United States Department of Agriculture
Forest Service
National Forests in North Carolina
Pisgah National Forest
Appalachian Ranger District
Burnsville Station
PO Box 128
US 19 Bypass
Burnsville, NC 28714-0128
828-682-6146

File Code: 1950
Date: November 2, 2007

Dear Interested Members of the Public and Forest Users:

In April 2007, a proposal and 30-day notice and comment period was issued by Acting District Ranger Anthony Matthews for the Shope Creek Project located in Buncombe County, North Carolina. Comments received during this period were used to prepare an environmental assessment (EA). In October 2007, I officially began serving as the Appalachian District Ranger and have decided to initiate a second 30-day notice and comment period with issuance of the EA. While Alternative B has been identified as the preferred alternative, a final decision has not been made yet. I am seeking your input again before I reach a decision.

In accordance with 36 Code of Federal Regulation (CFR) 215.6(a)(3), individuals or organizations wishing to be eligible to appeal must provide the following information: 1) Your name and address; 2) Title of the Proposed Action; 3) Specific substantive comments (215.2) on the proposed action, along with supporting reasons that the Responsible Official should consider in reaching a decision; and 4) Your signature or other means of identification verification. For organizations, a signature or other means of identification verification must be provided for the individual authorized to represent your organization.

In accordance with 36 CFR 215.6(2)(4) and 215.5(b)(2)(i), comments must be postmarked or received within 30 days beginning the day after publication of this notice in *The Asheville Citizens-Times*, the Appalachian Ranger District's newspaper of record. Oral or hand-delivered comments must be received within our normal business hours of 8:00 a.m. to 4:30 p.m. Comments may be mailed electronically, in a common digital format, to: comments-southern-north-carolina-pisgah-appalachian@fs.fed.us or regular mail to: Appalachian Ranger District, Attn: District Ranger, PO Box 128, Burnsville, North Carolina, 28714. The EA is available on our website (http://www.cs.unca.edu/nfsnc/nepa/nepa.htm) or upon request.

Feel free to contact Michael Hutchins, Interdisciplinary Team Leader, at 828-682-6146, if you have questions or need additional information regarding this proposal.

Sincerely,

/s/Tina R. Tilley
TINA R. TILLEY
District Ranger

United States Department of Agriculture

Forest Service

November 2007

Environmental Assessment

Shope Creek Project

Appalachian Ranger District, Pisgah National Forest
Buncombe County, North Carolina

Shope Creek Project

Environmental Assessment

Location of Action:	Appalachian Ranger District Pisgah National Forest Buncombe County, North Carolina
Lead Agency:	USDA Forest Service
Responsible Official:	Appalachian Ranger District District Ranger 30 Highway 19E PO Box 128 Burnsville, NC 28714
For More Information:	Paul Gilliland Project Leader or Michael Hutchins Team Leader (828) 682-6146 (828) 682-9179 (fax)
Send Electronic Comments to:	comments-southern-north-carolina-pisgah-appalachian@fs.fed.us

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CHAPTER 1 – PURPOSE AND NEED

1.1 Background

This proposal is located in the 1,736-acre Shope Creek Forest Plan Analysis Area (AA) Number 2, which includes Compartments 22, 23, and 24 and is about six miles northeast of Asheville, North Carolina, and approximately two miles north of the Riceville community, Buncombe County (see Figure 1). Access to the area is via US Highway 70, State Road (SR) 2002 (Riceville Road), SR 2426 (Shope Creek Road), and Forest Service Road (FSR) 220. The Shope Creek Project AA includes Compartments 23 and 24 (1,356 acres); no activities are proposed within Compartment 22. The Shope Creek Project AA is bounded by the Asheville watershed to the east, the Blue Ridge Parkway to the north, and private lands to the west and south. Additional project-level maps are located at the end of the Environmental Assessment (EA).

Figure 1: General Vicinity Area of Shope Creek Project

1.1.1 Project Record

This EA tiers (40 CFR 1502.20) to the Final Environmental Impact Statement (FEIS) for the Forest Plan. This EA also incorporates by reference (1502.21) the project record. The project record contains specialist reports and other technical documentation used to support the analysis and conclusions in this EA. The specialist reports provide additional detailed analysis. This EA incorporates by reference the Nantahala and Pisgah Management Indicator Species (MIS) Report. This report along with Monitoring and Evaluation Reports for the National Forests in North Carolina contains the most current information about forest population trends for MIS species.

1.2 Proposed Action – Alternative B

The Proposed Action (Alternative B) was developed to meet the Purpose and Need (Section 1.3 below). Maps of the proposal are located at the end of the EA.

The following table summarizes harvest-related information for the Proposed Action:

Table 1-1: Shope Creek Proposed Action – Alternative B

Stand	Acres	Cutting Method	Basal Area Retained[1]	Avg. Stand Age (CISC)[2]	Logging System
23-11	17	Two-age Regeneration	15-20	85	Tractor
23-13	12	Two-age Regeneration	15-20	74	Tractor
24-10	10	Two-age Regeneration	15-20	85	Tractor
24-11	12	Two-age Regeneration	15-20	74	Tractor
23-12(A)	14	Sanitation[3]	n/a	70	Tractor
23-12(B)	3	Sanitation[3]	n/a	70	Tractor
Total Harvest	**68**				

1 – Hard mast tree species would be prioritized for retention where available
2 – Continuous Inventory of Stand Conditions
3 – Sanitation cutting would remove the majority of white pine to allow regeneration of hard mast species and would retain hard wood species

In addition the Proposed Action would:

- Regenerate approximately 51 acres of upland hardwoods in four cutting units in Management Area (MA) 4D using the modified shelterwood cutting method (two-age harvest retaining 15-20 ft^2 basal area per acre) in (Compartment # - Stand #): 23-13, 23-11, 24-11, and 24-10. Two-age harvesting removes most trees, leaving some overstory trees so that two distinct ages of trees are maintained on the same site. Harvesting would include developing about 3-5 acres total of log landings and skid trails within harvest units – existing landings and skid trails would be used where available. Skid trails and log landings would be constructed using North Carolina Forest Practices Guidelines (FPGs) and Forest Plan standards (best management practices or BMPs). Following harvest activities, unsurfaced skid trails and log landings would be disced and seeded with an appropriate seed mix to reduce potential for sedimentation and compaction. Maintain 100 foot no harvest buffers along Shope Creek and its tributaries (Forest Plan, page III-181).
- Conduct a sanitation harvest to remove the majority of white pine on about 17 acres in stands 23-12(A) and 23-12(B). Sanitation harvesting removes tree species that have been attacked or are more susceptible to attack from injurious agents (such as disease or insects) other than competition between trees. The best trees in terms of species or vigor are left to grow. No minimum basal area is set using this type of cultural treatment. Removing the majority of white pine would allow for oaks and other hardwoods to thrive. The skid trails and log landings discussion above also applies for these two stands. Maintain 30 foot no harvest buffer along Shope Creek (Forest Plan, page III-181). The 30 foot buffer was mapped on February 26, 2007, by a hydrologist, a fisheries biologist, and a forester; and was evaluated by a wildlife biologist and a botanist. This team identified the 30 foot buffer as being an appropriate size to maintain riparian function for Shope Creek while also enhancing the area with the removal of white pine (for the promotion of hardwoods).
- Control/manage known populations of invasive exotic plant species in the analysis area prior to entry. Primary control method would be herbicide (Triclopyr/Glyphosate). Application would be by backpack sprayer.
- Designate at least 50 acres of small patch old growth communities in both Compartments 23 and 24 (at least 100 acres total) to provide a network of long-term old growth communities. Designated old growth communities are not scheduled for future harvesting.
- Reconstruct approximately one mile of existing system (classified) road by placing gravel and re-installing culverts. All roads, including reconstructed roads would remain closed by a

gate following project implementation. A temporary bridge would be used to access stands 23-12(B) and 24-11. The crossings would have silt fences and mulch applied to reduce potential for sedimentation to reach streams.

- Place about four miles of existing non-system roads (old "woods" roads or unclassified roads) onto the Forest's transportation system following harvest-related activities. The roads would be disced, seeded, and available for non-motorized use following project implementation as well as future administrative access needs. About two miles (½ of the total miles) of these road segments would be improved and used for harvesting.
- Disk and seed non-system road segment D (about ¼ mile in length), non-system segment G (about ¼ mile in length), and a user-developed trail segment off non-system road segment B (about 1/10 mile in length) following timber-related activities. These segments would be decommissioned, would not be placed on the Forest's transportation system, and are not needed for future administrative access needs.
- Following harvest activities, plant an old variety of apple trees on landings and advanced oak seedlings (>2 feet in height) on harvested white pine stands.
- Site preparation and release with herbicide (Triclopyr) and hand tools (chainsaw and hand axe) methods in all stands being regenerated.
- Timber Stand Improvement (TSI) with herbicide (Triclopyr) and hand tool methods on approximately 68 acres in stands 23-11, 23-12, 23-13, 24-10, and 24-11.
- Increase woody debris in Shope Creek (MA 18) to improve pool:riffle ration by felling and anchoring about 10 trees from within the 100 foot stream-side management zone within the lower reach from a quarter mile of the property boundary. Where available, priority for these trees would be hemlock, pine, and trees damaged or susceptible to windfall.
- Re-install a gate to its historic location on National Forest System (NFS) lands to provide non-motorized access for recreation users. A parking area would be developed at the gate on an old log landing and parking made available for about 3-5 vehicles. Place fences or other natural material barriers along the stream side of Forest Service Road (FSR) 220 and around the newly developed parking area to protect resources. Forest Service personnel would work closely with state, county, and municipal law enforcement agencies to manage/control use in the area.
- Ensure the proposal meets the partial retention (management actions are not dominant features in the characteristic of the landscape) visual quality objective (VQO) within two growing seasons through design features such as feathering visible edges of harvested stands, retaining trees in clumps within harvest stands, screening log landings and roads from view along the Blue Ridge Parkway, and/or modifying harvest boundaries, where needed.

1.3 Purpose and Need for Action

There is a need to develop up to 10% early-successional (0-10 year age class) wildlife habitat in the project area because there is currently no 0-10 year age class wildlife habitat. The purpose of the approximate 68 acres of harvesting is to develop about six percent 0-10 year age class wildlife habitat in the project area and increase the amount of hard mast producing tree species (oaks and hickories). The Shope Creek area is the next area the Appalachian Ranger District has identified to ensure each compartment is scheduled for visit at a 10 to 15 year interval.

There is a need to control/manage populations of invasive-exotic plants because they are established in the project area. The purpose of the herbicide treatment of Japanese spirea, multi-

floral rose, and other invasive/exotic plants prior to harvesting is to reduce potential for spread of them in the project area.

There is a need to designate small patch old growth communities because no old growth communities are currently designated. The purpose of designating small patch communities prior to harvesting is to ensure there is a network of old growth communities across the Forest.

There is a need to improve fish habitat in the lower reach of Shope Creek because there is a lack of large wood in the stream channel. The purpose of felling trees into the stream channel is to provide large wood that would increase the pool: riffle ratio and increase stream-bank stability.

There is a need to provide reasonable non-motorized access to the Shope Creek area and the current location of the private gate at Shope Creek does not provide adequate parking for members of the public. The purpose of installing a gate on NFS lands, developing a small turnaround, and allowing a few vehicles to park on the shoulder of the road is to provide reasonable non-motorized access to NFS lands.

1.3.1 Forest Plan Direction

As part of the National Forest System, the Pisgah National Forest is mandated to be managed for all of the various renewable resources, including outdoor recreation, range, timber, watershed, and wildlife and fish purposes (Multiple-Use and Sustained-Yield Act of 1960). How the various parts of a national forest are specifically managed is set forth in each Forest Plan, as required by the National Forest Management Act of 1976. The proposed actions in the Shope Creek Project are designed to implement the goals, objectives, and standards set forth in the Forest Plan for Nantahala and Pisgah National Forests.

Management opportunities were identified through a comparison of existing and desired conditions which could move this landscape toward a desired future condition. The desired future condition for a given resource was determined by examination of the Forest-wide and Management Area (MA) 4D General Direction and Standards in the Land and Resource Management Plan, Amendment 5, for the Nantahala and Pisgah National Forests (USDA March 1994 and here after referred to as Forest Plan). The general objectives for MA 4 places an emphasis on [p]*roviding high quality wildlife habitat, particularly for black bear. The preferred habitat for black bear includes freedom from the disturbance of motorized vehicles, some areas of older forest, a sustained supply of hard mast (such as acorns from oaks) and den trees, and small, widely dispersed openings providing the soft mast (fruits and berries) typically found in very young forest. Timber management activities should be designed to provide these conditions. The variety of wildlife likely to be present in management areas include ovenbird, black bear, and cerulean warbler* (Forest Plan, page III-77). Management Area 4D objectives also are to [e]*mphasize high quality habitats for wildlife requiring older forests and freedom from disturbance from motorized vehicles. Allow small widely dispersed openings throughout the management area. Close most roads to private motorized vehicles. Early successional habitat is provided in conjunction with managing suitable timber land in these areas* (Forest Plan, page III-78). Forest Plan standards for providing sawtimber in MA 4 state: *schedule to revisit each compartment at 10 to 15 year intervals* (Forest Plan, page III-85) and to disperse early successional habitat (0-10 year age class) within compartments and analysis areas *not to exceed 10%* (Forest Plan, page III-31). Forest Plan direction for controlling/managing pest populations state: *Use Integrated Pest Management (IPM) as the strategy in managing pest populations to achieve resource management objectives* (Forest Plan, page III-52). Forest Plan standards for

small patch old growth communities state: *Select a contiguous area at least 5% the size of the national forest land in the compartment or at least 50 acres, which ever is greater* (Forest Plan, page III-27). Forest Plan scenery standards (visual quality objective) for MA 4D calls for attaining partial retention (Forest Plan, page III-80) within two growing seasons (Forest Plan, page III-13). Embedded within MA 4D is MA 18; which [c]*onsists of the aquatic ecosystem, riparian ecosystem, and closely associated plant and animal communities* and is [a]*ctively managed to protect and enhance, where possible, the distinctive resource values and characteristics dependent on or associated with these systems* (Forest Plan, page III-179).

There are no Inventoried Roadless Areas, Wilderness Study Areas, North Carolina State proposed Natural Heritage Areas, or Forest Plan designated large or medium old growth communities located within the Shope Creek Project AA. There is Forest Plan initial inventory old growth communities in the AA and portions of stands 23-12 and 23-13 would harvest some; however 23-12 is predominantly white pine and the harvest prescription would allow for regeneration of oak/poplar. The project area is bounded by the Asheville watershed to the east, the Blue Ridge Parkway to the north, and private lands to the west and south.

1.4 Public Involvement

A letter was mailed to residents along the Shope Creek Road (State Road 2426) and a legal notice was placed in *The Asheville Citizen-Times* (AC-T) on March 29, 2007, announcing a roads analysis for the Shope Creek area and requesting input on access management. On April 2, 2007, the Responsible Official and Shope Creek Team Leader met with adjacent landowner Mr. Jerry Payne to discuss access to NFS lands and his and other landowner concerns with re-establishing the gate and road closure once again on NFS lands.

A scoping package explaining the Shope Creek Proposed Action was mailed to over 270 members of the public on April 19, 2007. This scoping package included a very detailed description and map of the proposal, describing the location, types, and amounts of proposed harvest, road work, invasive species control, and the other items described above in Section 1.2. A legal notice was placed in the AC-T on April 21, 2007, that initiated a 30-day Notice and Comment period pursuant to 36 Code of Federal Regulations (CFR) 215.3 and 215.6. An open house meeting was hosted by USDA Forest Service employees on April 26, 2007, at the Riceville Community Center to provide information and receive comments from members of the public. The Responsible Official and the ID Team were available to answer questions and insure the public had a clear understanding of the proposed action and could provide meaningful input during the comment period.

Following the closure of the comment period, the Responsible Official and the ID Team reviewed the comments received; issues and alternatives were developed and approved based on the comments. A letter with the Agency's response to comments was mailed in June 2007 to the individuals who provided mailing and e-mail addresses. In this letter, the Responsible Official invited the public to contact the District with any additional comments or clarifications on the issues and agency's response. Only one further response from the public was received; the responder noted he appreciated the efforts put forth in listening to the public's concerns, but he still disagreed with the agency on a larger, more philosophical basis. The proposal was listed in the Schedule of Proposed Actions in July and October 2007.

Using comments received from the public, agencies, and organizations as well as internal review the interdisciplinary team (IDT) developed a list of issues to address, alternatives to analyze, and developed a new preferred alternative that responds to these issues.

1.5 Issues

Issues are defined as a point of discussion, debate, or dispute about environmental effects. Issues are used to develop alternatives, mitigation measures, or analyze environmental effects. The Forest Service separated issues into two groups: significant and other. All comments received during scoping and the 30-day notice and comment period have been reviewed and a determination on significance was made.

1.5.1 Water Quality and Aquatic Resources

Reconstructing roads and harvest-related activities and may impact threatened, endangered, sensitive, Forest Concern, and Management Indicator aquatic species. There may be impacts to water quality at the ford on Shope Creek from personal vehicles once the gate is moved.

- Non-significant because Forest Plan standards and best management practices (BMPs) would be implemented to reduce potential for adverse impacts and site-specific field verification. There would be effects to aquatic species but they are expected to be local and minor in nature and are not expected to affect population viability.

1.5.2 Wildlife Resource

Harvest related activities may impact threatened, endangered, sensitive, Forest Concern, and Management Indicator wildlife species

- Non-significant due to site-specific field surveys and condition verification. There would be effects to wildlife resources but they are expected to be local and are not expected to result in any viability concerns for populations.

1.5.3 Botanical Resource

Harvest related activities may have adverse impacts to threatened, endangered, sensitive, Forest Concern, and Management Indicator botanical species

- Non-significant due to site-specific field surveys and condition verification. While effects to botanical resources may occur, they are expected to be localized and minor and are not expected to result in any viability concerns for populations.

1.5.4 Non-native Invasive Plants

Management activities may increase infestation of invasive exotic plants

- Non-significant due to project design features. Based on previously completed projects of similar nature across the Pisgah National Forest, the design (which includes treatments of non-native plants) of the Shope Creek proposal should minimize the potential for increasing invasive exotic infestations. Furthermore, the proposed action specifically states that known existing populations would be treated prior to any entry from this action.

1.5.5 Herbicide Use

Herbicide use may impact wildlife, aquatic, botanical resources and humans

- Non-significant – herbicides would be used under approved methods and in accordance with risk assessments and the vegetation management plan to reduce potential for adverse impacts to human health and safety, and the environment. Per Forest Plan direction, an alternative that does not use any herbicides was considered (see below).

1.5.6 Soil Resource

Harvest related activities may impact soils

- Non-significant due to project design, which includes full compliance with and implementation of Forest Plan standards and guidelines and BMPs approved by the state as the best means of protecting soil and water quality.

1.5.7 Cultural Resources

Harvest related activities may impact cultural sites

- Non-significant due to site-specific field surveys and condition verification and project design (proposal is designed to avoid identified sites).

1.5.8 Scenic Resources

Harvest related activities may impact scenic resources

- Non-significant due to adherence to Forest plan scenery standards and project design features for stands near scenic areas of concern. While there may be some minor short-term effects, the design is to meet visual quality objectives for the area. The no-action alternative would provide the basis for comparing how much of a change in the visual quality would result from the alternatives.

1.5.9 Non-timber Related Economics

Harvest related activities may impact non-timber related markets

- This issue is beyond the scope of this project and is best addressed at the Forest Plan level (see Appendix E).

1.5.10 Old Growth

Harvest activities may adversely affect old growth resources

- Non-significant – the proposal would designated old growth to meet Forest Plan standards and does not harvest stands averaging greater than 70 years in age.

1.5.11 Other Issues of Concern

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

- Non-significant – project does not propose actions within park lands, prime farmlands, wetlands (as per 1977 Executive Orders 11988 and 11990), wild and scenic rivers, or ecologically critical areas. It also would not violate local law or requirements imposed for the protection of the environment.

CHAPTER 2 – ALTERNATIVES

2.1 Range of Alternatives

The range of alternatives developed and analyzed by the interdisciplinary team (IDT) was driven by the purpose and need underlying the proposal (Chapter 1, Section 1.3), and by the issues responding to the proposal. An alternative should (1) reasonably respond to the purpose and need, and (2) address one or more significant issue. The only exception is the No Action Alternative, which is required by regulation [40 CFR 1502.14(d)].

The IDT considered eight alternatives. Following internal review, three alternatives were considered in detail and five were eliminated from consideration.

2.2 Alternatives Considered in Detail

2.2.1 Alternative A – No Action

Under this alternative the actions the proposed actions (Chapter 1, Section 1.3) would not occur. This alternative serves as the environmental baseline for analysis of effects.

2.2.2 Alternative B – Proposed Action

A complete description of the Proposed Action can be found in Chapter 1, Section 1.3 above.

2.2.3 Alternative C – Southern Appalachian Biodiversity Project/Community Alternative

This alternative was developed by members of the public in response to the notice and comment period and submitted by Southern Appalachian Biodiversity Project (SABP) representatives. The Responsible Official met with SABP to insure a clear understanding of the specific actions proposed—the description below includes the clarifications agreed to at that meeting. Alternative C proposes to:

- Remove introduced white pines from stands 23-12(A) and 23-12(B); harvest of the white pine would comply with all Forest Plan direction. White pine removal in these stands would not require the construction of new roads—minor reconstruction on existing system roads would be needed. Harvesting would include developing about 1-2 acres total of log landings and skid trails within harvest units – existing landings and skid trails would be used where available. Skid trails and log landings would be constructed using North Carolina Forest Practices Guidelines (FPGs) and Forest Plan standards (best management practices or BMPs). Following harvest activities, unsurfaced skid trails and log landings would be disced and seeded with an appropriate seed mix to reduce potential for sedimentation and compaction.
- Minimize the disturbance impacts from road maintenance, including soil compaction, erosion, and sedimentation.
- Restore the maintained roads to native vegetation (defined as standard Forest Service native grass seed mix) after completion of the project.
- Maintain cleared sites in stands 23-12(A) and 23-12(B) as wildlife openings, which provide early-successional habitat (ESH), by mowing or brush-hogging the area every two or three

years. Leave a 10-20 foot strip of brushy interface to be maintained every five to seven years. "Cleared sites" specifically refer to areas within the white pine stands where no overstory remains following removal of white pine trees. The expectation is that when the white pine are removed, there would be small "openings" (½ acres or less) created within the stand that could be maintained with mowing to provide the continued early successional habitat. The "brushy interface" is the areas immediately adjacent to and around the "cleared sites."

- Create a designated trail system, using existing woods roads and unclassified roads that are not required for white pine removal. [**Note**: After further review with the Inter Disciplinary Team, the Responsible Official decided to drop this portion of Alternative C and not include it in the analysis and decision for the alternative because designating a multi-use trail system in the project area is outside the scope of the proposal and developing new recreation facilities in the area was not a recommendation identified in the recent Appalachian Ranger District's recreation realignment action plan. A future analysis and decision would need to be completed prior to designation of such a trail system].
- Move the gate from its current location across the spillway to allow for public access for three to five cars. With this movement however, a bridge would be constructed to protect water quality and to allow for access to parking without driving through the stream.
- Designate remaining areas in Compartments 23 and 24 as old-growth forest in order to maintain and maximize biodiversity by creating multi-structured or multi-canopied habitat.
- There are a number of invasive non-native plant species creating various levels of impact in the Project area, including *Spiraea japonica, Rosa multiflora,* and *Vinca minor*. An inventory would be taken to determine if control efforts are needed on species besides those listed above.
- Treat invasive species through manual or herbicidal control. Manual control includes hand pulling or clipping and removing the entire plant. Herbicide application can be done using backpack sprayers.
- Control of non-native invasive plants would follow well-established Integrated Pest Management (IPM) procedures. IPM is defined as a sustainable approach to managing pests by combining biological, cultural, physical and chemical tools in a way that minimizes economic, health and environmental risks. Prior to pine removal activities, areas identified for control would be treated manually wherever practical and to the best extent possible. Only where manual control cannot be practically accomplished, would chemical treatments be used. Based on species type, population density and stem size, a determination would be made regarding treatment application (i.e., cut and paint, basal bark, backpack sprayer). Appropriate nozzle type and adjustment of output (mist/stream spray) would be carefully determined according to site and wind conditions. All label procedures and restrictions would be adhered to as required by law. Forest Service biologists would supervise all chemical treatments as necessary to insure that any threatened, endangered, sensitive, or other rare species are identified and protected during the treatment of invasives.
- Forest Service staff certified in pesticide/herbicide use by the state of North Carolina would be present to administer and supervise any chemical treatments. Chemical spray application would be conducted at times when treatment is most effective and impacts to non-target species are least damaging. Where evergreen invasive species are intermingled with native species, treatment would be conducted in winter during native plant dormancy.

- Heavy equipment, equipment trailers and equipment tires used in pine removal or road improvement activities would be pressure washed prior to entering the Shope Creek project area. This procedure would minimize risk of introducing to the site project-caused invasions of *Microstegium viminium*. The Forest Service would follow the standard timber sale contract clause that is included in all timber sale contracts regarding washing of vehicles to prevent spread of invasives.
- In areas where non-native invasive species that form dominant cover are removed, native species would be planted to re-cover newly exposed areas and complement remnant native plant recovery. The intent of this requirement is to insure that treated areas are seeded (where necessary) to prevent erosion of the soil and to reduce the potential for invasives to reestablish. Getting treated areas established with native vegetation should reduce the potential of invasives re-establishing.
- The Forest Service would monitor all treatment areas annually for a minimum of three years. Retreatment would be given to remaining or newly sprouting non-native invasive species following each monitoring visit. Treatment would immediately follow these visits and treatment methods and application rates, if needed, would be determined during the time of these visits.
- The Forest Service would work with local organizations and the public to help perform initial and follow-up manual treatments when implementing the IPM program. Efforts would be made to involve faculty/student participation from University of North Carolina-Asheville and Warren Wilson College in long-term monitoring of treatment areas.
- Procedures and methods outlined above would be analyzed for effectiveness following treatment and monitoring so that successive activities can be better adapted to accomplish the goal of non-native invasive species control in the project area.

2.3 Alternatives Considered but Eliminated from Detailed Study

As per 40 CFR 1502.14(a), the following alternatives were considered but eliminated from detailed study:

2.3.1 Alternative 1 – Prescribe Burn within White Pine Stands

This alternative proposed to prescribe burn within the white pine stands (23-12(A) and 23-12(B)]. It was eliminated from detailed study because prescribed burning the white pine stands (<20 acres) would be very difficult to implement due in part to the limited amount of National Forests System (NFS) lands and the difficulty in controlling prescribed fire within the project area given the Blue Ridge Parkway, private lands, and the Asheville watershed bordering NFS lands. To effectively control the fire, dozer lines would need to be constructed, but not within the riparian area. The benefit of the burn is uncertain as it would reduce needle litter, but would not likely improve soft mast or other herbaceous habitat due to the remaining overstory. The cost of the action would be high due to the limited acreage burned and the amount of control measures required.

2.3.2 Alternative 2 – No Herbicides

This alternative proposed to manage/control non-native invasive plants and competing vegetation without herbicides. It was considered because the Pisgah/Nantahala Forest Plan describes a management requirement for considering an alternative that does not use herbicides (Forest Plan, page I-3). This alternative was evaluated and discussed by the Responsible Official and the ID

Team. Instead of using herbicide to conduct timber stand improvement (TSI), only mechanical slashing and/or manual treatment (e.g., hand-pulling) would be used to accomplish the TSI work and treatment of non-native invasives. However, this alternative was not considered in further detail because treatment with herbicide is known to be the most effective tool for these TSI and non-native invasive treatments and only requires one application. Mechanical slashing and manual methods, on the other hand, require repeated treatments and do not kill the targeted vegetation; this method of treatment is very expensive and has proven to be ineffective in controlling non-native invasives. For these reasons, this alternative would not be considered in further detail. Use of herbicides is necessary to effectively and efficiently control/manage non-native plants and competing vegetation (TSI or timber stand improvement). Use would be pursuant to product labels, MSDSs, and pesticide risk assessments. Effects of herbicide use would be disclosed in the EA.

2.3.3 Alternative 3 – Do Not Harvest Stands 100+ Years

This alternative would propose to harvest no stands averaging more than 100 years in age. It was eliminated from detailed study because no stands averaging greater than 100 years in age are proposed for harvesting in any of the other alternatives, including the proposed action. The average stand age of those proposed for harvesting is about 80 years. There would be individual trees greater than 100 years of age harvested in the action alternatives, but stand averages are based on the average age of all the trees in the stand and not the oldest tree in the stand. Alternatives B and C which are analyzed in detail meet this concern; therefore, the Responsible Official decided to drop this proposed alternative from further analysis.

2.3.4 Alternative 4 – Do Not Harvest Hardwood Stands Using Two-age Treatments

This alternative proposed to harvest no hardwood stands using two-age harvest treatments. It was eliminated from detailed study because Alternatives A and C which are analyzed in detail meet this concern.

2.3.5 Alternative 5 – Develop Additional Early Successional Habitat

This alternative proposed to develop more early successional habitat than the proposed action. The ID Team considered adding more two-aged regeneration units and road daylighting harvests. However, developing additional treatment units at this time and as part of this proposal would be impractical given the area's visual sensitivity and the Forest Plan requirements for spacing of units. Due to the visual sensitivity of the area from the Blue Ridge Parkway as well as the Forest Plan standard of maintaining a minimum of 660-feet between two-age treatment units, accomplishing additional early successional habitat would require delaying the project for several more months. This delay would be necessary to completely redesign the proposal in order to meet visual quality objectives and comply with Forest Plan direction; the result could possibly add up to 4% more early successional habitat in the Shope Creek area. However, the lengthy delay in the project does not warrant the minor gains early successional habitat that would be realized; therefore, the Responsible Official decided to drop this alternative from further analysis.

2.4 Project Design Features and Monitoring Common to Action Alternatives

2.4.1 Project Design Features

The action alternatives share these project design features, which would become mandatory if the responsible official selects an action alternative for implementation (see also Sections 3.7.4 and 3.7.5, Chapter 3; Appendix A; and Appendix F).

1. Marking guidelines would emphasize the priority residual tree species of: white oak, red oak, hickory, black oak, and chestnut oak, where they occur. In addition, two 12" or greater diameter Black Gum species would be left as residual within every 10 acres, where this species occurs.
2. Within Stand 23-12, retain existing white oak and hickory trees while removing white pine. It is understood that this action may result in a higher residual basal area in some locations and a lower residual area in other locations, however the average residual basal area (rba) would be at least 15-20 ft^2 per acre.
3. Directionally fell trees to reduce potential for them to fall across stream channels. Where trees accidentally fall across stream channels (that prevent or block stream flow), they would removed (pulled). These removals would be perpendicular to the stream channel whenever possible to minimize stream bank disturbance. Bare soil would be seeded and mulched if native vegetation does not start to recolonize the area by the time timber removal from the unit is complete.
4. Skid trails developed for this proposal would avoid stream crossings and paralleling perennial channels within designated riparian areas.
5. Landings and skid trails developed for this proposal would be vegetated as soon as possible after use to avoid off-site soil movement.
6. Silt fences, straw bales, or brush barriers would be placed along the length of non-system roads used for project implementation where they parallel or cross a perennial or intermittent stream as needed to control runoff and stream sedimentation.
7. To reduce the possible effect of invasive exotic plant species to this proposal, herbicides such as Glyphosphate would be used.
8. Standard Forest Service native seed mixes and plants would be utilized in wildlife improvement and roadside erosion control.
9. Approximately 3 acres in stand 24-11 (as designated by the botanist) would be excluded from planned harvest activities to protect the rock complex, populations of regionally sensitive botanical species, and Forest Concern botanical species.
10. Block access up/down stream of concrete ford on Shope Creek with boulders and/or logs to limit potential for vehicles to drive up/down stream. Place fences or other natural material barriers along the stream side of Forest Service Road (FSR) 220 and around the newly developed parking area to protect resources. Place gravel up to the new gate and place signs informing the public National Forest System (NFS) lands are closed to motorized vehicles.
11. Working with the Forest Lands Specialist, place a sign on Shope Creek Road explaining to forest visitors that access is via rights-of-way agreements across private property and forest users should respect the private properties.

The following project design features are specific to Alternative B to reduce impacts to scenic resources:

1. The eastern half of Stand 23-13 should retain at least 25 ft^2 rba/ac; from the dividing ridge to the eastern unit boundary.
2. The southern half of Stand 23-12(A) and all of Stand 23-12(B) should retain at least 15 ft^2 rba/ac.
3. Ensure the uncut strip between Stand 23-12(A) and the system road remains intact; as indicated on project maps.

The following project design features are specific to Alternative C to reduce impacts to scenic resources:

1. The southern half of Stand 23-12(A) and all of Stand 23-12(B) should retain at least 15 ft^2 rba/ac.
2. Ensure the uncut strip between Stand 23-12(A) and the system road remains intact; as indicated on project maps.

2.4.2 Monitoring

The following monitoring is specific to Alternative B:

1. Areas would be established to monitor control efforts as part of our efforts to meet national objectives of reducing impacts from invasive species and improving the effectiveness of treating selected invasive species on the Nation's forests and grasslands. Survey areas would be established before control treatment, checked during treatment, and within nine months after treatment. A post-treatment evaluation report would be completed and filed in the project file.
2. A Forest Service Fisheries Biologist would work with UNCA Entomology Professor Tim Forrest to design and implement a program to seasonally monitor aquatic invertebrates above and below the two low-water concrete stream crossings. This monitoring would add to our knowledge of low-water crossing effects on the Forest.

Alternative C would employ specific monitoring listed in Section 2.2.3 above.

2.5 Summary Comparison of Actions by Alternative

The following table summarizes management activities within each of the alternatives analyzed in detail:

Table 2-1: Comparison of Management Activities by Alternative

Activity	Alternative		
	A	B	C
Two-age harvest (acres)	0	51	0
Sanitation harvest (acres)	0	17	17
Maintain sanitation harvested stands as early-successional habitat with brushy interface (Y/N)	No	No	Yes
Site prepare and subsequent release, if needed (acres)	0	68	0
Timber stand improvement (acres)	0	68	0
Control/manage non-native invasive plants along system roads (Y/N)	No	Yes	Yes
Reconstruct existing system roads (miles)	0	1	0.5
Improve two miles of existing non-system roads accessed. Following harvesting, the two miles would be disked, seeded, and closed. They would then be placed on the Forest's transportation system along with the remaining two miles of non-system road	0	4	0

Activity	Alternative		
	A	B	C
that are not accessed with this proposal (total miles placed on the transportation system)			
Decommission existing non-system road segments D & G (Y/N)	No	Yes	No[1]
Designate old growth communities (acres)	0	123	1,208
Implement stream restoration along lower section of Shope Creek (Y/N)	No	Yes	No
Disc and seed skid trails and log landings developed (Y/N)	No	Yes	Yes
Plant apples and advanced oak seedlings (Y/N)	No	Yes	No
Re-install gate on NFS lands and develop parking area (Y/N)	No	Yes	Yes
Remove existing low water crossing and replace with bridge (Y/N)	No	No	Yes

1 Alternative does not add roads to the transportation system and would restore maintained roads to native vegetation

CHAPTER 3 – ENVIRONMENTAL CONSEQUENCES

The following table displays past, present, and reasonably foreseeable future actions within and near the Shope Creek AA that would be accounted for in cumulative effects as appropriate by resource analysis (parameters for actions were determined by resource specialists for each activity):

Table 3-1: Past, Present, and Reasonably Foreseeable Future Actions within the Shope Creek AA

Activity	Description
Timber Harvesting (past/ foreseeable)	No timber harvesting in more than 20 years (none proposed for at least 10 years after this project should it move forward)
Road Maintenance (past/ present/ foreseeable)	General maintenance as needed (blading, ditch clearing, culvert cleaning)
Private Lands (past/present/ foreseeable)	Increased development over the past 20+ years
	Small trout farm located near NFS lands and Shope Creek
Special Uses (present/ foreseeable)	Environmental education & insect collection (annual)
Recreation (present/ foreseeable)	Hiking/hunting throughout the AA
Habitat Improvement (past/ present/foreseeable)	Mowing existing wildlife fields and linear openings (every few years)

3.1 Hydrology and Aquatic Habitat

3.1.1 Existing Condition

Existing data for aquatic resources within the aquatic AA is used to the extent it is relevant to the project proposal. This data exists in two forms: 1) general inventory and monitoring of Forest aquatic resources; and 2) 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 as a historical reference. Project-specific surveys are conducted to obtain reliable data where none exists. Additional analysis on aquatic habitat is disclosed in Appendix A, [Biological Evaluation (BE)]; Section 3.8 [Management Indicator Species (MIS)], and; Section 3.9 [Threatened, Endangered, Sensitive (TES), and Forest Concern (FC) Species] of this document.

Substrate, (or the material that occupies the bottom of the stream) within the activity area waters (Table 3-2) was evaluated and visually estimated. The three primary types of substrate that exist were documented at each macroinvertebrate sample site. This information is valuable for determining the amount of habitat available for threatened, endangered, and sensitive (TES) species, management indicator species (MIS), as well as other aquatic organisms.

Table 3-2 – Forest Plan Watershed 39 (North Fork Swannanoa)

Stream Name	Compartment/ Stand	Miles in Project Areas	Miles in AA
Shope Creek	23-12,24-01	0.49	4.36
Un-named Tributary (UT) 4	23-11	0.34	0.80
UT Shope Creek	24-10, 24-11	0.57	0.91
UT 1			0.19

Stream Name	Compartment/ Stand	Miles in Project Areas	Miles in AA
UT 2	24-10	0.15	0.11
UT 3	24-10	0.15	0.23
Wolf Branch	23-13	0.19	1.17
Total		**1.89**	**7.77**

In the Shope Creek Analysis area, landforms can be characterized as Valley Types I and II using the Rosgen (1996) classification. Typical for these valley types, the Shope Creek drainage has predominantly stable stream types characterized as "A" and "B", depending on the valley type that they occur. These stream types are stable with a low sediment supply due to abundant stream side vegetation and gravel to boulder sized substrate.

Fish habitat exists within the project and analysis areas of Shope Creek. The unnamed tributaries to Shope Creek and Wolf Branch generally have restricted flow regimes, or limited amount of water and therefore habitat, which provide habitat for aquatic macroinvertebrates only (i.e., no fish inhabit these stretches). The most downstream reaches of Wolf Branch and the unnamed tributaries to Shope Creek may be utilized for redds and nurseries during spawning because many times fish move upstream into smaller more protected areas to spawn. The rest of the activity area waters provide habitat for macroinvertebrates.

Existing non-system roads and skid trails in the activity area and the two fords in Shope Creek are impacting the streams and drainages within the Shope Creek AA. Impacts from these roads and skid trails are limited to down slope movement of sediment from road runoff and culvert fills. The majority of sediments from these sources are deposited in the natural vegetative filters before they reach areas of perennial streams. The two fords located in Shope Creek are currently stable and have little to no off site movement of soil entering into the stream. However, the fords are limiting the movement of aquatic organisms within the drainage.

An existing non-system, woods road that accesses Stand 24-10 has drainage structures needing repair or replacement to eliminate off site movement of soil occurring into unnamed tributaries to Shope Creek. There are seven crossings (3 of which are in perennial stream channels) that are either undersized or non-existent.

3.1.2 Effects Analysis

The basic premise of this analysis is that all Forest Service timber sale contract clauses, North Carolina best management practices (BMPs), 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 reduce impacts to aquatic resources.

Effects are disclosed below for 1) access on aquatic resources; 2) timber harvest on aquatic resources, water quality, and riparian areas; 3) herbicide use; and 4) stream enhancement in Shope Creek.

3.1.2.1 Effects of Access on Aquatic Resources

Alternative A – No Action

Implementation of the no action alternative would perpetuate the existing condition described above. Aquatic habitat quality, 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 impacts upon the one sensitive (S) species or the six Forest Concern (FC) species. If the no action alternative is implemented, off site movement of soil would continue to cause degradation in UTs 1,2, and 3 to Shope Creek because of the inadequate stream crossing associated with that access road (for Stand 24-10).

Alternative B

Direct Effects: This alternative would repair the road accessing Stand 24-10 to prevent further off-site movement of soil into UT Shope Creek. In order to repair the existing condition of the road, this alternative proposes to place seven culverts; three in existing stream crossings (perennial, or flows year around) and four in ephemeral or drainage channels. Currently, these crossings are causing sediment to enter into UTs to Shope Creek. During the culvert installations, there would likely be a temporary fluctuation of turbidity within UTs to Shope Creek. This turbidity would be minimized by the implementation of Forest Plan standards (best management practices or BMPs) and North Carolina State Forest Practice Guidelines (FPGs). As a result, no measurable direct adverse impacts to aquatic habitat or organisms are expected to occur from the improvement of access into the area. Following harvest activities all skid trails and log landings would be disced and seeded.

Indirect Effects: Temporary stream crossings should be used across ephemeral channels to avoid the potential for sedimentation of aquatic resources down slope. These crossings could include the use of temporary bridges (e.g. simple log stringers or pre-fabricated decking), culverts, or channel armor (e.g. stone or brush). There may be off-site movement of soil into activity area waters from temporary crossings and drainage culvert placements. The sedimentation effects of installing the temporary crossings and culvert replacements would occur during the installation phases and would be negligible and short-term (a few hours). Use of erosion control measures described in Section 2.4.1 would ensure potential erosion and sedimentation would be negligible. These measures include use of silt fence, straw bales, or brush barriers to control runoff and stream sedimentation.

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 temporarily be covered with sediments. This loss of individuals would be so minimal within the entire analysis area that it would not cause the decline of population trends and would not be a cause for viability to change on National Forests. The project design for the Shope Project minimizes sedimentation therefore; less mobile species that are affected by the implementation of this project would recolonize. Episodic fluctuations in turbidity may occur after soil disturbance ends because sediments deposited within the stream bed may be re-suspended during high flow events (Swank *et al*. 2001). Larger, more mobile aquatic species, such as fish are able to temporarily escape the effects of sedimentation by leaving the disturbed area. Over time, these species would recolonize areas as habitat conditions improve. This usually occurs after vegetation has reestablished and sediments are flushed through the system by storm events.

Alternative B would allow access by the public through a concrete ford on Shope Creek. The use of this ford is not expected to change the water quality of Shope Creek. While the crossing has been closed off to the general public for about 10 years, there have been vehicles crossing the creek at this ford during this closure. Although vehicles are passing through the ford (about 5

per month) aquatic fauna can still be found above and below the crossing. Fish data is all that exists for Shope Creek prior to 2007 which dates back to 1991. It does indicate that blacknose dace were previously found above the ford, however they are now only found below the ford. This could be a result of the drought currently affecting Western North Carolina and the Southeast. It is not expected that the absence of blacknose dace above the ford has any correlation with the use of the ford.

The ford is an improved concrete crossing with stabilized road surfaces on both approaches, thereby minimizing sediments entering the stream. The landforms and slopes adjacent to the ford are gentle in grade and somewhat stable. The approaches would be improved further eliminating the risk of sedimentation prior to implementation of either action alternative. Most sediment effects from the road surface are controlled through maintenance of the graveled surface. The second ford would be used during the project activities and would remain closed by a gate post-harvest; preventing vehicular access.

While research on the effects of low-water crossings is limited, the ID Team reviewed the San Dimas Technology and Development Center's *Low-Water Crossings: Geomorphic, Biological, and Engineering Design Considerations* (062 1808-SDTDC, October 2006). This study included a concrete-slab ford that handled an average of 75 vehicles per day in a popular hunting and recreation area (Case Study #8). While water, oil, grease, and other chemical pollutants could wash off a vehicle, limited studies have shown that improved crossings such as the one in Shope Creek show no significant traces of hydrocarbons and other potentially harmful by-products of vehicles, even where 75 vehicles per day cross the creek.

Any effects from the public's use of the low-water stream crossing nearest the gate would not impact the privately owned fish hatchery. This is because that hatchery is located upstream of this crossing.

A Forest Service Fisheries Biologist would work with UNCA Entomology Professor Tim Forrest to design and implement a program to seasonally monitor aquatic invertebrates above and below the two low-water concrete stream crossings. This monitoring would add to our knowledge of low-water crossing effects on the Forest.

Alternative C

The current erosion on non-system road segment C would be addressed under this Alternative by pulling existing culverts, stabilizing slopes, constructing broad based dips and waterbars where appropriate to frequently drain water from the segment's prism, and seeding all disturbed surfaces with native grasses. These activities would correct the erosion concerns of this segment.

Alternative C would not require the re-disturbance of about one mile of road in the Shope Creek area. By not reopening the road bed to disturbance, the risk of sedimentation entering into the aquatic AA waters would be the same as the No-Action alternative for this part of the area. Although FPGs and BMPs would be implemented for Alternative B, the risk of failure of an FPG or BMP still exists. With the implementation of Alternative C this risk is reduced.

Alternative C proposes to replace the first ford on Shope Creek at the entrance to the project area with a bridge. The replacement of the ford would address the aquatic passage issue that exists at this location in Shope Creek. The low-water crossing (ford) located further up Shope Creek would remain in place and used during the project. Following completion of the project, the area's roads would be closed by gate, thereby preventing vehicles from traveling through this

higher ford. The potential for sediments and vehicle emissions and/or leaks to affect the stream and associated aquatic resources would be limited at the upper ford location in duration to the period of time when the harvest and hauling activities are occurring. Based on historic use of a similar nature and the current status of the aquatic resources as well as the short duration of use, potential effects should be minimal.

During aquatic activity area surveys, species composition changes were evident where the lower ford exists (nearest current gate location). Downstream of the ford there were three species present, blacknose dace, rainbow trout and sculpin. Above the ford there are only two species, rainbow trout and sculpin. This could be a result of the drought currently affecting Western North Carolina and the Southeast. It is not expected that the absence of blacknose dace above the ford has any correlation with the use of the ford.

With Alternative C, the concrete would be removed from the first ford crossing and a bridge would be constructed. The bridge would basically protect the stream from potential effects (sediments and vehicle pollutants) from entering the stream by keeping the vehicles that access the area out of the stream itself. The potential for vehicle by-products to enter into Shope Creek would be reduced with Alternative C over Alternative B. By the placement of a bridge at the crossings, vehicles would not come into direct contact with the water in Shope Creek. Therefore, the potential for hydrocarbons and other chemicals from vehicles to come in contact with the water would be eliminated. Please see discussion above in Alternative B on the risks associated with the ford.

However, there would be a temporary fluctuation in sediments and turbidity during the removal of the concrete ford and installation of a bridge. Heavy equipment would be necessary to remove the concrete which could cause the sediments that have accumulated over the years behind the ford to move downstream. Bridge installation would also require heavy equipment to prepare the road alignment on either side of the creek and installing the bridge abutments on each side. The sediments that have built up behind the fords over the years would move downstream but eventually stabilize with larger storm events.

Under Alternative C, there would be fewer impacts to aquatic resources than Alternative B from access because approximately one mile of road would not be reconstructed. Although BMPs and FPGs generally protect streams from impacts during road reconstruction, the risk of failure still exists. If BMPs or FPGs fail, there could be sedimentation and turbidity to occur.

3.1.2.2 Effects of Timber Harvest on Aquatic Resources, Water Quality, and Riparian Areas

Alternative A – No Action

The existing condition of aquatic resources has been described above. Natural fluctuations in population stability, and habitat quality and quantity would continue.

Alternatives B & C

Although there is a 51-acre difference in the amount of acres proposed for harvest in Alternative B as compared to Alternative C, the stream or riparian buffers have been developed to protect streams within the analysis area from impacts of harvesting with both action alternatives. Visible sediment from logging activities would be against Forest Practice Guidelines and out of compliance with state regulations. Stream buffers have been set to prevent visible sediment from reaching any of the aquatic analysis area streams. The Forest Service uses even more stringent guidelines than state BMPs by using Forest Plan Standards and Guidelines. Alternative B could

increase the amount of overland flow once the trees are extracted from the Forest however, stream buffers would absorb increased surface flow and prevent sediments from reaching stream channels. Therefore, Alternatives B and C would be discussed together for potential impacts from harvesting activities.

Direct & Indirect Effects: North Carolina guidelines (FPGs) and Forest Plan standards (BMPs) would be implemented during harvest activities. 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 would be implemented as specified by state regulations. According to the NC Forestry BMP Implementation survey 2000 thru 2003: *Implementation of BMPs is critical in protecting water quality*. Monitoring of the English White Pine Project (on the Pisgah National Forest) BMP structures occurred during a two inch rain event in the summer of 2007. Straw bales, mulching and seeding had been installed two weeks prior to the event. The stream adjacent to the activity area was flowing clear and void of sediment from the associated activities. Both Shope Creek action alternatives would employ the same measures; therefore, sediments should not impact the area's streams.

Other than in the white pine stands (23-12A & 23-12B), there is no plan to harvest within any 100 foot riparian area of perennial streams within the Shope Project area. According to the Land and Resources Management Plan (LRMP) Vol. 1: *Under these conditions, no increase in water temperature is anticipated under any of the alternatives. Since riparian-area treatment is not expected under any alternatives, availability of woody debris would be positively influenced if there was no harvest anywhere within the riparian zone on each streambank* (Vol. 1, page IV-36). All of the culvert installations, the fords and the temporary bridge for this project are associated with existing roads and therefore would not cause any disturbance to the existing riparian vegetation.

The removal of white pine in Stands 23-12A & 23-12B up to 30 linear feet of Shope Creek would promote the growth and recruitment of hardwood species and would be done pursuant to Forest Plan standards and direction (Forest Plan, page III-181). Hardwood leaf litter is more beneficial to aquatic organisms, including fish, because the leaf litter provides more nutrients into the aquatic ecosystem (Benfield and Webster, 1985). According Patricia Fleebe, USDA Forest Service Aquatic Research Scientist, [p]*ine needles are slow to break down and are of poor quality for decomposers, so they don't really benefit fish. Ideal is to have a mix of species that provide food sources throughout the year* (personal communication, 2007).

Water quality should not be affected as long as Forest Plan standards and NC-FPGs are followed and timber sale contract clauses are implemented. Stream temperatures would not be affected because adequate shade would be maintained along perennial and intermittent streams. In the past, the implementation of the NC-FPGs have protected streams during similar past actions. Long-term adverse impacts from these similar past actions have not been apparent. When failure of any BMP or NC-FPG has occurred it has been corrected immediately.

3.1.2.3 Effects of Herbicide Use

Alternative A – No Action

Exotic invasive plants would likely continue to invade riparian vegetation without the treatment of these species within the Shope Creek area.

Alternative B & C

Direct & Indirect Effects: In accordance with the Vegetation Management Final Environmental Impact Statement (VM FEIS), herbicide spraying would not occur within 30 horizontal feet of water unless the herbicide has been approved for aquatic applications. The herbicide Triclopyr (ester formulation) has the potential to cause direct mortality to aquatic organisms at a concentration of 0.74 parts per million (ppm). The amine formulation of Triclopyr can be lethal at concentrations of 91 ppm (VM FEIS). Concentrations of Glyphosate at 24 ppm can be lethal to some aquatic organisms (VM FEIS). Sublethal effects, such as lethargy or hypersensitivity, have been observed in fish at concentrations of 0.1 mg/L – 0.43 mg/L. No adverse effects have been observed in fish or aquatic invertebrates from exposure to imazapic concentrations up to 100 mg/L. Field applications of herbicides where stream buffers have been maintained have resulted in concentrations of these herbicides in streams below the lethal concentration – generally concentrations ≤ 0.0072 ppm in the adjacent streams (Durkin, 2003a; Durkin, 2003b; and Durkin and Follansbee, 2004). Furthermore, these herbicides degrade into nontoxic compounds in approximately 65 days (VM FEIS). The 30 foot buffers would prevent the Estimated Environmental Concentrations of Glyphosate or Triclopyr from reaching the LC_{50} (Lethal Concentration at which 50% of the organisms suffer mortality) for any aquatic species (VM FEIS) because the herbicides would not enter the streams in any measurable quantity. Concentrations of these herbicides in adjacent waters where the waters were buffered (33 feet) resulted in concentrations of ≤0.0072 ppm. These concentrations are too low to produce the lethal or sub lethal effects described above. Activity area streams would be protected by a 30 foot buffer (minimum) which would prevent the concentrations of these herbicides from accumulating within the activity area streams in measurable quantities. There would be no effects to coldwater streams community because the amount of herbicides in activity area waters would be immeasurable.

3.1.2.4 Effects of Stream Enhancement Project

Alternative A – No Action & Alternative C

Under these alternatives, pool habitat enhancement would not occur. White pine would continue to be the dominant overstory. Over time, large woody debris would contribute to habitat when the white pine declined because of age or disease.

Alternative B

Direct & Indirect Effects: Alternative B involves the placement of logs into the stream channel of Shope Creek. The trees will be anchored in place to ensure they do not move downstream. A similar action on the Davidson River in Transylvania County effectively weathered the 2004 Tropical Storms. Where available, priority for these trees would be hemlock, pine, and trees damaged or susceptible to windfall. During project implementation, there could be some existing sediments within the channel would be redistributed in the water column causing some short-term turbidity. The duration of this turbidity would be only as long as it took to get the stream structure in place (approximately one hour). The short-term turbidity would not have any

long term impacts to aquatic resources. The log structures would create habitat for aquatic organisms by creating pools, providing cover for fish and directing stream flow away from stream banks where it is causing erosion, and back into the middle of the channel.

The removal of white pine in Stands 23-12 and 24-01 up to 30 linear feet of Shope Creek would promote the growth and recruitment of hardwood species. Hardwood leaf litter is more beneficial to aquatic organisms, including fish, because the leaf litter provides more nutrients into the aquatic ecosystem (Webster and Benfield, 1986). According Patricia Fleebe, USFS Aquatic Research Scientist, "pine needles are slow to break down and are of poor quality for decomposers, so they don't really benefit fish. Ideal is to have a mix of species that provide food sources throughout the year" (personal communication, 2007).

3.1.2.5 Cumulative Effects

Alternatives A, B & C

Expected cumulative effects should not be any greater than the direct and indirect effects disclosed above for each alternative and there should be no adverse cumulative effects to AA aquatic resources, based on the project's design features included in this analysis.

Remnants of the past timber activities where access was associated with the projects are in many cases on-going contributors to adverse impacts to aquatic resources. In general, undersized culverts and degraded stream crossings cause constant sources of problems for aquatic resources including unstable stream banks and channelization. Within the AA for Shope, solutions to these problems have been addressed. There are places within riparian areas of this project area that have historically been harvested. However, as these areas continue to grow older, conditions should improve as large woody debris input into analysis area streams returns to a more natural state.

Activities on adjacent private lands, downstream of National Forest System (NFS) lands, have the potential to affect aquatic habitat within the Shope Creek watershed. These include residential development along the Shope Creek State Road which includes agriculture. Many sections of Shope Creek have little to no vegetation on the streambanks causing off site movement of soil and degraded habitat availability for aquatic organisms. An existing trout farm is also a source of sediments and nutrients into the Shope Creek system. The proposed action alternatives are not expected to cause long term impacts to the aquatic resources within the area, therefore the Shope Project would not further degrade water quality.

3.2 Wildlife Habitat

The wildlife effects were evaluated over the Shope Creek Forest Plan AA, a total of 1,736 acres, which includes compartments 22, 23, and 24. Additional wildlife analyses on aquatic are located in Appendix A, [Biological Evaluation (BE)]; Section 3.8 [Management Indicator Species (MIS)], and; Section 3.9 [Threatened, Endangered, Sensitive (TES), and Forest Concern (FC) Species] of this document. The following tables outline existing forest habitat and the potential change to habitat.

Table 3-3: Existing Forest Types within the Shope Creek AA

Species/Forest Type	Acres (CISC)	% of AA
White Pine	20 ac	1%

Species/Forest Type	Acres (CISC)	% of AA
Hemlock – Hardwood	16 ac	1%
White Oak – Red Oak -Hickory	[1/]93 ac	5%
Red Oak	[1/]226 ac	13%
Poplar – White Oak – Red Oak	[2/]987 ac	57%
Chestnut Oak – Scarlet Oak	[1/]394 ac	23%
Total	**1,736 ac**	**100 %**

[1/]High level hard mast = 629 acres
[2/]Medium level hard mast = 987 acres
[3/]Cove forest type

Table 3-4: Age Class Representation and Proposed Change by Alternative

Age Class – Habitat Vegetation Component	Acres (CISC)	Percentage of AA
0-10 age – Early Successional	0 ac	0%
11-20 age – Early Successional	0 ac	0%
21-50 age – Mid Successional	151 ac	9%
51-100 age – Mature Forest	1,306 ac	75%
101- 140 age – Old Forest	279 ac	16%
Grass/forb habitat	1.7 ac	0.1 %
[1/]Open road - mi/mi^2	1.24 mi/mi^2	

[1/] Portion of Blue Ridge Parkway with AA, no open Forest Service roads – includes state and private roads

3.2.1 Effects Analysis

3.2.1.1 Alternative A – Direct, Indirect, and Cumulative Effects on Wildlife Habitat

Under this alternative, the early successional habitat (ESH; 0-10 years) would remain at 0 acres and the grass/forb openings would also remain at <1 percent. The Forest Plan standard for early successional habitat is not to exceed 10% in Management Area (MA) 4D (Forest Plan, page III-31). The Forest Plan standard for grass/forb openings is 0.5% in MA 4 (Forest Plan, pages III-23). Under this alternative habitat connectivity would be maintained. There would be no adverse cumulative effects with this alternative when combined with other activities listed in Table 3-1 above.

3.2.1.2 Alternatives B & C – Direct, Indirect, and Cumulative Effects on Wildlife Habitat

The following tables disclose the forest types and age class distribution by action alternative (refer to Section 3.8 below for further discussion of effects to wildlife habitat):

Table 3-5: Forest Type Proposed Effects by Action Alternative

Species/Forest Type	Acres (CISC)	% of AA	Alt B	Alt C
White Pine	20 ac	1.2%	17 ac	17 ac
Hemlock – Hardwood	16 ac	1%	-	-
White Oak – Red Oak -Hickory	93 ac	5.8%	-	-
Red Oak	226 ac	14%	-	-
Poplar – White Oak – Red Oak	987 ac	53%	36 ac	-
Chestnut Oak – Scarlet Oak	394 ac	25%	12 ac	-
Total	**1,736 ac**	**100 %**	**[1]65 ac**	**17 ac**

1 – 65 acres versus 68 acres (Table 1-1 above) displays a 3 acre reduction in 24-11 for botanical reasons

Table 3-6: Age Class Representation and Proposed Changes by Alternative

Age Class – Habitat Vegetation Component	Acres (CISC)	Percentage of AA	Alt B	Alt C
0-10 age – Early Successional	0 ac	0%	+65 ac/+4%	+6 ac/+1%
11-20 age – Early Successional	0 ac	0%	-	-
21-50 age – Mid Successional	151 ac	9%	-	-
51-100 age – Mature Forest	1,306 ac	75%	-65 ac/-4%	-17 ac/-1%
101- 140 age – Old Forest	279 ac	16%	-	-
Grass/forb habitat (high quality)[1]	1.7 ac	0.1 %	+4.4 ac/+0.3%	+1.7 ac/+0.1%
Grass/forb habitat (low quality)[2]	0 ac	0%	-	+6.8 ac/+0.4%

1 – high quality grass/forb habitat due to seeding
2 – low quality habitat grass/forb habitat due to no seeding – estimated that about 40% of the 17 acres would be low quality grass/forb

Creation of ESH and Soft Mast Production

Alternative B creates about 65 acres of ESH, which equates to about 4% of the total Management Area (MA) 4D acreage. Alternative C creates about 17 acres of ESH, which equates to about 1% of the total MA 4D acreage. Alternative B provides about 48 additional acres of ESH habitat than Alternative C.

Creation of Grass/Forb Habitat

Alternative B creates over 4 acres of grass/forb habitat, which equates to about 0.3% of the AA. This habitat would be considered high quality due to an appropriate seed mix. Alternative C creates almost 7 acres of permanent grass/forb, which equates to about 0.4% of the AA. This habitat would be considered low quality due to no seed mix being applied and natural grass/forb sporadically covering the open forest floor.

Hard Mast Production

The creation of ESH has the effect of setting back the age of the stands treated. Alternatives B and C regenerate mature forest – Alternative B regenerates about 48 additional acres over Alternative C. Each action alternative harvests and regenerates acres of mature forest. In the case of hard mast producing forest communities – those with abundant oaks and hickories – hard mast production would be reduced until the young, regenerating trees again reach mast producing age. Hard mast production in the AA would be temporarily reduced on about 48 acres in Alternative B; however, the reduction would be minimized because project design features prioritize retention of available hard mast producing species (Section 2.4.1, Chapter 2). Hard mast production in the AA would effectively be unchanged under Alternative C because the 17 acres of harvesting are within white pine stands and

Large Woody Debris

There would be a short term increase in down wood on acres harvested: Alternative B- 65 acres and Alternative C – 17 acres.

3.2.1.3 US Fish and Wildlife Service Species of Concern

The US Fish & Wildlife Service (USFWS) has listed bird species of conservation concern within this region. The Wood thrush was recorded within activity areas 24-11, 23-13 and 23-11 which are all considered preferred, cove forest type for this species.

The USFWS did not list the wood thrush and worm-eating warbler as priority species for conservation due to high populations recorded within the region. Partners-in-Flight listed these species to be considered for dropping from the concern list and not of local conservation interest.

The wood thrush is found in moist cove forests where deciduous shrubs and saplings occur. This AA exhibits 1,003 acres of this preferred forest type for the thrush (poplar-white oak-red oak and hemlock-hardwood). In addition there are 105 acres of riparian habitat which may not always be defined as a cove forest type. Alternative B proposes to harvest 38 acres of cove forest type or 3.7% of this preferred forest type across the AA. The reduction of 38 acres is not considered significant as the National Forests of North Carolina has recorded a slight increase in this species (La Sorte et al 2006) and the 38-acre reduction represents a small percentage (3.8%) of total habitat across this AA. Alternative C does not propose to harvest any of this habitat type, therefore Alternatives A and C would have no impact to this species habitat across the AA.

Recent research (Vitz 2006) found wood thrush utilized the interior of clearcuts from 10-22 acres in size during post-breeding. This research tested several widely held theories regarding the mature forest or forest interior bird guilds that resulted in their conclusion that a mosaic of successional stages holds the greatest promise for this bird guild.

The worm-eating warbler was recorded within Stand 24-10. The worm-eating warbler is often found in steep areas with a thick rhododendron and laurel shrub layer. The canopy trees they favor are oak, hickory, white pine, and hemlock according to The Audubon Society. These forest types are represented across 1,342 acres of this AA. However, rhododendron is not common within the activity areas and is often only seen within the riparian areas of this AA. Alternative B would harvest 55 acres or 4 % of the warbler's habitat. Alternative C would harvest 17 acres or 1.2 % of the warbler's habitat. The stream restoration project would not affect the habitat for the warbler as the approximately 10 trees to be cut would be scattered over a 100 foot length of the Shope Creek riparian area. As no further riparian areas would be impacted by any alternative, there would be minimal impacts to the worm-eating warbler habitat under Alternatives B or C.

3.3 Non-native Invasive Plants

3.3.1 Existing Condition

The botanical AA is the total area within 2 kilometers of any proposed unit (activity area) or known EO (Element Occurrence) of any plant T&E, S, and FC species. This results in the botanical AA consisting of 5,478 acres. Because the size of an area included in effects analysis is specific to the specific resource being considered, other disciplines may employ different from this botanical AA. Potential direct and indirect effects to botanical species were analyzed in the areas where timber harvest or ground disturbance is proposed—this area is referred to as the activity area and is smaller in size than the analysis area.

The persistence and spread 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: 1) non-native plant species may persist by the introduction of an "invasive non-native species" to the ecosystem or 2) by modifying 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, 25 are currently recognized as having

aggressive invasive qualities that can dominate local communities (Danley and Kauffman, Regional Foresters, May 2001, List of Invasive Exotic Plant Species). The proliferation of these species can have devastating and long lasting effects on natural communities and native species. Kudzu, *Pueraria montana*, is a familiar example of this sort of non-native persistent species.

Eleven species on the Regional Forester's non-native invasive plant species are known within the analysis area (see following table). The invasive plants *Microstegium vinineum*, *Lonicera japonica,* and *Allium vineale* (Wild Garlic) are well established such that complete control would be difficult with current tools (manual, mechanical, and chemical treatments). While both alternatives would pre-treat these populations and monitor and follow-up with treatments, full control would take many years. The populations of *Lespedeza cuneata*, *Lolium arundinaceum,* and *Coronilla varia* are not expected to be invasive within natural communities.

Table 3-7: Non-native Invasive Plant Species Summary

Species	Regional Category*	Location in Project Area
Lespedeza cuneata Sericea	1	All roadsides throughout AA and wildlife fields
Paulownia tomentosa Princess tree	1	Infection limited to area near Wolf Branch and Shope creek
Lolium arundinaceum Tall fescue	1	Old roads, Wildlife fields
Lonicera japonica Japanese honeysuckle	1	Alluvial Forest along Shope Creek, woods roads, through out AA
Microstegium vinineum Japanese stilt grass	1	Mostly in Alluvial Forests and coves. Very well established
Celastrus orbiculatus bittersweet	1	Mostly in Alluvial Forests and Rich Coves. Very well established in AA.
Spiraea japonica japanese spiraea	1	Along existing roads and woods roads, through out AA
Rosa multiflora Multi floral rose	1	Along existing roads and woods roads, through out AA
Miscanthus sinensis Plume grass	2	Along existing roads and woods roads, through out AA
Allium vineale Field garlic	1	Scattered small populations near old roads
Coronilla varia Crown vetch	2	Found only along system roads

* Regional categories have specific legal ramifications as per Regional Forester memo dated May, 2001

3.3.2 Alternative A – Direct, Indirect, and Cumulative Effects

Existing conditions and trends continue. Under this alternative no actions are proposed. There would be no potential increase in non-native invasive plant species as a result of ground disturbing actions. However, there would also be no control measures implemented to reduce the continued spread of these species. It is expected that non-native invasive plant species would

continue to increase. There are no other known foreseeable actions in the activity areas that could affect spread or control/management of non-native invasive plants.

3.3.3 Alternatives B & C – Direct, Indirect, and Cumulative Effects

Both alternatives propose to control/manage non-native invasive species on about six acres using both manual and chemical applications (see also Section 1.2, Chapter 1; Section 2.2.3, Chapter 2; and Appendix F for more specific implementation details). Both alternatives also propose to monitor treatment effectiveness to determine if follow-up treatments are necessary.

It is expected that there would be a temporary increase of ruderal (weedy) species of plants under both alternatives. However, Alternative B would result in about 68 acres and Alternative C would result in about 17 acres of disturbed area for the increase in ruderal species. These species are often prevalent during the initial stages of succession. This is particularly true near constructed roads and log landings. Because Alternative B would use more roads (about 2 miles in B to about ½ mile in C) and have more landings than Alternative C (Alternative B harvests 6 units and about 68 acres compared to 2 units and about 17 acres in Alternative C), the amount of area exposed to these species is higher for Alternative B. A high percentage of these ruderal species are non-native. A temporary increase of non-native plant species in the proposed activity area is expected. Many of these species 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 or spread to other areas. Furthermore, both action alternatives include requirements for monitoring and treatment of non-native species as needed to control non-native invasives.

Non-native invasive plants persist in the area 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 increase the persistence of non-native vegetation in the analysis area. Because it disturbs more acres, Alternative B would have more potential increase than Alternative C; however pre-treatment of existing non-native invasive species along with monitoring and follow-up treatment are expected to keep the actual adverse increases and effects of these plants under control. To further help reduce this effect, native plants should 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 at accomplishing these goals. However, Presidential Executive Order 13112, Title 3 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. 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.

Oriental bittersweet (*Celastrus orbiculatas*) is prevalent within the AA. Bittersweet is an aggressive non-native invasive vine often invading open or disturbed areas. Natural tree fall canopy gaps can be invaded. Once invaded, bittersweet can persist in shade, growing up trees and killing them by girdling the bark. In older infections, mature trees can be killed. Within the AA, bittersweet is very common and well established along old roads, the alluvial forest along Shope Creek, Rich Cove Forests and other natural openings. It is particularly abundant in Stands 24-01 and 23-12 along unclassified roads and wildlife fields. At present, bittersweet is making a

large impact on native species and natural communities within the AA. It is expected that this trend of bittersweet growth would continue with or without planned activities. Opening the forest canopy by construction of wildlife fields, road reconstruction, and timber removal may provide new habitat for bittersweet and exacerbate this trend.

The proposed control of bittersweet may have a delaying effect upon the growth of this vine within those stands that are treated long enough so that trees canopies may be re-established. Once the tree canopy is established, bittersweet has more difficultly spreading within the stand. There are no other known foreseeable actions in the activity areas that can be cumulatively added to the proposal to adversely affect resources in the AA due to non-native invasive species.

3.4 Herbicides

3.4.1 Alternative A – Direct, Indirect, and Cumulative Effects

Under this alternative, there would be no adverse direct, indirect, or cumulative effects to wildlife, water quality, and humans as related to herbicide use as none would be applied. The existing condition would remain the same; invasive and invasive exotic plant species would likely continue to spread in the AA. Herbicide use within the landscaping shrub/tree business would continue in the AA. There are no other known foreseeable actions in the activity areas that could affect resources in the AA due to herbicide use.

3.4.2 Alternatives B & C – Direct, Indirect, and Cumulative Effects

The following table displays expected maximum acreages of herbicide treatment (Glyphosate and Triclopyr) that may occur – additional treatments within these acres may be necessary as site specific monitoring determines:

Table 3-8: Maximum Acres of Pesticides Applied Manually by Alternative[1]

Herbicide	Alternative A	Alternative B	Alternative C[2]
Triclopyr/Glyphosate (ac)[3]	0 ac	<75 ac	<23 ac

1 – Not all acreage is treated, i.e. buffers along streams and "non-target" species would not be treated. Herbicides are applied manually and would not be applied aerially (see also Appendix F). Herbicides are primarily applied to stems during release and to foliage on non-native invasives.

2 – Alternative C would also employ specific Integrated Pest Management (IPM) techniques as well as other techniques as disclosed in Section 2.2.3, Chapter 2 – Alternative B would employ IPM too.

3 – Acres include treatment for site preparation and non-native invasive species

Use of herbicides is not expected to have measurable adverse effects on wildlife, water quality, and humans due to proper application as per Material Safety Data Sheets (MSDSs); product labels; risk assessments; fact sheets; mitigation measures contained in the *Vegetation Management in the Appalachian Mountains* (VMAM) Final Environmental Impact Statement (FEIS), issued in July 1989; design features disclosed in Appendix F; and standards and guidelines from the Forest Plan including *Requirements For Vegetation Management In The Appalachian Mountains* listed in Appendix I of the Forest Plan (pages I-10 – I-14). Any herbicides applied would be done according to the labeling information, at the lowest rate effective at meeting project objectives in accordance with guidelines for protecting the environment, and manually (not aerially). Risks of adverse effects are further reduced by requiring the applicator to be trained in safety precautions, proper use, and handling of herbicides. Other factors reducing risk are the low level of active ingredient per acre and placement of notice signs in areas where herbicides have been applied. The signs include

information on the herbicide used, when it was applied, and who to contact for additional information.

Herbicide with the active ingredients Glyphosate and Triclopyr are not considered soil active (mobile). In addition, with the provision of riparian buffer strips on stream zones, the risk of herbicide spills or movement into stream zones is further reduced. Due to project design, effects of the treatment would be limited to individual trees/plants that are treated and the immediate area near them and is not expected to adversely affect private residences downstream. All applicable mitigation measures contained in the VMAM FEIS and Forest Plan standards and guidelines would be followed. A complete discussion of the effects of herbicides is contained in this FEIS, to which this analysis tiers to. Current pesticide information for Glyphosate and Triclopyr may be found at: http://www.fs.fed.us/foresthealth/pesticide/risk.shtml.

Impacts of herbicide use to wildlife, water quality, and humans are expected to be low due to proper handling and application. The use of herbicides would have no measurable impact on water quality because according to the VMAM FEIS: *No herbicide is aerially applied within 200 horizontal feet, nor ground-applied within 30 horizontal feet, of lakes, wetlands, or perennial or intermittent springs and streams. No herbicide is applied within 100 horizontal feet of any public or domestic water source. Selective treatments (which require added site-specific analysis and use of aquatic-labeled herbicides) may occur within these buffers only to prevent significant environmental damage such as noxious weed infestations. Buffers are clearly marked before treatment so applicators can easily see and avoid them* (VMAM FEIS, page II-67). There would be no adverse effects (direct, indirect, or cumulative) of the usage of herbicides associated with the action alternatives if no spills occur within riparian areas—no herbicide would be applied within at least 30 feet of riparian areas. According to the VMAM FEIS: *The greatest hazards to surface and ground water quality arise from a possible accident or mishandling of concentrates during transportation, storage, mixing, and loading, equipment cleaning, and container disposal phases of the herbicide use cycle*. Herbicides would be mixed at the pesticide storage building at the Appalachian Ranger District Work Center and not in the field, and applicators do not carry concentrated amounts of herbicide in the field. There are no other known foreseeable applications of herbicides on NFS lands in the Shope Creek area that could affect herbicide use with this proposal—the last measurable herbicide use on NFS lands in the Shope Creek area was over 20 years ago in Compartments 23 and 24. The Forest Service is unaware of any large-scale quantities of herbicide being applied on adjacent non-NFS lands within the watershed that could cause adverse cumulative effects. Individual home owners are expected to use herbicides on their properties; however, determining measurable amounts, formulations, locations, frequency, and timing of their use would be speculative. Additional project design features are listed in Appendix F below.

There are no other actions occurring on NFS lands that could cumulatively be added to the Shope Creek proposal to cause adverse cumulative effects. There is likely herbicide use on private lands downstream of the Shope Creek project area, but the actions on NFS lands are not expected to cumulatively be added to those uses because of the design of the project (Section 1.2, Chapter 1; Section 2.2.3, Chapter 2; project design features listed in Appendix F; and implementation of BMPs & Forest Plan standards).

3.5 Soil Resources

The following is an analysis of the soils that would be impacted by harvest-related activities in the activity areas. The following table lists the soil map units found by stand number:

Table 3-9: Primary Soil Map Units by Stand and Access Route by Alternative

Primary Soil Map Unit Name (w/ Slope Range)[1]	Stands[2]/Access Routes[3]	Alternative A (acres)	Alternative B (acres)	Alternative C (acres)
Ashe-Cleveland (E&F)	23-11, 23-13, 24-11, 24-10 / Route I, Route J	0	12	2
Toecane-Tusquitee (C,D&E)	23-11, 23-13, 24-11, 23-12(A), 24-12(B) / Route A, Route B, Route C, Route D, Route E, Route F, Route G, Route H, Route I, Route J	0	49	16
Edneyville-Chestnut (E&F)	24-11, 24-10 / Route B, Route C, Route I, Route J	0	8	0
Tusquitee-Whiteside (C)	23-12(A) / Route F	0	3	0
Porters-Unaka (B&C)	Route B	0	<1	0
Total Acres[4]		**0**	**72**	**18**

1 – Average slope percent ranges are for soil map units from NRCS data and are not necessarily the average slope within the stand (A = 0% - 2%, B = 2% - 8%, C = 8% - 15%, D = 15% - 30%, E = 30% - 50%, and F = 50% - 95%)
2 – Portions of soil map units make up each stand – includes developing landings and skid trails to facilitate harvesting
3 – Includes decommissioning and/or disking & seeding
4 – Acres include stands harvested (including skid trails & landings) and timber hauling routes

The following table displays characteristics of each soil map unit:

Table 3-10: Comparison of Soil Map Units[1]

Soil Map Unit Name	Characteristics
Ashe	The Ashe series consists of moderately deep, somewhat excessively drained soils on gently sloping to very steep ridges and side slopes of the Blue Ridge (MLRA 130). They formed in residuum that is affected by soil creep in the upper part, and weathered from felsic or mafic igneous and high-grade metamorphic rocks such as granite, hornblende gneiss, granodiorite, biotite gneiss, and high-grade metagraywacke. Somewhat excessively drained; moderately rapid permeability; medium internal drainage. Runoff class is low on gentle slopes, medium on strong or moderately steep slopes, and high on steeper slopes. Runoff is much lower where forest litter has little or no disturbance.
Chestnut	The Chestnut series consists of moderately deep, well drained soils on gently sloping to very steep ridges and side slopes of the Blue Ridge (MLRA 130). They formed in residuum that is affected by soil creep in the upper part, and weathered from felsic or mafic igneous or high-grade metamorphic rocks such as granite, hornblende gneiss, granodiorite, biotite gneiss, and high-grade metagraywacke. Well drained; moderately rapid permeability. Runoff class is low on gentle slopes, medium on strong or moderately steep slopes, and high on steeper slopes. Runoff is much lower where forest cover is intact. Most of the soil is in forest. Common trees are scarlet oak, chestnut oak, white oak, black oak, hickory, eastern white pine, Virginia pine, and pitch pine. Yellow poplar and northern red oak are common in the northern portions of MLRA 130. The understory species are dominantly rhododendron, mountain laurel, flowering dogwood, sourwood, chestnut sprouts, and buffalo nut.
Cleveland	The Cleveland series consists of shallow, somewhat excessively drained, moderately rapidly permeable soils affected by soil creep. They formed in residuum weathered from felsic or mafic

Soil Map Unit Name	Characteristics
	igneous and high-grade metamorphic rocks such as granite, hornblende gneiss, granodiorite, biotite gneiss, and high-grade metagraywacke. Somewhat excessively drained; moderately rapid permeability. Runoff class is very high. Runoff is much lower where forest litter has little or no disturbance.
Edneyville	The Edneyville series consists of very deep, well drained soils on gently sloping to very steep ridges and side slopes of the Blue Ridge (MLRA 130). They formed in residuum that is affected by soil creep in the upper part, and is weathered from felsic or mafic igneous or high-grade metamorphic rocks such as granite, hornblende gneiss, granodiorite, biotite gneiss, and high-grade metagraywacke. Well drained, permeability is moderate in the subsoil and moderately rapid in the underlying material. Runoff class is low on gentle slopes, medium on strong or moderately steep slopes, and high on steeper slopes. Runoff is much lower where forest litter has little or no disturbance. Forested to oak, hickory, and pine. Understory of native grasses, wild grape, rhododendron, mountain laurel, and dogwood.
Porters	The Porters series consists of deep, well drained, moderately permeable soils on ridges and side slopes in the Southern Appalachian Mountains. These soils formed in residuum, affected by soil creep in the upper part, that has weathered from felsic to mafic, high-grade metamorphic and igneous rocks such as granite, gneiss, hornblende gneiss, mica gneiss, schist, and amphibolite. Well drained, moderate permeability. Runoff class is medium on strongly sloping or moderately steep slopes, and high on steeper slopes. Runoff is much lower where forest litter has little or no disturbance.
Toecane	The Toecane series consists of very deep, well drained soils with moderately rapid permeability. They formed in colluvium derived from materials weathered primarily from felsic high-grade metamorphic and igneous rocks such as metagraywacke, gneiss, schist, and granite. They are along drainage ways, on benches and fans, and in coves in the Blue Ridge (MLRA 130). Well drained. Permeability is moderately rapid in the upper part and rapid in the lower part. Surface runoff is very low on gentle slopes where the forest litter has not been disturbed and medium or high on very steep slopes where litter has been removed. The seasonal high water table is greater than 6 feet throughout most of the year. These soils receive surface and subsurface water from surrounding uplands and seeps and springs are common.
Tusquitee	The Tusquitee series consists of very deep, well drained soils on gently sloping to very steep benches, foot slopes, toe slopes, and fans in coves in the Southern Appalachian Mountains. These soils formed in colluvium derived from materials weathered from igneous and metamorphic crystalline rocks such as granite, mica gneiss, hornblende gneiss, and schist. Well drained; moderate permeability in the subsoil and moderately rapid permeability in the underlying material. Runoff class is low on gentle slopes, medium on strong or moderately steep slopes, and high on steeper slopes. Runoff is lower where forest litter has not been disturbed or had only partial disturbance.
Unaka	The Unaka series consists of moderately deep, well drained, loamy soils formed in residuum from granite and gneiss. They are mainly at high mountain elevations. Well drained; moderate permeability. Runoff class is medium on strongly sloping or moderately steep slopes, and high on steeper slopes. Runoff is much lower where forest litter has little or no disturbance.
Whiteside	The Whiteside series consists of very deep, moderately well drained, moderately permeable soils on colluvial toe slopes, benches, and fans in coves in the Southern Appalachian Mountains. These soils formed in colluvium and alluvium derived from materials weathered from felsic to mafic crystalline rocks such as granite, mica gneiss, and hornblende gneiss. Moderately well drained; slow runoff; moderate permeability.

1 – Information taken from USDA Natural Resource Conservation Service (NRCS) website

3.5.1 Alternative A – Direct, Indirect, and Cumulative Effects

There would be no adverse effects (compaction) to soils with this alternative because no activities are proposed. However, erosion would still continue in specific places within the AA.

3.5.2 Alternative B – Direct, Indirect, and Cumulative Effects

3.5.2.1 Direct and Indirect Effects

Any adverse effects to soils with Alternative B are expected to be negligible and short-term (one or two seasons) because the majority of soil types where harvesting is proposed (81%) are moderately to very deep and well drained (reducing potential for compaction); would not be taken out of production through permanent road construction; and would have project design features (Section 2.4, Chapter 2); and FPGs and Forest Plan standards (BMPs) applied to further reduce potential for compaction and long-term damage. The remaining 19% of the harvesting is proposed on soil map series that are shallow but somewhat excessively well drained. There may be some minor, short-term erosion with the improvement of about two miles of existing non-system (old woods) roads. However, the effects are expected to be short-term (a season or two) and limited in their extent when applied to the total area of operation—all non-system roads accessed for harvest-related activities would be disced and seeded following harvest activities. Harvesting under this alternative would be with ground based logging equipment (skidders or caterpillars) on about 6% of the AA. Harvest-related activities include developing log landings and skid trails – existing log landings and skid trails would be used where available. Forest Plan direction states: *Expose the minimum amount of soil practicable at any given time during project implementation* (Forest Plan, page III-42). Skid trails and log landings are necessary to meet this direction because they limit the amount of ground disturbed in a harvest stand by concentrating equipment to specific routes/areas instead of throughout the entire stand – about 3-5 acres total within the 68 acres harvested are expected to be used as skid trails and log landings. Long-term compaction and erosion of soils where skid trails and log landings would be developed is not expected because following harvest activities they would be disced and seeded with an appropriate seed mix.

3.5.2.2 Cumulative Effects

When added to the effects from past, ongoing, and reasonably foreseeable future actions listed in Table 3-1 above, Alternative B is not expected to cause adverse cumulative effects to soils. This is because the past actions occurred such a long time ago that effects are no longer occurring; the past, ongoing, or future actions were designed to meet Forest Plan standards (BMPs) reducing potential for adverse effects, or the actions do not have any potential to adversely affect soils (i.e., insect collection and hiking). In addition, onsite reviews and evaluations have not identified large-scale or severe adverse effects to soil resources in the AA—specific areas that have experienced small-scale erosion due to past management are proposed to be addressed with this proposal or have been addressed under separate storm-related recovery projects. There are no other known projects in the AA that could cause adverse cumulative effects on soil resources when combined with potential effects of the Shope Creek proposal.

3.5.3 Alternative C – Direct, Indirect, and Cumulative Effects

3.5.3.1 Direct and Indirect Effects

Effects to soils under Alternative C would be less than Alternative B because Alternative C proposes 51 less acres of harvesting and about two less miles of non-system road use. Any effects to soils with Alternative C would be negligible because all of the soil types where harvesting is proposed are very deep and well drained (reducing potential for compaction); would not be taken out of production through permanent road construction; and would have project design features (Section 2.4, Chapter 2); and FPGs and BMPs applied to further reduce

potential for compaction and long-term damage. There may be some minor, short-term erosion with the improvement of 0.2 miles of existing non-system road. However, the effects are expected to be short-term (one season or less) and limited in their extent when applied to the total area of operation—all non-system roads would be disced and seeded following harvest activities. Harvesting under this alternative would be with ground based logging equipment (skidders or caterpillars) on about 1% of the Shope Creek Project AA. Harvest-related activities include developing log landings and skid trails – existing log landings and skid trails would be used where available. Forest Plan direction states: *Expose the minimum amount of soil practicable at any given time during project implementation* (Forest Plan, page III-42). Skid trails and log landings are necessary to meet this direction because they limit the amount of ground disturbed in a harvest stand by concentrating equipment to specific routes/areas instead of throughout the entire stand – about 1-2 acres total within the 17 acres harvested are expected to be used as skid trails and log landings. Long-term compaction and erosion of soils where skid trails and log landings would be developed is not expected because following harvest activities they would be disced and seeded with an appropriate seed mix.

3.5.3.2 Cumulative Effects

The cumulative effects for Alternative C would be less than Alternative B because the direct/indirect effects of Alternative C are less. The effects of the past, ongoing, and reasonably foreseeable actions would be the same as in Alternative B. When the lesser effects of Alternative C are added to these other effects, the overall cumulative effects would be less than B.

3.6 Cultural Resources

3.6.1 Existing Condition

A total of four archeological sites were located and recorded during the survey for the proposed Shope Creek Project. One site is rated as a Class I archaeological site and is eligible for inclusion in the National Register of Historic Places (NRHP) under Criteria D—it would be protected by avoidance during project implementation. Three sites are rated as Class III archaeological sites and are not eligible to the NRHP—they do not require protection from ground disturbing activities.

3.6.2 Effects Analysis – Alternatives A, B, & C

There are no expected adverse direct, indirect, or cumulative effects to NRHP eligible Heritage Resources with these alternatives because the one Class I site would be protected by avoidance during project implementation and the three Class III sites do not require protection from project activities.

3.7 Scenery Resources

3.7.1 Existing Condition

Shope Creek project area is in Buncombe County, north of Riceville and adjacent to the Blue Ridge Parkway (BRP); Asheville watershed Beetree Reservoir is to the east. The Shope Creek valley has a growing residential community. Many new homes are being constructed on side

slopes and ridges, while the valley floor remains light agricultural and rural residential development. There is no commercial development in the area.

The project area includes no Forest Service developed recreation facilities, though it is bordered on two sides by the BRP. Hundreds of thousands of visitors drive or cycle this section of BRP each year. There are three BRP overlooks in the vicinity, but only one of them offers views of the project area.

No Forest Service system trails exist in the area, though gated Forest Service roads are used by hunters, fishermen, horseback riders, mountain bikers, and hikers. Currently, there is poor access to the area, and no public parking along Shope Creek road.

Scenery in the project area consists of typical mountain landscapes, with dense mixed hardwood and evergreen forests, steep mountain slopes, and narrow creek valleys. The area would be classified as "common" in the Southern Appalachian landscape type; there are no extraordinary geologic features or outstanding scenic qualities. Forest Service lands in the area show evidence of past timber management; while views of private lands include rural residential and farmlands.

3.7.2 Scenery Analysis

All proposed activities lie in Management Area (MA) 4D. In this MA, all proposed activities visible from the BRP must meet Partial Retention (PR) Visual Quality Objective (VQO) and Modification (M) VQO for activities not seen from the BRP. Under PR VQO, treatments must remain visually subordinate to the surrounding natural landscape character. Activities visible from all other areas must meet Modification VQO; which is defined as treatments that may dominate the surrounding landscape, but borrow from naturally occurring form, line, color and texture.

Visibility of proposed activities was assessed using a computer GIS analyzing seen-area on a three-dimensional terrain model, leaf-off field reconnaissance, and 3D terrain modeling.

Viewpoints considered in the analysis include all public travel corridors, water bodies, and use areas in and around the project area. Portions of the project area are visible from the end of Shope Creek road, and the BRP. Visibility from residential areas along Shope Creek road were considered, but views from individual residences were not. Though, some residences at higher elevations may have views into the project area.

The analysis determined that no proposed activity areas are visible from Shope Creek road, or residential areas adjacent to the road. The only viewpoints where activities would be visible are along the BRP, Shope Creek, and its tributaries.

3.7.3 Direct and Indirect Effects of Alternative A (No Action Alternative)

With this alternative, no change in appearance of the existing landscape would occur—all VQOs would be met.

3.7.4 Direct and Indirect Effects of Alternative B

Proposed two-age harvest treatment of stands 23-13, 23-11, 24-11, and 24-10 would have a residual basal area (rba) of 15-20 ft^2 per acre. Two-age harvests do not typically create large openings in the canopy, as seen with clear-cut harvest methods. Immediately after harvest, a two-age treatment would reveal some areas of exposed ground in small openings, trunks of mature residual trees would be more visible, and segments of roads and landings may be seen.

After one or two growing seasons, under-story vegetation would obscure exposed ground, tree crowns would fill-out, and the canopy would begin to close. Seeded roads and landings would also green-up, and be screened by vegetative growth. Where identified by the analysis, increasing residual basal area would further reduce contrast between harvest areas and surrounding forest.

Sanitation harvest in white pine stands 23-12(A) and 23-12(B) would have an appearance similar to two-age treatments, but reducing tree density in an evergreen forest-type is less noticeable than in hardwoods. Residual evergreen trees also offer more vegetative screening of adjacent roads and landings.

Typically, creation of wildlife food plots, invasive species control, and non-commercial silvicultural treatments do not create noticeable changes in the characteristic landscape, and easily meet VQOs. This is true for all wildlife habitat enhancements, and non-commercial treatments proposed in this project.

Road reconstruction, temporary road, and landing construction activities are usually most noticeable because of contrasts between exposed soil color, gravel, and the surrounding vegetation. In middleground views, contrasts in the form of a linear feature crossing the landscape can also be noticeable. Road reconstruction occurs within an existing prism, while temporary roads are constructed to a lower standard, have minimal surfacing gravel, and no permanent bridges or culverts. Both types of roads and landings are seeded after project completion. Scenery objectives are considered when locating roads and landings, and identifying areas needing vegetative screening.

Portions of harvest Stands 23-13, 23-12(A) and 23-12(B) are visible from the BRP. Design features incorporated to meet or exceed assigned VQOs:

- The eastern half of Stand 23-13 should retain at least 25 ft^2 rba/ac; from the dividing ridge to the eastern unit boundary.
- The southern half of Stand 23-12(A) and all of Stand 23-12(B) should retain at least 15 ft^2 rba/ac.
- Ensure the uncut strip between Stand 23-12(A) and the system road remains intact; as indicated on project maps.

These features would allow treatments to meet the assigned PR VQO where seen from the BRP, and M VQO from area streams.

3.7.5 Direct and Indirect Effects of Alternatives C

Sanitation harvest in White Pine stands 23-12(A) and 23-12(B) would have an appearance similar to two-age treatments, but reducing tree density in an evergreen forest-type is less noticeable than in hardwoods. Residual evergreen trees also offer more vegetative screening of adjacent roads and landings.

Typically, creation of wildlife food plots, invasive species control, and non-commercial silvicultural treatments do not create noticeable changes in the characteristic landscape, and easily meet VQOs. This is true for all wildlife habitat enhancements, and non-commercial treatments proposed in this project.

Portions of harvest Stands 23-12(A) and 23-12(B) are visible from the BRP. Design features incorporated to meet or exceed assigned VQOs:

- The southern half of Stand 23-12(A) and all of Stand 23-12(B) should retain at least 15 ft^2 rba/ac.
- Ensure the uncut strip between Stand 23-12(A) and the system road remains intact; as indicated on project maps.

These features would allow treatments to meet the assigned PR VQO where seen from the BRP, and M VQO from area streams.

3.7.6 Cumulative Effects

While traveling the BRP, many existing modifications to the scenic landscape are visible in the form of past timber management; and commercial, agricultural, and residential development. In places, existing and future modifications would be seen in conjunction with Shope Creek project treatments; examples of possible future landscape modifications include additional private or commercial development.

Cumulative scenery impacts of past, currently proposed, and foreseeable future activities have been considered. It has been determined that assigned VQOs would be met with Alternatives A, B and C where effects to scenery associated with Shope Creek project activities would be seen in conjunction with other existing and foreseeable future actions.

3.8 Management Indicator Species

3.8.1 Introduction

An assessment of habitat changes linked to management indicator species (MIS) and habitat components is documented in this section based on the species list that became effective Forest-wide on October 1, 2005. The assessment provides a checkpoint of project level activities, the anticipated change in habitat used by MIS, and the likely contribution to Forest-wide trends. Additional information on MIS, as well as other species, is located in the wildlife, aquatics, and botanical resource reports, project record.

3.8.2 Process

The Forest-wide list of MIS was considered as it relates to the AAs. Only those MIS that occur or have habitat within the AAs and may be affected by any of the alternatives were carried through a site-specific analysis. The documentation below shows which MIS were and were not analyzed along with the reasons.

Consistent with the Forest Plan and its associated FEIS (Volumes I and II), the effects analyses focus on changes to MIS habitat. These project-level effects are then put into context with the Forest-wide trends for populations and habitats.

To process and document the information efficiently, a series of tables are used as follows:

1) **Table 3-11**: This table displays biological communities and associated MIS, and reasons species were, or were not selected for analysis in the project. The source of these tables is Amendment 17 to the Nantahala and Pisgah Land and Resource Management Plan effective October 1, 2005, and the associated environmental assessment (EA) and project record.
2) **Table 3-12**: This table displays the habitat components and associated MIS, and reasons species were, or were not selected for analysis in the project.

3) **Table 3-13**: This table displays by MIS the Forest-wide population trend along with the associated biological community or habitat component. The information in this table is taken from the MIS Report for the Nantahala and Pisgah National Forests.
4) **Table 3-14**: This table compares effects (expressed as changes in habitat) by alternative to the Forest-wide estimates of habitats for each biological community and habitat component considered in the project-level analyses. This table explains how effects to communities and habitats affect Forest-wide population trends for the species considered.

Table 3-11: Biological Communities, Associated MIS, and why Species were Chosen or Eliminated from Analysis

Biological Community	MIS	Analyzed Further/ Evaluation Criteria*
Fir dominated high elevation forests	Fraser fir	No/1
Northern hardwood forests	Ramps	No/1
Carolina hemlock bluff forests	Carolina hemlock	No/1
Rich Cove forests	Ginseng	Yes
Xeric yellow pine forests	Pine warbler	No/1
Reservoirs	Largemouth bass	No/1
Riparian forests	Acadian flycatcher	Yes
Coldwater streams	Wild trout (brook, brown, and rainbow); blacknose dace	No/2
Coolwater streams	Smallmouth bass	No/1
Warmwater streams	Smallmouth bass	No/1

*1 Biological Community and its represented species do not occur within the activity areas; therefore, this biological community would not be affected by any of the alternatives. Given no effects to the community, the alternatives in this project would not cause changes to forest-wide trends or changes in population trends of species associated with this community.

2 Biological Community and its represented species would be protected in accordance with Forest Plan standards and guidelines. Populations would not be affected by management activities because the associated habitat would not be entered by the proposed activities, pursuant to forest plan direction; therefore, there would be no change to forest-wide population trends.

Table 3-12: Habitat Components Associated MIS and why Species were Eliminated from Analysis

Habitat Components	MIS	Analyzed Further/ Evaluation Criteria*
Old Forest Communities (100+ years old)	Black bear	No/1
Early successional (0-10 years old)	Rufous-sided (eastern) towhee	Yes
Early successional (11-20)	Ruffed grouse	Yes
Soft mast producing species	Ruffed grouse	Yes
Hard mast-producing species (>40 yrs)	Black bear	Yes
Large contiguous areas with low levels of human disturbance	Black bear	No/1
Large contiguous areas of mature deciduous forest	Ovenbird	Yes
Permanent grass/forb openings	White-tailed deer	Yes
Downed woody debris	Ruffed Grouse	Yes

Habitat Components	MIS	Analyzed Further/ Evaluation Criteria*
Snags	Pileated woodpecker	Yes

*1 Habitat and its represented species do not occur within the project area; therefore, this special habitat would not be affected by any of the alternatives. Given no effects to the habitat, the alternatives in this project would not cause changes to forest-wide trends or changes in population trends of species associated with this habitat.

2 Habitat and its represented species would be protected in accordance with Forest Plan standards and guidelines. Populations would not be affected by management activities; therefore, there would be no change to forest-wide population trends.

Table 3-13: MIS Estimated Population Trend and Biological Community or Habitat Component

Species	Estimated Population Trend	Biological Community and/or Habitat Component
Rufous-sided towhee	Decreasing	Early successional (0-10 years old)
Ginseng	Decreasing	Rich cove forests
Ovenbird	Slight decrease	Large contiguous areas of mature deciduous forest
Acadian flycatcher	Increasing	Riparian Forests
Ruffed grouse	Static to decreasing	Downed woody debris, soft mast-producing species, and early successional (11-20 years old)
Black bear	Increasing	Hard mast-producing species (>40 years)
Pileated woodpecker	Increasing	Snags
White-tailed deer	Static to decreasing	Permanent grass/forb

Table 3-14: Habitat Component, Forest-wide Estimates, and Expected Changes resulting from the Alternatives

Habitat Component	Forest-wide Estimate	Alt A	Alt B	Alt C
Rich cove forests	109,745 ac	No change	25 acre reduction	No change
Early successional (0-10 years old)	26,800 ac (yr 2000) 2,040 ac (5 yr avg)	No change	65 acre increase	17 acre increase
Early-successional (11-20 years old)	46,290 ac (yr 2000) Peak of upward trend	No change	No change	No change
Soft mast producing species	13,144 ac early seral (yr 2000), highest potential on 5,650 ac	No change	65 acre increase	17 acre increase
Hard mast-producing species (>40 yrs)	High El Red oak: 40,600 ac Mesic Oak/H: 283,340 ac Dry Mesic Oak/H: 21,800 ac Chestnut Oak/H: 8,600 ac Upland hwd (other): 6,900 ac	None affected	48 acre increase	No change
Large contiguous areas of mature deciduous forest	279,000 ac	None affected	48 acre reduction	No change
Permanent grass/forb openings	3,000 ac	No change	2.7 acre increase	6.8 acre increase
Riparian forests	100,000 ac	No change	Removal of up to 10 trees within a 100 foot section of Shope Creek for stream	No change

Habitat Component	Forest-wide Estimate	Alt A	Alt B	Alt C
			restoration activity	
Snags	Ave. at 80 year Cove=4/acre Upland=3/acre Pine=2/acre	No change	No change	No change
Downed woody debris	High accumulation small wood: 18,000; Large wood: 386,000; Low accumulation (approximately 600,000)	No change	48 acre increase	No change

3.9 Threatened, Endangered, Sensitive, and Forest Concern Species

This section discloses the determination of effects the proposal may have on threatened and endangered (T&E); Regional Forester's sensitive (S); and Forest Concern (FC) aquatic, wildlife, and botanical species—see Appendix A, Biological Evaluation (BE) for complete disclosure of surveys, habitat, species, and effects analyses.

There would be no effect to any TES or FC species under Alternative A as no actions are proposed—current conditions would be maintained.

3.9.1 Threatened and Endangered Species

Neither Alternative B nor Alternative C would adversely affect T&E botanical, wildlife, or aquatic species or their habitat as disclosed in the BE. Consultation with the US Fish and Wildlife Service is not required.

3.9.2 Sensitive Species

3.9.2.1 Botanical Species

Trillium rugelii

Conclusion of Impacts: This proposal would have little impact on the total numbers of *Trillium rugelii* individuals throughout the Forest and Botanical AA but may directly impact some individuals. This proposal would have no effect upon the Forest viability of *Trillium rugelii.* This proposal has no known cumulative effects to *Trillium rugelii* as a result of this proposal and past, present and reasonably foreseeable projects.

The known local population (Botanical AA) consists of thousands, (estimated) individuals of *Trillium rugelii*. The population is scattered in the Rich Cove Forest Communities east of Shope Creek. It occurs in harvested and non-harvested stands. It is particularly common in the harvested (1976) stands along the unclassified road to Stand 24-10. *Trillium rugelii* occurs within Stand 24-10, the unclassified road to 24-10, and also within non-activity areas.

Direct Impacts: This proposal would likely directly negatively impact individuals of *Trillium rugelii* by mechanical damage as a result of heavy equipment and logging activities such as skidding logs in Stand 24-10 and the unclassified road to Stand 24-10.

Indirect Impacts: of modifying the habitat may also impact *Trillium rugelii*. Some of the expected indirect effects of timber removal would initially produce an increase in light, temperature, reduced humidity, and decreased soil surface moisture. It is not known if these impacts are negative or positive. However, as plant succession occurs within the harvest units these effects would modify slowly to the original condition. Because of the rather large vigorous populations of Trillium *rugelii* observed within stands harvested less than 40 years ago, the possible negative impacts are thought to be insubstantial to the local viability of the species.

Alternative B would negatively impact individual *Trillium rugelii* plants. However, the local, Shope Creek population is expected to remain viable after the proposed activity is completed because: 1) *Trillium rugelii* is a perennial plant with a bulb that can reproduce after some disturbance. It is very unlikely that all the individuals or a significant portion of the population would be lethally affected by the proposed activity and 2) only a small percent (5%) of the known population of *Trillium rugelii* would be affected by the proposal. Thus it is expected that the local population of *Trillium rugelii* would remain viable. Furthermore, the habitat for *Trillium rugelii* is not expected to be permanently impacted and *Trillium rugelii* is expected to recover in the proposed activity areas.

Coreopsis latifolia

Conclusion of Impacts: This proposal would have little impact on the total numbers of *Coreopsis latifolia* individuals throughout the Forest and Botanical AA but may directly impact some individuals. This proposal would have no effect upon the Forest viability of *Coreopsis latifolia.* This proposal has no known cumulative effects to *Coreopsis latifolia* as a result of this proposal and past, present and reasonably foreseeable projects.

The known local population (Botanical AA) consists of thousands (estimated) of individuals of *Coreopsis latifolia*. The population occupies Rich Cove Forest or Montane Oak-Hickory Communities surrounding Shope Creek where it occurs in previously harvested and non-harvested stands. It is particularly common in the harvested (1963-1982) stands in the north and eastern part of the Botanical AA. *Coreopsis latifolia* occurs within stands 24-10, 23-10, and the unclassified road to stands 24-10 and 23-11. It also occurs within many non-activity areas.

Direct Impacts: This proposal would likely directly negatively impact individuals of *Coreopsis latifolia* by mechanical damage as a result of heavy equipment and logging activities such as skidding logs in stands 24-10 and 23-11, and the unclassified road to them.

Indirect Impacts: Modifying the habitat may also impact *Coreopsis latifolia*. Some of the expected indirect impacts of timber removal would initially produce an increase in light, temperature, reduced humidity, and decreased soil surface moisture. *Coreopsis latifolia* seems to prefer openings so the net result of indirect impacts of tree removal is beneficial. However, as plant succession occurs within the harvest units these effects would modify slowly to the original condition. Because of the large vigorous populations of *Coreopsis latifolia* observed within stands harvested less than 40 years ago, the possible negative impacts are thought to be insubstantial to the local viability of the species.

Alternative B would negatively impact individual *Coreopsis latifolia* plants. However, the local, Shope Creek population is expected to remain viable after the proposed activity is completed because: 1) *Coreopsis latifolia* is a perennial plant with a rhizome that can reproduce after some disturbance. It is very unlikely that all the individuals or a significant portion of the population

would be lethally impacted by the proposed activity and 2) only a small percent (5%) of the known population of *Coreopsis latifolia* would not be impacted by the proposal because it is not within activity areas. Thus it is expected that the local population of *Coreopsis latifolia* would remain viable. Furthermore, the habitat for *Coreopsis latifolia* is not expected to be permanently impacted by this proposal.

Helianthus glaucophyllus

Conclusion of Impact: This proposal would have little impact on the total numbers of *Helianthus glaucophyllus* individuals throughout the Forest and Botanical AA but may directly impact some individuals. This proposal would have no impact upon the Forest viability of *Helianthus glaucophyllus.* This proposal has no known cumulative impacts to *Helianthus glaucophyllus* as a result of this proposal and past, present and reasonably foreseeable projects.

Direct/Indirect Impacts: The maintenance of Forest Service Road 220 needed for implementation of this proposal may directly negatively impact individuals of *Helianthus glaucophyllus*. The impacts to *Helianthus glaucophyllus* would have little impact on the entire population within the botanical AA. The population of *Helianthus glaucophyllus* has greater than one hundred individuals scattered along road 220. The local roadside population of *Helianthus glaucophyllus* receives regular maintenance. *Helianthus glaucophyllus* thrives in open areas. The regular disturbance of road maintenance probably has created the habitat necessary for its existence within the botanical AA. Maintenance of road 220 would impact no more than 10% of this population. A viable population of *Helianthus glaucophyllus* would remain within the analysis area. In conclusion, although this proposal would likely negatively impact individuals of *Helianthus glaucophyllus* it would not impact local or Forest viability. Furthermore, the indirect impact to the habitat of *Helianthus glaucophyllus* is not expected to be permanent—*Helianthus glaucophyllus* is expected to recover in the proposed activity areas.

Possible Impacts to Potential Habitat for TES Plants

This discussion summarizes the possible effect on potential, or "apparently suitable habitat" for all TES plant occurring species within the botanical AA. This analysis is based upon current knowledge of species habitat parameters. Usually, these parameters are very broad habitat concepts. This discussion does not imply species occupancy in those areas. It examines potential suitable habitat based upon a predictive model of general Forest communities and current knowledge of species habitat parameters within the AA. Species occupancy could be none or a very small percentage of these potential habitat acres. For example, *Carex pedunculata* is known to occur from only one small (<2 acres) population on the Forest. Since this population is found within Rich Cove Forest, the potential habitat is all known Rich Cove Forest within the Forest (56,223 acres). The known Forest occupancy for this species is then 3 one thousandths of a percent (0.003%). This example is typical of many TES plant species with broad habitat definitions. As habitat definitions and botanical surveys become more complete, estimation of potential habitat may become more precise. The following table summarizes the results of this analysis within the Shope Creek botanical AA for Alternative B – Alternative C would have reduced potential to adversely impact these species because it proposes 51 less acres of harvesting and only within white pine stands.

Table 3-15 Impacts (Alternative B) Upon Potential Habitat for S Plant Species within Botanical A.A

Species	Natural Community or Habitat	Predicted Potential Acres Existing Condition	Acres of Potential Habitat Impacted, % of Area Total (Alternative B)
Carex biltmoreana	Wet, open areas near granite domes or other rock out crop	95 acres	Not impacted
Coreopsis latifolia	Rich Cove Forest	353 acres	25 acres, 7%
Helianthus glaucophyllus	Open Areas in Rich Cove Forest	353 acres	25 acres, 7%
Packera (Senicio) millifolium	Open areas near granite domes or other rock out crop	95 acres	Not impacted
Rudbeckia triloba var. pinnatiloba	Open areas near mafic rock out crop	95 acres	Not impacted
Saxifraga caroliniana	Wet, open areas near granite domes or other rock out crop	95 acres	Not impacted
Silene ovata	Canopy Gaps in Rich Cove Forest, Montane Oak Hickory or near Rock outcrops	807 acres	60 acres, 5%
Trillium rugelii	Rich Cove Forest	353 acres	25 acres, 7%
Tsuga caroliniana	Dry ridges. Pine-oak Heath	146 acres	Not impacted

Potential Habitat Cumulative Impacts

The cumulative impact to potential habitat is the total impact of past, current, and foreseeable actions within the botanical AA that have directly or indirectly affected S plant species potential habitat. Within the botanical AA, only timber harvest and controlled burns are thought to have important influence on habitat. All other activities are minor and not analyzed (Hurricane and Storm road repair, special forest product permits, hemlock woolly adelgid control, public recreation etc.).

Past timber harvest and clearing activities greater than 50 years old are thought to be recovered for forest species requiring more mature habitat conditions and unsuitable for species requiring early successional habitat. The following table summarizes these impacts of proposed harvest actions and past harvest actions less than 40 years old based on Alternative B – Alternative C would have reduced potential to adversely impact these species because it proposes 51 less acres of harvesting and only within white pine stands.

Table 3-16: Summary Cumulative Effect of past & future Timber Harvest upon Potential Suitable Habitat for S Plant Species Known within Botanical A.A

Regionally Sensitive Botanical Species Potential Habitat, Alternative B						
Habitat	Total Acres in AA	Associated Species	Past impact(s) (<40 years old)	Proposed impact(s)/ % of total	Future impact(s)	Total Impact/ % of Total Habitat in AA

Regionally Sensitive Botanical Species Potential Habitat, Alternative B						
Habitat	**Total Acres in AA**	**Associated Species**	**Past impact(s) (<40 years old)**	**Proposed impact(s)/ % of total**	**Future impact(s)**	**Total Impact/ % of Total Habitat in AA**
Acidic Cove Forest	126	None Known	30 acres	0%	None known	30 acres/ 24 %
Rich Cove Forest	353	*Helianthus glaucophyllus Coreopsis latifolia Trillium rugelii, Silene ovata*	111 acres	25 acres	None known	135 acres / 38%
Pine Oak Heath/ Chestnut Oak Forest	168	*Tsuga caroliniana*	23 acres	none	None Known	23 acres/ 14%
Montane Oak Hickory	454	*Silene ovata*	158 acres	35 ac/ 8%	None known	193 acres/ 43%
High Elevation Red Oak Forest	152	none	10	None proposed	None known	10 acres/ 6%
Rock Outcrop	<95	*Carex biltmoreana Packera (Senicio) millifolium Rudbeckia triloba var. pinnatiloba Saxifraga caroliniana*	None known	None proposed	None known	Habitat not affected

3.9.2.2 Wildlife Species

Diana Fritillary (*Speyeria Diana*)

Direct/Indirect Impacts: There are no known direct impacts to this species because it has not been identified in the wildlife AA. Indirectly, Alternative B post-harvest would increase potential habitat for this species within the 68 acres of newly created early successional habitat, the seeded landings, and the seeded roads. Alternative C would have reduced beneficial impacts than Alternative B since it does not provide as many acres of early successional habitat and seeded roads.

Overall, Alternative B is expected to benefit the Diana fritillary and its habitat across the AA throughout the next ten years and is not likely to cause a trend toward federal listing or loss of viability across the analysis area. Private and NFS lands would continue to provide potential habitat for nectar species. Alternative C is expected to benefit Diana fritillary and its habitat but to a lesser extent than Alternative B due to its reduced acres of early successional habitat created and roads seeded.

Cumulative Impacts: There have been no known impacts to this species by past actions and Alternatives B and C would not create adverse impacts. Therefore, the cumulative impact to the Diana fritillary is an increase in habitat for three to five years and is not likely to cause a trend toward federal listing or loss of viability across the wildlife AA.

Southern Water Shrew (*Sorex p. punctulatus*)

Direct/Indirect Impacts: Dr. M. Ford (personal conv. Ford/Burnet) stated the Forest Plan standards and guidelines that protect perennial streams would protect this species as it is rarely found more than twenty feet from stream banks. Dr. Ford stated there is a very little likelihood that this

species exists within the streams of the Shope Creek project as it is too low in elevation for this species. The impact of the hemlock wooly adelgid eliminating hemlock within the riparian area would increase long-lasting, large, woody debris. Dr. Ford further stated that cutting within the riparian area to create large, woody debris would benefit this species by increasing the pools and aquatic insects within this stretch of Shope Creek. There would be no direct or indirect impacts to this species by Alternatives B and C.

Cumulative Impacts: There is a low likelihood of occurrence for this species; however, with Forest Plan standards and guidelines for protecting perennial streams in place, it would be protected. No additional past, ongoing, or foreseeable future actions would impact this species. Therefore, there would be no cumulative impact to the water shrew and this proposal is not likely to cause a trend toward federal listing or loss of viability across the analysis area.

Lampshade Spider (*Hypochilus sheari*)

Direct/Indirect/Cumulative Impacts: This species occurs on small rock faces where moist conditions exist. The boulder face within Stand 23-13 does not provide habitat because it was dry and the spider was not found within it. Under Alternative B, the rock/boulder complex within Stand 24-11 was excluded from harvesting because it has potential habitat for this species – Alternative C does not propose to harvest this stand. The exclusion would include the trees currently shading this rock/boulder complex, and this species and its habitat would be protected if it occurs. No other habitat is known within the activity areas.

No past, ongoing, or foreseeable future actions would impact this species. Therefore, any cumulative impacts to the lampshade spider with this proposal would be the same as described in the direct/indirect effects.

Eastern Small-footed Bat (*Myotis leibii)*

Direct/Indirect/Cumulative Impacts: This species may occur in rock crevices within the AA. It also occurs in caves and old or abandoned buildings (Currie/Burnet personal conversation). There are no known caves within the activity area and Forest Plan standards protect this unique habitat if a cave is found within an activity area. The rock/boulder face in Stand 23-13 does not exhibit crevices or resting habitat for this bat. Under Alternative B, the rock/boulder complex in Stand 24-11 may provide habitat for this species; however, it has been excluded from any timber harvesting. If rock crevices occur outside of the activity areas, there would be no impact to this species. Alternative C proposed no actions that would affect directly or indirectly this species or its habitat.

No past, ongoing, or foreseeable future actions would impact this species. Therefore, there would be no cumulative impact to this species from either Alt B or C, and the proposal is not likely to cause a trend toward federal listing or loss of viability across the analysis area.

3.9.2.3 Aquatic Species

French Broad Crayfish (*Cambarus reburrus*)

Direct Impacts: If the species exists at the stream crossing locations (though none was found during activity area surveys) individuals could be crushed during culvert installations. If individuals were crushed no threat to the overall populations or habitat would exist due to the overall numbers of this species across the Nantahala and Pisgah National Forests.

Indirect Impacts: Off-site movement of soil could occur during culvert installations. Sediment and turbidity resulting from installation activities could cause a temporary degradation of *Cambarus reburrus* habitat. This degradation would cease as sediments flush through the system during larger storm events (usually 1-2 per year).

Cumulative Impacts: Because effects from past actions are no longer evident and there are no effects projected from ongoing or reasonably foreseeable actions, the cumulative impacts from Alt. B and C would be limited to the direct/indirect effects described above. No risk to the population viability of *Cambarus reburrus* would occur as a result of the Shope Creek Project implementation.

3.9.3 Forest Concern Species

The following species: *Amelachier sanquinia, Adlumia fungosa, Botrichium oneidense*, *Canoparmelia amablis, Carex leptonervia, Carex oligocarpa, Coeloglossum viride var. virescens, Dodecathion meadia, Draba ramosissima, Euphorbia commutate,e Hydrastis canadensis, Hydrophyllum macrophyllum, Celastrus scandens,* Long-tailed shrew, Allegheny woodrat, Tawny crescent, Cerulean warbler, *Micrasema burksi*, *Baetopus trishae*, *Ephemerella berneri*, *Habrophlediodes spp.*, Macdunnoa are not found in the activity areas or their habitat is excluded from proposed actions; therefore, there would be no direct, indirect, or cumulative effects.

Individuals or populations of *Polygala senega* and the Appalachian yellow-bellied sapsucker (or their habitat) is found within activity areas. Since snags would be maintained in the activity areas, habitat for the sapsucker would be maintained. The maintenance and/or reconstruction of the non-system road to stands 23-11 and 24-10 may directly adversely affect individuals of *Polygala Seneca*. This may reduce these two small subpopulations. Under Alternative B, the population within stand 24-11 would not be directly impacted because the entire population is excluded from activity. The road activities under Alternative B would directly impact about 11% of the local population. This impact would not appreciably reduce the local population of *Polygala seneca*. *Polygala seneca* is most often observed in open to partly shaded areas (such as roadsides). Since Alternative B opens some of the forest, increasing sunlight and bare soil substrate, there may be a positive indirect effect upon the habitat of *Polygala seneca*. Although Alternative B would adversely affect individuals of *Polygala Seneca,* it would not affect local populations or Forest viability because the majority o the local population would be unaffected and the indirect benefit of increased habitat. The following table summarizes the FC species that could occur within the AAs along with potential effects by species from Alternative C:

Table 3-17: FC Species and Potential Effects from Alternatives B and C

Species	Type	Habitat	Potential Effects
Adlumia fungosa	Vascular Plant	Rich Cove Forest, Montane Acidic Cliff, Montane Calcareous Cliff	Could occur in analysis area, not known to occur in analysis or activity area.
Amelachier sanquinia	Vascular Plant	Rock outcrops.	Known to occur in analysis area, but not activity area.
Botrichium oneidense	Vascular Plant	Northern Hardwood Forest Rich Cove Forest, Southern Appalachian Bog	Could occur in analysis area, not known to occur in analysis or activity area.

Species	Type	Habitat	Potential Effects
Canoparmelia amablis	Lichen	Pine-Oak Heath Forest, Chestnut Oak Forest	Could occur in analysis area, not known to occur in analysis or activity area.
Carex leptonervia	Vascular Plant	Rich Cove Forest	Could occur in analysis area, not known to occur in analysis or activity area.
Carex oligocarpa	Vascular Plant	Rich Cove Forest	Could occur in analysis area, not known to occur in analysis or activity area.
Coeloglossum viride var. virescens	Vascular Plant	Seep, Rich Cove Forest	Could occur in analysis area, not known to occur in analysis or activity area.
Dodecathion meadia	Vascular Plant	Montane Mafic Cliffs	Known to occur in analysis area, but not activity area.
Draba ramosissima	Vascular Plant	Montane Mafic Cliffs	Known to occur in analysis area, but not activity area.
Euphorbia commutata	Vascular Plant	Montane Mafic Cliffs	Could occur in analysis area, not known to occur in analysis or activity area.
Hydrastis canadensis	Vascular Plant	Rich Cove Forest, Mesic Oak-Hickory Forest, Mafic Rock	Could occur in analysis area, not known to occur in analysis or activity area.
Hydrophyllum macrophyllum	Vascular Plant	Rich Cove Forest, Basic Oak-Hickory Forest	Known to occur in analysis area, but not activity area.
Polygala senega	Vascular Plant	Basic Oak-Hickory Forest	Known to occur in activity areas. Along road to 24-10 and 23-11.
Celastrus scandens	Vascular Plant	Rock outcrop	Likely to occur in AA, not known to or likely to occur in activity area.
Long-tailed shrew	Mammal	High elevation moist forests, rock slides, and boulder complexes	Habitat in the AA, habitat excluded in activity areas
Allegheny woodrat	Mammal	Rock/boulder complexes	Habitat in the AA, but it is excluded from activity areas
Tawny crescent	Insect	Moist meadows to dry hillsides	Habitat in the AA, no species identified in activity areas
Appalachian yellow-bellied sapsucker	Bird	Snags	Habitat in the AA, habitat maintained during harvesting by retaining snags
Cerulean warbler	Bird	High elevation openings	Habitat in the AA, no species identified in activity areas
Micrasema burksi	Insect	Streams	Habitat in the AA, no species identified in activity areas
Baetopus trishae	Insect	Streams	Habitat in the AA, no species identified in activity areas
Barbaetis benfieldi	Insect	Streams	Habitat in the AA, no species identified in activity areas
Ephemerella berneri	Insect	Streams	Habitat in the AA, no species identified in activity areas

Species	Type	Habitat	Potential Effects
Habrophlediodes spp.	Insect	Streams	Habitat in the AA, no species identified in activity areas
Macdunnoa	Insect	Streams	Habitat in the AA, no species identified in activity areas

3.10 Dispersed Recreation

3.10.1 Existing Condition

The Shope Creek AA's close proximity to Asheville, NC and surrounding communities increases its potential for non-motorized recreation use which includes fishing, hiking, and hunting. However, the overall size of the Shope Creek Project AA (1,225 acres) combined with its bounding by private lands, the Blue Ridge Parkway, and the Asheville watershed has limited the potential for developing recreation facilities such as parking areas or developed picnic/camping areas. The Shope Creek area is closed to motorized access by a gate on Forest Service Road 220 and private land near Shope Creek—there is currently parking for 1-2 vehicles at the gate. There are no developed recreation facilities (restrooms, camp grounds, trails, etc.) on NFS lands in the AA.

3.10.2 Direct, Indirect, Cumulative Effects

3.10.2.1 Alternative A

There would be no direct, indirect, or cumulative recreational effects under this alternative. Recreational facilities and infrastructure would not change and use would be expected to increase in proportion to population and recreational trends.

3.10.2.2 Alternative B

Under this alternative, dispersed recreation opportunities are expected to improve over existing conditions with movement of the current gate on to NFS lands and developing a small parking area for 3-5 vehicles. This alternative is also expected to improve habitat for wildlife species that prefer early-successional habitat (ESH) more than Alternative C because is proposes to develop about 50 more acres of ESH.

There would likely be direct and indirect impacts to recreationists during implementation of the timber sale caused by limitations in access to portions of the AA during hauling/harvesting as well as noise from harvest-related activities. These impacts are expected to be short-term and could be completed in one season (generally March – November) or periodically over a few seasons.

There may be cumulative effects to dispersed recreation in the Shope Creek AA based on increased development on private lands in the area. As more residents locate to the Shope Creek area, it is expected they would access NFS lands. There is potential for increased activity to carryover to the Blue Ridge Parkway and the Asheville watershed as a result. Maintaining the area as closed to motorized recreation, moving the gate on to NFS lands and providing a small amount of additional parking, working with other law enforcement agencies to manage/control use in the area, and not developing additional recreational facilities at this time would likely provide a balance to dispersed recreation needs in the area.

3.10.2.3 Alternative C

Under this alternative, dispersed recreation opportunities are expected to improve over existing conditions with movement of the current gate on to NFS lands and developing a small parking area for 3-5 vehicles. The white pine removal under this alternative is expected to improve habitat for wildlife species but to a lesser degree than Alternative B because it does not propose as much ESH habitat. Impacts from hauling/timber harvest and noise are expected to be less for Alternative C than Alternative B due to the reduced acres harvested.

Cumulative effects of this alternative are expected to be similar to Alternative B.

3.11 Old Growth Communities

3.11.1 Existing Condition

The Forest Plan describes the purpose of retaining old growth communities: [T]*he desired future condition for old growth across the forest is to have a network of small, medium, and large sized old growth areas, representative of sites, elevation gradients, and landscapes found in the Southern Appalachians and on the Forests, that are well dispersed and interconnected by forested lands. Areas to be managed for old growth would be selected considering the following criteria: 1. Priority consideration for areas currently exhibiting high quality old growth characteristics, including areas in the initial inventory of possible old growth; 2. Areas with unique species diversity; 3. Community, soil type, aspect, and elevation; 4. Other resource concerns and management objectives* (page III-26). The Forest Plan describes old growth communities as those that exhibit the following characteristics: [d]*owned logs in all stages of decay; old trees; standing trees; undisturbed soils; uneven-aged structure of canopy species; single and multiple tree-fall gaps; abundant fungal component; large trees; appropriate density and basal area of canopy trees* (page III-28).

Currently, there are 123 acres of Forest Plan initial inventory old growth communities in the Shope Creek Project AA—63 acres in Compartment 23 and 60 acres in Compartment 24. Compartments 23 and 24 would need at least 50 acres of small patch old growth communities (at least 100 acres total) designated respectively to meet Forest Plan standards for small patch old growth communities due to the ground disturbing activities proposed within them (Forest Plan, page III-27). There is no medium or large Forest Plan old growth communities designated in the Shope Creek AA (additional analysis on old growth is disclosed in Appendix C below).

3.11.2 Alternative A – Direct, Indirect, and Cumulative Effects

Under this alternative, there would be no harvesting and the existing condition of not meeting Forest Plan standards for designated small patch old growth community habitat in the two compartments would continue. Existing stands would remain intact. Past, present, and reasonably foreseeable actions listed in Table 3-1 above would not have measurable adverse cumulative effects on old growth communities in the project area because no action is proposed with this alternative that could be cumulatively added to them.

3.11.3 Alternative B – Direct, Indirect, and Cumulative Effects

No designated old growth communities (as defined by the Forest Plan) or initial inventory old growth communities would be harvested under this alternative. There would be individual trees greater than 100 years of age harvested, but old growth is a community and not an individual

tree. Designating about 123 acres of small patch old growth communities averaging 107 years in age within the Shope Creek Project area would ensure old growth communities are distributed throughout the area.

Under this alternative each compartment in the project area would meet Forest Plan standards for small patch old growth communities and harvesting would occur within stands averaging less than 100 years in age. The following table summarizes age-classes for the Shope Creek Project AA by alternative along with old growth disclosures:

Table 3-18: Age-Class for Shope Creek Project AA by Alternative and Old Growth Communities Disclosures

Measurement	Alternative A (existing)	Alternative B (after harvest implementation)	Alternative C (after harvest implementation)
Acres treated by age-class Project Area 0-10 years old 11-20 years old 21-50 years old 51-100 years old 101-140+ years old	 0% 0% 10% 73% 17%	 6% 0% 9% 68% 17%	 1% 0% 10% 72% 17%
Acres of existing Forest Plan designated old growth or initial inventory old growth communities proposed for harvest	0	0	0
Acres of newly designated small patch old growth	0	123	0
Acres of newly designated medium patch old growth	0	0	1,208

No adverse cumulative effects to old growth communities are expected because no Forest Plan designated old growth communities or initial inventory old growth communities would be harvested; no stands averaging greater than 100 years in age would be harvested; 123 acres would be designated as small patch old growth communities and would not be scheduled for future harvest; and about 295 acres (17%) in the Shope Creek Project AA averaging greater than 101 years are not scheduled for harvesting with this alternative. There are no other foreseeable future actions identified in the Shope Creek Project AA that could adversely affect old growth communities.

3.11.4 Alternative C – Direct, Indirect, and Cumulative Effects

No designated old growth communities (as defined by the Forest Plan) or initial inventory old growth communities would be harvested under this alternative. There may be individual trees greater than 100 years of age harvested, but old growth is a community and not an individual tree. This alternative would designate all of the Shope Creek Project area as medium patch old growth communities except for the 17 acres of white pine harvested in Stands 23-12(A) and (B), about 1,208 acres total; these lands would not be scheduled for future harvesting. The 1,208 acres average about 107 years in age and designating them as medium patch old growth would ensure old growth communities are well distributed throughout the area. Continued higher basal areas within these stands could increase future disease and/or insect infestations.

Under this alternative each compartment in the project area would meet Forest Plan standards for small patch old growth communities and harvesting would occur within stands averaging less

than 100 years in age. See also table above for a summary of age-classes for the Shope Creek Project AA by alternative along with old growth disclosures.

No adverse cumulative effects to old growth communities are expected because no Forest Plan designated old growth communities or initial inventory old growth communities would be harvested; no stands averaging greater than 100 years in age would be harvested; and the remaining 1,208 acres in the Shope Creek Project AA would be designated as medium patch old growth communities and would not be scheduled for future harvest. There are no other foreseeable future actions identified in the Shope Creek Project AA that could adversely affect old growth communities.

3.12 Other Areas of Concern

3.12.1 Alternative A – Direct, Indirect, and Cumulative Effects

Since no action is proposed under this alternative, there would be no direct, indirect, or cumulative effects to park lands, prime farmlands, wetlands, wild and scenic rivers, or ecologically critical areas.

3.12.2 Alternatives B & C – Direct, Indirect, and Cumulative Effects

There would be no measurable direct, indirect, or cumulative effects from either of these alternatives because neither proposes actions within park lands, prime farmlands, wetlands (as per 1977 Executive Orders 11988 and 11990), wild and scenic rivers, or ecologically critical areas. It also would not violate local law or requirements imposed for the protection of the environment. There are no other known foreseeable actions in the activity areas that could adversely affect park lands, prime farmlands, wetlands, wild and scenic rivers, or ecologically critical areas.

CHAPTER 4 – CONSULTATION WITH AGENCIES AND OTHERS

The following individuals helped develop this environmental assessment:

4.1 ID Team Members

4.1.1 Core IDT

Scott Ashcraft - Archaeologist
Sandy Burnet - Wildlife Biologist
Eric Crews - Landscape Architect
David Danley - Botanist
Brady Dodd - Hydrologist
Paul Gilliland - Project Leader
Michael Hutchins - Team Leader
Bob Noel - Archaeologist
Pete Russell - Engineer
Lorie Stroup - Fisheries Biologist
Amber Vanderwolf - GIS

4.2 Government Agencies and Elected Officials Contacted

Asheville Mayor
Buncombe County Commissioner
Cherokee Indian Nation
Congressman Heath Shuler
NC Department of Natural Resources
NC Department of Transportation
NC Division of Water Quality
NC Forest Service
NC State Historic Preservation Office
NC Wildlife Resources Commission
US Fish and Wildlife Service

4.3 Others Contacted

Over 270 members of the public were contacted and/or provided comments on the proposal during the 30-day Notice and Comment period that was initiated on April 19, 2007, and at the April 26, 2007, open house. A complete list of individuals and their comments is located in the project record.

APPENDIX A – BIOLOGICAL EVALUATION

I. INTRODUCTION

The purpose of this biological evaluation (BE) is to provide the decision maker with relevant biological information as to the possible effects this proposal may have to Federally Threatened, Endangered (T&E) and Regional Forester's Sensitive (S) species.

This BE documents the possible biological effects of a proposed timber sale and improvements known as the Shope Creek Project Environmental Assessment (EA, 2007). Included within this preferred alternative proposal (Alternative B) are: using and maintain existing roads and skid trails, construction of temporary road, wildlife plantings, planting superior oak seedlings, daylighting roads, treatment of exotic invasive species, relocating a gate, stream enhancement, site preparation and release of harvested areas, regeneration harvest treatment, soil and erosion treatment, and small patch old growth designation (see the EA for a complete description of acreage, distances, procedures, and areas).

A detailed description of the proposal is disclosed in Section 1.2, Chapter 1 of the Shope Creek Project EA. A list of project design features and monitoring is disclosed in Section 2.4 of the same Chapter. A list of definitions, including analysis areas is located at the end of this BE.

Location

The proposal is located in northeast Buncombe County; Compartments 23 and 24.

II. METHOD OF EVALUATION AND SURVEYS

Potentially affected T&E and S (August 7, 2001) species and habitat were identified from the following sources:

1) Information on TES species and their habitat on the Nantahala and Pisgah National Forests were obtained from the North Carolina Wildlife Resources Commission (NCWRC), U.S. Fish and Wildlife Service (USFWS), and North Carolina Natural Heritage Program (NCNHP) occurrence records.
2) Surveys completed for this analysis, past surveys, and analysis for projects within or near the analysis areas.
3) Consulting with individuals both in the public and private sector who are knowledgeable of the area and its biota.

III. SURVEY INFORMATION

A. BOTANICAL SURVEYS

The proposed activity areas were surveyed by David M. Danley, Forest Botanist on April 6, 18, 20 (with botanist Brad Oburly, Missouri Botanical Garden): May 9, 10 12, 17, 29, 30 June 15,

18, 20, 25 and Aug. 17 2007. All proposed units or activity areas were visited at least once during this time

Other relevant Botanical surveys include: inventories by Josh Kelly, botanist Western NC Alliance.

B. WILDLIFE SURVEYS

Bird surveys were completed on May 10 and 15, 2007. Activity areas were surveyed on May 10 and 24, June 5 and 7. Snail and salamander surveys within the proposed units found only common species occurred. No spruce-fir, bogs, or cave habitat was found within the activity areas. The surveys identified no TES listed species within the activity areas.

C. AQUATIC SURVEYS

Project information was obtained from Paul Gilliland, US Forest Service (USFS) Forester. Lorie Stroup, USFS Fisheries Biologists, Kerri Lyda, USFS Biological Technician, Patrick Scott, Fire Management Officer, and John Brooks & Anthony Conte, Forest Technicians conducted fish, aquatic habitat, and aquatic macroinvertebrate surveys of the proposed aquatic project and analysis areas in the spring and summer months of 2007.

Fish surveys were conducted in Wolf Branch, Shope Creek and UT Shope Creek using an electrofishing back pack shocking device. Tim Forrest, UNC-A Entomology Professor, assisted with the aquatic macroinvertebrate surveys within Shope Creek and Wolf Branch. The surveys consisted of examining streams within the aquatic activity area, noting habitat quality, quantity, and suitability for rare aquatic species, as well as existing impacts and their source.

IV. EXISTING BIOLOGICAL CONDITION

A detailed review of species information and habitat is found within the botanical, aquatic, and, wildlife analyses located in the project record and has been prepared based on the best available information at the present time.

A. BOTANICAL

The botanical analysis area (AA) or “boundary of effects” used for this proposal is defined as: the total area within 2 kilometers of any proposed unit (activity area) or known EO (Element occurrence) of any plant TES species. The botanical AA consists of 5,478 acres. All potential effects (direct, indirect and cumulative) to botanical resources in the botanical AA were analyzed using this “boundary”. The botanical AA definition was selected because it is analogous to the Natural Heritage Program and The Nature Conservancy’s plant delimitation guidelines of EO.

<u>TES Plant Species</u>

Of the total of 99 plant TES species known to occur in Buncombe County, North Carolina (Appendix 1), all but 34 species (Table A-1) 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 TES species are derived from information in *Classification of the Natural plant Communities of North Carolina, the Natural Heritage Program's List of Rare Plant of North Carolina* or information obtained through other botanists. Based upon habitat information, 24 plant TES species could occur in the AA, only one (*Trillium rugelii*, Regionally Sensitive) is known to occur within the botanical AA and the activity area. A list of TES plants that occur in Buncombe County is found in Appendix 1. A list of TES plants that potentially could occur in the project or activity areas is listed in Table A-1 and summarizes the list of TES plant species that are: likely to occur, known to occur, or potentially could occur in the botanical AA. *Trillium rugelii* is known to occur in stands 24-11 and 24-10 and is known to occur in non-activity areas.

Table A-1: Potential & Known TES Plant Species in the Shope Creek Botanical Analysis Area

Species	Type	Natural Community or Habitat	Occurrence
Federally Threatened or Endangered plant species (T&E)			
None	N/A	N/A	N/A
2002 Region 8 Regional Forester's Sensitive plant species (S)			
Aconitum reclinatum	Vascular Plant	Northern Hardwood Forest, Boulderfield Forest, Rich Cove Forest	Could occur in analysis area, not known to occur in analysis or activity area.
Botrychium jenmanii	Vascular Plant	Rich Cove Forest	Could occur in analysis area, not known to occur in analysis or activity area.
Carex biltmoreana	Vascular Plant	High Elevation Granitc dome, Wet rock outcrop	Known to occur in analysis area, but not activity area.
Coreopsis latifolia	Vascular Plant	Rich Cove Forest, Northern Hardwood Forest	Occurs in activity area stands 23-11, 24-10, 24-11 and roads to these stands
Euphorbia purpurea	Vascular Plant	Northern Hardwood Forest, Rich Cove Forest, Mesic Oak Hickory	Could occur in analysis area, not known to occur in analysis or activity area.
Hexistylis contracta	Vascular Plant	Acidic Cove Forest	Could occur in analysis area, not known to occur in analysis or activity area.
Hexastylis rhombiformis	Vascular Plant	Acidic Cove Forest.	Could occur in analysis area, not known to occur in analysis or activity area.
Helianthus glaucophyllus	Vascular Plant	Anthropogenic, roadsides; Rich Cove Forests	Occurs in activity area along roads stands 23-11 and in stands 23-11, 24-11.
Heuchera longiflora var. aceroides	Vascular Plant	Rock outcrop in Rich Cove Forest	Could occur in analysis area, not known to occur in analysis or activity area.
Hydothyria venosa	Lichen	On rock in streams	Could occur in analysis area, not known to occur in analysis or

Species	Type	Natural Community or Habitat	Occurrence
			activity area.
Juglans cinerea	Vascular Plant	Rich Cove Forest.	Could occur in analysis area, not known to occur in analysis or activity area.
Liatris turgida	Vascular Plant	Pine-oak Heath, Montane Mafic Cliff	Could occur in analysis area, not known to occur in analysis or activity area.
Lysimiachia fraseri	Vascular Plant	Rich Cove Forest, Acidic Cove Forest, roadsides	Could occur in analysis area, not known to occur in analysis or activity area.
Monotropsis oderata	Vascular Plant	Chestnut Oak Forest	Could occur in analysis area, not known to occur in analysis or activity area.
Nardia lescurii	Liverwort	Acidic Cove Forest.	Could occur in analysis area, not known to occur in analysis or activity area.
Packera (Senicio) millifolium	Vascular Plant	Rock outcrop	Known to occur in analysis area, but not activity area.
Rudbeckia triloba var. pinnatiloba	Vascular Plant	Rich Cove Forest, Montane Mafic Cliff, mafic rock	Known to occur in analysis area, but not activity area.
Saxifraga caroliniana	Vascular Plant	Mafic Cliff, mafic rock	Likely to occur in analysis area, but not activity area.
Silene ovata	Vascular Plant	Rich Cove Forest above 3,400 ft. near rock or openings	Known to occur in analysis area, but not activity areas.
Thermopsis fraxinifolia	Vascular Plant	Forest openings above 3,000 ft.	Could occur in analysis area, not known to occur in analysis or activity area.
Trillium rugelii	Vascular Plant	Rich Cove Forest, low elevation	Known to occur in activity area. (Stands: 24-10 and road to 24-10)
Tsuga caroliniana	Vascular Plant	Pine oak Heath, Chestnut Oak Forest	Known to occur in botanical AA, but not activity area.

Table A-2: Natural Communities and Plant S Species by Unit

Stand (comp-stand)	Natural Communities or Habitat	Occurrence
23-11	Montane Oak Hickory (65%))/ Rich Cove Forest (35%)	*Coreopsis latifolia* known
23-12	Originally Rich Cove/Montane Oak-Hickory Forest. White Pine stand is mid succession.	No S known
23-13	Montane Oak Hickory (45%))/ Chestnut Oak Forest (65%)	No S known
24-1	Originally Rich Cove/Montane Oak-Hickory Forest. White Pine stand is mid	No S known

Stand (comp-stand)	Natural Communities or Habitat	Occurrence
	succession.	
24-10	Rich Cove Forest	*Trillium rugelii* and *Coreopsis latifolia* in harvest stand.
24-11	Mostly Montane Oak Hickory. Mafic Rock outcrop and Oak-Hickory woodland contained in stand are excluded from harvest.	*Silene ovata,* and *Coreopsis latifolia* are excluded from harvest.
Unclassified road to 23-11	Goes through Rich Cove Forest, Acidic Cove Forest and Montane Oak-Hickory Forest.	No S known
Unclassified road to 23-13	Goes through mostly Montane Oak-Hickory Forest.	No S known
Unclassified road to 24-10	Goes through mostly (harvested) Rich Cove Forest Some Acidic Cove Forest and Montane Oak-Hickory Forest.	*Coreopsis latifolia* and *Trillium rugallii* may be impacted by road reconstruction.
Gate replacement , Wildlife planting, Aquatic stream improvement	Various communities	No S known

Plant Communities and Habitats Found in the Shope Creek Project Area

The Shope Creek botanical AA can be characterized by mid elevation Mountain region type communities. The AA has one major south trending stream (Shope Creek) and smaller southwest and southeast (Wolf Branch) trending drainages. All these flow into Shope Creek. A "U" shaped succession of ridges and peak surround Shope Creek on the west, north and east. The highest points of these ridges are about 3,800-5,200 feet (Paynes Knob, Fork Mountain, High Swan, Rocky Knob and Bull Mountain.). The drainage flows downward to about 2,600 feet to the south.

The analysis area exhibits many typical plant comminutes of the mid elevation southern Appalachian mountains. Particularly common communities are: Rich Cove Forest, Montane Oak-Hickory Forest, Acidic Cove Forest, and Chestnut Oak Forest. The peaks, knobs and high rides often have rock out crop that are apparently mafic (high calcium soils). These uncommon rock outcrop communities have habitat for a large number of associated Regionally Sensitive plant species. This high base rock influences the rich soils found through out the botanical AA. There is an occurrence of a rare Basic Oak-Hickory Forest within stand 24-11. Some of the lower flatter areas show signs of heavy past disturbances such as farming, clearing and/or logging (Ashcraft, USFS Archeologist). The slopes were logged and "high graded" during the early part of the last century. Some of the communities are impacted by non-native invasive species particularly bittersweet, *Celastrus orbiculatas*.

A few common community types are characteristic within the AA and include: 1) Rich Cove Forest, 2) Chestnut Oak Forest, and 3) Montane Oak-Hickory Forest. The Acidic Cove Forest occurs to a much lesser extent. Montane Mafic Rock Cliff communities are associated with the high elevation areas directly adjacent to major ridges, but are best developed along Rock Knob, Rocky Knob and Paynes Knob. High Elevation Red Oak and Northern Hardwood communities occur in the extreme north part of the botanical AA at high elevations. The High Elevation Red Oak and Northern Hardwood communities are not affected by this proposal. Small habitat areas such as forested seeps and streams can be imbedded within these communities. Natural communities often grade together and definite boundaries are usually difficult to see. However, there is often a pattern to these comminutes on the landscape. Within the AA, the Acidic Cove Forest and Alluvial Forest type often occupies areas near streams. Lower cove slopes, and southern aspects dominated by the Chestnut Oak Forest. Montane Oak-Hickory Forest and Rich Cove Forest Communities is found on northern and east facing ridges and slopes. The Montane Oak-Hickory Forest and Rich Cove Forest communities have the most diverse herbaceous component of the communities found within the analysis area. The AA has a rich herbaceous diversity. All of the communities are very common community types within the Southern Appalachian (see Schafale and Weakley for a detailed description and discussion of these communities). The primary natural communities affected by this proposal are the Rich Cove Forest, and the Montane Oak-Hickory Forest.

Using the natural vegetation predictive model (S. Simon, USFS); 2) CISC data (USFS) and field experience, the acres of natural communities are estimated in Table A-3 within the botanical AA.

Table A-3: Estimated Quantities of Communities within Botanical AA on National Forest System Lands

Community	EST. Acres/ % of Total Habitat in AA	Acres over 40 years old
Acidic Cove Forest	126 acres / 8%	96
Chestnut Oak Forest/Pine Oak Heath	169 acres/ 11%	146
Rich Cove Forest	353 acres/ 23 %	242
Montane Oak-Hickory Forest	459 acres/ 30%	296
Northern Hardwood	141 acres/ 9 %	152
High Elevation Red Oak Forest	162 acres/11%	97
No Data (mostly rock out crops)	95 acres/	No data
Totals	**1,505 acres**	**1,029 acres**

State Natural Heritage Areas, Research Natural Areas (RNA), Special (botanical) Areas

There are no known Research Natural Areas (RNA) or botanical special interest areas identified by the Forest Plan within the Shope Creek AA. Therefore, this proposal would have no effect to any of these areas.

B. WILDLIFE EXISTING CONDITION

Wildlife Habitat

The wildlife AA that effects were evaluated within is the Shope Creek Forest Plan Analysis Area (1,736 acres) which includes compartments 22, 23, and 24.

There is one threatened and three endangered wildlife species listed as occurring in Buncombe County by the US Fish and Wildlife Service. However, the species occurrence records are historical (+50 years) and/or species has well defined habitat characteristics that does not exist within the proposed activity areas. Therefore, these species were eliminated from further evaluation (Appendix A). There are four wildlife S species within Buncombe County that may occur within this AA. The following table lists those wildlife species found within Buncombe County

Table A-4: Regional Forester's Sensitive Wildlife Species Within Buncombe County

Species	Type & Status	Potential of Occurrence
Diana Fritillary, *Speyeria diana*	Insect, S	May occur
Southern water shrew, *Sorex p. punctulatus*	Mammal, S	May occur in habitat adjoining activity areas
Lampshade spider, *Hypochilus sheari*	Insect, S	Potential habitat excluded from activity area
Eastern small-footed bat, *Myotis leibii*	Mammal, S	Potential habitat excluded from activity area

C. AQUATIC EXISTING CONDITION

The aquatic analysis area addresses activity area waters and AA waters. Activity area waters are defined as those in the area of potential site-specific impacts to aquatic habitat and populations. The AA encompasses waters downstream that potentially could be impacted by project activities, in addition to activity area waters. The AA is larger than the activity area.

Substrate within the activity area waters (Table A-5) was evaluated and visually estimated. The three primary types of substrate that exist were documented at each macroinvertebrate sample site. This information is valuable for determining the amount of habitat available for proposed endangered, threatened, and sensitive species as well as other aquatic organisms.

Table A-5: Forest Plan Watershed 39 (North Fork Swannanoa)

Stream Name	Compartment/ Stand	Miles in Project Areas	Miles in Analysis Area	Classification
Shope Creek	23-12,24-01	0.49	4.36	C
UT 4	23-11	0.34	0.80	C
UT Shope Creek	24-10, 24-11	0.57	0.91	C
UT 1			0.19	C
UT 2	24-10	0.15	0.11	C
UT 3	24-10	0.15	0.23	C
Wolf Branch	23-13	0.19	1.17	C
Total		**1.89**	**7.77**	

*The NC Department of Environmental Management designates classifications and water quality standards known as "Classifications and Water Quality Standards Applicable to the Surface Waters and Wetlands of North Carolina." The "C" classification denotes waters suitable for aquatic life propagation and survival, fishing, wildlife, secondary recreation, and agriculture.

In the Shope Creek AA, landforms can be characterized as Valley Types I and II using the Rosgen (1996) classification. Typical for these valley types, the Shope Creek drainage has predominantly stable stream types characterized as "A" and "B", depending on the valley type that they occur. These stream types are stable with a low sediment supply due to abundant stream side vegetation and gravel to boulder sized substrate.

Fish habitat exists within the project and analysis areas of Shope Creek. The un-named tributaries to Shope Creek and Wolf Branch generally have restricted flow regimes which provide habitat for aquatic macroinvertebrates only. The lower reaches of tributaries to fish inhabiting streams may be utilized for redds and nurseries during spawning. The rest of the activity area waters provide habitat for macroinvertebrates.

Table A-6: Threatened, Endangered, and Sensitive Aquatic Species in Buncombe County

Species	Type	Habitat	Occurrence
Federally Threatened and Endangered Species			
Alasmidonta raveneliana (Appalachian elktoe)	Mussel	Lotic-large streams and rivers	Does not occur
Hybopsis (Cyprinella) monacha (Spotfin chub)	Fish	Lotic- large streams and rivers	Does not occur (historical record)
2006 Region 8 Regional Forester's Sensitive Species List			
Cambarus chaugaensis (French Broad Crayfish)	Crayfish	Lotic-moderately flowing streams in headwaters	May Occur
Percina macrocephala (Longhead Darter)	Fish	Lotic-streams and rivers	Does not occur (historical record)
Fusconaia subrotunda (Long-solid)	Mussel	Lotic-clean, swift waters with stable gravel, or sand and gravel substrates	Not likely to occur

Aquatic Threatened and Endangered Species

Three aquatic T&E species are either known to occur or may occur on the Pisgah and Nantahala National Forests (Attachment 1). The North Carolina Heritage database was queried for occurrences of T&E species for Buncombe County. Two species remained after this initial filter. *Alasmidonta raveneliana* and *Hybopsis (Cyprinella) monacha* inhabit riverene habitat which is non-existent in the Shope aquatic AA. Also, the EO for *Hybopsis (Cyprinella) monacha* is historical and would not be considered further.

Aquatic Sensitive Species

Eighteen aquatic sensitive species are either known to occur or may occur on the Pisgah and Nantahala National Forests (Attachment 1). The North Carolina Natural Heritage Database was queried for occurrences of sensitive species in Buncombe County. Three sensitive aquatic species remained after this initial filter. Two of these species, *Percina macrocephala* and *Fusconaia subrotunda* were not considered because the element of occurrence, or EO, is considered historical. This indicates that this species has not been found in the county for longer

than 20 years ago. Also, riverene habitat, or the habitat for these two particular species, is not present within the analysis area of Shope Creek. Project specific surveys conducted in the spring of 2007 as well as historical surveys from this area indicate these two species were and are non-existent this high up in the watershed.

Cambarus reburrus could exist within the Shope Creek watershed, therefore it has been considered for this analysis. The range for this species is limited to the Horsepasture River (Savannah River Drainage), Little Tennessee River and tributaries to the French Broad River in Buncombe, Henderson, Jackson, Madison, and Transylvania counties in North Carolina.

V. EFFECTS/IMPACTS OF PROPOSED MANAGEMENT ON TES SPECIES

This section and Table A-7 summarize the effects to TES species. Other ecological effects or possible effects to other species may be found within the attached resource reports.

Table A-7: Summary of effect/impact to TES Species known or Likely to Occur in Biological AA(s) (1) impacts to potential habitat or species analyzed below, (2) species not further analyzed

Species	Type	Effects/Impacts
Federally Threatened or Endangered (T&E) Species		
Alasmidonta raveneliana (Appalachian elktoe)	Mussel	Does not occur. No riverene habitat in aquatic AA (2)
Hybopsis (Cyprinella) monacha (Spotfin chub)	Fish	Does not occur. No riverene habitat in aquatic AA (2) (historical record)
2002 Region 8 Regional Forester's Sensitive (S) Species List[1]		
Carex biltmoreana	Vascular Plant	No impact. No habitat or populations near activity (2)
Packera (Senicio) millifolium	Vascular Plant	No impact. No habitat or populations near activity (2)
Rudbeckia triloba var. pinnatiloba	Vascular Plant	No impact. No habitat or populations near activity (2)
Saxifraga caroliniana	Vascular Plant	No impact. No habitat or populations near activity (2)
Silene ovata	Vascular Plant	No impact. Populations excluded from proposed activity (1)
Tsuga caroliniana	Vascular Plant	No impact. No habitat or populations near activity (2)
Coreopsis latifolia	Vascular Plant	25 acres, 7% of potential habitat (1)
Helianthus glaucophyllus	Vascular Plant	25 acres, 7% of potential habitat (1)
Trillium rugelii	Vascular Plant	25 acres, 7% of potential habitat (1)
Carex biltmoreana	Vascular Plant	No impact. No habitat or populations near activity (2)
Diana Fritillary, *Speyeria diana*	Insect	68 acres increased nectar habitat (1)

Species	Type	Effects/Impacts
Southern water shrew, *Sorex p. punctulatus*	Mammal	Alternative B no impact (1)
Lampshade spider, *Hypochilus sheari*	Spider	Potential habitat excluded from activity area (2)
Eastern small-footed bat, *Myotis leibii*	Mammal	Potential habitat excluded from activity area (2)
Cambarus chaugaensis (French Broad Crayfish)	Crayfish	Habitat may occur, no record of species. May impact potential habitat with culvert installations (1)
Percina macrocephala (Longhead Darter)	Fish	Does not occur. No riverene habitat in aquatic AA (2) (historical record)
Fusconaia subrotunda (Long-solid)	Mussel	Does not occur. No riverene habitat in aquatic AA (2)

1 – August 7, 2001, Region 8 Regional Forester's Sensitive species list

A. EFFECTS/IMPACTS TO TES PLANT SPECIES

Trillium rugelii

Status: Federal: None; NC State, watch list; Global G3?; Forest, sensitive.
Known Forest Occurrences: >100 populations are known, not tracked by North Carolina Natural Heritage.

Conclusion of Impacts: This proposal would have little impact on the total numbers of *Trillium rugelii* individuals throughout the Forest and Botanical AA but may directly impact some individuals. This proposal would have no effect upon the Forest viability of *Trillium rugelii.* This proposal has no known cumulative effects to *Trillium rugelii* as a result of this proposal and past, present and reasonably foreseeable projects.

Trillium rugelii, southern nodding trillium, is a member of the lily family that is separated from other *Trillium* species by the presence of flowers with broad recurved white or maroon petals and short stamens with lavender anther sacs that are abruptly declined below the leaves (Weakley 1997). It ranges from North Carolina and Tennessee south to South Carolina, Alabama and Georgia. Recently this species has been placed on the USFS regional rare species list given the limited number of occurrences throughout its range. The North Carolina Natural Heritage Program currently places this species on the watch list in watch category 1, which denotes species that are rare within the state but, which appear to be relatively secure within the state (Amoroso & Weakley). This species was previously on the main rare species list for the state. It primarily has been located within the foothills portion of the mountains and the Piedmont of North Carolina (Radford et.al.1968). Few have been recorded within the Forest. Within the Nantahala and Pisgah National Forest seven other populations are currently known. As such, it is important to maintain the viability of this species across the forest. Generally this species occurs under a full canopy cover, such as found in a rich cove forest. It has been observed from 40 to 80 year old forest communities within the Pisgah and Nantahala National Forest.

The known local population (Botanical AA) consists of thousands, (estimated) individuals of *Trillium rugelii*. The population is scattered in the Rich Cove Forest Communities east of Shope Creek. It occurs in harvested and non-harvested stands. It is particularly common in the harvested (1976) stands along the unclassified road to stand 24-10. *Trillium rugelii* occurs within stand 24-10, the unclassified road to 24-10, and also within non-activity areas.

Direct Impacts: This proposal would likely directly negatively impact individuals of *Trillium rugelii* by mechanical damage as a result of heavy equipment and logging activities such as skidding logs in stand 24-10 and the unclassified road to stand 24-10.

Indirect Impacts: of modifying the habitat may also impact *Trillium rugelii*. Some of the expected indirect effects of timber removal would initially produce an increase in light, temperature, reduced humidity, and decreased soil surface moisture. It is not known if these impacts are negative or positive. However, as plant succession occurs within the harvest units these effects would modify slowly to the original condition. Because of the rather large vigorous populations of Trillium *rugelii* observed within stands harvested less than 40 years ago, the possible negative impacts are thought to be insubstantial to the local viability of the species.

Individuals would be negatively impacted; however, the local Shope Creek population is expected to remain viable after the proposed activity is completed because: 1) *Trillium rugelii* is a perennial plant with a bulb that can reproduce after some disturbance. It is very unlikely that all the individuals or a significant portion of the population would be lethally affected by the proposed activity and 2) only a small percent (5%) of the known population of *Trillium rugelii* would be affected by the proposal. Thus it is expected that the local population of *Trillium rugelii* would remain viable. Furthermore, the habitat for *Trillium rugelii* is not expected to be permanently impacted and *Trillium rugelii* is expected to recover in the proposed activity areas.

Coreopsis latifolia

Status: Federal; FSC; NC State, Significantly Rare, S3; Global G3; Forest, Sensitive.
Known Forest occurrences: 14 populations are known from recent sightings from Avery, Buncombe, Haywood, Henderson, McDowell, Mitchell, Polk, Rutherford, and Yancey Counties.

Conclusion of Impacts: This proposal would have little impact on the total numbers of *Coreopsis latifolia* individuals throughout the Forest and Botanical AA but may directly impact some individuals. This proposal would have no effect upon the Forest viability of *Coreopsis latifolia.* This proposal has no known cumulative effects to *Coreopsis latifolia* as a result of this proposal and past, present and reasonably foreseeable projects.

Coreopsis latifolia is a glabrous, erect perennial herb about 1 meter high. The leaves are opposite each other along the stem in few pairs. They are ovate, 5-12 cm. long about half as wide. The flowers heads are numerous and arranged in panicles or cymes, yellow, about 3 cm. in diameter (see Radford et al, 1968 and Fernald, 1987 for technical descriptions and keys).*Coreopsis latifolia* is a very distinct species and is seldom confused with any other species of *Coreopsis*.

Coreopsis latifolia is recognized as "rare" over its entire range of the southern Appalachian mountains. Populations of *Coreopsis latifolia* are typically scattered and occur in canopy gaps or roadsides size. The Pisgah and Nantahala National Forests has a significant portion (about 50%) of all the known populations of *Coreopsis latifolia*. Thus, conservation of *Coreopsis latifolia* is an important botanical concern. The limiting factor of *Coreopsis latifolia* appears to be a limited habitat of small disturbance "gaps" in Rich Cove Forests in a limited range.

Generally this species occurs in a rich cove forest under a partial or open canopy cover. It has been observed from 40 to 80 year old forest communities within the Pisgah and Nantahala National Forest.

The known local population (Botanical AA) consists of thousands (estimated) of individuals of *Coreopsis latifolia*. The population occupies Rich Cove Forest or Montane Oak-Hickory Communities surrounding Shope Creek where it occurs in previously harvested and non-harvested stands. It is particularly common in the harvested (1963-1982) stands in the north and eastern part of the Botanical AA. *Coreopsis latifolia* occurs within stands 24-10, 23-10, and the unclassified road to stands 24-10 and 23-11. It also occurs within many non-activity areas.

Direct Impacts: This proposal would likely directly negatively impact individuals of *Coreopsis latifolia* by mechanical damage as a result of heavy equipment and logging activities such as skidding logs in stands 24-10 and 23-11, and the unclassified road to them.

Indirect Impacts: of modifying the habitat may also impact *Coreopsis latifolia*. Some of the expected indirect impacts of timber removal would initially produce an increase in light, temperature, reduced humidity, and decreased soil surface moisture. *Coreopsis latifolia* seems to prefer openings so the net result of indirect impacts of tree removal is beneficial. However, as plant succession occurs within the harvest units these effects would modify slowly to the original condition. Because of the large vigorous populations of *Coreopsis latifolia* observed within stands harvested less than 40 years ago, the possible negative impacts are thought to be insubstantial to the local viability of the species.

Individuals would be negatively impacted; however, the local Shope Creek population is expected to remain viable after the proposed activity is completed because: 1) *Coreopsis latifolia* is a perennial plant with a rhizome that can reproduce after some disturbance. It is very unlikely that all the individuals or a significant portion of the population would be lethally impacted by the proposed activity and 2) only a small percent (5%) of the known population of *Coreopsis latifolia* would not be impacted by the proposal because it is not within activity areas. Thus it is expected that the local population of *Coreopsis latifolia* would remain viable. Furthermore, the habitat for *Coreopsis latifolia* is not expected to be permanently impacted by this proposal.

Helianthus glaucophyllus

Status: Federal: None; NC State, none; Global G3?; Forest, Sensitive.
Known Forest occurrences: >25 populations are known, not tracked by North Carolina Natural Heritage. *Helianthus glaucophyllus* occurs within openings in rich communities.

The only known local population of *Helianthus glaucophyllus* in the Botanical AA occurs along the FS 220 road and the wildlife openings associated with FS 220.

Conclusion of Impact: This proposal would have little impact on the total numbers of *Helianthus glaucophyllus* individuals throughout the Forest and Botanical AA but may directly impact some individuals. This proposal would have no impact upon the Forest viability of *Helianthus glaucophyllus.* This proposal has no known cumulative impacts to *Helianthus glaucophyllus* as a result of this proposal and past, present and reasonably foreseeable projects.

Direct/Indirect Impacts: The maintenance of road 220 needed for implementation of this proposal may directly negatively impact individuals of *Helianthus glaucophyllus*. The impacts to *Helianthus glaucophyllus* would have little impact on the entire population within the botanical AA. The population of *Helianthus glaucophyllus* has greater than one hundred individuals scattered along road 220. The local roadside population of *Helianthus glaucophyllus* receives regular maintenance. *Helianthus glaucophyllus* thrives in open areas. The regular disturbance of road maintenance probably has created the habitat necessary for its existence within the botanical AA. Maintenance of road 220 would impact no more than 10% of this population. A viable population of *Helianthus glaucophyllus* would remain within the analysis area. In conclusion, although this proposal would likely negatively impact individuals of *Helianthus glaucophyllus* it would not impact local or Forest viability. Furthermore, the indirect impact to the habitat of *Helianthus glaucophyllus* is not expected to be permanent—*Helianthus glaucophyllus* is expected to recover in the proposed activity areas.

Possible Impacts to Potential Habitat for TES Plants

This discussion summarizes the possible effect on potential, or "apparently suitable habitat" for all TES plant occurring species within the botanical AA. This analysis is based upon current knowledge of species habitat parameters. Usually, these parameters are very broad habitat concepts. This discussion does not imply species occupancy in those areas. It examines potential suitable habitat based upon a predictive model of general Forest communities and current knowledge of species habitat parameters within the AA. Species occupancy could be none or a very small percentage of these potential habitat acres. For example, *Carex pedunculata* is known to occur from only one small (<2 acres) population on the Forest. Since this population is found within Rich Cove Forest, the potential habitat is all known Rich Cove Forest within the Forest (56,223 acres). The known Forest occupancy for this species is then 3 one thousandths of a percent (0.003%). This example is typical of many TES plant species with broad habitat definitions. As habitat definitions and botanical surveys become more complete, estimation of potential habitat may become more precise. Table A-8 summarizes the results of this analysis within the 1,505 acre Shope Creek botanical AA.

Table A-8 Impacts (Alternative B) Upon Potential Habitat for TES Plant Species within Botanical A.A

Species	Natural Community or Habitat	Predicted Potential Acres Existing Condition	Acres of Potential Habitat Impacted, % of Area Total (Alternative B)
Federally Threatened or Endangered plant species (T &E)			
None	N/A	None	None

Species	Natural Community or Habitat	Predicted Potential Acres Existing Condition	Acres of Potential Habitat Impacted, % of Area Total (Alternative B)
2002 Region 8 Regional Forester's Sensitive plant species (S)			
Carex biltmoreana	Wet, open areas near granite domes or other rock out crop	95 acres	Not impacted
Coreopsis latifolia	Rich Cove Forest	353 acres	25 acres, 7%
Helianthus glaucophyllus	Open Areas in Rich Cove Forest	353 acres	25 acres, 7%
Packera (Senicio) millifolium	Open areas near granite domes or other rock out crop	95 acres	Not impacted
Rudbeckia triloba var. pinnatiloba	open areas near mafic rock out crop	95 acres	Not impacted
Saxifraga caroliniana	Wet, open areas near granite domes or other rock out crop	95 acres	Not impacted
Silene ovata	Canopy Gaps in Rich Cove Forest, Montane Oak Hickory or near Rock outcrops	807 acres	60 acres, 5%
Trillium rugelii	Rich Cove Forest	353 acres	25 acres, 7%
Tsuga caroliniana	Dry ridges. Pine-oak Heath	146 acres	Not impacted

Potential Habitat Cumulative Impacts

The cumulative impact to potential habitat is the total impact of past, current, and foreseeable actions within the botanical AA that have directly or indirectly affected Regionally Sensitive plant species potential habitat. Within the botanical AA, only timber harvest and controlled burns are thought to have important influence on habitat. All other activities are minor and not analyzed (Hurricane and Storm road repair, special forest product permits, hemlock woolly adelgid control, public recreation etc.).

Past timber harvest and clearing activities greater than 50 years old are thought to be recovered for forest species requiring more mature habitat conditions and unsuitable for species requiring early successional habitat. The following summarizes these impacts of proposed harvest actions and past harvest actions less than 40 years old.

Table A-9: Summary Cumulative Effect of past & future Timber Harvest upon Potential Suitable Habitat for TES Plant Species known within Botanical A.A

Regionally Sensitive Botanical Species Potential Habitat, Alternative B						
Habitat	Total Acres in AA	Associated Species	Past impact(s) (<40 years old)	Proposed impact(s)/ % of total	Future impact(s)	Total Impact/ % of Total Habitat in AA

Regionally Sensitive Botanical Species Potential Habitat, Alternative B						
Habitat	**Total Acres in AA**	**Associated Species**	**Past impact(s) (<40 years old)**	**Proposed impact(s)/ % of total**	**Future impact(s)**	**Total Impact/ % of Total Habitat in AA**
Acidic Cove Forest	126	*None Known*	30 acres	0%	None known	30 acres/ 24 %
Rich Cove Forest	353	*Helianthus glaucophyllus Coreopsis latifolia Trillium rugelii, Silene ovata*	111 acres	25 acres	None known	135 acres / 38%
Pine Oak Heath/ Chestnut Oak Forest	168	*Tsuga caroliniana*	23 acres	none	None Known	23 acres/ 14%
Montane Oak Hickory	454	Silene ovata	158 acres	35/ 8%	None known	193 acres/ 43%
High Elevation Red Oak Forest	152	none	10	None proposed	None known	10 acres/ 6%
Rock Outcrop	<95	*Carex biltmoreana Packera (Senicio) millifolium Rudbeckia triloba var. pinnatiloba Saxifraga caroliniana*	None known	None proposed	None known	Habitat not affected

B. EFFECTS/IMPACTS TO TES WILDLIFE SPECIES

Diana Fritillary (*Speyeria Diana*)

This species has been documented within 15 of the 18 western most counties. There are more than 40 populations known to occur within the Nantahala or Pisgah National Forest. As a result of all the documentations for this species, the North Carolina Natural Heritage Program no longer formally tracks Diana Fritillary (Legrand et al. 2004). Generally speaking, the distribution or population sizes of this species in the state are fairly well known. This butterfly likes rich woods with host plants of both *Viola* and rhododendron for the larval stage and adjacent edges or openings with nectar species for the adult stage. Habitat for the Diana fritillary is found throughout the AA within riparian areas where moist conditions are found. Nectar species are found along both State and Forest Service roads and intersections of old woods roads, within this AA. Although no Diana fritillary were observed during surveys of the roads and activity areas, there is suitable habitat present adjoining the activity areas and on the access road to stand 24-10 as well as perennial stream corridors across the wildlife AA.

Potential Direct and Indirect Impacts of Alternative B to the Diana Fritillary

There is no known direct impact to this species because it has not been identified in the AA. Indirectly, Alternative B post-harvest would increase potential habitat for this species within the 68 acres of newly created early successional habitat, within the seeded landings, and roads.

Overall, Alternative B is expected to benefit the Diana fritillary and its habitat across the AA throughout the next ten years and is not likely to cause a trend toward federal listing or loss of viability across the analysis area. Private and NFS lands would continue to provide potential habitat for nectar species.

Cumulative Impacts of Alternative B to the Diana Fritillary and its habitat

There have been no known impacts to this species by past actions and Alternative B would not create adverse impacts. Therefore, the cumulative impact to the Diana fritillary is an increase in habitat for three to five years and is not likely to cause a trend toward federal listing or loss of viability across the wildlife AA.

Southern Water Shrew (*Sorex p. punctulatus*)

This species inhabits high water quality streams above 2,600 feet but are usually found in streams at 5,000 feet. The species prefers pools to riffles with large, woody debris where it feeds on aquatic insects along the stream banks. It is globally secure; however, it is found in disjunct populations at high elevations in Virginia, Tennessee, North Carolina, and Georgia. The water shrew is associated with Canadian and Hudsonia Life Zones and populations may have been contracting for years in response to climate-driven habitat changes and past land use practices in headwater streams (Laerm et al 1999)

Potential Direct and Indirect Impacts of Alternative B to the Southern Water Shrew and its Habitat

Dr. M. Ford (personal conv. Ford/Burnet) stated the Forest Plan standards and guidelines that protect perennial streams would protect this species as it is rarely found more than twenty feet from stream banks. Dr. Ford stated there is a very little likelihood that this species exists within the streams of the Shope Creek project as it is too low in elevation for this species. The impact of the hemlock wooly adelgid eliminating hemlock within the riparian area would increase long-lasting, large, woody debris. Dr. Ford further stated that cutting within the riparian area to create large, woody debris would benefit this species by increasing the pools and aquatic insects within this stretch of Shope Creek. There would be no direct or indirect impacts to this species by Alternative B.

Cumulative Impacts of Alternative B to the Southern Water Shrew and its Habitat

There is a low likelihood of occurrence for this species; however, with Forest Plan standards and guidelines for protecting perennial streams in place, it would be protected. No additional past or foreseeable future actions would impact this species. Therefore, there would be no cumulative impact to the water shrew and this project proposal is not likely to cause a trend toward federal listing or loss of viability across the analysis area.

Lampshade Spider (*Hypochilus sheari*)

This species occurs on small rock faces where moist conditions exist. The boulder face within stand 23-13 does not provide habitat because it was dry and the spider was not found within it. The rock/boulder complex within stand 24-11 was excluded because it has potential habitat for

this species. The exclusion would include the trees currently shading this rock/boulder complex, and this species and its habitat would be protected if it occurs. No habitat is known within the activity areas.

No past or foreseeable future actions would impact this species. Therefore, there would be no cumulative impact to the lampshade spider.

Eastern Small-footed Bat (*Myotis leibii)*

This species may occur in rock crevices within the AA. It also occurs in caves and old or abandoned buildings (Currie/Burnet personal conversation). There are no known caves within the activity area and Forest Plan standards protect this unique habitat if a cave is found within an activity area. The rock/boulder face in stand 23-13 does not exhibit crevices or resting habitat for this bat. The rock/boulder complex in stand 24-11 may provide habitat for this species; however, it has been excluded from any timber cutting activity. If rock crevices occur outside of the activity areas, there would be no impact to this species.

No past or foreseeable future actions would impact this species. Therefore, there would be no cumulative impact to this species and Alternative B is not likely to cause a trend toward federal listing or loss of viability across the analysis area.

C. EFFECTS/IMPACTS TO REGIONAL FORESTER'S SENSITIVE AQUATIC SPECIES

French Broad Crayfish (*Cambarus reburrus*)

This species could exist within the Shope Creek watershed, due to the species' habitat preference "streams." The range for this species is limited to the Horsepasture River (Savannah River Drainage), Little Tennessee River and tributaries to the French Broad River in Buncombe, Henderson, Jackson, Madison, and Transylvania counties in North Carolina. Personal communication with Steve Fraley, NCWRC Non-game Aquatic Biologist, indicates that this particular species is very common within its range but is considered sensitive because the range of this species is small (2007). Surveys were conducted at each of the proposed culvert locations and no crayfish were present. This is likely due to the restricted flow regimes at the location of these crossings. *Cambarus reburrus* could however exist during the wetter seasons of spring and winter when the area is not in a drought.

A research project in the Shope Creek area conducted by Tim Forrest of UNCA, addresses interaction between raccoons and crayfish. Crayfish samples within the Shope Creek watershed found two species; *Cambarus (Jugicambarus) asperimanus* and *Cambarus (Cambarus) bartonii*. No *Cambarus reburrus* were located with these surveys.

Direct Impacts: If the species exists at the stream crossing locations (though none was found during activity area surveys) individuals could be crushed during culvert installations. If individuals were crushed no threat to the overall populations or habitat would exist.

Indirect Impacts: Off-site movement of soil could occur during culvert installations. Sediment and turbidity could cause a temporary degradation of *Cambarus reburrus* habitat could occur. This degradation would cease as sediments flush through the system during larger storm events (usually 1-2 per year).

Cumulative Impacts: No cumulative impacts would occur to *Cambarus reburrus*, or habitat, as a result of either action alternative being implemented. No risk to the population viability of *Cambarus reburrus* would occur as a result of the Shope Creek Project implementation.

VI. PROJECT DESIGN FEATURES/ REQUIRED MITIGATION

Botanical Species

1. To reduce the possible effect non-native invasive plant species to this proposal, herbicides such as Glyphosate would be used.
2. Standard Forest Service native seed mixes and plants would be utilized in wildlife improvement and roadside erosion control.
3. Approximately 3 acres in stand 24-11 (as designated by the botanist) would be excluded from planned harvest activities to protect populations of the regionally sensitive species *Silene ovata* and the rock complex.

There are no mitigation measures recommended for botanical TES species.

Wildlife Species

The preferred alternative needs no specific project design features to protect TES wildlife species. There are no mitigation measures recommended for wildlife TES species.

Aquatic Species

Project design features for protection of aquatic resources are sufficient to protect all Regional Forester's S species (see Section 2.4, Chapter 2 and aquatic analysis, project record). There are no mitigation measures recommended for aquatic TES species.

VII. DETERMINATION OF EFFECT

Botanical

This proposal would not affect (directly or indirectly) any proposed or listed Federal threatened or endangered plant species or their habitat; no formal consultation with US Fish & Wildlife Service is required. This proposal would not impact the population viability of any Regional Sensitive plant species. This proposal may impact the Regional Forester's S species *Trillium rugelii, Coreopsis latifolia,* and *Helianthus glacophyllus,* but is not expected to impact Forest population viability of these species or cause a trend towards Federal listing. This proposal would have no known cumulative adverse effects to any Federally Listed, Federally Proposed, or Regional Forester's S botanical species.

No other Regional Forester's S botanical species would be impacted by Alternative B or past and foreseeable future actions.

Wildlife

There are no known T&E species or their habitat within the proposed project area. There would be no effect to T&E species by any alternative considered in the Shope Creek environmental assessment; no formal consultation with US Fish & Wildlife Service is required.

There are both positive indirect habitat effects and negative potential direct effects to individual larvae and eggs of the Diana fritillary as a result of Alternative B and past or foreseeable future activities. As the Diana fritillary was not observed during surveys the negative direct impacts to individual larva are not considered significant and Alternative B is expected to benefit the Diana fritillary by the 68 acres of increased habitat across the AA which would endure throughout the next ten years. The cumulative impact to the Diana fritillary is not likely to cause a trend toward federal listing or loss of viability across the planning area.

No other Regional Forester's S wildlife species would be impacted by Alternative B or past and foreseeable future actions.

This proposal would have no impacts to any population of Regional Forester's S species.

Aquatic

No risk to population viability of any aquatic federally listed species or their habitat across the Forest would occur as a result of the implementation of the Shope Project; no formal consultation with US Fish & Wildlife Service is required. The project would have no effect on any federally listed species or their habitat.

No risk to population viability of any aquatic Regional Forester's S species across the Forest would occur as a result of the implementation of the Shope Project. Surveys of the Shope Creek Project area did not find *Cambarus reburrus.* No crayfish (any species) was found at the proposed stream crossing locations therefore, the project would have no effect on Regional Forester's S aquatic species or their habitat.

No other Regional Forester's S aquatic species would be impacted by Alternative B or past and foreseeable future actions.

Prepared by:

/s/David Danley September 10, 2007

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Attachment 1

These lists are a compilation of 1) North Carolina Natural Heritage biological data base, 2) US Fish & Wildlife Service records, or 3) recent occurrence not in data base.

Botanical

Botanical TES species of Buncombe County:

Species	Form	Natural Communities/Habitat	Status/Occurrence
Aconitum reclinatum	Vascular plant	Northern Hardwood Forest, Boulderfield Forest, High Elevation Seep, Rich Cove Forest	Sensitive/3
Berberis canadensis	Vascular plant	Rich Cove Forest, Glade, mafic rock	Sensitive/3
Botrychium jenmanii	Vascular plant	Rich Cove Forest	Sensitive/3
Buckleya distichophylla	Vascular plant	Hemlock Hardwood Forest, Acidic Cove Forest, Montane Acidic Cliff, Mesic Oak-Hickory	Sensitive/4
Calamagrostis cainii	Vascular plant	High Elevation Rocky Summit	Sensitive/4
Carex biltmoreana	Vascular plant	High Elevation Granitic Dome, Montane Cedar-Hardwood Forest, Montane Acidic Cliff	Sensitive/2
Carex misera	Vascular plant	High Elevation Rocky Summit, Montane Acidic Cliff, High Elevation Granitic Dome	Sensitive/4
Cleistes bifaria	Vascular plant	Pine-Oak/Heath Forest, Pine-Oak Woodland	Sensitive/4

Species	Form	Natural Communities/Habitat	Status/Occurrence
Coreopsis latifolia	Vascular plant	Rich Cove Forest, Northern Hardwood Forest	Sensitive/1
Diplophyllum obtusatum	Liverwort	Spruce-Fir Forest	Sensitive/4
Euphorbia purpurea	Vascular plant	Northern Hardwood Forest, Rich Cove Forest, Mesic oak-hickory	Sensitive/3
Fissidens appalachensis	Moss	streams at high elevations	Sensitive/4
Frullania oakesiana	Liverwort	Spruce-Fir Forest	Sensitive/4
Geum radiatum	Vascular plant	High Elevation Rocky Summit	Endangered/4
Gymnoderma lineare	Lichen	High Elevation Rocky Summit, Moist Rock Outcrop in Acidic Cove in Gorge	Endangered/4
Hasteola suaveolens	Vascular plant	Montane Alluvial Forest	Sensitive/4
Helianthus glaucophyllus	Vascular plant	Rich Cove Forest, Northern Hardwood Forest, High Elevation Red Oak Forest, Mesic Oak-Hickory Forest, Roadside	Sensitive/1
Heuchera longiflora var. aceroides	Vascular plant	rock outcrops in Rich Cove Forest, mafic rock	Sensitive/3
Hexastylis contracta	Vascular plant	Acidic Cove Forest	Sensitive/3
Hexastylis rhombiformis	Vascular plant	Acidic Cove Forest, Hemlock Hardwood Forest, Montane Alluvial Forest	Sensitive/3
Hydrothyria venosa	Lichen	Stream	Sensitive/3
Hypericum graveolens	Vascular plant	High Elevation Seep, Wet Meadow	Sensitive/4
Hypericum mitchellianum	Vascular plant	High Elevation Seep, Wet Meadow	Sensitive/4
Hypotrachyna virginica	Lichen	High Elevation Forest	Sensitive/4
Juglans cinerea	Vascular plant	Rich Cove Forest, Mesic Oak-Hickory, Montane Alluvial Forest	Sensitive/3
Liatris turgida	Vascular plant	High Elevation Granitic Dome, Montane Oak Woodland	Sensitive/4
Lilium grayi	Vascular plant	Northern Hardwood Forest, High Elevation Seep, Grassy Bald, Wet Meadow	Sensitive/4
Lysimachia fraseri	Vascular plant	Mesic Oak-Hickory Forest, Montane Oak Forest, Rich Cove Forest, Acidic Cove Forest, Roadside	Sensitive/3
Monotropsis odorata	Vascular plant	Rich Cove Forest, Mesic Oak-Hickory, Xeric Oak-Hickory, Pine-Oak/Heath Forest	Sensitive/3
Nardia lescurii	Liverwort	Acidic Cove Forest, near streams	Sensitive/3
Packera millefolia	Vascular plant	Montane Acidic Cliff, Montane Cedar-Hardwood Woodland, High Elevation Granitic Dome	Sensitive/4
Penstemon smallii	Vascular plant	rock outcrops, woodlands	Sensitive/3
Polytrichum appalachianum	Moss	Rocky Summits, mid to high elevation	Sensitive/4
Prenanthes roanensis	Vascular plant	Northern Hardwood Forest, Grassy Bald, Meadow, Roadside, High Elevation Red Oak Forest	Sensitive/4
Rhododendron vaseyi	Vascular plant	Northern Hardwood Forest, High Elevation Seep, Southern Appalachian Bog, Meadow, Roadside	Sensitive/4
Robinia viscosa var. viscosa	Vascular plant	High Elevation Granitic Dome, woodlands	Sensitive/4
Rudbeckia triloba var. pinnatiloba	Vascular plant	Rich Cove Forest, Montane Mafic Cliff, mafic rock	Sensitive/2
Sagittaria fasciculata	Vascular plant	Southern Appalachian Bog, Streamside, Swamp Forest-Bog Complex	Endangered/4
Sarracenia jonesii	Vascular plant	Southern Appalachian Bog	Endangered/4
Saxifraga caroliniana	Vascular plant	Northern Hardwood Forest, Montane Acidic Cliff, High Elevation Rocky Summit	Sensitive/3
Silene ovata	Vascular plant	Rich Cove Forest, Mesic Oak-Hickory, Roadside, mafic rock	Sensitive/2
Spiraea virginiana	Vascular plant	Riverside scour zone	Threatened/4
Thermopsis fraxinifolia	Vascular plant	Xeric Oak-Hickory Forest, Montane Oak Woodland, Pine-Oak/Heath	Sensitive/3
Trillium rugelii	Vascular plant	Rich Cove Forest, low elevation	Sensitive/1
Tsuga caroliniana	Vascular plant	Carolina Hemlock Forest, Montane Acidic Cliff, Pine-Oak/Heath, High Elevation Rocky Summit	Sensitive/2
Xanthoparmelia monticola	Lichen	High Elevation Rocky Summit	Sensitive/4

1 = Found in activity area

2 = Found within botanical analysis area but not activity area
3 = Possibly may be found with botanical analysis area (based on broad habitat concepts)
4 = No known occurrences or habitat known within botanical analysis area, (not further analyzed)

Wildlife

Wildlife TES species in Buncombe County:

Federally Listed Wildlife Species

Species	Habitat Characteristics	Occurrence
Clemmys muhlenbergii, Bog Turtle *Clemmys muhlenbergii,* Bog Turtle	Slow flow water, bogs and swamps	4
Glaucomys sabrinus coloratus, Carolina northern flying squirrel	Spruce/fir and northern hardwood interface	4
Puma concolor couguar, Eastern cougar	Large, contiguous areas of forest with large deer populations. Historical record	4
Myotis grisencens, Gray Bat	Cave dwelling bat, often forages along river riparian areas	4

Regional Forester's Sensitive Wildlife Species

Species	Habitat Characteristics	Occurrence
Thryomanes bewickii altus, Appalahcian Bewick's wren	Historical record. Open areas with shrubs, saplings, and/or brush piles	4
Aimophila aestivalis, Bachman's sparrow	Historical record. Dense grassy with scattered tress or saplings.	4
Myotis leibii, Eastern small-footed bat	Historical record. Winter: cave dwelling, summer: barns or caves	4
Corynorhinus refonesquii, Rafinesque's big-earred bat	Historical record. Maternity colonies utilize abandoned buildings.	4

Aquatic

2005 Rare Aquatic Species List - NANT/ PISGAH National Forests (updated 03/06/05)

Group	Designation*	Scientific Name	Common Name	NC Status	US Status	NC Rank	Global Rank
Mollusk	Endangered	*Alasmidonta raveneliana*	Appalachian elktoe	E	E	S1	G1
Mollusk	Endangered	*Pegias fabula*	little-wing pearlymussel	E	E	S1	G1
Fish	Threatened	*Hybopsis (Cyprinella) monacha*	spotfin chub	T	T	S1	G2
Crayfish	Sensitive	*Cambarus chaugaensis*	Oconee stream crayfish	SR(PSC)		S2	G2
Crayfish	Sensitive	*Cambarus georgiae*	Little Tennessee River crayfish	SR(PSC)		S2S3	G1
Crayfish	Sensitive	*Cambarus parrishi*	Hiwassee headwaters crayfish	SR(PSC)	FSC	S2S3	G1
Crayfish	Sensitive	*Cambarus reburrus*	French Broad crayfish				G3
Crustacean	Sensitive	*Caecidotea carolinensis*	Bennett's Mill cave water slater	SR	FSC	S1	G1G2
Crustacean	Sensitive	*Stygobromus carolinensis*	Yancey sideswimmer	SR	FSC	S1	G1G2
Dragonfly	Sensitive	*Gomphus diminutus*	diminuitive clubtail	SR		S2S3	G3
Dragonfly	Sensitive	*Macromia*	mountain river	SR	FSC	S2S3	G2G3

Group	Designation*	Scientific Name	Common Name	NC Status	US Status	NC Rank	Global Rank
		margarita	cruiser				
Dragonfly	Sensitive	*Ophiogomphus edmundo*	Edmund's snaketail	SR	FSC	S1?	G1G2
Dragonfly	Sensitive	*Ophiogomphus howei*	pygmy snaketail	SR	FSC	S1S2	G3
Fish	Sensitive	*Etheostoma acuticeps*	sharphead darter	T		S1	G3
Fish	Sensitive	*Etheostoma vulneratum*	wounded darter	SC		S2	G3
Fish	Sensitive	*Percina burtoni*	blotchside darter	E		S1	G2
Fish	Sensitive	*Percina macrocephala*	longhead darter	SC	FSC	SX	G3
Fish	Sensitive	*Percina squamata*	olive darter	SC	FSC	S2	G3
Mussel	Sensitive	*Alasmidonta varicosa*	brook floater	T(PE)	FSC	S1	G3
Mussel	Sensitive	*Fusconaia barnesiana*	Tennessee pigtoe	E		S1	G2G3
Mussel	Sensitive	*Lasmigona holstonia*	Tennessee heelsplitter	E	FSC	S1	G3
Amphibian	Locally rare	*Cryptobranchus alleganiensis*	hellbender	SC	FSC	S3	G4
Amphibian	Locally rare	*Necturus maculosus*	common mudpuppy	SC		SH	G5
Caddisfly	Locally rare	*Ceraclea mentiea*	a caddisfly	SR		S2?	G?
Caddisfly	Locally rare	*Ceraclea slossonae*	a caddisfly	SR		S2?	G?
Caddisfly	Locally rare	*Matrioptila jeanae*	a caddisfly	SR		S3	G?
Caddisfly	Locally rare	*Micrasema burksi*	a caddisfly	SR		S3	G?
Caddisfly	Locally rare	*Micrasema sprulesi*	a caddisfly	SR		S3	G?
Caddisfly	Locally rare	*Palaeagapetus celsus*	a caddisfly	SR		S2?	G?
Caddisfly	Locally rare	*Rhyacophila amicus*	a caddisfly	SR		S2	G?
Caddisfly	Locally rare	*Rhyacophila melita*	a caddisfly	SR		S2	G?
Caddisfly	Locally rare	*Rhyacophila vibox*	a caddisfly	SR		S1S2	G?
Crustacean	Locally rare	*Ascetocythere cosmeta*	Grayson crayfish ostracod	SR	FSC	S2?	G?
Crustacean	Locally rare	*Cymocythere clavata*	Oconee crayfish ostracod	SR	FSC	S2?	G?
Crustacean	Locally rare	*Dactylocythere isabelae*	Catawba crayfish ostracod	SR	FSC	S1?	G?
Crustacean	Locally rare	*Dactylocythere prinsi*	Whitewater crayfish ostracod	SR	FSC	S1	G?
Crustacean	Locally rare	*Skistodiaptomus carolinensis*	Carolina skistodiaptomus	SR	FSC	S1?	G?
Crustacean	Locally rare	*Waltoncythere acuta*	Transylvania crayfish ostracod	SR	FSC	S2?	G?
Damselfly	Locally rare	*Lestes congener*	spotted spreadwing	SR		S1?	G5
Dragonfly	Locally rare	*Aeshna tuberculifera*	black-tipped darner	SR		S1S2	G4
Dragonfly	Locally rare	*Aeshna verticalis*	green-striped darner	SR		S1S2	G5
Dragonfly	Locally rare	*Cordulia shurtleffii*	American emerald	SR		S1?	G5

Group	Designation*	Scientific Name	Common Name	NC Status	US Status	NC Rank	Global Rank
Dragonfly	Locally rare	*Gomphus adelphus*	moustached clubtail	SR		S1S2	G4
Dragonfly	Locally rare	*Gomphus consanguis*	Cherokee clubtail	SR	FSC	S1S2	G2G3
Dragonfly	Locally rare	*Gomphus descriptus*	harpoon clubtail	SR		S1?	G4
Dragonfly	Locally rare	*Gomphus lineatifrons*	splendid clubtail	SR		S2S3	G4
Dragonfly	Locally rare	*Gomphus viridifrons*	green-faced clubtail	SR		S1S2	G3
Dragonfly	Locally rare	*Neurocordulia yamaskanensis*	stygian shadowdragon	SR		S1S2	G5
Dragonfly	Locally rare	*Ophiogomphus aspersus*	brook snaketail	SR		S1S2	G3G4
Dragonfly	Locally rare	*Ophiogomphus mainensis*	Maine snaketail	SR		S2?	G4
Dragonfly	Locally rare	*Ophiogomphus rupinsulensis*	rusty snaketail	SR		SR	G5
Dragonfly	Locally rare	*Somotochlora elongata*	ski-tailed emerald	SR		S2S3	G5
Dragonfly	Locally rare	*Stylurus scudderi*	zebra clubtail	SR		S3?	G4
Dragonfly	Locally rare	*Sympetrum obtrusum*	white-faced meadowhawk	SR		S1?	G5
Fish	Locally rare	*Acipenser fulvescens*	lake sturgeon	SC	FSC	SX	G3
Fish	Locally rare	*Aplodinotus grunniens*	freshwater drum	T		S1	G5
Fish	Locally rare	*Capoides velifer*	highfin carpsucker	SC		S2	G4G5
Fish	Locally rare	*Clinostomus funduloides ssp 1*	Little Tennessee River rosyside dace	SC		S2	G5T3Q
Fish	Locally rare	*Cottus carolinae*	banded sculpin	T		S1	G5
Fish	Locally rare	*Cyprinella zanema (population 1)*	Santee chub (piedmont population)	SR		S3	G4T3Q
Fish	Locally rare	*Erimystax insignis*	blotched chub	SR	FSC	S2	G3G4
Fish	Locally rare	*Etheostoma inscriptum*	turquoise darter	SC		S1	G4
Fish	Locally rare	*Hiodon tergisus*	mooneye	SC		S1	G5
Fish	Locally rare	*Hybopsis rubrifrons*	rosyface chub	T		S1	G4
Fish	Locally rare	*Ichthyomyzon bdellium*	Ohio lamprey	SR		S1	G3G4
Fish	Locally rare	*Lampetra appendix*	American brook lamprey	T		S1	G4
Fish	Locally rare	*Luxilus chrysocephalus*	striped shiner	T		S1	G5
Fish	Locally rare	*Micropterus coosae*	redeye bass	SR		S1	G5
Fish	Locally rare	*Moxostoma species 1*	sicklefin redhorse	SR	FSC	S1S2	G2G3Q
Fish	Locally rare	*Notropis lutipinnis*	yellowfin shiner	SC		S3	G4Q
Fish	Locally rare	*Noturus flavus*	stonecat	E		S1	G5
Fish	Locally rare	*Percina caprodes*	logperch	T		S1	G5
Fish	Locally rare	*Percina*	blackbanded darter	SR		S1	G5

Group	Designation*	Scientific Name	Common Name	NC Status	US Status	NC Rank	Global Rank
		nigrofasciata					
Fish	Locally rare	*Percina sciera*	dusky darter	E		SH	G5
Fish	Locally rare	*Polydon spathula*	paddlefish	E	FSC	SH	G4
Fish	Locally rare	*Stizistedion canadense*	sauger	SR		S2	G5
Mayfly	Locally rare	*Acerpenna macdunnoughi*	a mayfly	SR		S2S3	G5
Mayfly	Locally rare	*Baetis punctiventris*	a mayfly	SR		S2	G?
Mayfly	Locally rare	*Baetopus sp. 1*	a mayfly	SR		S1	G?
Mayfly	Locally rare	*Barbaetis benfieldi*	Benfield's bearded small minnow mayfly	SR		S1	G2
Mayfly	Locally rare	*Barbaetis cestus*	a mayfly	SR		S1	G?
Mayfly	Locally rare	*Barbaetis gloveri*	a mayfly	SR		S2	G?
Mayfly	Locally rare	*Drunella longicornis*	a mayfly	SR		S3	G5
Mayfly	Locally rare	*Ephemerella berneri*	a mayfly	SR		S3	G3
Mayfly	Locally rare	*Habrophlediodes spp*	a mayfly	SR		S2	G5
Mayfly	Locally rare	*Heterocleon petersi*	a mayfly	SR		S2S3	G4
Mayfly	Locally rare	*Homoeneuria cahabensis*	Cahaba sand-filtering mayfly	SR		S1S2	G2
Mayfly	Locally rare	*Leptohyphes robacki*	a mayfly	SR		S1	G3
Mayfly	Locally rare	*Macdunnoa brunnea*	a mayfly	SR		S2	G2
Mayfly	Locally rare	*Serratella spiculosa*	spicilose serratellan mayfly	SR		S1	G2
Mussel	Locally rare	*Alasmidonta viridis*	slippershell mussel	E		S1	G4G5
Mussel	Locally rare	*Elliptio dilatata*	spike	SC		S1	G5
Mussel	Locally rare	*Epioblasma capsaeformis*	oyster mussel	EX	E	SX	G1
Mussel	Locally rare	*Lampsilis fasciola*	wavy-rayed lampmussel	SC		S1	G4
Mussel	Locally rare	*Pleurobeme oviforme*	Tennessee clubshell	SR	FSC	S1?	G3
Mussel	Locally rare	*Toxolasma lividus*	purple lilliput	EX	FSC	SX	G2
Mussel	Locally rare	*Villosa constricta*	notched rainbow	SR(PSC)		S3	G3
Mussel	Locally rare	*Villosa delumbis*	Eastern creekshell	SR		S3	G4
Mussel	Locally rare	*Villosa iris*	rainbow	SC		S1	G5
Mussel	Locally rare	*Villosa trabilis*	Cumberland bean	SR	E	S1	G1
Mussel	Locally rare	*Villosa vanuxemensis*	mountain creekshell	T		S1	G4
Snail	Locally rare	*Elimia (Goniobasis) interrupta*	knotty elimnia	E		S1	G1
Snail	Locally rare	*Leptoxis virgata*	smooth mudalia	SR	FSC	SU	G2
Stonefly	Locally rare	*Attaneuria ruralis*	a stonefly	SR		S2?	G4
Stonefly	Locally rare	*Bolotoperla rossi*	a stonefly	SR		S3	G4
Stonefly	Locally rare	*Isoperla frisoni*	a stonefly	SR		S3	G5

Group	Designation*	Scientific Name	Common Name	NC Status	US Status	NC Rank	Global Rank
Stonefly	Locally rare	*Megaleuctra wouldiamsae*	Wouldiams' rare winter stonefly	SR		S1	G2
Stonefly	Locally rare	*Zapada chila*	a stonefly	SR		S1S2	G2

* **Endangered (E) or Threatened (T):** as listed by the U.S. Fish and Wildlife Service
Sensitive (S): as listed by the U.S. Forest Service (Region 8, 2001)
Locally Rare (LR): as listed by the National Forests in North Carolina, must meet at least **one** of the following:
1. State Rank S1, S2, or S3
2. Federal Species of Concern
3. State Threatened or Endangered

Definitions

Threatened, or Endangered (T&E) is a species that has been listed or is proposed for listing by the United States Fish and Wildlife Service. These species are included in every BE conducted for projects where the species is known to, likely to, or may occur. These species are also included in projects where the species occurred historically but hasn't been found during recent surveys.

Sensitive Species (S) is a species appearing on the Regional Forester's Sensitive Species List for the Southern Region (August 7, 2001). These species are included in every BE conducted for projects within an area where the species is known to, likely to, or may occur.

Known to Occur: those species in which there are records that they exist within a specified area, or it was found in the area during project specific surveys.

Likely to Occur: those species in which there is no documentation of the species occurring in a specified area but are expected to occur based on documentation of very similar habitat to known populations. For purposes of the BE, it should be assumed that the species does occur in specified area until presence/absence of the species is verified.

May (could) Occur: the species probably occurs in a specified area in the broadest sense. Only very general habitat preferences and species distribution are used to determine if a species may occur. This does not imply their existence in an area, but that their general habitat description is found in the area, so therefore the species may occur. See the attached resource reports for "may occur".

Forest Plan Analysis Area (AA): 4th order watersheds as determined by the Forest Plan.

Biological Analysis Area: The maximum geographic boundary where cumulative biological effects of analyses from past, present, and reasonably foreseeable actions are expected to be combined with effects from the proposal. Analysis areas are specific to individual resources and may be different boundaries. The **botanical AA** is the total area within 2 kilometers of any proposed unit (activity area) or known EO (Element occurrence) of any plant T&E, S, and FC species. The botanical AA consists of 5,478 acres. The **wildlife AA** is the Forest Plan AA, a total of 1,736 acres and includes compartments 22, 23, and 24. The aquatic analysis includes activity area waters and AA waters. Activity area waters are defined as those in the area of potential site-specific impacts to aquatic habitat and populations. The **aquatic AA** encompasses waters downstream that potentially could be impacted by project activities, in addition to activity area waters. The aquatic AA is larger than the activity area.

Management Area: Forest Plan designated areas with specific management objectives, standards, and guidelines.

Project Area: The general location identified by the Responsible Official where actions are proposed.

Activity Area: The geographic boundary where direct effects of the proposal would specifically occur, i.e. specific timber stands, haul routes, temporary roads, linear wildlife fields, trails, prescribed fire, areas where invasive exotic species would be treated, etc. and would change by alternative.

Coldwater Streams: Are usually defined as those with maximum temperatures of 68 degrees F or less. In North Carolina, these streams are largely ground-water fed, have relatively stable flows and generally elevations of 1,100 feet or more. They have gradients that are steep with stable banks. Boulder-rubble dominates their bottoms, and their turbidity is low. Productivity is usually limited.

Coolwater Streams: Represent the transitional community between coldwater streams and warmwater streams. Components of the community may include elements of both coldwater and warmwater habitats.

Warmwater Streams: Are characterized by having annual maximum temperatures greater than 68 degrees F.

APPENDIX B – AGE CLASS DISTRIBUTION

The Shope Creek proposal extends across the administrative watershed or analysis area (AA) 2, referred to as the Shope Creek AA, which includes compartments 22, 23, and 24. This AA is dominated by management areas that are suitable for timber production.

The entire AA is under Management Area (MA) 4D, with an objective to [e]*mphasize high quality habitats for wildlife requiring older forests and freedom from disturbance from motorized vehicles. Allow small widely dispersed openings throughout the management area. Close most roads to private motorized vehicles. Early successional habitat is provided in conjunction with managing suitable timber land in the areas* (Forest Plan, page III-78). The age-class distribution for this area is unbalanced for MA 4D.

This analysis determines the minimum and maximum harvest levels for the proposal according to the Forest Plan.

Forest Plan Direction for Distribution of Early Successional Habitat

The Forest Plan contains specific desired conditions for the amount of 0-10 year age-class in management areas with timber production (Forest Plan, pages III, 29-31). Regulation is at three scales: the watershed or topographic level; the management area within the watershed or topographic area; and the compartments within the area.

The tables below summarize existing 0-10 year age-class and regeneration goals for the Shope Creek proposal in AA 2. Uncut inclusions and non-forested areas are not considered as 0-10 year old regeneration.

Topographic or AA Analysis

For every analysis area with at least 250 acres in MAs 1B, 2A, 3B, 4A and/or 4D, the number of acres in each management area is multiplied by the maximum percent allowed and then summed to determine the amount of 0-10 year age-class allowed in the AA.

Table B-1: AA 2 Calculations 0-10 Year Age-Class

		0-10 YEAR AGE CLASS			HARVEST GOALS		SHOPE CREEK PROPOSAL	
AA 2	Suitable Acres	Min. Desired	Max Allowed	Existing 0-10 Yr	Min.	Max.	Proposed Harvest Acres	Percent* 0-10 Yr
Shope Creek	1,356	80	135	0	n/a	135		

*Percentages of forested acres in 1B, 2A, 3B, 4A, or 4D

Management Area Analysis

For every MA with at least 250 acres in the analysis area, the amount of 0-10 year age-class allowed in the management area is calculated by multiplying the number of acres in each management area in the analysis area by the maximum percent allowed. Each result is the amount of 0-10 year age-class allowed in that management area.

Table B-2: Management Area Calculations 0-10 Year Age-Class

		0-10 YEAR AGE CLASS			HARVEST GOALS		SHOPE CREEK PROPOSAL	
MA	Forested Acres	Min. Desired	Max. Allowed	Existing 0-10 Yr	Min.	Max.	Proposed Harvest Acres	Percent 0-10 Yr
4D	1,356	80	135	0	n/a	135		

Compartment Area Analysis

For every compartment with at least 250 acres in MA 1B, 2A, 3B, 4A, or 4D, the amount of 0-10 year age-class allowed in each compartment is calculated by determining which of the MA's has the most acres in the compartment (1B, 3B, 2A, 4A, or 4D). If 1B and 3B have the most, then the maximum allowed in the 0-10 year age-class is 15 percent of all acres in the compartment. If 2A, 4A, or 4D have the most acres, then the maximum amount allowed in the 0-10 year age-class is 10 percent of all acres in the compartment. The following table shows the age-class by compartment:

Table B-3: Shope Creek Analysis Area 2 Compartment 22 0-10 Year Age Class

		0-10 YEAR AGE CLASS			HARVEST GOALS		SHOPE CREEK PROPOSAL	
MA	Forested Acres	Min. Desired	Max. Allowed	Existing 0-10 Yr	Min.	Max.	Proposed Harvest Acres	Percent 0-10 Yr
4D	371	-	-	0	-	-	-	-

Table B-4: Shope Creek Analysis Area 2 Compartment 23 0-10 Year Age Class

		0-10 YEAR AGE CLASS			HARVEST GOALS		SHOPE CREEK PROPOSAL	
MA	Forested Acres	Min. Desired	Max. Allowed	Existing 0-10 Yr	Min.	Max.	Proposed Harvest Acres	Percent 0-10 Yr
4D								

Table B-5: Shope Creek Analysis Area 2 Compartment 24 0-10 Year Age Class

		0-10 YEAR AGE CLASS			HARVEST GOALS		SHOPE CREEK PROPOSAL	
MA	Forested Acres	Min. Desired	Max. Allowed	Existing 0-10 Yr	Min.	Max.	Proposed Harvest Acres	Percent 0-10 Yr
4D								

APPENDIX C – OLD GROWTH COMMUNITIES ANALYSIS

Forest Plan Direction for Old Growth Restoration Patches

The Forest Plan contains specific directions for designating large, medium, and small old growth restoration patches (Forest Plan, pages III-26 – II-28). The administrative watershed, or analysis area (AA) affected by this proposal is 2 (Shope Creek). The requirements for this project are as follows: (1) select small patch old growth for compartments 23 and 24; and (2) field check stands in the initial inventory of old growth that would be directly affected by this project.

Initial Inventory of Old Growth and Small Patch Designation

There are several patches of initial inventory old growth identified in the Forest Plan. There is currently no designated large patch old growth within the analysis area.

The purpose of the small patches is to increase biological diversity and to provide structural components of old growth at the stand and landscape levels. There are currently no small old growth patches in the AA. The proposal for old growth is the same in the action alternatives. The following stands would be designated as small patches for long-term old growth retention to meet Forest Plan standards for old growth.

Table C-1: Initial Old Growth Patches Proposed in Shope Creek AA

Comp.	Acres	Stands	Age in 2007	Initial Inv.?	Forest Type
23	63	4, 5	117, 92	yes	3, 56
24	60	5, 9	92, 127	yes	53, 56

APPENDIX D – APPROPRIATENESS OF HARVEST METHODS

Regeneration methods were discussed at length in Appendix E of the FEIS for the Forest Plan, and on pages E1-E2 in Amendment 5 of the Forest Plan. Choices include shelterwood cutting and clearcutting (even-aged management system), two-age (two-aged system), and group selection (uneven-aged system). At this time, single-tree selection (uneven-aged management) is not being considered as appropriate in meeting long-term regeneration needs to sustain productive stands of desirable tree species except in northern hardwood (beech-birch-sugar maple) or hemlock stands (all shade tolerant species). This is because regeneration objectives would not be met and single-tree selection does not work with shade intolerant species as occur in the Sugarloaf or Shelton Laurel analysis areas. Thinning and sanitation cutting may also occur, but they are intermediate treatments not meant to establish regeneration.

With any method, there must be enough quantity and quality of timber to be removed to make a sale operable, i.e. economically feasible to log at a given stumpage price (stumpage is the price paid for standing timber). The minimum quantity would generally be three thousand board feet of sawtimber per acre, although markets may develop for lower value products. Sawtimber would be defined as trees that are large enough, free enough of defects, and of commercially valuable species which could be sawed into grade 3 or better lumber. Some species like scarlet oak seldom contain any grade 3 logs because of defect. Other species like sourwood seldom reach large enough diameter to become sawtimber. Changes in markets may change operability standards in a local area as well as affecting stumpage price.

Operability and stumpage price are also affected by transportation cost, logging cost, and size of the area being logged. Costs of getting logs from the stump to the mill are higher for timber in remote areas, where haul roads must be built, or for timber logged with specialized logging equipment, e.g. with cable systems or with a helicopter. As costs increase, prospective timber purchasers lower their bid prices on stumpage to compensate. If the price they can pay becomes less than the minimum acceptable stumpage price, the timber becomes inoperable (no one would buy it).

Each logging crew, depending on the size of their operation and the value of the timber to be logged, would have a minimum amount of timber that would be economical for them to move in and cut. For instance, in a given stand, it might be economical for a given logging crew to harvest a clearcut as small as 10 acres to obtain 50 MBF. If group selection is chosen, where only about 25 percent of the area is regenerated per entry, 40 acres would be needed to provide the crew with the same amount of sawtimber. Therefore, operability becomes an important factor in determining which regeneration methods are appropriate.

Much concern has been expressed over **clearcutting** as a management tool. Other regeneration methods would be used when management objectives can be met and when the other methods are economically feasible. In a memo to Regional Foresters dated June 4, 1992, the Chief of the Forest Service stated that *"Clearcutting would be limited to areas where it is essential to meet forest plan objectives and involve one or more of the following circumstances:*

1. *To establish, enhance, or maintain habitat for threatened, endangered, or sensitive species.*
2. *To enhance wildlife habitat or water yield values, or to provide for recreation, scenic vistas, utility lines, road corridors, facility sites, reservoirs, or similar development.*
3. *To rehabilitate lands adversely impacted by events such as fires, windstorms, or insect or disease infestations.*
4. *To preclude or minimize the occurrence of potentially adverse impacts or insect or disease infestations, windthrow, logging damage, or other factors affecting forest health.*
5. *To provide for the establishment and growth of desired trees or other vegetative species that are shade intolerant.*
6. *To rehabilitate poorly stocked stands due to past management practices or natural events.*
7. *To meet research needs."*

These circumstances would be referred to on a site-specific basis when showing that clearcutting is optimum for a given stand.

Regeneration using the **group selection** method is appropriate where logging costs are relatively low and where there is enough volume and value in the stands to make selection cutting operable. Group selection is not traditionally done in very small stands or on slopes greater than 40 percent where cable logging is necessary, where timber volume or value is low, or in stands where insect or disease hazards are high and widespread. It is also not appropriate where partial cutting and leaving a white pine seed source would result in conversion of mixed pine/hardwood stands to almost pure pine stands, if the accompanying long-term loss of mast production would be detrimental to local wildlife populations.

The **shelterwood** method of regeneration has been traditionally used where a residual seed source was needed for stand establishment or where new seedlings developed best with partial shade or protection from exposure. In the Appalachian Mountain region, seed from reserve trees (or "leave trees") are usually not needed to establish a new stand, but visual concerns often make shelterwood desirable. Leave trees must be those that would not likely be windthrown after having the adjacent trees cut. The residual overstory of a new shelterwood cut would look more park-like with the biggest and best trees evenly distributed across the landscape, rather than having a denuded appearance like a fresh clearcut might have. Regeneration would become established under the residual overstory. Then, at some later time depending on objectives, all or part of the overstory may be removed so it would not hinder further growth and development of the new stand. Some damage to the regeneration would occur during the overstory removal. Shelterwood is not appropriate on slopes greater than 40 percent where cable logging is necessary unless timber volume and values are very high. Shelterwood is not appropriate in stands where leaving an overstory would make the stands inoperable, or in stands where insect or disease hazards are high and widespread. It is also not appropriate where partial cutting and leaving a white pine seed source would result in conversion of mixed pine/hardwood stands to almost pure pine stands, if the accompanying long-term loss of mast production would be detrimental to local wildlife populations.

The **two-age** regeneration method is similar to shelterwood except that overstory removal is deferred indefinitely or until another two-age cut can be done. This perpetuates at least two distinct ages of timber growing on the same site. Since leave trees do not have to support another operable sale, they do not have to be merchantable and not as many have to be left. The type of leave trees retained would depend on site-specific objectives. Basal area of leave

trees should not exceed 20-30 sq ft/acre fifteen years after harvest so they would not hinder further growth and development of the new stand. More than one harvest entry may be used to reduce basal area to this level. For example, a shelterwood removal could reduce basal area from 50 sq ft/ac to 15 sq ft/ac, thus perpetuating a two-aged stand. The two-age method is appropriate in operable stands on slopes less than 40 percent whenever there are enough leave trees that would live to be a part of the stand for 50-100 years into the future. Two-age could be appropriate to meet objectives other than timber production, e.g. if continuous acorn production is needed within a stand, or if den trees are scarce, or if aesthetics is a consideration. Two-age would be appropriate on slopes greater than 40 percent if timber value is high enough to offset increased costs of selective logging with cable systems, and if visual concerns or wildlife habitat objectives cannot be met by clearcutting. Two-age is not appropriate in stands where leaving an overstory would make the stands inoperable.

The following table describes factors to be considered in determining appropriateness of regeneration methods for each stand:

Table D-1: Factors Considered in Determining Appropriate Regeneration Methods

Compartment-Stand	Acres	Volume/Acre (CCF)	Timber Quality	Leave Trees	Future Removal	Access	Special Concerns
23-12(A)	14	19	High	Y	No	Good	Disease
23-13	12	13	Medium	Y	No	Fair	
23-11	17	13	High	Y	No	Fair	
24-11	12	25	High	Y	No	Fair	
24-10	10	10	High	Y	No	Fair	
23-12(B)	3	30	High	Y	No	Good	Disease
Total Harvest	**68**						

1/ Timber Quality:	Very High	= Northern Red Oak, White Oak, Black Cherry
	High	= Large White Pine, Yellow-poplar
	Medium	= Small Diameter Sawtimber, Mixed Oak
	Low	= Small Roundwood, Scarlet Oak, Yellow Pine
2/ Leave Trees:	Y	= Well distributed, long-lived, meet objectives
	Spotty	= Available in clumps; not well distributed
	N	= Scarce, scattered, or high mortality risk
3/ Future Removal:	Yes	= Potential for operable removal of overstory
	No	= Removal would not be operable within 10 years
	Cable	= Slopes >40 percent require cable logging systems
4/ Access:	Good	= Less than 0.5 mile from existing haul road
	Fair	= 0.5-1.0 mile from existing haul road
	Poor	= Greater than 1.0 mile from existing haul road
5/ Special Concerns:	Conversion	= Risk that oak component be lost to pine
	Wildlife	= Modify to provide needs for wildlife
	Visual	= Modify to mitigate aesthetic concerns
	Insect/Disease	= High risk of loss due to SPB and/or loss due to oak decline

The following table summarizes appropriate regeneration methods for each stand and what is proposed in each alternative:

Table D-2: Appropriate Regeneration Method by Stand by Alternative

Compt-Stand	Acres	Forest Type	Age	Method Of Logging	Selection (groups <1 ac)	Shelterwood BA 30-50	Two-Age BA 15-25
23-12(A)	14	White Pine	70	Tractor	n/a	n/a	n/a
23-13	12	Up. Hwd.	70	Tractor	n/a	n/a	Yes
23-11	17	Up. Hwd.	70	Tractor	n/a	n/a	Yes

Compt-Stand	Acres	Forest Type	Age	Method Of Logging	Selection (groups <1 ac)	Shelterwood BA 30-50	Two-Age BA 15-25
24-11	12	Up. Hwd.	70	Tractor	n/a	n/a	Yes
24-10	10	Up. Hwd.	70	Tractor	n/a	n/a	Yes
23-12(B)	3	White Pine	70	Tractor	n/a	n/a	n/a

Timber Cutting Methods Considered

The following is a list of timber cutting methods which were considered in this analysis. A brief description is provided to help the reader understand these terms as they are used in this document:

Cutting for Even-aged or Two-aged Regeneration

Clearcutting

Removal, in a single cutting, of older trees to establish a new stand of trees in a fully exposed microclimate. All merchantable trees on an area are harvested, and remaining trees are cut or killed in site preparation. This method would be used only when no other method is feasible.

Shelterwood Cutting

Similar to clearcutting, except some overstory trees are temporarily left well distributed across an area to accomplish some objective. Usually 20-40 sq ft/acre of basal area is left. Depending on diameter, this could be between 10 and 50 trees per acre (fewer large trees are required to reach a given basal area). Normally, only healthy, wind-firm trees are left as overwood. After a time, usually within 10 years, the overwood is removed by logging or by other means so that it does not impede development of the younger trees that were established after the shelterwood cut.

Two-Age Cutting

Similar to shelterwood cutting except fewer overstory trees are left in place, and they are not subsequently removed, so that two distinct ages of trees are maintained on the same site. Trees left as overwood should be long-lived since they may be expected to live 120 years or more (Beck 1986).

Cutting to Establish Regeneration and Maintain at Least 3 Ages in an Area

Group Selection Cutting

Cutting small areas between 0.2 and 2.0 acre each, distributed over a large area, with the intent over time to establish three or more distinct age-classes. Width of an individual opening would be 1.5 - 2 times the height of trees adjacent to the opening. Small trees having good growth potential may be left standing within openings, and priority for openings would be where mature timber occurs. The number of openings would depend on the size of the area where selection would be used, the frequency of timber sale entry, and the desired age of the oldest trees. Intermediate harvests to improve the condition of the residual stand or to establish advance regeneration may be done between openings when needed.

Cutting to Anticipate Mortality and Improve the Growth and Vigor of the Remaining Trees without Regard for the Establishment of Regeneration

Free Thinning

Cutting trees that are diseased or damaged, suppressed by other trees or that are crowding other trees. The best trees in terms of species, size or quality are left to grow. Some minimum basal area is usually set using this type of timber stand improvement.

Sanitation Thinning

Cutting trees that have been attacked or appear in imminent danger of attack from injurious agents (such as disease or insects) other than competition between trees. The best trees in terms of species or vigor are left to grow. No minimum basal area is set using this type of timber stand improvement.

Selection Thinning

Cutting the larger trees in an area to improve the growth of the remaining trees, but leaving enough desirable, healthy trees to recapture the potential of the site and develop into larger merchantable trees themselves in a reasonable time. This may be done with yellow-poplar on a good site, but only once during a rotation (Beck 1988).

Other Terms Used

Advance Reproduction

Young trees, usually seedlings and saplings, growing in the understory of existing stands.

Rotation

The time between regeneration and final harvest.

Stand

A community of trees sufficiently uniform in composition, age, site productivity, spatial arrangement, or condition to be distinguishable from adjacent communities, thereby forming a silvicultural or management entity.

APPENDIX E – FINANCIAL EFFICIENCY

Purpose

The purpose of the financial efficiency analysis is to present the estimated costs and revenues of the alternatives considered in the Environmental Analysis for the Proposed Shope Creek Timber Sale and Associated Activities, Appalachian Ranger District, Pisgah National Forest. As per Forest Service Handbook 2409.18, each timber sale in the project proposal expected to exceed $100,000 in advertised value requires a financial analysis to determine financial efficiency.

Assumptions

For the purpose of this analysis, the following assumptions would apply:

1. Discount rate is 4%.
2. Inflation rate 0% throughout the analysis period (60 years plus).
3. Estimated timber revenues were calculated using the base prices from the Pisgah and Nantahala National Forests 3rd Quarter Adjustment Sheet for Fiscal Year 2007 issued out of the Forest Supervisor's office in Asheville, North Carolina.
4. Sale preparation costs and timber harvest administration costs were obtained from budget figures for the 2006 National Forests in North Carolina. Sale Preparation costs are approximately $175/acre and timber harvest administration costs are approximately $4,000 per year of sale (generally a sale runs three years).
5. Reforestation and silvicultural treatment costs were taken from averages of actual contract costs on the Appalachian Ranger District plus an additional 25% to cover district preparation and administration costs.
6. Road reconstruction costs were estimated at $17,500/mile.
7. A 60-year long-term projection was used to simulate the time for high quality sawtimber and as per Forest Service Handbook 2409.18, Section 13.05, Long-Term Efficiency Analysis.

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 is assumed to be 0% over the entire analysis period; a situation rarely encountered in the real world. The differences between economic values of the alternatives remain the same, regardless of the inflation rate, so constant dollars were used for comparisons between alternatives.

Financial Analysis Worksheets

Table E-1: Sale Revenue Estimates for all Alternatives

Alternative	Timber Volume (CCF)	Revenues
A	0	0
B	2,075	$171,007
C	600	$56,544

Table E-2: Sale Cost Estimates – Alternative B

Activity	Units	Number	Cost/Unit	Total Costs
Sale Preparation	CCF	2,075	$9.60	$19,920
Harvest Administration	Year	2	$4,000	$8,000
Site Preparation – Herbicide	Acres	68	$175	$11,900
Road Construction	Miles	0	$35,000	$0
Road Reconstruction	Miles	1	$17,500	$17,500
Temporary Road Construction	Miles	0	$10,000	$0
Total				**$57,320**

Table E-3: Benefit Cost Ratio – Alternative B

Year	Discount Factor	Revenue	Cost	PNV	BCR
0	0	$171,007	$57,320	$113,687	2.98
60	0.04	$6,840	$2,293	$4,547	2.98

PNV – present net value
BCR – benefit cost ratio

Table E-4: Sale Cost Estimates – Alternative C

Activity	Units	Number	Cost/Unit	Total Costs
Sale Preparation	CCF	600	$9.60	$5,760
Harvest Administration	Year	1	$4,000	$4,000
Site Preparation – Herbicide	Acres	17	$175	$2,975
Road Construction	Miles	0	$35,000	0
Road Reconstruction	Miles	0	$17,500	0
Temporary Road Construction	Miles	0	$10,000	0
Total				**$12,735**

Table E-5: Benefit Cost Ratio – Alternative C

Year	Discount Factor	Revenue	Cost	PNV	BCR
0	0	$56,544	$12,735	$43,809	4.44
60	0.04	$2,262	$509	$1,753	4.44

Salability of Shope Creek Timber Sale

Salability is determined by accessibility of timber and current markets for timber. Shope Creek is accessible from State Road (SR) 2426 (Shope Creek Road), and Forest Service Road (FSR) 220. Road reconstruction is necessary to access most units; however, road costs are estimated to be approximately $22,500, well below the value of the timber to be removed. The timber quality is high within the proposed sale units. The market for quality timber is good within western North Carolina. Recent timber sold on the Pisgah National Forest show revenues have been higher than estimated – there are no problems anticipated in selling the Shope Creek timber sale if offered.

APPENDIX F – PROJECT DESIGN FEATURES FOR HERBICIDE USE

Herbicide Application Project Design Features (see also Forest Plan, Appendix I, pages I-10 – I-14)

1. Herbicides are applied according to labeling information and the site-specific analysis done for projects. This labeling and analysis are used to choose the herbicide, rate, and application method for the site. They are also used to select measures to protect human and wildlife health, non-target vegetation, water, soil, and threatened, endangered, proposed, and sensitive species. Site conditions may require stricter constraints than those on the label, but labeling standards are never relaxed.
2. Only herbicide formulations (active and inert ingredients) and additives registered by EPA and approved by the Forest Service for use on National Forest System lands are applied.
3. Public safety during such uses as viewing, hiking, berry picking, and fuelwood gathering is a priority concern. Method and timing of application are chosen to achieve project objectives while minimizing effects on non-target vegetation and other environmental elements. Selective treatment is preferred over broadcast treatment.
4. Areas are not prescribed burned for at least 30 days after herbicide treatment.
5. A certified pesticide applicator supervises each Forest Service application crew and trains crew members in personal safety, proper handling and application of herbicides, and proper disposal of empty containers.
6. Each Contracting Officer's Representative (COR), who must ensure compliance on contracted herbicide projects, is a certified pesticide applicator. Contract inspectors are trained in herbicide use, handling, and application.
7. Contractors ensure that their workers use proper protective clothing and safety equipment required by labeling for the herbicide and application method.
8. Notice signs (FSH 7109.11) are clearly posted, with special care taken in areas of anticipated visitor use.
9. No herbicide is ground-applied within 60 feet of any known threatened, endangered, proposed, or sensitive plant. Buffers are clearly marked before treatment so applicators can easily see and avoid them.
10. Application equipment, empty herbicide containers, clothes worn during treatment, and skin are not cleaned in open water or wells. Mixing and cleaning water must come from a public water supply and be transported in separate labeled containers.
11. No herbicide is ground-applied within 30 horizontal feet of lakes, wetlands, or perennial or intermittent springs and streams. No herbicide is applied within 100 horizontal feet of any public or domestic water source. Selective treatments (which require added site-specific analysis and use of aquatic-labeled herbicides) may occur within these buffers only to prevent significant environmental damage such as noxious weed infestations. Buffers are clearly marked before treatment so applicators can easily see and avoid them.
12. During transport, herbicides, additives, and application equipment are secured to prevent tipping or excess jarring and are carried in a part of the vehicle totally isolated from people, food, clothing, and livestock feed.
13. Only the amount of herbicide needed for the day's use is brought to the site. At day's end, all leftover herbicide is returned to storage.
14. Herbicide mixing, loading, or cleaning areas in the field are not located within 200 feet of private land, open water or wells, or other sensitive areas.
15. During use equipment to store, transport, mix, or apply herbicides is inspected daily for leaks.

APPENDIX G – PROJECT-LEVEL ROADS ANALYSIS

Background

In August 1999, the Washington Office of the USDA Forest Service published Miscellaneous Report FS-643 titled: *Roads Analysis: Informing Decisions about Managing the National Forest Transportation System*. The objective of roads analysis is to provide decision makers with critical information to develop road systems that are safe and responsive to public needs and desires, are affordable and efficiently managed, have minimal negative ecological effects on the land, and are in balance with available funding for needed management actions.

Products

The product of an analysis is a report for decision makers and the public that documents the information and analyses used to identify opportunities and set priorities for future national forest road systems. Included in a report is a map displaying the known road system for the analysis area, and the risks and opportunities for each road or segment of road. A report may also include other maps and tables necessary to display specific priorities and changes in a road system.

Objectives

This roads analysis evaluates the existing condition of the transportation system within the Shope Creek Project Analysis Area (AA). The Shope Creek AA is approximately 1225 acres in size. The area in bounded by the Blue Ridge Parkway to the north and by private land holdings to east, south, and west. The roads analysis is being completed for information and support of the environmental assessment and the decision to be made for the Shope Creek Project. This report includes the analysis of all system classified Forest Service Roads (FSRs) within the project's AA as well as making recommendations for some of the existing unclassified roads. Objectives of the Shope Creek Project roads analysis are:

- *Identification of needed and unneeded roads.*
- *Identification of road associated environmental and public safety risks.*
- *Identification of site-specific priorities and opportunities for road improvements and decommissioning.*
- *Identification of areas of special sensitivity or unique resource value that may require specific road management.*
- *Provide other specific information that may be needed to support the Shope Creek Project.*

Identification of Needed and Unneeded Roads

This analysis includes the Shope Creek Analysis Area (AA) and is within the scope of the Shope Creek Project decision to be made. Forest Plan transportation system management and Road Management Objectives (RMOs) need to be reviewed concurrently with most resource

management projects. The designation of RMOs is to establish the intended purpose of an individual road based on management area direction and Forest Plan access management objectives. RMOs contain design, operation, and maintenance criteria.

Table G-1: Inventory of All System (classified) Forest Service Roads (FSR) within the Shope Creek AA

FSR No.	FSR Name	Analysis Area	Length in Miles	Road Management Objectives (RMO)	Mgmt. Area	Status
220	Shope Creek	Shope Creek	0.60	D3	4D	Closed
220A	Shope Creek	Shope Creek	0.40	D1	4D	Closed

State Road 2426 is the only access to the area. It is a paved, double-lane secondary road which ends approximately 200 feet from National Forest System lands. Forest Service Roads 220 and 220A provide access to the southern portion of the AA. Forest Service Road 220A is listed as a linear wildlife opening, but has not been maintained as such.

Table G-2: Inventory of All Needed Non-system (unclassified) Roads within the Shope Creek AA

ID No.	Analysis Area	Length in Miles	Road Management Objectives (RMO)	Mgmt. Area	Status
A	Shope Creek	0.35	D0	4D	Closed
B	Shope Creek	0.92	D0	4D	Closed
C	Shope Creek	0.89	D3	4D	Closed
E	Shope Creek	0.24	D0	4D	Closed
F	Shope Creek	0.43	D0	4D	Closed
H	Shope Creek	0.80	D0	4D	Closed
I	Shope Creek	0.78	D0	4D	Closed
J	Shope Creek	0.19	D0	4D	Closed

As shown in Table G-2, there are approximately 4½ miles of unclassified roads in the AA resulting from past timber harvesting activities. For the most part these travel-ways were temporary roads and have grown up with vegetation. With the exception of roads D and G (about ½ mile), all of the unclassified roads listed in Table G-2 would be placed on the Forest's transportation system. The need for these roads exists because of future forest management activities and fire suppression/prevention. There is some unauthorized all-terrain vehicle (ATV) traffic on some of these routes.

Table G-3: Inventory of All Un-needed Routes within the Shope Creek AA (to be decommissioned)

ID No.	Analysis Area	Length in Miles	Mgmt. Area	Status
D	Shope Creek	0.18	4D	Closed
G	Shope Creek	0.24	4D	Closed
User-developed trail off Road Segment B	Shope Creek	0.10	4D	Closed

The roads shown in Table G-3 are unneeded roads. These roads would be decommissioned by blading (shaping, waterbarring, and dipping), disking, and seeding with an erosion-control seed mix. These roads would not be placed on the Forest's transportation system and would not be available for future administrative needs.

Forest Plan Guidelines

The entire project area lies within MA 4D. In MA 4, most roads are closed to motor vehicles, and a somewhat remote setting is provided, but with some timber management in 4A and 4D. In MAs 4A and 4C, emphasis is placed on managing for quality scenery. In MA 4D emphasis is on providing high quality wildlife habitat, particularly for black bear. The preferred habitat for black bear includes freedom from the disturbance of motorized vehicles, some areas of older forest, a sustained supply of hard mast (such as acorns from oaks) and den trees, and small, widely dispersed openings providing the soft mast (fruits and berries) typically found in a very young forest. Timber management activities should be designed to provide these conditions. Management Area 4C tends to be fairly steep, rugged, often inaccessible terrain usually seen only from a distance by forest visitors. This land is unsuitable for timber production but can provide a scenic backdrop for people viewing the forest from a distance, while also providing wildlife habitat. The variety of wildlife species likely to be present in these management areas include ovenbird, black bear, and cerulean warbler. The visitor using these areas for recreation may occasionally encounter other people. Forest management activities are less likely to be encountered than in Management Area 1 or 3.

The lands of MA 4 are managed to provide high levels of scenic quality, many opportunities for non-motorized recreational uses and habitat for animals which prefer a predominance of older vegetation and limited disturbance. In the area, few roads are open for driving; however, some opportunities are available for use by conventional and four-wheel drive vehicles. Timber harvest areas are widely dispersed to provide a wide variety of tree ages and wildlife habitat.

This management area is subdivided into three parts – A, C, and D.

Management Area 4A
In MA 4A, permit timber production, modified to emphasize visual quality and wildlife habitat.

Management Area 4C
In MA 4C, emphasize 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.

Management Area 4D
In MA 4D, emphasize high quality habitats for wildlife requiring older forests and freedom from disturbance from motorized vehicles. Allow small widely dispersed openings throughout the management area. Close most roads to private motorized vehicles. Early successional habitat is provided in conjunction with managing suitable timber land in these areas.

Road Management Objectives

RMO D0
Road in storage. Pull culverts at live stream crossings. Use dips in lieu of culverts for cross drainage. Outslope road. Provide no maintenance except to prevent unacceptable environmental damage. Allow woody vegetation to grow on road prism. Roadway put to bed for future use.

Compatible with MAs 3B, 4A, 4D, 5, 6, and 10. By exception compatible with MA 4C. Eliminate and prohibit all unauthorized motorized access.

RMO D1
Linear wildlife opening. Maintain as linear wildlife opening. Mow roadbed annually. Brush shoulders once every three years. Maintain turnarounds suitable for fire equipment at the end of dead-end roads. Install and maintain router markers, warning, regulatory, and guide signs. Scarify, seed, and fertilize roadbed. Provide access for future timber operations and for fire protection. Compatible with MAs 3B, 4A, 4C, 4D, 14, 15, and 17. By exception compatible with Area 5. Closed with a gate or other structure. Allow occasional access for mowing operations and administrative use and fire protection. Discourage non-motorized use, but do not prohibit.

RMO D3
Restricted Low Standard Timber Haul Road. Blade every two years. Mow cut and fill slopes once every 3 years. Maintain drainage. Maintain turnarounds suitable for fire equipment at the end of dead-end roads. Install and maintain router markers, warning, regulatory, and guide signs. Use as two-wheel-drive access for timber harvesting and fire protection. Compatible with MAs 3B, 4A, 4D, 11, 14, 15, and 17. By exception compatible with MAs 1B, 13. Closed with a gate or other structure. Restricted most of the year. Access can be allowed seasonally for hunting and other public/administrative activities and fire protection. Encourage non-motorized use such as hiking, biking, and horseback riding.

Road Definitions (36 CFR 212.11)

The Federal Register published the Final Rule and Administrative Policy January 12, 2001; this established new definitions for road management on the National Forests. Listed below are the definitions for roads.

Classified Road
Roads wholly or partially within or adjacent to National Forest System (NFS) lands that are determined to be needed for long-term motor vehicle access, including State roads, county roads, privately owned roads, NFS roads, and other roads authorized by the Forest Service.

Temporary Road
Roads authorized by contract, permit, lease, other written authorization, or emergency operation, not intended to be a part of the forest transportation system and not necessary for long-term resource management.

Unclassified Road
Roads on NFS lands that are not managed as part of the forest transportation system, such as unplanned roads, abandoned travel ways, and off-road vehicle tracks that have not been designated and managed as a trail; and those roads that were once under permit or other authorization and were not decommissioned upon the termination of the authorization.

Road Decommissioning: Activities that result in the stabilization and restoration of unneeded roads to a more natural state.

Identification of Road Associated Environmental and Public Safety Risks

In following Forest Plan direction, when performing road planning and road maintenance, we must insure road stability and protection of the environment. The maintenance of all roads (open or closed) must be done at a level sufficient to provide appropriate use and protect soil, water and other resources.

Properly designed, constructed, and maintained roads incorporate outlets so that runoff water would infiltrate soils and erosion would be deposited before reaching stream channels. Access management of specific road segments with the use of gates can be used seasonally or permanently control uses such as hunting, recreation, administrative (i.e. resource or pest management) and fire protection.

Improperly maintained roads can be a source pollutant to water quality when inadequate or nonfunctioning outlets for runoff are not periodically inspected and maintenance performed. Such roads, if open to the public, may become a hazard to many motorized vehicles which in turn could threaten public safety via vehicle accident or limit emergency fire protection access.

A proper combination of RMOs and access management (seasonal or permanent closures) of FSRs must be implemented to ensure the integrity of resources (i.e. wildlife, recreation, and road stability) in order to protect the environment while minimizing risks.

Identification of Site-Specific Priorities and Opportunities For Road Improvements and Decommissioning

Approximately one mile of existing road would be reconstructed by blading (shaping, waterbarring and dipping), placing gravel and re-installing culverts in order to access harvest units. About four miles of old “woods” roads would be placed onto the Forest’s transportation system following harvest related activities. These roads would be shaped, waterbarred, disked, seeded with an erosion-control seed mix, and available for non-motorized use following project implementation as well as future administrative needs.

Woods roads D (about ¼ mile in length) and G (about ¼ mile in length) along with a user-developed trail segment off woods road B (about 1/10 mile in length) would be disked and seeded following timber related activities. These segments of road would not be placed on the Forest’s transportation system and would not be available for future administrative access needs because they are unnecessary for access. These roads also run parallel to streams. The removal would be beneficial to aquatics and wildlife. There would be no new classified road construction within the AA.

Identification of Areas of Special Sensitivity or Unique Resource Value That May Require Specific Road Management

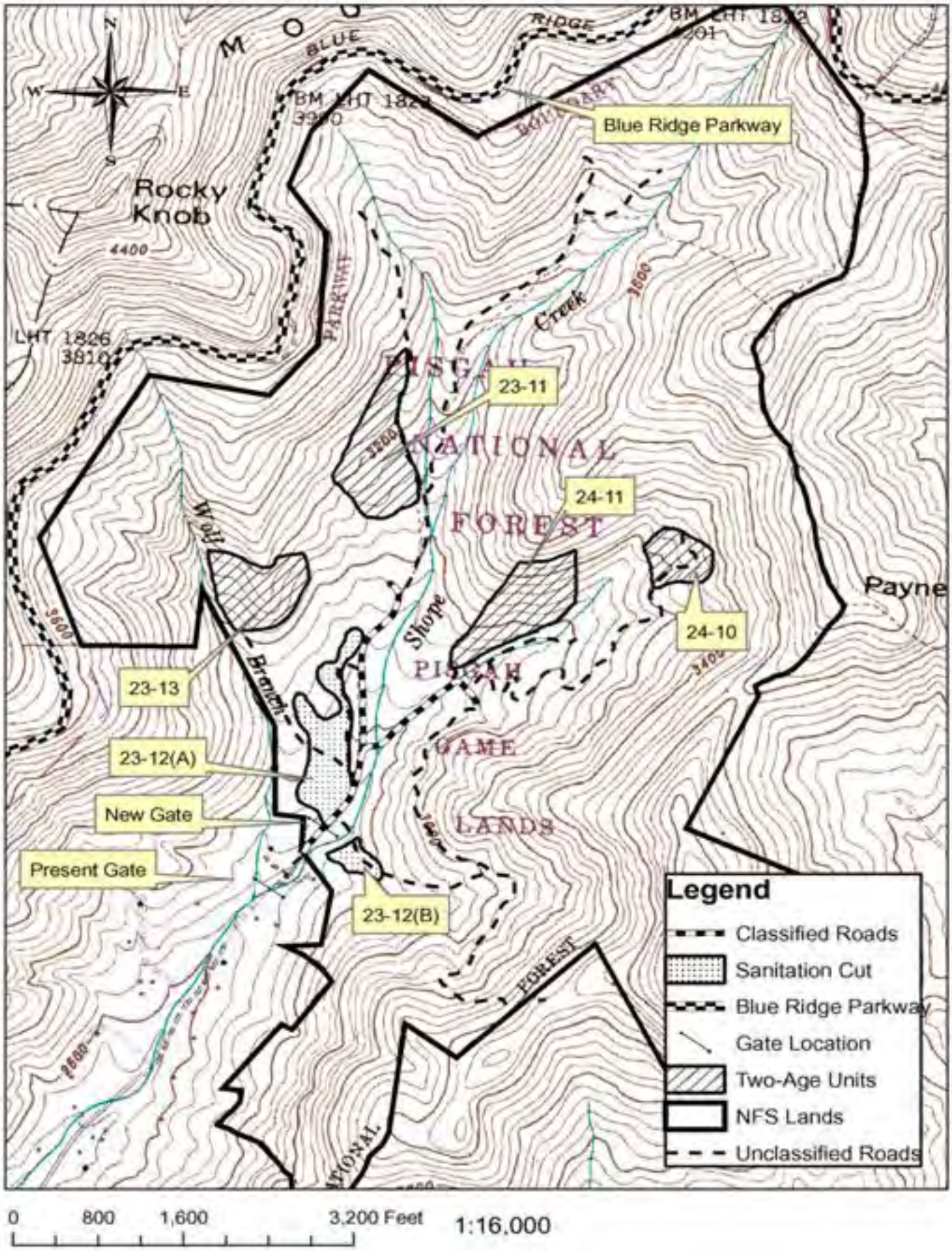
There are no areas of special sensitivity or unique resource value that would require specific road management.

Provide Other Specific Information that may be Needed to Support the Shope Creek Project Decision

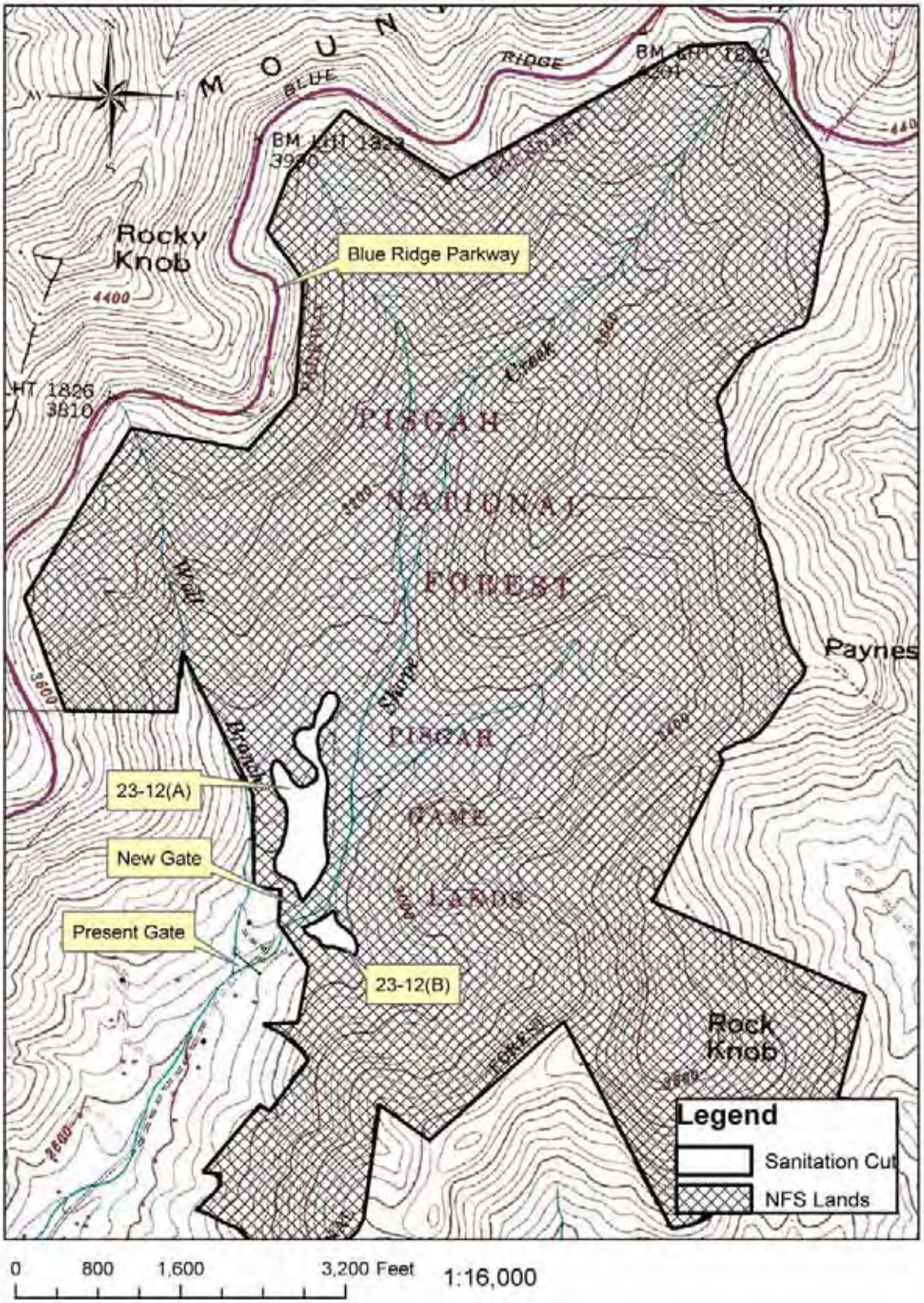
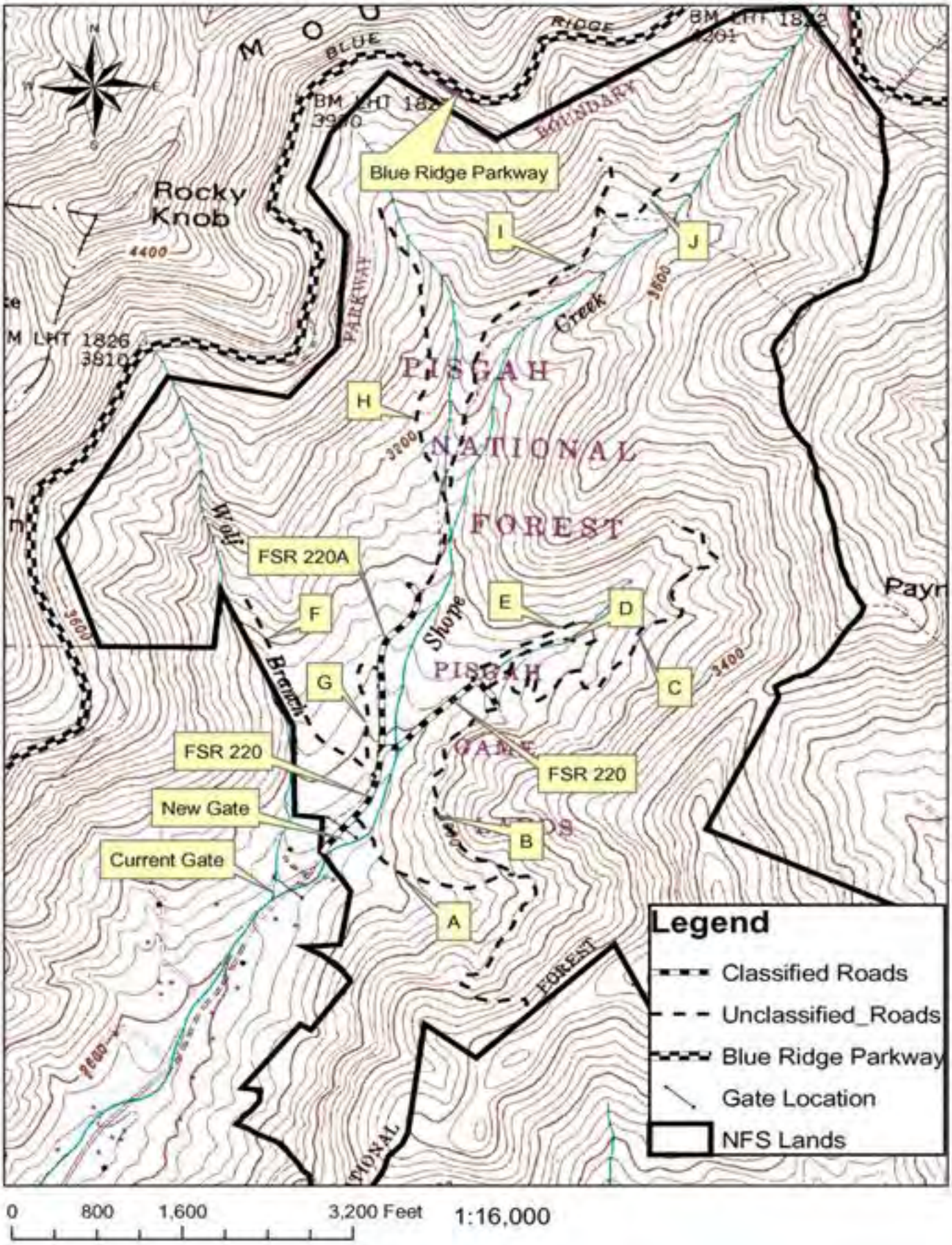
A new gate would be installed on NFS lands to provide non-motorized public access for recreation users. A turnaround would be developed at the gate and parking made available for 3-5 vehicles. Forest Service personnel would work closely with state, county, and municipal law enforcement agencies to manage/control use in the area.

SHOPE CREEK PROJECT MAPS

Alternative B



Alternative C



Existing Roads