANAGEMENT PROJECT

ECONOMIC ASSUMPTIONS
and
FINANCIAL EFFIECENCY ANALYSIS

FINANCIAL EFFICIENCY ANALYSIS
Tanasee Forest Management Environmental Assessment
Compartments 118, 119, and 120

PURPOSE

The purpose of the financial efficiency analysis is to present estimated costs and revenues of the alternatives considered in the Environmental Analysis for the Proposed Tanasee Vegetative Management Project, Pisgah Ranger District, Pisgah National Forest.

ASSUMPTIONS

For this analysis, the following assumptions apply:

1. Discount rate is 4%.

2. Inflation rate is 0% throughout the analysis period (60 years plus).

3. Estimated timber revenues were calculated using the most current base prices for the Pisgah National Forest.

4. Sale preparation costs and timber harvest administration costs were obtained from budget figures for the National Forests in North Carolina. Sale preparation costs are $7.15/CCF (hundred cubic feet) and timber harvest administration costs are $3.30/CCF.

5. Resource support costs were based on an average rate of $290/day for the various resource professionals.

6. System road construction costs for Parker Creek Road are estimated at $43,200/mile.

7. System road construction costs for Miser Creek Road are estimated at $30,000/mile.

8. System road reconstruction costs for Miser Creek Road are estimated at $23,000/mile.

9. System road reconstruction costs for Bracken Mountain Road are estimated at $10,000/mile.

10. System road reconstruction costs for Indian Rock and Woods Church Roads are estimated at $9,100/mile.

11. Temporary road construction costs are estimated at $12,000/mile.

12. Required natural reforestation and site preparation (KV funded) costs are estimated at $200/acre.

13. Required artificial reforestation and site preparation (KV Funded) costs are estimated at $360/acre.

14. Hardwood release (KV or Appropriated Funding) costs are estimated at $145/acre

15. Conversion of temporary roads/landings to linear wildlife food plots (KV funding) costs are estimated at $1,700/acre.

16. A 60-year long-term projection was used for comparison basis only. Many of these stands will be carried for a longer rotation period.

The above costs include direct and indirect costs. Direct costs include: NEPA analysis, contract costs, and sale preparation and sale administration costs. Indirect costs include Forest Service overhead. All costs are estimated until an SAI/KV Plan is completed.

LIMITATIONS OF ANALYSIS

Any financial analysis must draw limitations on the amount of data to be included or the entire process would quickly become a mix of different alternatives and expected yields or losses. For instance, inflation rate is assumed to be 0% over the entire analysis period; a situation rarely encountered in the real world. The differences between the economic values of the alternatives remain the same, regardless of the inflation rate, so constant dollars were used for comparisons between alternatives.

FINANCIAL ANALYSIS WORKSHEET
ALTERNTIVE B

Project Name:	Tanasee	Analyst:	Oprean/Compton
Treatment Year:	2004	Date:	5/12/04

SALE REVENUE ESTIMATES

Compartment/Stand	$/CCF	CCF	Total Value
118/04	$96	253	$24,288
118/22	$106	590	$62,540
118/27	$102	242	$24,684
119/03	$125	423	$52,875
119/09	$92	537	$49,404
119/13	$113	223	$25,199
119/23	$99	176	$17,424
119/26	$98	564	$55,272
Parker Creek Road R/W	$91	287	$26,117
Parker Creek SubTotal	**~$103**	**3,295**	**$337,803**
118/08	$97	477	$46,269
120/10	$110	403	$44,330
120/26	$103	447	$46,041
Miser Creek Road R/W	$97	34	$3,298
Bracken Mill SubTotal	**~$103**	**1,361**	**$139,938**
GRAND TOTAL		**4,656**	**$477,741**

ALTERNTIVE B Continued

Project Name:	Tanasee	Analyst:	Oprean/Compton
Treatment Year:	2004	Date:	5/12/2004

SALE COST ESTIMATES

Activity	Units	Number	Cost/Unit	Total Costs
Analysis and Documentation	Days	75	$290	$21,750
Sale Preparation	CCF	4,656	$7.15	$33,290
Harvest Administration	CCF	4,656	$3.30	$15,365
System Road Construction Parker Creek Road	Miles	2.3	$43,200	$99,360
System Road Construction Miser Creek Road	Miles	0.5	$30,000	$15,000
System Road Reconstruction Miser Creek Road	Miles	1.8	$23,000	$41,400
System Road Reconstruction Indian Rock Road	Miles	0.3	$9,100	$2,730
System Road Reconstruction Woods Church Road	Miles	0.2	$9,100	$1,820
System Road Reconstruction Bracken Mountain Road	Miles	1.4	$10,000	$14,000
Temporary Road Construction	Miles	2.0	$12,000	$24,000
Required Natural Regeneration and Site Preparation	Acres	197	$200	$39,400
Required Artificial Reforestation and Site Preparation	Acres	87	$360	$31,320
Hardwood Release	Acres	284	$145	$41,180
Wildlife Field Conversion	Acres	4.0	$1,700	$6,800
TOTAL				$387,415

Year	Discount Factor	Revenue	Cost	PNV*	BCR+
0	0	**$477,741**	**$387,415**	**$90,326**	**1.23**
60	0.096	$45,863	$37,192	$8,671	1.23

*Net Present Value, +Benefit Cost Ratio

FINANCIAL ANALYSIS WORKSHEET
ALTERNATIVE C

Project Name:	Tanasee	Analyst:	Oprean/Compton
Treatment Year:	2004	Date:	5/12/2004

SALE REVENUE ESTIMATES

Compartment/Stand	$/CCF	CCF	Total Value
118/22	$106	590	$62,540
119/03	$125	423	$52,875
119/23	$99	176	$17,424
Parker Creek SubTotal	**~$112**	**1,189**	**$132,839**
118/08	$97	477	$46,269
120/10	$110	403	$44,330
120/26	$103	447	$46,041
Miser Creek Road R/W	$97	34	$3,298
Bracken Mill SubTotal	**~$103**	**1,361**	**$139,938**
GRAND TOTAL		**2,550**	**$272,777**

ALTERNTIVE C Continued

Project Name:	Tanasee	Analyst:	Oprean/Compton
Treatment Year:	2004	Date:	5/12/2004

SALE COST ESTIMATES

Activity	Units	Number	Cost/Unit	Total Costs
Analysis and Documentation	Days	75	$290	$21,750
Sale Preparation	CCF	2,550	$7.15	$18,233
Harvest Administration	CCF	2,550	$3.30	$8,415
System Road Construction Miser Creek Road	Miles	0.5	$30,000	$15,000
System Road Reconstruction Miser Creek Road	Miles	1.8	$23,000	$41,400
System Road Reconstruction Indian Rock Road	Miles	0.3	$9,100	$2,730
System Road Reconstruction Woods Church Road	Miles	0.2	$9,100	$1,820
System Road Reconstruction Bracken Mountain Road	Miles	1.4	$10,000	$14,000
Temporary Road Construction	Miles	0.8	$12,000	$9,600
Required Natural Regeneration and Site Preparation	Acres	91	$200	$18,200
Required Artificial Reforestation and Site Preparation	Acres	87	$360	$31,320
Hardwood Release	Acres	178	$145	$25,810
Wildlife Field Conversion	Acres	1.7	$1,700	$2,890
TOTAL				$211,168

Year	Discount Factor	Revenue	Cost	PNV*	BCR+
0	0	**$272,777**	**$211,168**	**$61,609**	**1.29**
60	0.096	$26,187	$20,272	$5,915	1.29

*Net Present Value, +Benefit Cost Ratio

APPENDIX F

TANASEE FOREST MANAGEMENT PROJECT

EMERGENCY SPILL PLAN

EMERGENCY SPILL PLAN
TRICLOPYR PRODUCTS

NOTE: Field personnel transporting or working with pesticides should familiarize themselves with this plan, as well as with the labels and Material Safety Data Sheets of all pesticides to be used on a project. A copy of this plan is to be carried to the field by all crews working with pesticides; a copy is also to be kept in an easily accessible location near the telephone at the district dispatch or reception desk.

THIS PLAN APPLIES TO USE AND TRANSPORT OF GARLON 3A, GARLON 4, OR OTHER PRODUCTS WITH TRICLOPYR AS ITS ACTIVE INGREDIENT. DO NOT USE THIS PLAN FOR ANY OTHER PESTICIDE PRODUCTS UNLESS SO PROVIDED BY DISTRICT PESTICIDE COORDINATOR.

In case of a spill: Immediately isolate contaminated area and keep unnecessary people away.

Emergency procedures to follow when a pesticide spill occurs at the work site:

1. PROVIDE FOR CARE OF INJURED OR CONTAMINATED PERSONNEL

A. Immediately determine if any personnel are injured or contaminated. Each situation may differ, but the major and immediate effort should be to assist personnel and minimize further contamination. Accordingly, the following must be accomplished as rapidly as possible.

B. Remove injured or contaminated personnel from the spill site to a safe area.

C. If eyes are contaminated with Garlon 3A, immediately and continuously irrigate eyes with flowing water for at least 30 minutes and get prompt medical attention. If eyes are contaminated with Garlon 4, give first priority to washing them out, using portable eyewash bottles, or if these are unavailable, any clean water. Flush eyes thoroughly with water for several minutes and get medical attention if affects occur. If eyes are contaminated with pesticide, give first priority to washing them out, using portable eyewash bottles, or if these are unavailable, any clean water. Remove contaminated clothing from affected individuals, and wash pesticides off skin with detergent and clean water. If pesticide has been ingested, immediately dilute by swallowing large amounts of water or milk, and contact medical facilities as listed in this plan. Do not induce vomiting.

D. Immediately seek medical assistance for injured and contaminated personnel. Do not leave contaminated individuals alone unless essential to secure aid. If necessary, direct a third person to stay with the injured until a physician takes charge and has been advised of the actual or possible pesticide exposure.

E. Watch for the following symptoms of pesticide poisoning: Eye irritation, skin irritation, gastrointestinal discomfort, dizziness, headache, nausea, vomiting, diarrhea, slurred speech, muscle twitching or convulsions, or difficulty in breathing.

2. SPILL IDENTIFICATION

Garlon 3A
Triclopyr ((3,5,6-trichloro-2-pyridinyl)oxy) acetic acid triethylamine salt,
CAS # 057213-69-1 (44.4%)
Inert Ingredients, Total (55.6%), Including:
Ethanol, CAS # 000064-17-5
Triethylamine (N,N-Diethylthanamine), CAS # 000121-44-8
Ethylenediaminetetraacetic Acid (EDTA), CAS # 000060-004

Garlon 4
Triclopyr ((3,5,6-trichloro-2-pyridinyl)oxy) acetic acid, butoxy ethyl ester
CAS # 064700-56-7 (61.6%)

Other ingredients, Total (38.4%), Including:
Kerosene, CAS # 008008-20-6
Proprietary surfacants

3. FIRE FIGHTING MEASURES

Garlon 3A

Flash Point: 110ºF (43ºC)
Extinguishing Media: Alcohol foam and CO_2
Fire and Explosion Hazards: Toxic, irritating vapors may be formed or given off if product is involved in fire. Although product is water-based, it has a flash point due to the presence of small amounts of ethanol and triethylamine.
Fire-Fighting Equipment: Use positive pressure self-contained breathing apparatus and full protective clothing.

Garlon 4

Flash Point: 147ºF (64ºC)
Extinguishing Media: Water fog, foam, CO_2, and dry chemical
Fire and Explosion Hazards: Combustible. Toxic, irritating vapors may be formed or given off if product is involved in fire.
Fire-Fighting Equipment: Use positive pressure self-contained breathing apparatus and full protective clothing.

4. NOTIFY

Field personnel contact dispatcher/receptionist for aid.

District Pesticide Specialists: Ted Oprean
Office: 828-877-3265

Give the following information: Chemical name, location of spill, road name, and estimated size of the spill in gallons.

The District Pesticide Specialist, or other District Assistant acting for him, will notify key personnel and agencies as required (see attached notification list).

5. CONTAIN SPILL

A. Spilled pesticides must be contained as much as possible on the site where the spill has occurred. Keep spilled pesticides from entering streams, storm drains, wells, ditches, or water systems by following these procedures:

B. Wear appropriate protective clothing. At a minimum, this will include suitable clothing for pesticide application, plus rubber or nitrile gloves and safety glasses or goggles.

C. Prevent further leakage from containers by repositioning them so that the damaged part of the container is above the level of the contents, or by applying rags, tape, or other materials at hand to temporarily seal the leak.

D. Separate leaking containers from undamaged containers.

E. Confine the spill to prevent it from spreading. Encircle the spill area with a dike of sand or other absorbent material; rags or similar material may be used if necessary. If spilled material may flow toward sensitive areas, divert it by ditching.

F. If the spill involves a water course, dam it up to confine the spill if possible. For larger waterways, a log boom or baled straw may be used to contain the spill. Dam or divert the flow of clean water around the spill if possible.

G. Cover spilled liquid with absorbent material (kitty litter is ideal) for spilled quantities greater than can be handled by mixing with loose dirt. NOTE: Unless this material can be reused in accordance with pesticide label, it must be disposed of as a toxic waste.

H. DO NOT flush the spill into a ditch, sewer, drain, or off of a road, since this will further spread the chemical.

6. CLEAN-UP

Spill containment is the objective of this emergency spill plan. Clean-up and disposal procedures are covered in FSH 2109.12 Chapter 33, Project Safety Plan, in the 1990 Emergency Response Guidebook ("Orange Book"), and in the Material Safety Data Sheets for each pesticide.

7. DOCUMENTATION

Document spill type, action taken, and any needed follow-up or assistance necessary in a letter to the Forest Supervisor, with a copy to the Regional Pesticide Specialist.

SUMMARY OF CLEAN-UP STEPS:

A. Pump or bail as much of the spilled liquid as possible into containers, then:

B. Use absorbent materials, such as commercially bagged clay, kitty litter, or sawdust to soak up the spill. Use only enough material to absorb the spill. Begin spreading the absorbent material around the edge of the spill and work toward the center. Use loose soil to deactivate and bind Glyphosate products.

C. Shovel the absorbent material and pesticide, along with any contaminated soil, into leak-proof containers.

D. Label all containers

E. Store the containers in the pesticide storage building until the contents can be evaluated for disposal or reuse in a manner consistent with labeling.

NOTIFICATION LIST OF KEY PERSONNEL AND AGENCIES

1. District Pesticide Specialists	Ted Oprean Office: 828-877-3265
2. Medical Facilities	Ambulance-EMS 911 Transylvania Community Hospital 828-884-9111
3. Carolina Poison Center	1-800-848-6946

4. Fire Departments — Emergency Response: 911

5. County Sheriff Department — Transylvania County Sheriff — 828-884-3168

6. National Response Center (Oil and Toxic Chemical Spills) — 1-800-424-8802

7. Forest Pesticide Specialist
   John Blanton
   Office: 828-257-4248
   Email: jblanton@fs.fed.us

   (Notify if spill is larger than 5 gallons)

8. USFS Region 8 Spill Coordinator
   Roger Mizell
   Office: 404-347-3369
   E-mail: rmizell/r8

9. Pesticide Manufacturer:
   Dow Agrosciences, Indianapolis, IN: Emergency Number, 1-800-992-5994

10. CEMTREK - EPA number for technical assistance - 1-800-424-9300
    (NOTE: Chemicals which we normally use are not on EPA's hazardous list; you are not required to contact them.)

11. EPA National Emergency Response Center - 1-800-424-9346
    (Notify only if spilled chemical is on CERCAL Consolidated Chemical List)

12. Pesticide Safety Team of the National Agriculture Chemical Association (for technical assistance) 1-513-961-4300

13. Local Sources of emergency equipment and supplies
    Contact District Business Manager for Emergency Equipment Rental Agreements

14. Forest HAZMAT Coordinator
    Tim Chesley
    Office: 828-257-4223
    E-mail: tchesley@fs.fed.us

15. Forest Safety Coordinator
    Mike Sorrells
    Office: 828-257-4218
    E-mail: msorrells@fs.fed.us

RECOMMENDED PESTICIDE SPILL KIT CONTENTS

Storage Facility Kit

4 pair nitrile gloves

2 pair unvented goggles

1 roll of flagging or engineer's tape

1 dust pan

1 shop brush

1 dozen polyethylene bags with ties

1 gallon liquid detergent

1 polyethylene or plastic tarp

10 blank labels

100 feet of rope

1 ABC-type fire extinguisher

80 lbs. absorbent material

3 gallons household bleach

1 square-point "D" handled shovel

1 55-gallon open-head drum, or 50-gallon trashcan with lid

1 18-inch push broom with synthetic fibers

1 bung and 1 bung wrench for 2.5 inch and 0.75 inch bungs

1 drum spigot

30 feet of 0.5 inch polyethylene tubing or 150 feet of garden hose

Vehicle Kit

2 pair nitrile gloves

1 pair unvented goggles

1 dust pan

1 shop brush

6 polyethylene bags with ties

1 pint liquid detergent

1 polyethylene or plastic tarp

10 blank labels

1 ABC-type fire extinguisher

10-30 lbs. absorbent material

2 eyewash bottles

1 round-point shovel

1 portable weatherproof container for storage and transport (may also be used for cleanup)