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: 1950-1
Date: August 16, 2005

Dear Interested Members of the Public and Forest Users:

Enclosed is information my staff has assembled to date evaluating the Shadline Project on the Appalachian Ranger District, Pisgah National Forest. The project is located in Madison County in the Polecat and Rich Mountain analysis areas. Three alternatives have been developed and are currently being analyzed; Alternative A – No Action, Alternative B – Proposed Action, and Alternative C. A decision will be made that selects one of these alternatives or a modification of one.

Your comments need to be as specific as possible and you 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), comments must be postmarked or received within 30 days beginning the day after publication of this notice in *The Asheville Citizen-Times*. 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; regular mail to: Appalachian Ranger District, Attn: District Ranger, PO Box 128, Burnsville, NC 28714; or faxed to 828-682-9179.

I encourage your participation during this 30-day notice and comment period on the information summarized to date to allow me the opportunity to solidify our analysis and complete the environmental assessment (EA). Please note that I am requesting your comments under 36 CFR 215 earlier in the process than with previous projects. By taking your comments now, I believe we can ensure our analysis satisfactorily addresses the issues and effects and the final documentation will be complete and clearly focused. I believe the enclosed information is detailed enough for you to provide substantive, meaningful comments. Following this 30-day notice and comment period, I will be publishing a decision with the EA. Pursuant to 36 CFR 215.11(a) and 215.15(a), my decision will initiate a 45-day appeal period,

Please contact Michael Hutchins, Interdisciplinary Team Leader at 828-682-6146, or Linda Randolph, Project Leader at 828-622-3202 if you have questions concerning this proposal. Thank you for your continued interest in management of the National Forests in North Carolina.

Sincerely,

/s/PL Bradley

PAUL L. BRADLEY
District Ranger

Enclosure

United States
Department of
Agriculture

Forest
Service

August
2005

Preliminary Analysis

Shadline Project

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

Shadline Project

Preliminary Analysis

Location of Action:	Appalachian Ranger District Pisgah National Forest Madison County, North Carolina
Lead Agency:	USDA Forest Service
Responsible Official:	Paul L. Bradley District Ranger 30 US Highway 19 Burnsville, NC 28714
For More Information:	Linda Randolph Project Leader (828) 622-3202 (828) 622-3352 (fax) Michael Hutchins ID 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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SUMMARY

The Pisgah National Forest proposes to: harvest about 74 acres using the two-age regeneration harvest prescription and about 69 acres using the group selection harvest prescription in the Polecat and Rich Mountain & Mill Ridge analysis areas (AAs); construct about 0.5 miles of temporary road; site prepare with herbicides if needed on the 74 acres of two-age harvest; control invasive exotic plants with herbicide along Forest Service Roads (FSR) adjacent to harvest areas before being cut, along other FSRs and trails within the AAs, and near Runion and within the Moye tract; control about 33 acres of invasive grape with herbicide in stand 423-23 while retaining ¼ acre of arbor per 10 acres treated; plant hard mast producing species where feasible including blight resistant American chestnuts if seedlings become available; daylight along FSRs 467 and 3524, and daylight and enhance linear grass/forb wildlife openings on ½ mile of skid road and FSRs 3578 and 3514; use Imazapic herbicide to eradicate fescue in several existing wildlife fields and refurbish the fields with a clover/warm season grass mix along with lime and fertilizer (autumn olive would be controlled but not eliminated in the fields); constructed log landings would be seeded following harvest with a clover/approved wildflower mix and an old variety species of apple or other fruit trees would be planted; apple, pear, peach, and persimmon trees in existing wildlife fields would be released; improving access to two wildlife fields; develop two additional trails within the Polecat AA; plant a row of yellow pine in the Moye tract along State Road 1304; improve a scenic vista on Mill Ridge; slash down and apply herbicide and possibly sell firewood in portions of stands 425-10 and 425-12; and designate 186 acres of small patch old growth in Compartments 420, 422, and 423. The project area is located about three miles north and west of Hot Springs, North Carolina, Madison County and is within the Appalachian Ranger District, Pisgah National Forest.

This action is needed because: age-class distribution in stands within the project area is not balanced; previously harvested stands are being out-competed by vegetation and impacted by southern pine beetle; invasive exotic vegetation is established in the AAs and may become established in additional areas after implementation; wildlife habitat is not as vigorous and developed as desired; and there are opportunities to: better protect wildlife along the French Broad River, improve recreation opportunities in the AAs, and improve vegetation diversity in the AAs.

In addition to the proposed action (Alternative B), the Forest Service also evaluated the following alternatives:

- *Alternative A – No Action Alternative*
- *Alternative C – No daylighting along roads, no non-motorized trail developed within the Moye Tract, eliminate Autumn olive within wildlife fields and replant with a suitable non-invasive species, and designate small patch old growth*

Based upon the effects of the alternatives, the responsible official will decide to select the no-action alternative, an action alternative, or a modification of an action alternative.

CHAPTER 1 – PURPOSE AND NEED

1.1 Document Structure

The Forest Service has prepared this preliminary analysis to initiate compliance with the National Environmental Policy Act (NEPA) and other relevant Federal and State laws and regulations. This preliminary analysis discloses the direct, indirect, and cumulative environmental impacts that may result from the proposed action and alternatives. The document is organized into four parts:

- *Chapter 1 – Purpose and Need:* This section includes information on the history of the project proposal, the purpose of and need for the project, and the agency's proposal for achieving that purpose and need. This section also details how the Forest Service informed the public of the proposal and how the public responded.
- *Chapter 2 – Alternatives:* This section provides a more detailed description of the agency's proposed action as well as alternative methods for achieving the stated purpose. These alternatives were developed based on key issues raised by the public and other agencies. This discussion also includes possible mitigation measures. This section also provides a summary of the environmental consequences associated with each alternative.
- *Chapter 3 – Environmental Consequences:* This section describes the environmental effects of implementing the proposed action and other alternatives. This analysis is organized by key issues.
- *Chapter 4 – Preparers and Public Involvement:* This section provides a list of preparers and members of the public consulted during the development of this preliminary analysis.
- *Appendices:* The appendices provide more detailed information to support the analyses presented in this preliminary analysis.

1.1.1 Project Record

This preliminary analysis incorporates by reference the project record (40 CFR 1502.21). The project record contains specialist reports and other technical documentation used to support the analysis and conclusions in this preliminary analysis. The specialist reports provide additional detailed analysis. This preliminary analysis 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 determine the Forest-wide population trends for MIS species.

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

1.2 Background

The proposed action is located in the 10,554 acre Rich Mountain and Mill Ridge Analysis Area 13 (AA) and the 5,439 acre Polecat AA 14 (15,993 total acres – see Vicinity Map at the end of this chapter). The AAs are within Compartments 418, 419, 420, 421, 422, 423, 424, 425, 426, 427, 428, 429, 430, 431, and 432. The two AAs are within several Management Areas, each of which has unique goals and appropriate management direction and standards to achieve these goals as described in the Land and Resource Management Plan, Amendment 5 for the Nantahala and Pisgah National Forests North Carolina (1994), hereafter called the Forest Plan (Forest Plan, page III-54). The following MAs are within the two AAs: MAs 1B, 2A, 2C, 3B, 4A, 4C, 4D, 13, 14, and 18. Management Area 1B is managed to emphasize a sustainable supply of timber and providing motorized access into the forest for traditional uses (Forest Plan, page III-57). Management Area 2A is managed to provide visually pleasing scenery for forest visitors and is suitable for timber production (Forest Plan, page III-63). Management Area 2C is managed to provide visually pleasing scenery and is unsuitable for timber production (Forest Plan, page III-63). Management Area 3B is managed to emphasize a sustainable timber supply (Forest Plan, page III-71). Management Area 4A is managed for timber production but emphasizes visual quality and wildlife habitat (Forest Plan, page III-77). Management Area 4C is managed emphasize visually pleasing scenery and habitats for wildlife requiring older forests, and is unsuitable for timber production (Forest Plan, Page III-77). Management Area 4D is managed provide high quality habitats for wildlife requiring older forests and freedom from motorized vehicles (Forest Plan, page III-78). Management Area 13 is managed to protect, and where appropriate, foster public use and enjoyment of unique scenic, geological, botanical or zoological attributes (Forest Plan, page III-144). Management Area 14 is the Appalachian Trail and corridor and is not selected for timber production (Forest Plan, page III-148). Management Area 18 lands are embedded in other management areas of the AA. These lands are to be "*...actively managed to protect and enhance, where possible, the distinctive resource values and characteristics dependent on or associated with these systems. For example, timber management can only occur in this area if needed to maintain or enhance riparian habitat values*" (Forest Plan, page III-179). In addition to lands assigned a MA, 1,134 acres (which includes 353 acres called the Moye Tract) are undesignated.

The AAs are the range that cumulative effects can reasonably be analyzed. Some resources (e.g. botanical) may have smaller analysis areas as effects to that specific resource may be more localized and not expected to be realized to the full analysis area boundaries.

This preliminary analysis tiers to the Final Environmental Impact Statement (FEIS) for the Forest Plan and to the FEIS for Vegetation Management in the Appalachian Mountains (VMAM).

1.3 Proposed Action

The Proposed Action has been developed by the Forest Service to meet the Purpose and Need of this project. A more detailed discussion on the Proposed Action is located in Chapter 2, Section 2.2.2. The Proposed Action would:

- Harvest about 74 acres using the two-age regeneration harvest prescription and retaining 20-25 ft^2 of basal area per acre, and harvest about 69 acres using the group selection harvest prescription;

- Construct about 0.5 miles of temporary road;
- Use and maintain the existing road and skid trail system;
- Site prepare and subsequently release, if needed with herbicide (Triclopyr) all stands being regenerated. Control invasive exotics along roads adjacent to harvest areas before they are cut and place notification signs along the Appalachian Trail. Control invasive grape with herbicide (Triclopyr) on about 33 acres in stand 423-23. For every 10 acres treated, ¼ acre of grape arbor would be maintained. Plant hard mast producing species where feasible including blight resistant American chestnuts if seedlings become available;
- Maintain Forest Service Road 467 (Rich Mountain Road), and Forest Service Road 3524 (Shirley Brooks Road) by daylighting. Daylighting would be done along much of the length but would not be done where topography prohibits it or where no-harvest standards for perennial or intermittent stream crossings occur. Daylight and enhance linear grass/forb wildlife openings on ½ mile of skid road, Forest Service Road 3578 (Big Hurricane Road), and Forest Service Road 3514 (Neal Barnette Road). Following harvest, revegetate skid roadbed into clover/warm season vegetation to restore the grass/forb condition;
- Use Imazapic herbicide to eradicate fescue component in existing fields then refurbish them by using a clover/warm season grass mix, lime, and fertilizer within several existing wildlife fields in both analysis areas. Within these fields control other non native invasive plants. Autumn olive would be controlled but not eliminated in the fields;
- Following harvest, all landings constructed for harvest activities would be seeded with a clover and native wildflower seed mix and on smaller landings, an old variety species of apple or other fruit trees would be planted;
- Release all apple, pear, peach and persimmon trees in wildlife openings;
- Use herbicides (Triclopyr and Glyphosate) to control non-native, invasive exotic plants along Forest Service roads and trails within the Analysis Areas. Two concentrated areas dominated by invasive exotic plants near Runion and on the Moye Tract would also be treated;
- Improve access to two wildlife openings. Work includes repairing a slide, reducing the size of water control structures, and installing a culvert;
- Develop two non-motorized, multi-use trails within the Polecat Analysis Area but not within the Moye Tract;
- Plant a row of yellow pine along the edge of fields in the Moye Tract adjacent to State Road 1304 (Paint Rock Road);
- Improve scenic vista on Mill Ridge by removing brush and saplings on about 1 acre using mechanical hand treatments and cutting and leaving the material;
- Designate 186 acres of small patch old growth in Compartments 420, 422, and 423; and
- Improve stand conditions in portions of Stand 425-10 and 425-12 that have been damaged by southern pine beetle by slashing down and possibly selling some of the timber for firewood. This treatment would allow tree regeneration. In addition, this stand would be treated with herbicide to improve species competition and control invasive exotics.

1.3.1 Changes Between Scoping and Preliminary Analysis

Since February 2005, when scoping for this proposal was initiated until completion of this preliminary analysis, the following changes have taken place:

- The proposed multi-use trail through the Moye Tract was dropped for resource protection; and

- ◊ 186 acres of small patch old growth are proposed for designation in Compartments 420, 422, and 423 within the Appalachian Trail corridor (MA 14) and the visual boundary along Highway 25/70 (MA 2A).

1.4 Purpose and Need for Action

The purpose and need (objectives) for the Shadline Project proposal are to meet Forest Plan direction by:

- ◊ Balancing age-class distribution, improving timber stand conditions, and providing for a continuous supply of timber;
- ◊ Reducing competition and improving species composition in proposed harvest units through herbicide use;
- ◊ Controlling non-native invasive species through herbicide use;
- ◊ Creating additional recreational opportunities by designated new non-motorized, multi-use trails in the Polecat Analysis Area and improving a vista on Mill Ridge;
- ◊ Improving conditions for wildlife by creating additional early-successional habitat, maintaining and enhancing existing linear fields, and planting a screen along highly accessible wildlife fields; and
- ◊ Improving wildlife field access and water quality by improving two access roads.

1.4.1 Why Here, Why Now?

1. The existing condition of the Shadline project area has been evaluated and compared against the desired future condition for the area as described in the Forest Plan. Where resources in the project area are found to be outside the desired future condition, opportunities for moving the resources towards the desired future condition exist. The Shadline project area was chosen at this time for vegetation management over other areas on the Appalachian Ranger District because the last appreciable entry in Analysis Area 13 was over 15 years ago and in Analysis Area 14 was eight years ago. The Forest Plan schedules re-entry into MAs 1B and 3B stands every 10 years to meet early succession habitat standards (Forest Plan, pages III-60 and III-75); and every 10-15 years in MAs 2A, 4A, and 4D (Forest Plan, pages III-68 and III-85). Stands in the watershed currently do not meet Forest Plan standards for early successional habitat (Forest Plan, page III-29). Harvesting is proposed to ensure early successional vegetation in the watershed begins to achieve desired ranges allowed in the Forest Plan.
2. Forest-wide direction calls for using Integrated Pest Management to manage pest populations (Forest Plan, III-52). Currently within timber stands and along roads and trails non-native plant species are established and thriving. Use of hand-sprayed herbicides (Triclopyr and Glyphosate) throughout the project area would begin to control and reduce the spread of non-native invasive plants (including oriental bittersweet, Chinese yam, paulownia, tree-of-heaven, *Miscanthus*, and others).
3. Management Areas 3B and 4C direction calls for providing non-motorized recreation opportunities including hunting, access for fishing, wildlife viewing, horseback riding, bicycle riding, and hiking; and to construct new trails for horseback riding or bicycles primarily when needed to connect existing roads or trails (Forest Plan, pages III-73, 74, and 83). Currently there are opportunities to develop additional multi-use trails to connect to

existing roads in the Polecat AA; and there is an opportunity to improve viewing by developing a scenic vista in the Mill Ridge area.

1.5 Decision Framework

Based on the analysis disclosed in this preliminary analysis, the Responsible Official will make a decision and document it in a Decision Notice and Finding of No Significant Impact. The Responsible Official can:

- Select an action alternative that has been considered in detail, or
- Select a modified action alternative, or
- Select the No-action Alternative.

1.6 Public Involvement

The proposal was listed in the April 2005 Schedule of Proposed Actions. The proposal was provided to members of the public, organizations, and agencies for a 30-day comment period during scoping on February 16, 2005. Eight letters were received as a result of this scoping.

On February 24, 2005, the Appalachian Ranger District hosted a public open house at the Hot Springs Community Center to discuss the proposal and answer questions. Eight individuals signed in at the open house.

Using comments received from the public, agencies, and organizations during this period and at the open house as well as internal review, the interdisciplinary team (IDT) developed a list of issues to address.

1.7 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: key and non-key issues.

The Council on Environmental Quality (CEQ) regulations specifies that environmental analysis focus on significant (key) issues. Issues determined not to be significant (non-key) shall be discussed only briefly and eliminated from detailed study [40 CFR 1500.1(b), 1500.2(b), 1500.4(c), 1501.7(3), and 1502.2(b)]. The key issues will be analyzed in Chapter 3 of this preliminary analysis and will also help form the decision. The non-key issues will be disclosed here in Chapter 1 with an analysis, but not in Chapter 3. They will not be used to form the decision.

1.7.1 Key Issues

1.7.1.1 Key Issue #1: Wildlife Resource – *Developing multi-use system trails may impact wildlife*

Indicator:

- Miles of new system trail developed

1.7.1.2 Key Issue #2: Invasive Exotics – *Daylighting along system roads and constructing temporary roads may increase infestations of invasive exotic plants*

Indicator:

- ◊ Acres of daylighting
- ◊ Miles of temporary road construction

1.7.1.3 Key Issue #3: Age Class Distribution – *Age-class distributions within the analysis area are not balanced as per the Forest Plan*

Indicator:

- ◊ Acres by age class before and after implementation

1.7.2 Non-Key Issues

1.7.2.1 Non-key Issue A: Water Quality and Aquatic Habitat – *Reconstructing roads and harvest-related activities may impact water quality and aquatic habitat*

- Non-key because Forest Plan standards and best management practices (BMPs) would be implemented to reduce potential for adverse impacts

Habitat Description/Existing Condition

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

Davis Branch, Silver Mine Creek and UT Silver Mine Creek, Big Laurel Creek and unnamed tributaries to Big Laurel Creek, Little Hurricane Creek and unnamed tributaries to Little Hurricane Creek, Cook Branch, Big Hurricane Creek and unnamed tributaries to Big Hurricane Creek, Little Laurel Creek and unnamed tributaries to Little Laurel Creek and Trent Branch were surveyed by the USFS and NCWRC for brook trout. The majority of these surveys were collected during 1996. Other surveys within the project areas were taken by Carolina Power biologists in the mid 1980's to the mid 1990s. Odonate surveys of the Nantahala and Pisgah National Forests were conducted by the USFS under contract with Virginia Commonwealth University in 2003. Surveys were taken from two locations within the Shadline Aquatic Analysis area of the French Broad River. Additional information specifically addressing aquatic MIS was obtained from North Carolina Wildlife Resources Commission (NCWRC) biologists, North Carolina Natural Heritage Program (NCNHP) records, North Carolina Department of Environment and Natural Resources (NCDENR) Division of Water Quality aquatic biologists, and US Fish and Wildlife Service (USFWS) biologists.

Fish habitat exists within the analysis areas of Silver Mine Creek, Big Laurel Creek, UT 1 Big Laurel Creek, Big Laurel Creek, UT 1 French Broad River, Davis Branch (lower reaches), Big Hurricane Creek, and Little Hurricane Creek. Some of the other unnamed tributaries and Cook Branch may be used by fish during spawning and for nursery areas. There is limited habitat for fish species within the other project area waters, due to small stream size and restricted flow regimes. Project area waters provide habitat for macroinvertebrates.

Culverts along Forest Service Roads (FSRs) 113A, 113, 467 A, 3514, 3578, plus existing skid trails and roads previously used to access Group Selects, the roads themselves, and existing old roads and skid trails in the project area are the existing threats to streams and drainages. Impacts from these sources are limited to down slope movement of sediment from road runoff and

culvert fills. It is suspected that sediments from these sources are deposited in the natural vegetative filters before they reach areas of perennial water. FSR 113A and 3578 are closed to all vehicle traffic but administrative and fire control traffic (i.e. road disturbance is limited).

The Department of Natural Resources Division of Water Quality (DWQ) has two benthic macroinvertebrate monitoring sites on Big Laurel Creek and the French Broad River. Surveys were conducted in 1992, 1997 and 2002. In 2002, the French Broad River site was given the bioclassification rating of "Good-fair" and the Big Laurel Creek sites were given the bioclassification ratings were "Good" and "Excellent." These bioclassification ratings are based on species present and total taxa richness of each site.

DWQ also has fish monitoring sites on Big Laurel Creek. These sites indicate the fish population within Big Laurel Creek consists of *Oncorhynchus mykiss, Rhinichthys cataractae, Etheostoma swannanoa, Cyprinella galactura, Etheostoma blennioides, Etheostoma rufilineatum, Micropterus dolomieu, Ambloplites rupestris, Etheostoma chlorobranchium, Hypentelium nigricans, Campostoma anomalum, Luxilus coccogenis, Notropis leuciodus, and Nocomis micropogon*.

Freshwater mussel surveys were conducted in 2001 and 2003 as a part of the Department of Transportation (DOT) surveys and by the Tennesee Valley Authority (TVA). These surveys consisted of snorkeling Big Laurel Creek and the French Broad River. Species found included *Elimia proxima* and *Corbicula fluminea.*

Crayfish surveys were conducted in September of 2001 by the NCDENR Division of Water Quality. Three species were found during these surveys *Cambarus bartonii, Puncticambarus robustus,* and *Cambarus (Hiaticambarus longirostris)*.

Project area specific aquatic macroinvertebrates were sampled by the USFS in the spring and summer of 2005. Sample locations were predetermined based on location of project activity sites. Sites were located within or downstream of proposed project activities. Samples were collected by walking stream reaches and sampling various habitats by turning over rocks, investigating leaf packs and using a serber net for depositional habitats.

Additional aquatic habitat analyses are located in the aquatic report located in the project record, Appendix A, Biological Evaluation, and Appendix G, Management Indicator Species.

Effects of Access on Aquatic Resources

Alternative A (No Action)

Implementation of this 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 impacts upon the two sensitive species and the eight Forest Concern (FC) species.

Alternatives B & C

Direct Effects: Approximately 22 to 26 linear feet of the unnamed tributary to Cook Branch would be affected by the implementation of action Alternatives B or C. The installation of the culvert within UT Cook Branch would result in the permanent loss of 22 to 26 linear feet of stream substrate. However, the culvert would be sized according to National Forests in North Carolina *Culvert Sizing Protocol* which considers species present and aquatic organism passage.

The road drainage on all roads within the project area would be designed so water flows off the roaded area and enters into vegetation rather than directly into project area streams.

More mobile aquatic species such as aquatic salamanders, crayfish and fish would emigrate downstream away from the disturbed area during culvert installation. The loss of less mobile individuals such as macroinvertebrates would likely occur during this process.

Indirect Effects: There may be off-site movement of soil into project area waters from temporary skid trail construction, road reconstruction, and the installation of the culvert. Turbidity and sediment loading can cause mortality by injuring and stressing individuals or smothering eggs and juveniles. Available habitat, including the interstitial space within substrate used as spawning and rearing areas, may be covered with sediments. Episodic fluctuations in turbidity may occur after soil disturbance ends because sediments deposited within the stream bed may be re-suspended during high flow events (Swank *et al*. 2001). If habitat complexity is lost through sedimentation, a shift in the aquatic insect community could occur that favors tolerant macroinvertebrates. Larger, more mobile aquatic species, such as fish are able to temporarily escape the effects of sedimentation by leaving the disturbed area. Eggs and juveniles may be lost due to reduced habitat or suffocation. This can result in the loss of, or reduced, year-class strength, which can lead to accelerated population fluctuations and suppressed population levels. Over time, these species would recolonize areas as habitat conditions improve.

Smaller, less mobile organisms and insects may not be able to move to more suitable habitat. Populations of these species may decline locally or be lost through reduced productivity. These may recolonize from reaches of undisturbed streams as conditions improve with site rehabilitation. Implementation of contract clauses and erosion control precautions described above would minimize sediment effects and accelerate site rehabilitation.

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

Effects of Timber Harvest on Aquatic Resources

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

North Carolina Forest Practices Guidelines (NC-FPGs) and Forest Plan standards 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.

There is no plan to harvest within any 100 foot riparian area of perennial streams within the Shadline 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, IV-36.

Effects of Timber Harvest on Water Quality

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

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. Water Quality may improve with project implementation occurs as watershed issues including repairing repairing a land slide are included in all action alternatives. It is suspected that as stream banks rehabilitate and large woody debris provides a more natural pool to riffle ratio within project area streams, aquatic insect and fish populations would improve.

Effects of Timber Harvest on 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

There is no plan to harvest within the 100 foot riparian area of any analysis or project area streams. The only cutting within the riparian areas would be associated with stream crossings discussed above. Day lighting for wildlife habitat improvement involves the cutting of vegetation parallel to road beds. The day lighting associated with Alternative B has been designed so that perennial intermittent stream vegetation is not utilized; there is the possibility that as trees are cut, they would cross a stream channel or spring. While LWD in and adjacent to stream channels is desirable for aquatic habitat diversity, it needs to be of the same scale as the channel size and type. The scales of the trees and stream channels do not match, and it is possible that leaving large tree boles in the channels and across springs could result in flow obstruction. This can lead to accelerated bank scouring and failure, and subsequently, sedimentation of local and downstream channels. To avoid the potential for this habitat loss, trees accidentally felled across stream channels or springs would be removed. "Drag lanes" should not be designated for the removal of these trees to avoid severe bank disturbance. Rather, trees should be removed individually, from where they fell. It is unlikely that pulling individual trees across would result in permanent stream bank damage. Any damage done to the stream banks would most likely be temporary, as there is an abundance of herbaceous vegetation along the banks that would quickly recolonize bare soil.

Effects of Other Activities

Alternative A

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

Use of Herbicides: Herbicides are proposed in both action alternatives for the Shadline Project. Herbicides use for silvicultural treatments and their impacts to aquatic resources is analyzed in detail in the Vegetation Management Environmental Impact Statement for the Southern Appalachians (VMEIS). Included in this document is a detailed analysis of the effects of silvicultural treatments on aquatic resources. Please refer to this document for a description of such effects. No herbicide would be used within 30 feet of any perennial streams within the Shadline Project except for on headwater reaches of UT 9 and UT 11 of Little Hurricane Creek and along the French Broad River. Grapevine and non-native invasives in these areas have become a problem as are choking out other vegetation across the landscape. Treatment within the 30 foot buffer area around these two tributaries of Little Hurricane Creek and along the French Broad River with an approved herbicide near aquatics would avoid the loss of native riparian vegetation. No herbicide would be sprayed within the 30 foot designated riparian area of any other intermittent or perennial streams within the project area.

Designation of Trails in the Polecat Area: The designation of trails may have positive impacts within the Polecat Analysis Area by developing a manageable trail system within the area and prevent unauthorized trails.

Table 1-1: Summary of Potential Effects to Aquatic Resources by Project Alternatives

Issue	Alternative A	Alternatives B & C
Effects on water quality (Associated with the amount of soil disturbance)	Slight risk of degradation from undesignated trails within the Polecat Area and from not reconditioning the Locust Gap access for the maintenance vehicles for the wildlife field.	Turbidity and sediment loading may increase slightly during culvert installation. Should diminish downstream and cease with site rehabilitation.
Effects on aquatic habitat and populations	Existing habitat and population trends continue.	May temporarily affect aquatic habitat within an unnamed tributary to Cook Branch but would improve over time.
Effects to riparian areas	Remain in present state. Aquatic habitat would improve, as riparian areas grow older.	Remain in present state except at stream crossing on Cook Branch where some vegetation may have to be manipulated during culvert installation. Aquatic habitat would improve, as riparian areas grow older, increasing large woody debris in streams.
Effects of herbicide	No treatment would likely cause the replacement of native riparian vegetation with exotics.	No impact as no spraying would occur within 30 horizontal feet of streams except on UT Little Hurricane Creek where grape is encroaching upon native riparian vegetation and along the French Broad River where non-native invasive vegetation is encroaching on native vegetation.

Effects to Aquatic TES and Forest Concern Species

There are no aquatic threatened or endangered or proposed threatened and endangered species and two sensitive aquatic species within the Shadline project and analysis areas. During the project area specific surveys there were no sensitive or Forest concern aquatic organisms found. However, 2 sensitive are included in this analysis due to their habitat preferences and the presence of this habitat within the project and analysis areas and/or element of occurrence information.

Activities within the Shadline Project area would follow the riparian area guidelines along perennial and intermittent streams as stated in Forest Plan and North Carolina Best Management Practices (BMPs). There are two exceptions, one for the removal of grapevine from the headwater reaches of two unnamed tributaries to Little Hurricane Creek and the other for reducing non-native invasive plants along the French Broad River. The removal of grape would involve cut and squirt techniques and hand application would be used for the non-native invasives along the French Broad River—preventing herbicide from reaching surface water or leeching into ground water. An approved herbicide for use around aquatic resources would be used within riparian areas. During specific project area surveys, none of the members of the Forest concern aquatic insect species were present, however habitat did exist. Aquatic insects present during culvert installation may suffer mortality during disturbance at stream crossings. This disturbance may cause a temporary fluctuation in turbidity, but it is not expected to impact any of the area's aquatic resources.

There are three sensitive species (*Percina squamata, Etheostoma vulneratum* and *Cambarus reburrus* were documented by the Natural Heritage Program within the French Broad River in Madison County. *Etheostoma vulneratum* was not further considered for the Shadline analysis because the element of occurrence, or EO, was listed in 1870, indicating that the species is probably extirpated from the system. The most recent element of occurrence, or (EO), for *Percina squamata* dates back to 1977 (Natural Heritage Program information) indicating that the species is also probably extirpated from the system, however it has been analyzed further since the EO was less than 30 years ago. *Cambarus reburrus* most recent EO was 1981 according to NCNHP however recent surveys did not reveal any *Cambarus reburrus* (NCDENR September 2001 surveys).

Alternative A

The existing condition of the aquatic resources within the area would remain in their present condition. There would be no direct or indirect effects to any Proposed, Endangered, Threatened, or Sensitive or Forest Concern aquatic species.

Alternatives B & C

There would be one stream crossing in UT Cook Branch associated with the implementation of this project. Though no TES or Forest concern aquatic species were found during project area surveys, habitat exists thus they were included in the analysis. If present, individuals may be impacted by the replacement and enhancement of stream crossings associated with this project. Although individuals may be present there would be no effect to the viability of these species across the Forest as a result of project implementation. Therefore, there would be no effects of the proposed actions of Alternatives B and C to any aquatic PETS or FC species. The following table displays effects determinations for PETS and FC species:

Table 1-2: Determination of Effect of Each Alternative on the Evaluated Threatened and Endangered, Sensitive Species, and Forest Concern Species

Species	Alternative A	Alternatives B & C
Federally Threatened and Endangered Species		
None present (*Cyprinella monacha* is listed for the French Broad River from an 1888 record and is probably extirpated from the drainage)		
2002 Region 8 Regional Forester's Sensitive Species List		
Cambarus reburrus (French Broad crayfish)	No Impact. Existing condition would continue.	No impacts to individuals or species viability across the Forest.
Percina squamata (olive darter)	No Impact. Existing condition would continue.	No impacts to individuals or species viability across the Forest.
Forest Concern Species		
Cryptobranchus alleganiensis (Hellbender)	No Impact. Existing condition would continue.	No impacts to individuals or species viability across the Forest.
Ceraclea slossonae (a caddisfly)	No Impact. Existing condition would continue.	*May impact individuals
Aplodinotus grunniens (freshwater drum)	No Impact. Existing condition would continue.	No impacts to individuals or species viability across the Forest.
Cottus carolinae (banded sculpin)	No Impact. Existing condition would continue.	No impacts to individuals or species viability across the Forest.
Hiodon tergisus (mooneye)	No Impact. Existing condition would continue.	No impacts to individuals or species viability across the Forest.
Stizistedion canadense (sauger)	No Impact. Existing condition would continue.	No impacts to individuals or species viability across the Forest.
Polydon spathula (paddlefish)	No Impact. Existing condition would continue.	No impacts to individuals or species viability across the Forest.
Heterocleon petersi (a mayfly)	No Impact. Existing condition would continue.	*May impact individuals

*No TES species were found at the crossing in the project area but they have been included because the species' habitat exists within or immediately below the crossings. Although crossing replacements may impact individuals, implementation would not affect viability across Forest.

Cumulative Effects

It is very unlikely that, given the location and types of management proposed, any long-term effects on aquatic species or habitat would be measurable, and therefore contribute to cumulative effects. There has been a tremendous amount of resource specialist involvement in the planning and design of this proposal, contributing to the reduction in possible adverse effects.

Past timber projects within the analysis area of the Shadline Project date back to the 1980s and 1990s (Table 1-9, Chapter 1). Other disturbances within the AA include several private

residences along the French Broad River, and the Larman Wildfire severely burned vegetation within the Mill Ridge Area in 2001. Other impacts to the analysis area streams include illegal ORV use, use of undesignated trails located in drainage areas, and the replacement of native riparian area vegetation with invasive exotics.

Two tropical storms moved through the project and analysis areas during September of 2004 during an 8 day period. These storms released up to 14 inches of rain within 48 hours each time. Many streams within the French Broad River drainage were heavily impacted by the storm events. The Mill Ridge Area received the most impacts to during these storms of the Shadline Project areas. A culvert along FSR 113A was completely blocked. As a part of the storm recovery projects, this culvert would be replaced with a larger and more hydrologically functioning culvert. As observed in other watersheds across the Pisgah National Forest and the Appalachian Ranger District, these large storms (100 year floods or greater) often act as a "restart mechanism" for cumulative effects. Substrates in the upper reaches of the tributaries to aquatic analysis area streams have been cleaned or washed out, creating habitat for aquatic organisms which rely on interstitial space (the space between substrate particles). Interstitial space is especially important for trout species which spawn over clean substrates that allow for oxygen to reach the eggs and juveniles.

The Shadline Project action alternatives propose management outside of riparian areas and there is only one stream crossing in an unnamed tributary to Trent Branch. By placing a permanent structure at this crossing, aquatic habitat less disturbed than having a ford. As a result, the expected cumulative effects should not be any greater than the direct and indirect effects disclosed above and there should be no adverse cumulative effects to the analysis area aquatic resources, based on the project's design features included in this analysis. There are no known foreseeable ground disturbing projects scheduled in the analysis area.

1.7.2.2 Non-key Issue B: Watershed Restoration without Harvesting or Road Building – *The proposed action may impact water quality, fish habitat, wildlife habitat and other forest resources due to harvesting and road construction*

- Non-key because harvesting is required to meet Forest Plan standards for early successional habitat and purpose and need for the proposal. Concern was considered as an alternative but eliminated from detailed study (see Section 2.3.1, Chapter 2).

1.7.2.3 Non-key Issue C: Botanical Resource – *Harvest related activities may impact threatened, endangered, sensitive, Forest Concern, and Management Indicator botanical species*

- Non-key due to site-specific field verification. There would be effects to botanical resources but they would be local and would not affect populations of plants.

Existing Condition

Of the total of 56 plant threatened, endangered, and sensitive (TES) and Forest concern (FC) species known to occur in Madison Counties, North Carolina, all but 42 species 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 and FC 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, 28 plant TES and FC species could occur in the AA but are not known to occur within it or activity areas. Twenty-three plant species are known to occur within the botanical AA but not the activity areas. No T&E plants are known to occur within the activity or botanical AA areas (see botanical report, project record). A list of TES and FC plants that potentially could occur in the project or activity areas is listed in the following table and summarizes the list of TES and FC plant species that are: likely to occur[1], known to occur, or potentially could occur[2] in the botanical AA.

Table 1-3: Potential & Known TES and FC Plant Species in the Shadline Botanical Analysis Area

Species	Type	Habitat	Occurrence
Federally Threatened or Endangered (T&E) Species			
None	None	None	None known to occur in the analysis or activity areas
2002 Region 8 Regional Forester's Sensitive (S) Species List[1]			
Paravitrea placentula, Glossy Supercoil	Snail	Moist leaf litter in rich cove, northern red oak and montane oak/hickory forests with hemlock and birch.	One population known within activity area in stand 423-15
Allium cuthbertii	Vascular Plant	Low elevation granite domes, rocky areas with high pH soils.	Known to occur within the analysis area (Big Laurel) but not within activity areas.
Asplenium x ebenoides	Vascular Plant	Montane Calcareous Cliff	Known to occur within the analysis area (Paint Rock) but not within activity areas.
Buckleya distichophylla	Vascular Plant	Montane Acidic Cliffs	Known to occur within the analysis area (Lovers Leap & Big Laurel) but not within activity areas.
Cleistes bifaria	Vascular Plant	Pine-Oak Heath Woodland	Not known to occur in project or activity area.
Euphorbia purpurea	Vascular Plant	Northern Hardwood Forest, Rich Cove Forest.	Not known to occur in project or activity area.
Heuchera longiflora var. aceroides	Vascular Plant	Rich Cove Forest, Glade, Mesic Oak-Hickory Forest	Known to occur within the analysis area (Lovers Leap, etc.) but not within activity areas.
Hydrotherria venosa	Lichen	Aquatic on rock in fast moving streams.	Not known to occur in project or activity area.
Juglans cinerea	Vascular Plant	Rich Cove Forest, Montane Alluvial Forest, Mesic Oak Hickory Forest.	Known to occur within the analysis area (North side of Lover's Leap) but not within project or activity areas.
Penstemon	Vascular Plant	Rock outcrops, woodlands	Known to occur within the analysis

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

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

Species	Type	Habitat	Occurrence
smallii			area (near French Broad River) but not within project or activity areas.
Plagiochila austinii	Liverwort	Rich Cove Forest, Spray Cliff, Northern Hardwood Forest	Not known to occur in project or activity area.
Saxifraga caroliniana	Vascular Plant	Northern Hardwood Forest, Montane Acidic Cliff,High Elevation Rocky Summit	Not known to occur in project or activity area.
Silene ovata	Vascular Plant	Rich Cove Forest, High Elevation Red Oak Forest	Not known to occur in project or activity area.
Thaspium pinnatifidum	Vascular Plant	Rich Cove Forest, Mesic Oak-Hickory, Roadside	Known to occur within the analysis area (near French Broad River) but not within project or activity areas.
Trillum simile	Vascular Plant	Rich Cove Forest	Not known to occur in project or activity area.
Trillum rugellii	Vascular Plant	Rich Cove Forest	Not known to occur in project or activity area.
Forest Concern Plant Species (FC)			
Adlumia fugosa	Vascular Plant	Rich Cove Forest, Montane Acidic Cliff	Known to occur within the analysis area (near French Broad River) but not within project or activity areas.
Arabis patens	Vascular Plant	Montane Mafic Cliff, Montane Calcareous Cliff.	Known to occur within the analysis area (near French Broad River) but not within project or activity areas.
Asplenium ruta-muraria	Vascular Plant	Montane Calcareous Cliff.	Known to occur within the analysis area (near French Broad River) but not within project or activity areas.
Botrychium matricarifolium	Vascular Plant	Rich Cove Forest, Grassy Balds	Could occur in analysis area, not known to occur in project or activity area.
Carex leptonervia	Vascular Plant	Rich Cove Forest	Could occur in analysis area, not known to occur in project or activity area.
Carex oligocarpa	Vascular Plant	Rich Cove Forest	Could occur in analysis area, not known to occur in project or activity area.
Carex projecta	Vascular Plant	Rich Cove Forest, Low Mountain alluvial Forest	Could occur in analysis area, not known to occur in project or activity area.
Celastrus scandens	Vascular Plant	Rock out crops (mafic), Rich Cove Forest, Mesic Oak Hickory Forest	Could occur in analysis area, not known to occur in project or activity area.
Cephaloziella spinicaulis	Liverwort	High Elevation Rocky Summit, wet cliffs	Known to occur within the analysis area (near Paint Rock) but not within project or activity areas.
Corydalis micrantha ssp. micrantha	Vascular Plant	Montane Acidic Cliff	Known to occur within the analysis area (near French Broad River on Islands) but not within project or activity areas. (Specimen may be miss identified)

Species	Type	Habitat	Occurrence
Cheilanthes alabamensis	Vascular Plant	Montane Calcareous Cliff, Montane Acidic Cliff	Known to occur within the analysis area (near French Broad River) but not within project or activity areas.
Croton monanthogynus	Vascular Plant	Montane Calcareous Cliff, Montane Acidic Cliff, Montane Acidic Cliff	Historic record known to occur within the analysis area (near Murray Branch) but not within project or activity areas.
Dicentra eximia	Vascular Plant	Montane Acidic Cliff Montane Calcareous Cliff.	Known to occur within the analysis area (near French Broad River) but not within project or activity areas.
Draba ramamosissima	Vascular Plant	Montane Acidic Cliff, Montane Basic Cliff	Known to occur within the analysis area (Lover's Leap) but not within project or activity areas.
Fleischmannia incanata	Vascular Plant	Montane Oak Woodland	Known to occur within the analysis area (Lover's Leap) but not within project or activity areas.
Hexalectris spicata	Vascular Plant	Rich Cove Forest, glade, Mesic Oak-Hickory Forest, mafic rock	Could occur in analysis area, not known to occur in project or activity area.
Houstonia longifolia	Vascular Plant	Montane Acidic Cliff	Known to occur within the analysis area (Lovers Leap, Big Laurel) but not within project or activity areas.
Hydrastis canadensis	Vascular Plant	Rich Cove Forest, Basic Mesic Forest.	Could occur in analysis area, not known to occur in project or activity area.
Hydrphyllum macrophyllum	Vascular Plant	Rich Cove Forest, Basic Oak-Hickory Forest	Could occur in analysis area, not known to occur in project or activity area.
Melica nitens	Vascular Plant	Basic Oak-Hickory Forest	Known to occur within the analysis area (Murray Branch) but not within project or activity areas.
Meehania cordata	Vascular Plant	Rich Cove Forest, Acidic Cove Forest , Boulderfield Forest	Could occur in analysis area, not known to occur in project or activity area.
Oligoneuron rigidum var. rigdium	Vascular Plant	Open forest on basic rock	Could occur in analysis area, not known to occur in project or activity area.
Packera plattensis	Vascular Plant	Open forest on basic rock, serpentine woodland	Known to occur within the analysis area (near Murray Branch) but not within project or activity areas.
Phlox subulata	Vascular Plant	Montane Mafic Cliff, High Elevation Rocky Summit	Could occur in analysis area, not known to occur in project or activity area.
Platydicta confervoides	Moss	Moist Montane Calcareous Cliff	Historic record from Murray Branch Area (not within project or activity area)
Ruellia purshiana	Vascular Plant	Basic Oak-Hickory Forest, Mafic Rock, roadside	Known to occur within the analysis area (near French Broad River) but

Species	Type	Habitat	Occurrence
			not within project or activity areas.
Stellaria alsine	Vascular Plant	Roadside wet ditch, open springs	Known to occur in project or activity area on proposed Moye Tract trial. Also known in the analysis area (near French Broad River, Paint Rock-Murray Branch).
Symphyotrichum oblongifolium	Vascular Plant	Montane Calcareous Cliff	Known to occur within the analysis area (near French Broad River) but not within project or activity areas.
Tortula papillosa	Moss	Alluvial Forest	Historic Record. Known to occur within the analysis area (Lover's Leap) but not within project or activity areas.
Trichostema brachiatum	Vascular Plant	Rich Cove Forest	Could occur in analysis area, not known to occur in project or activity area.
Trillium recurvatum	Vascular Plant	Rich Cove Forest	Could occur in analysis area, not known to occur in project or activity area.

The following table discloses location of natural plant communities and presence of Forest concern or sensitive plants within the project area:

Table 1-4: Natural Communities and Sensitive Plant or Forest Concern Species by Unit

Stand	Natural Communities or Habitat	Occurrence of Plant TES or FC Species
422/ Scraggy Ridge group selections	Mostly, Chestnut Oak Forest some Acidic Cove Forest in drains and Montane Oak Hickory at higher elevation	No plant TES or FC known
423/10	Acidic Cove Forest in drains and Montane Oak Hickory at higher elevation in unit	No plant TES or FC known
423/15	Acidic Cove Forest in drains and Montane Oak Forest at higher elevation in unit	No plant TES or FC known
423/Little Hurricane Cr. Group Selections	Mostly, Chestnut Oak Forest Acidic Cove Forest near drains	No plant TES or FC known
424/12	Mostly, Chestnut Oak Forest Acidic Cove Forest near drains	No plant TES or FC known
425/12	About 50% Chestnut Oak Forest and Acidic Cove Forest in drains.	No plant TES or FC known
425/13	Mostly, Chestnut Oak Forest some Acidic Cove Forest near upper Creek.	No plant TES or FC known
426/1	Chestnut Oak Forest	No plant TES or FC known

Stand	Natural Communities or Habitat	Occurrence of Plant TES or FC Species
Site Prep	Various	No plant TES or FC known
Proposed Moye Tract trail	Various	*Stellaria alsine* (FC) found to exist

Only one TES or FC species has been identified in the project areas; three sites of the FC species *Stellaria alsine*. During the June 30, 2005, botanical survey along the existing old road within the Moye Tract originally proposed for development as a multi-use trail, a new population of *Stellaria alsine* was found. This new population is called the "Davis Branch" population and is located entirely in the middle of the old road.

One of the other two Forest populations of *Stellaria alsine* occurs near the French Broad River, within in the AA, and about ¾ of a mile south from the Davis Branch Population. The French Broad population has been recently relocated (Danley, 2002). The French Broad population consists of several hundred individuals. The other known Forest population occur(ed?) along the shores of Upper Creek in Compartment 94 on the Grandfather Ranger District. This very small population was found in 2003 and was a new county record. Unfortunately, flooding caused by the September 2004 tropical storms has likely damaged this population—no attempt has been made to relocate the Upper Creek population since the storms. These are the only known populations within the State of North Carolina. Limiting factors to *Stellaria alsine* are unknown. The North Carolina populations are peripheral to the main northern populations.

Alternative A – No Action Direct, Indirect, and Cumulative Effects

Under this alternative no actions are proposed and thus there would be no direct, indirect, or cumulative effects on TES or FC plant species.

Alternatives B and C Direct, Indirect, and Cumulative Effects

No TES plant species are known or expected to occur within the project area. In very broad definitions of habitat, some, or all, of the species listed above could potentially occur in activity areas. However, because of negative survey results, it is unlikely that non-detected plant TES species occur in the activity area. Because there are no known populations of TES plant species in or near the proposed activity areas, there are no known effects (direct, indirect, or cumulative) to TES species.

Stellaria alsine: This FC species was identified in the AAs. Conversion of the existing old road in the Moye Tract into a multi-use trail would directly and severely impact the newly found Davis Branch population.

The possible cumulative effects of the flooding and probable damage to the Upper Creek population and elimination of the Davis Branch population by possible trail construction would limit the known Forest populations of *Stellaria alsine* to one population. Trail construction would negatively affect and reduce the species viability of *Stellaria alsine* within the Forest and specific mitigation has been developed to protect it (Section 2.4, Chapter 2). Any potential re-routing of a multi-use trail around this population would need to be at least 100 feet away from it to ensure its protection. There are no additional foreseeable ground disturbing projects known in the analysis area.

1.7.2.4 Non-key Issue D: Cultural Resource – *Harvest related activities may impact cultural sites*

- Non-key due to site-specific field verification and avoidance. There are no known foreseeable ground disturbing projects scheduled in the analysis area.

Existing Condition

Within the project area, 10 cultural sites were identified; of which all are Class III—not eligible to the NRHP.

Alternative A – Direct, Indirect, and Cumulative Effects

Under this alternative, there would be no adverse direct, indirect, or cumulative effects to cultural resources as no ground disturbing activities are proposed.

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

Under the action alternatives, there would be no direct, indirect, or cumulative effects to significant cultural resources beccause all sites are Class III – not eligible to the NHRP.

1.7.2.5 Non-key Issue F: Soil Resource – *Harvest activities may impact soils*

- Non-key due to implementation of Forest Plan standards and guidelines and BMPs and identifying soil mapping units with erosion hazard

The following table displays soil map units and their characteristics the proposal may affect:

Table 1-5: Comparison of Soil Map Units[1]

Map Unit Name	Soil Map Symbol	Avg. Slope Percent	Characteristics
Northcove-Maymead	171E	30-50	This map unit consists of steep Northcove soils and Maymead soils on benches and coves. Northcove soils are along drainageways and Maymead soils are on crowned areas. These soils formed in colluvium weathered from phyllite, quartzite, metasandstone, metagraywacke, and slate. Northcove soils are very deep and well drained. They have a loamy surface layer and subsoil with many gravels, cobbles, and stones. Some surface stones and boulders are present. Permeability is moderately rapid and shrink-swell potential is low. Seasonal high water table is below 6.0 feet. Maymeade soils have a loamy surface layer and subsoil. They have gravels, cobbles, and stones throughout these soils. Some surface stones and boulders are present. Permeability is moderately rapid and shrink-swell potential is low. Seasonal high water table is below 6.0 feet.
Soco-Stecoah	375C,D,E,F	8-95	This map unit consists of moderately steep Soco soils and Stecoah soils on uplands. They formed in residuum weathered from metasandstone, phyllite, and slate. Soco soils are moderately deep and well drained. They have a loamy surface layer and subsoil. A significant amount of channers and flagstones are present throughout these soils. Soft bedrock is within a depth of 20 to 40 inches. Permeability is moderately rapid and shrink-swell potential is low. Seasonal high water table is below 6.0 feet. Stecoah soils are deep and well drained. They have a loamy surface layer and subsoil. A significant amount of channers and flagstones are present throughout these soils. Soft bedrock is within a depth of 40 to 60 inches. Permeability is moderate and shrink-swell potential is low. Seasonal high water table is below 6.0 feet.
Sylco-Soco	385E,F	30-95	The Sylco series consists of moderately deep, somewhat excessively drained soils on mountain ridge summits and side slopes in the Blue Ridge (MLRA 130). They formed in residuum that is affected by soil creep in the upper part, and weathered from metasedimentary rocks such as phyllite, slate, and metsandstone. Sylco soils are on mountain summits and side slopes in the Blue Ridge (MLRA 130). Elevations generally range from about 1,800 to 4,500 feet. Slope gradients range from 7 to 95 percent, but most areas as are 35 to 95 percent. The soil formed in residuum that is affected by soil creep in the upper part, and weathered from

Map Unit Name	Soil Map Symbol	Avg. Slope Percent	Characteristics
			metasedimentary rocks such as metasandstone, slate and phyllite. The Soco series consists of moderately deep, well drained, moderately rapid permeable soils on 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 coarse grained low-grade metasedimentary rocks such as metasandstone and metagraywacke, occasionally interbedded with phyllite or slate. Soco soils are on gently sloping to very steep ridges and side slopes of the Blue Ridge (MLRA 130). Elevation ranges from 1500 to 4800 feet. Slope is commonly between 30 and 70 percent but ranges from 2 to 95 percent. Soco soils formed in residuum that is affected by soil creep in the upper part, and is weathered from low-grade metasedimentary rocks such as metasandstone or metagraywacke, occasionally interbedded with phyllite or slate. Occasionally they form from residuum weathered from quartzite with a high content of feldspar.
Junaluska-Brasstown	782D	15-30	This map unit consists of moderately steep Junaluska soils and Brasstown soils on uplands. They formed in residuum weathered from phyllite, slate, quartzite, and metasandstone. Junaluska soils are moderately deep and well drained. They have a loamy surface layer and subsoil. A significant amount of channers and flagstones are present throughout these soils. Soft bedrock is within a depth of 20 to 40 inches. Permeability is moderate and shrink-swell potential is low. Seasonal high water table is below 6.0 feet. Brasstown soils are deep and well drained. They have a loamy surface layer and subsoil. A significant amount of channers and flagstones are present throughout these soils. Soft bedrock is within a depth of 40 to 60 inches. Permeability is moderate and shrink-swell potential is low. Seasonal high water table is below 6.0 feet.

1 – Soil mapping unit information taken from USDA Natural Resource Conservation Service reports. These reports are based on information collected in the field by soil scientists

The following table displays acres of soil map units affected by each alternative by proposed activity:

Table 1-6: Acres of Soil Map Units Newly Affected by Alternatives

Soil Map Unit Symbol	Proposed Activity	Alternative A (acres)	Alternative B (acres)	Alternative C (acres)
171E	Group Select Harvest	0	<1	<1
171E	Regeneration Harvest	0	1.5	1.5
Total Acres 171 Affected		**0**	**2.5**	**2.5**
375C,D,E	Group Select Harvest	0	12	12
375F	Group Select Harvest	0	9	9
375C,D,E	Regeneration Harvest	0	47	47
375F	Regeneration Harvest	0	3	3
375D,E	Temporary Road Construction	0	1	1
Total Acres 375 Affected		**0**	**72**	**72**
385E	Group Select Harvest	0	12	12
385F	Group Select Harvest	0	22.5	22.5
385E	Regeneration Harvest	0	8	8
385F	Regeneration Harvest	0	15	15
Total Acres 385 Affected[1]		**0**	**57.5**	**57.5**
782D	Group Select Harvest	0	10.5	10.5
782D	Regeneration Harvest	0	0	0
Total Acres 782 Affected		**0**	**10.5**	**10.5**

1 – Includes 20 total acres of skyline harvest

Alternative A

There would be no adverse effects to soils with this alternative. Any areas with current erosion would not be corrected. Soil displacement and compaction related to temporary road construction and landing construction would not occur.

Alternatives B & C

There are no anticipated adverse effects to soils with either of these alternatives because the soil types in the project area are all at least moderately deep and well drained (reducing potential for compaction); would not be taken out of production with classified (permanent) road construction; and would have mitigation measures (Section 2.4, Chapter 2) and Forest Plan standards (BMPs) applied to further reduce potential for compaction and long-term damage. The Forest Plan provides direction to [m]*inimize soil damage by designing all facilities to prevent damage; constructing and maintaining all facilities to prevent substantial soil movement; and exposing the minimum amount of soil practicable at any given time during project implementation* (Forest Plan, page III-42). The action alternatives propose ground disturbing actions on four general soil map units with various amounts of intensity as disclosed in the previous table. Within the 14,859 acre analysis area, Alternatives B and C propose <1% ground disturbance. This percentage would likely be even lower due to cable logging systems, as per Forest Plan standard 7a on page II-34 (less area disturbed due to narrower log yarding corridors) and designated tractor logging corridors. Designated corridors eliminate tractor logging equipment impacting every acre in each timber stand. In addition, each of the soil map units affected are either moderately deep to very deep and are well drained; indicating soil stability, and a reduced potential for erodibility and compaction.

There would be some minor, short-term erosion with the construction of ½ mile of temporary road in both alternatives. However, the effects are not expected to be major since they would be limited in their extent when applied to the total area of operation (<1%) and short-term (about 1 year due to freeze/thaw and vegetative green up). Both alternatives propose 20 acres of harvest with cable logging systems (partial suspension of logs) and 123 acres of harvest with ground based logging equipment (skidders or caterpillars). Cable logging systems afford higher protection to soils than ground based systems, but adverse effects to soils are not expected to occur for the reasons stated above.

Within the analysis area, the ~1,400 acre Scraggy Prescribed Burn was implemented April 2005. Post-burn field review has identified successful vegetative green up and no evidence of erosion or loss of soil productivity through excessive heat. There are no known foreseeable ground disturbing projects scheduled in the analysis area.

1.7.2.6 Non-key Issue G: Non-timber Related Economics – *Harvest related activities may impact non-timber related markets*

- Non-key due to concern being outside the scope of an EA. Concern is addressed at the Forest Plan level (Note: financial efficiency is addressed in Appendix E).

1.7.2.7 Non-key Issue H: Scenery Resource – *Harvest related activities may impact scenic resources*

- Non-key due to site-specific field verification and design of stands near scenic areas of concern

Existing Condition

Management Area 3B has an assigned Visual Quality Objective (VQO) of Modification (M) for all Sensitivity Levels (SL) and Distance Zones (DZ), except where seen from the Appalachian Trail (AT). Those MA 3B areas seen from the AT must meet Partial Retention (PR) VQO. Management Area 4D has a VQO of PR in Foreground(FG)/SL1 or Middle ground (MG)/SL1, and M VQO for all other SL and DZ. Management Area 2A requires a VQO of Retention (R) in FG/SL1, and PR in all other SL and DZ. Retention VQO must be met within one growing season, PR allows two, and M is to be met within three growing seasons. Refer to the Nantahala and Pisgah Land and Resource Management Plan (LRMP) for specific definitions of visual management terminology, and management area standards.

Scenery consists of the combination of landforms, rock outcrops, water bodies, and vegetation as seen across the landscape. From viewpoints analyzed for this project, modifications to the landscape can be seen on public lands in the form of clearings, roads, and timber harvests. National Forest lands seen in the middle ground appear as a continuous hardwood-conifer forest with patches of younger trees in areas of past timber management. The logging roads and landings used to harvest these areas are seen as well. Existing harvest areas vary in size and the degree to which they blend-in with the surrounding forest. Many views would be screened by foreground vegetation during leaf-on season, and would be filtered during leaf-off season; others are open and unobstructed. Foreground views are of mixed hardwood-conifer forests with an open understory in places and dense Rhododendron in others. Middle ground views are generally of forested lands on the mountain slopes and residential or agricultural lands in the valleys.

Field surveys were used to identify viewpoints (VP) and determine visibility of proposed management activities. All public travel corridors, water bodies and use areas in and around the project area were considered for potential viewpoints.

The following list identifies the location of VPs considered in the analysis. Many of the locations are specific points, while others are segments of trail or road. Some of the views would be seen as the viewer is moving (in a vehicle, walking, horseback, etc.), others are stationary. Views may be filtered or seasonally screened by foreground vegetation; others are open and unobstructed. The degree of potential impact varies with these and several other factors such as distance from viewer, viewer position, slope, size, shape and type of proposed harvest or road, landing, etc. All of these factors are considered when determining what activities would meet assigned VQOs or what mitigation would be required.

Viewpoints

1. AT, Bluff Mt.
2. AT, from Mill Ridge to Hurricane Gap
3. Rich Mt. Fire Tower
4. Mill Ridge Trail 280 (FSR 113A)
5. FSR 113, wildlife fields, and Mill Ridge Overlook
6. US 25/70 east and west of Hot Springs
7. FSR 3514
8. Golden Ridge Trail 295

Alternative A Direct, Indirect, and Cumulative Effects

Under this alternative no action would occur and all VQOs would be met.

Alternatives B & C

Direct & Indirect Effects: Action alternatives propose two-age harvests, group selection harvest, slashdown/firewood sale, wildlife field improvements and grapevine control. There is no new road construction, but some existing haul roads would require brushing and spot gravel. The following table shows stands, treatments, associated VPs, distance zones, assigned VOQ and required mitigation. Wildlife and grapevine treatments would meet assigned VQOs from all analyzed VPs and are not included in the table below. Potential scenery impacts and necessary mitigation for proposed road improvements are considered in the analysis of the stand they access.

Table 1-7: Scenery Analysis by Action Alternatives

Stand	Treatment	Seen From VP#	MA	DZ	VQO	Project Design Features[1]
423-10	Two Age	N/A	3B	N/A	N/A	None
423-15	Two Age	3, 4	3B, 2A	FG, MG	M, PR	a
424-14	Two Age	4	3B	FG	M	None
425-12	Two Age	4	3B	FG	M	None
425-13	Two Age	N/A	3B	N/A	N/A	None
426-1	Two Age	1, 5, 6, 8	3B	FG, BG	M	b
422-GS	Group Selection	2, 3, 4, 5, 6, 7	4D	FG, MG	PR, M	None
420-GS	Group Selection	N/A	3B	N/A	N/A	None
425-FW	Slashdown/ Firewood	4	3B	FG	M	a

1 See also Section 2.4, Chapter 2
a Openings along Trail 280/Forest Service Road 113A should not exceed 500 linear feet
b Stand boundary should not extend east of ridge. Leave tree density should increase to 40 ft^2 ba/ac at ridge. Improvements to existing haul road through MA14 should be limited to trimming overhanging vegetation and spreading gravel only where needed. Harvest and hauling operations should only occur on weekdays to minimize disturbance to weekend recreationists.

Cumulative Effects: Past timber harvest areas and existing roads are visible on National Forest System lands from analyzed viewpoints. From most VPs, existing harvest areas would not be noticeable to the average viewer. Existing roads and landings may remain visible for many years, but are primarily seen during leaf-off season. Proposed treatments would create openings of various sizes, or the canopy may appear thinner as seen from specified viewpoints. With incorporation of mitigation, all assigned VQOs would be met where proposed treatments would be seen in conjunction with existing modifications, and where multiple treatment areas would be visible. There are no known foreseeable ground disturbing projects scheduled in the analysis area.

1.7.2.8 Non-key Issue I: Herbicide Use – *Herbicide use may impact wildlife, aquatic, botanical resources and humans*

◊ Non-key due to proper application as per MSDSs, Product Labels, and Risk Assessments.

Alternative A – No Action 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 exotic plant species would likely continue to spread in the AAs.

Alternatives B and C Direct, Indirect, and Cumulative Effects

The following table displays expected maximum acreages herbicide would be applied (Glyphosate, Triclopyr, and Imazapic):

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

Herbicide	Alternative B	Alternative C
Triclopyr/Glyphosate (ac)[2]	152	107
Imazapic[3]	5	5

1 – Not all acreage is treated; buffers along streams would not be treated (except grapevine along UTs 9 and 11 of Little Hurricane Creek and non-native invasives along the French Broad River). Herbicides are applied manually and would not be applied aerially (see also Appendix F).
2 – Application for timber stand improvement, daylighting, and non-native invasive species control
3 – Applied to wildlife fields

Use of pesticides 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) FEIS, issued in July 1989, and Forest Plan standards and guidelines (Forest Plan, page III-181). The use of pesticides poses some risk to wildlife, water quality, and humans; however, any pesticides 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). This risk is further reduced by requiring the applicator to be trained in safety precautions, proper use, and handling of pesticides. Other factors reducing risk is the low level of active ingredient per acre and placement of notice signs in areas where pesticides have been applied. The signs include information on the pesticide used, when it was applied, and who to contact for additional information (see also Appendix F, Standard Mitigation Measures for Prescribed Fire and Pesticide Use). Herbicide with the active ingredients Glyphosate and Triclopyr are not considered soil active. 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. Effects of the treatment would be limited to individual trees/plants and the immediate area near them. 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 document tiers. Current pesticide information for Glyphosate and Triclopyr may be found at: http://www.fs.fed.us/foresthealth/pesticide/index.shtml. Site preparation treatments are scheduled for two applications, wildlife field conversions are scheduled for one application, and invasive exotics are scheduled for three applications (unless reviews show additional treatments are required).

The use of herbicides carries some risks to human health and safety, particularly to the applicator. This risk is reduced by requiring the applicator to be trained in safety precautions, proper use, and handling of herbicides. Other factors reducing the risk of herbicide use to human health and safety is the low level of active ingredient per acre and placement of notice signs posted in areas where herbicide has been applied. The signs include information on the herbicide used, when it was applied, and who to contact for additional information (see also Appendix F, Standard Mitigation Measures for Prescribed Fire and Herbicide Use).

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 Vegetation Management 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.*" (Veg. Mgt. FEIS, page II-67). There would be no adverse effects (Direct, Indirect, or Cumulative) of the usage of pesticides associated with the action alternatives if no spills occur within riparian areas. An appropriate herbicide is proposed for use within 30 feet of the French Broad River to control oriental bittersweet. According to the Veg. Mgt. 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 either the Busick or Hot Springs Work Centers and not in the field and applicators do not carry concentrated amounts of herbicide in the field.

The following table discloses the acres of past herbicide use by the Forest Service in the AAs:

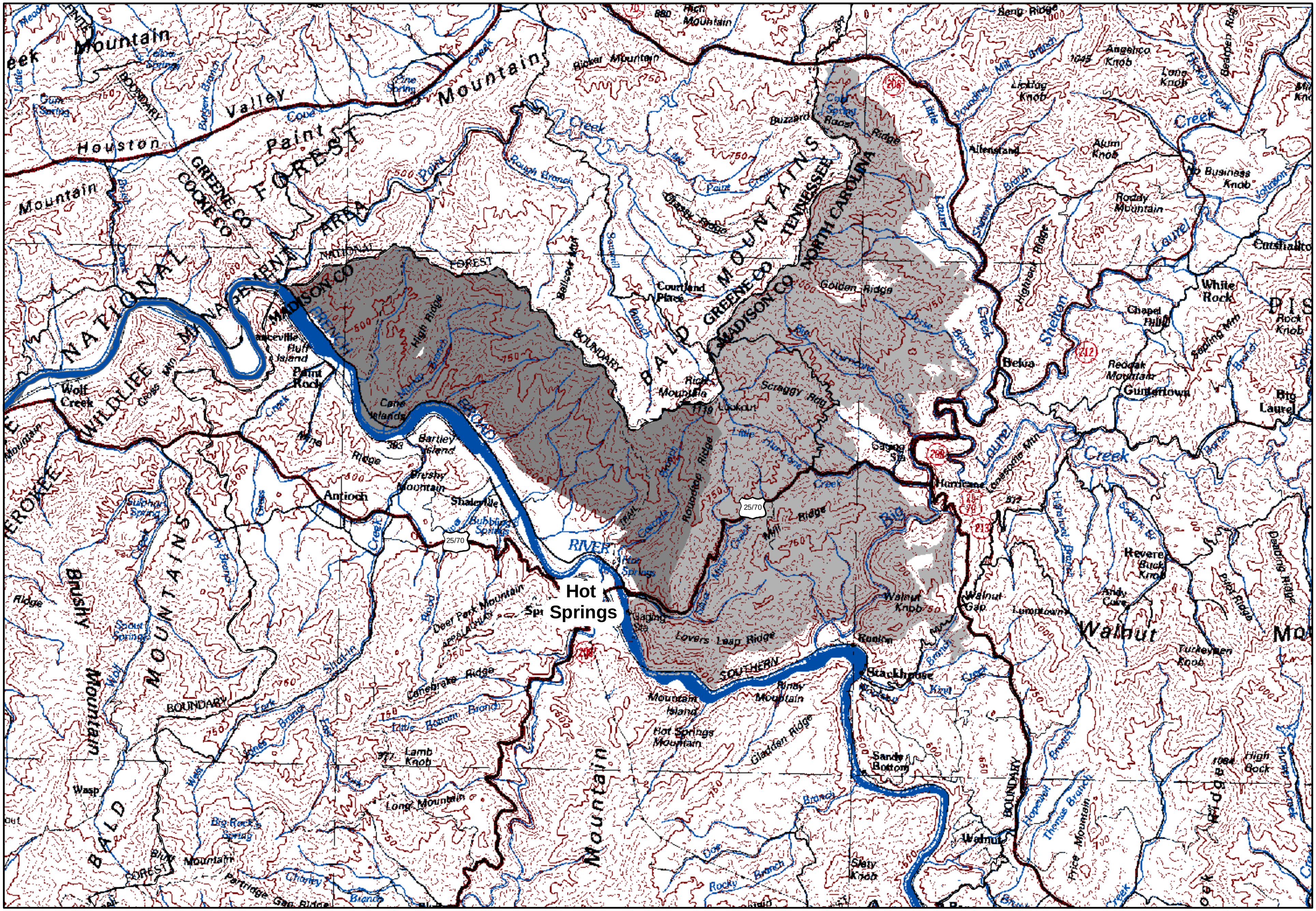
Table 1-9: Past Herbicide Use in AAs 13 and 14

Project	Year	Acres
Mill Ridge Sale	1983	259
Spring Mountain Sale	1983-1986	84
Spring Mountain Ranger Sale	1991	13
Scraggy Ridge 2 Sale	1992	246
Horse Cove	1996	137
Silvicultural Treatments (release)	2001-2002	75
Total		**814**

It has been almost 10 years since the last appreciable amount of herbicide use in the AA; the past use is not expected to contribute to with the proposed herbicide use under the action alternatives to cause adverse cumulative effects. There are also no known foreseeable projects proposing herbicide application scheduled in the analysis area.

1.7.2.9 Non-key Issue J: 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-key – proposal does not schedule actions within park lands, prime farmlands, wetlands (as per 1977 Executive Orders 11988 and 11990), wild and scenic rivers, or ecologically critical areas. The proposal would also not violate local law or requirements imposed for the protection of the environment.



SHADLINE PROJECT
Vicinity Map

Map Legend

- Analysis Area 13
- Analysis Area 14

Miles

0 1 2 4

Scale 1:100,000

CHAPTER 2 – ALTERNATIVES

Chapter 2 is the "heart" of this preliminary analysis (40 CFR 1502.14) and describes alternatives the Forest Service considered in addition to the proposed action. It also compares each alternative.

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 proposed action, and by the key issues responding to the proposed action. An alternative to the proposed action should (1) reasonably respond to the purpose and need and (2) address one or more key issues. The only exception is the No Action Alternative, which is required by regulation [40 CFR 1502.14(d)].

The interdisciplinary team (IDT) considered seven alternatives. Following internal review, four alternatives were developed in detail and three were eliminated from detailed study.

2.2 Alternatives Considered in Detail

2.2.1 Alternative A – No Action

Under this alternative, the projects described in the proposed action (Section 1.3, Chapter 1) would not be accomplished. No management actions would take place at this time to improve the existing condition of the environment in the project area. There would be no regeneration, timber stand improvements, treatment of non-native invasive species, development of new trails, or wildlife habitat improvements made. This alternative serves as the environmental baseline for analysis of effects.

2.2.2 Alternative B – Proposed Action

This alternative was developed to improve existing stand conditions while providing a continuous supply of sawtimber; improving distribution and percent of early successional habitat; reduce invasive exotic plant species; improve recreation opportunities; identify small patch old growth; and improve wildlife habitat and aquatic-related resources. Specific activities and locations are displayed in the following table and in the Alternative B map located at the end of this chapter.

Table 2-1: Summary of Alternative B – Proposed Action

Stand	Acres	Prescription	Basal Area	Logging System	Temp Road
423-10	12	Two-age Regeneration	20-25	Tractor	0.5 mi
423-15	20	Two-age Regeneration	20-25	Cable	
424-12	9	Two-age Regeneration	20-25	Tractor	
425-12	9	Two-age Regeneration	20-25	Tractor	
425-13	15	Two-age Regeneration	20-25	Tractor	
426-1[1]	9	Two-age Regeneration	20-25	Tractor	
Total Two-age	**74**				
Analysis Area 13	69	Group Selection		Tractor	
Total	**143**				**0.5 mi**

1: Additional basal area along top of stand would be retained to address scenic concerns from the Appalachian Trail.

In addition, Alternative B would:

- Use and maintain the existing road and skid trail system;
- Site prepare and subsequently release, if needed with herbicide (Triclopyr) all stands being regenerated. Control invasive exotics along roads adjacent to harvest areas before they are cut and place notification signs along the Appalachian Trail. Control invasive grape with herbicide (Triclopyr) on about 33 acres in stand 423-23. For every 10 acres treated, ¼ acre of grape arbor would be maintained. Plant hard mast producing species where feasible including blight resistant American chestnuts if seedlings become available;
- Maintain Forest Service Road 467 (Rich Mountain Road), and Forest Service Road 3524 (Shirley Brooks Road) by daylighting. Daylighting would be done along much of the length but would not be done where topography prohibits it or where no-harvest standards for perennial or intermittent stream crossings occur. Daylight and enhance linear grass/forb wildlife openings on ½ mile of skid road, Forest Service Road 3578 (Big Hurricane Road), and Forest Service Road 3514 (Neal Barnette Road). Following harvest, revegetate skid roadbed into clover/warm season vegetation to restore the grass/forb condition;
- Use Imazapic herbicide to eradicate fescue component in existing fields then refurbish them by using a clover/warm season grass mix, lime, and fertilizer within several existing wildlife fields in both analysis areas. Within these fields control other non native invasive plants. Autumn olive would be controlled but not eliminated in the fields;
- Following harvest, all landings constructed for harvest activities would be seeded with a clover and native wildflower seed mix and on smaller landings, an old variety species of apple or other fruit trees would be planted;
- Release all apple, pear, peach and persimmon trees in wildlife openings;
- Use herbicides (Triclopyr and Glyphosate) to control non-native, invasive exotic plants along Forest Service roads and trails within the Analysis Areas. Two concentrated areas dominated by invasive exotic plants near Runion and on the Moye Tract would also be treated;
- Improve access to two wildlife openings. Work includes repairing a slide, reducing the size of water control structures, and installing a culvert;
- Develop two non-motorized, multi-use trails within the Polecat Analysis Area but not within the Moye Tract;
- Plant a row of yellow pine along the edge of fields in the Moye Tract adjacent to State Road 1304 (Paint Rock Road);
- Improve scenic vista on Mill Ridge by removing brush and saplings on about 1 acre using mechanical hand treatments and cutting and leaving the material;
- Designate 186 acres of small patch old growth in Compartments 420, 422, and 423; and
- Improve stand conditions in portions of Stand 425-10 and 425-12 that have been damaged by southern pine beetle by slashing down and possibly selling some of the timber for firewood. This treatment would allow tree regeneration. In addition, this stand would be treated with herbicide to improve species competition and control invasive exotics.

2.2.3 Alternative C

Alternative C was developed to address public concerns concerning trails developed in the Moye Tract and daylighting along existing roads. Specific activities and locations are displayed in the following table and in the Alternative C map located at the end of this Chapter.

Table 2-2: Summary of Alternative C

Stand	Acres	Prescription	Basal Area	Logging System	Temp Road
423-10	12	Two-age Regeneration	20-25	Tractor	0.5 mi
423-15	20	Two-age Regeneration	20-25	Cable	
424-12	9	Two-age Regeneration	20-25	Tractor	
425-12	9	Two-age Regeneration	20-25	Tractor	
425-13	15	Two-age Regeneration	20-25	Tractor	
426-1[1]	9	Two-age Regeneration	20-25	Tractor	
Total Two-age	**74**				
Analysis Area 13	69	Group Selection		Tractor	
Total	**143**				**0.5 mi**

1: Additional basal area along top of stand would be retained to address scenic concerns from the Appalachian Trail.

In addition, Alternative C would:

- ◊ Use and maintain the existing road and skid trail system;
- ◊ Site prepare and subsequently release, if needed with herbicide (Triclopyr) all stands being regenerated. Control invasive exotics along roads adjacent to harvest areas before they are cut and place notification signs along the Appalachian Trail. Control invasive grape with herbicide (Triclopyr) on about 33 acres in stand 423-23. For every 10 acres treated, ¼ acre of grape arbor would be maintained. Plant hard mast producing species where feasible including blight resistant American chestnuts if seedlings become available;
- ◊ Use Imazapic herbicide to eradicate fescue component in existing fields then refurbish them by using a clover/warm season grass mix, lime, and fertilizer within several existing wildlife fields in both analysis areas. Within these fields control other non native invasive plants. Autumn olive would be eliminated in the fields and a suitable non-invasive species would be planted;
- ◊ Following harvest, all landings constructed for harvest activities would be seeded with a clover and native wildflower seed mix and on smaller landings, an old variety species of apple or other fruit trees would be planted;
- ◊ Release all apple, pear, peach and persimmon trees in wildlife openings;
- ◊ Use herbicides (Triclopyr and Glyphosate) to control non-native, invasive exotic plants along Forest Service roads and trails within the Analysis Areas. Two concentrated areas dominated by invasive exotic plants near Runion and on the Moye Tract would also be treated;
- ◊ Improve access to two wildlife openings. Work includes repairing a slide, reducing the size of water control structures, and installing a culvert;
- ◊ Develop two non-motorized, multi-use trails within the Polecat Analysis Area but not within the Moye Tract;
- ◊ Plant a row of yellow pine along the edge of fields in the Moye Tract adjacent to State Road 1304 (Paint Rock Road);

- Improve scenic vista on Mill Ridge by removing brush and saplings on about 1 acre using mechanical hand treatments and cutting and leaving the material;
- Designate 186 acres of small patch old growth in Compartments 420, 422, and 423; and
- Improve stand conditions in portions of Stand 425-10 and 425-12 that have been damaged by southern pine beetle by slashing down and possibly selling some of the timber for firewood. This treatment would allow tree regeneration. In addition, this stand would be treated with herbicide to improve species competition and control invasive exotics.

2.3 Alternative Considered but Eliminated from Detailed Study

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

2.3.1 Alternative 1 – Watershed Restoration without Harvesting and Temporary Road Construction

Alternative 1 focused on a watershed restoration proposal without commercial timber harvest or temporary road construction. This alternative was eliminated from detailed study because harvesting is necessary to meet the purpose and need (Section 1.4, Chapter 1) and temporary road construction is necessary for access to perform proposed activities. Alternative A – No Action meets portions of this alternative.

2.4 Project Design Features and Monitoring Common to Action Alternatives

Specific project design features are necessary for wildlife and aquatics (Appendix A), and herbicide use (listed in Appendix F). The action alternatives share these project design features, and unless noted otherwise in the decision document, they would become mandatory if the responsible official selects an action alternative.

Project Design Features

- In the Polecat Analysis Area, place signs restricting camping, horse, and mountain bike use at each of the five existing wildlife fields and on roads maintained as linear openings that access the fields.
- Native plants would be utilized in wildlife improvement and roadside erosion control plantings where practical.
- Retain hemlock understory and soft mast producing species (holly, black gum, and dogwood) within two-age harvest areas and timber stand improvement activities where their numbers do not interfere with regeneration objectives (winter cover and soft mast is utilized by numerous bird and mammal species).
- Cable corridors would be outside the immediate area of the talus slope and spring head found within unit 423-15. The trees contributing shade directly to this habitat would be retained.
- Group selection cuts would each be about ½ - 2 acres in size.
- Marking priority within regeneration areas would be hickory, white oak, and red oak, where available.
- Near harvested areas, all known populations of *Miscanthus sinensis*, *Ligustrum japonica, Celastrus orbiculatus, Paulownia tomentosa,* and *Ailanthus altissima* would be controlled

prior to disturbance activities. All populations total less than 2 acres. Control of *Miscanthus sinensis, Ligustrum japonica, Celastrus orbiculatus, Paulownia tomentosa* and *Ailanthus altissima* is best done by the use of herbicide (Glyphosphate).

- ◊ Do not construct the trail within 100 feet of the known "new" Davis Branch population of the FC plant species *Stellaria alsine* located at North 35° 56.759' West 82˚ 52.514' and ensure that any trail traffic does not use this area.
- ◊ Trees accidentally felled across stream channels (that prevent or block stream flow) would be lifted (when possible) away from the water. If this is not possible, each tree would be pulled away from the water where it fell and temporary decking would be used to support the weight of the tree as it is pulled across the channel. 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.
- ◊ Skid roads would avoid stream crossings and paralleling perennial channels within designated riparian areas.
- ◊ Landings and skid trails should be vegetated as soon as possible after use to avoid off-site soil movement.
- ◊ Temporary roads (if needed) would be constructed to avoid runoff into area streams. In addition, silt fence, straw bales, or brush barriers would be placed along the length of the road where it parallels or crosses a stream as needed to control runoff and stream sedimentation.
- ◊ Grapevine treatment would occur within the 30 foot buffer along UT 9 and UT 11 of Little Hurricane Creek and non-native invasive treatment would occur within the 30 foot buffer along the French Broad River.

The following project design features apply to scenery resources located in Section 1.7.2.7, Chapter 1:

a. Openings along Trail 280/Forest Service Road 113A would not exceed 500 linear feet.
b. Stand boundary in 426-1 should not extend east of ridge. Leave tree density would increase to 40 ft^2 ba/ac at ridge. Improvements to existing haul road through MA 14 would be limited to trimming overhanging vegetation and spreading gravel only where needed. Harvest and hauling operations would only occur on weekdays to minimize disturbance to weekend recreationists.

Monitoring

- ◊ National objectives include reducing impacts from invasive species and to improve the effectiveness of treating selected invasive species on the Nation's forests and grasslands. As part of a National Forest Foundation grant transects would be established in two project areas, the Lover's leap and Murray Branch Natural Heritage areas. Transects would be established before treatment and would be monitored after treatment to determine treatment effectiveness. In addition with the herbicide treatment a post-treatment evaluation report would be completed and filed in the project file according to direction in the Forest Service Handbook 2109.14 Chapter 70 paragraph 72 – POST-TREATMENT EVALUATION. It is expected that up to three applications would be required within about a five year.

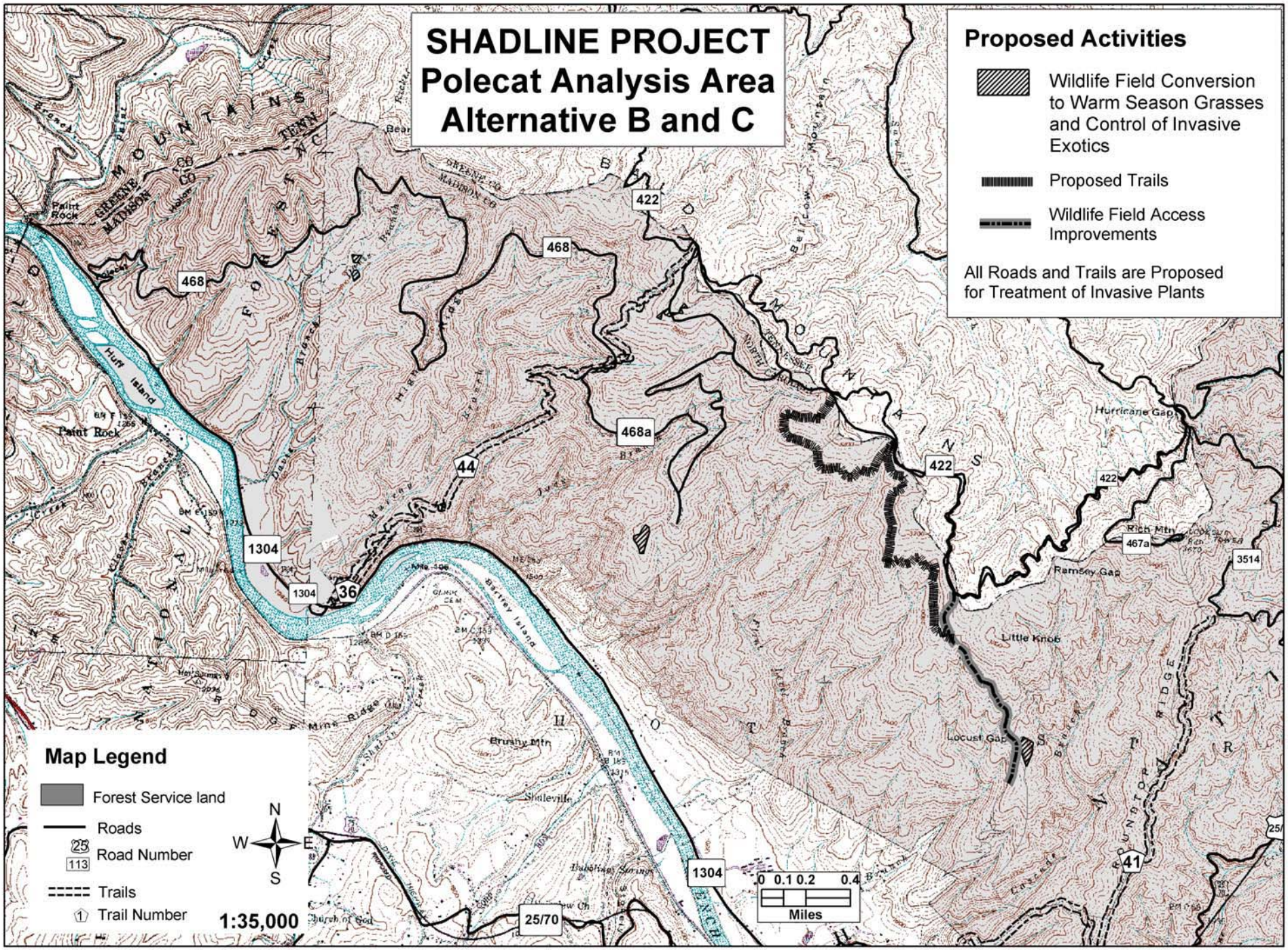
2.5 Comparison of Alternatives

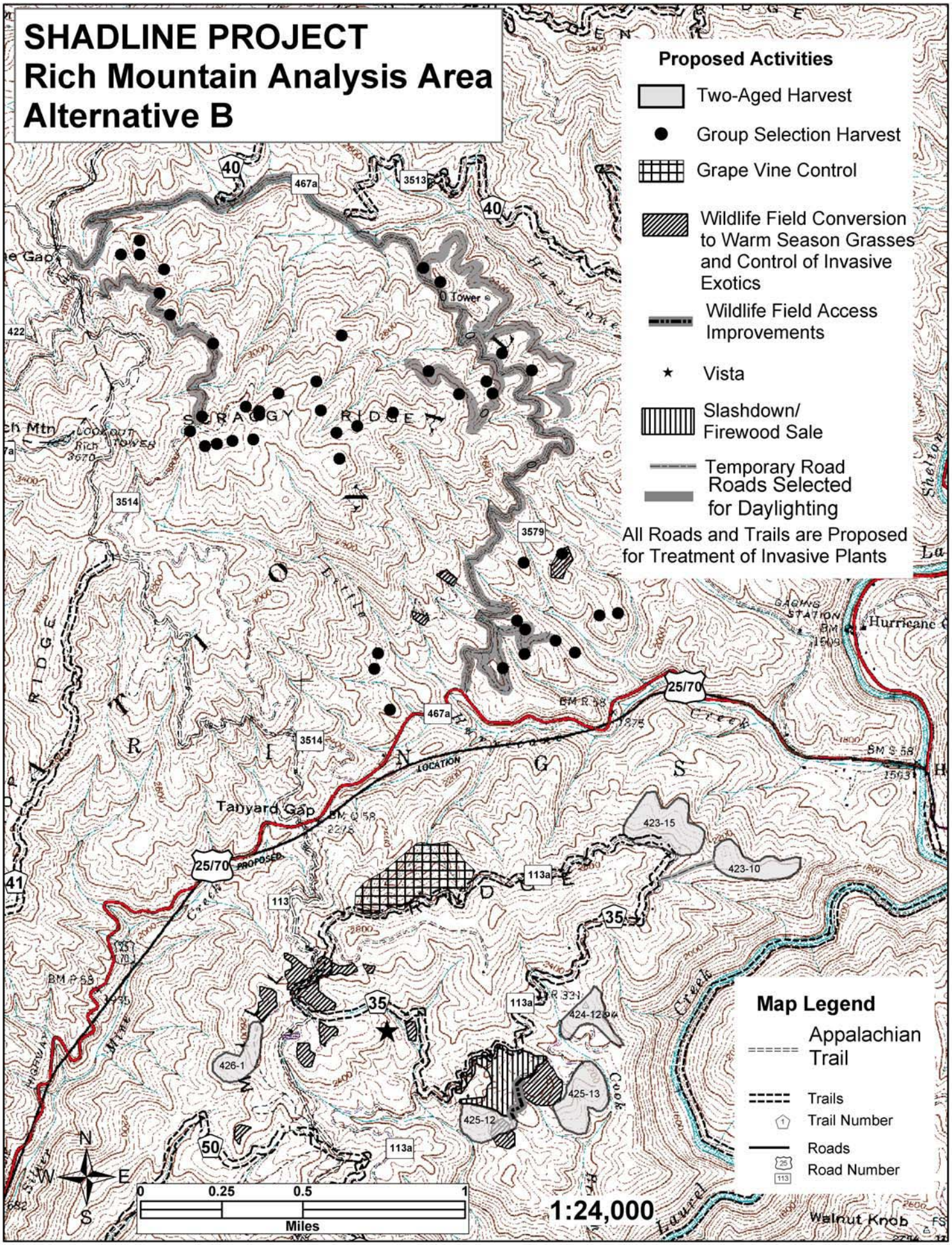
The following table provides a comparison between the alternatives:

Table 2-3: Harvest Comparison by Alternative

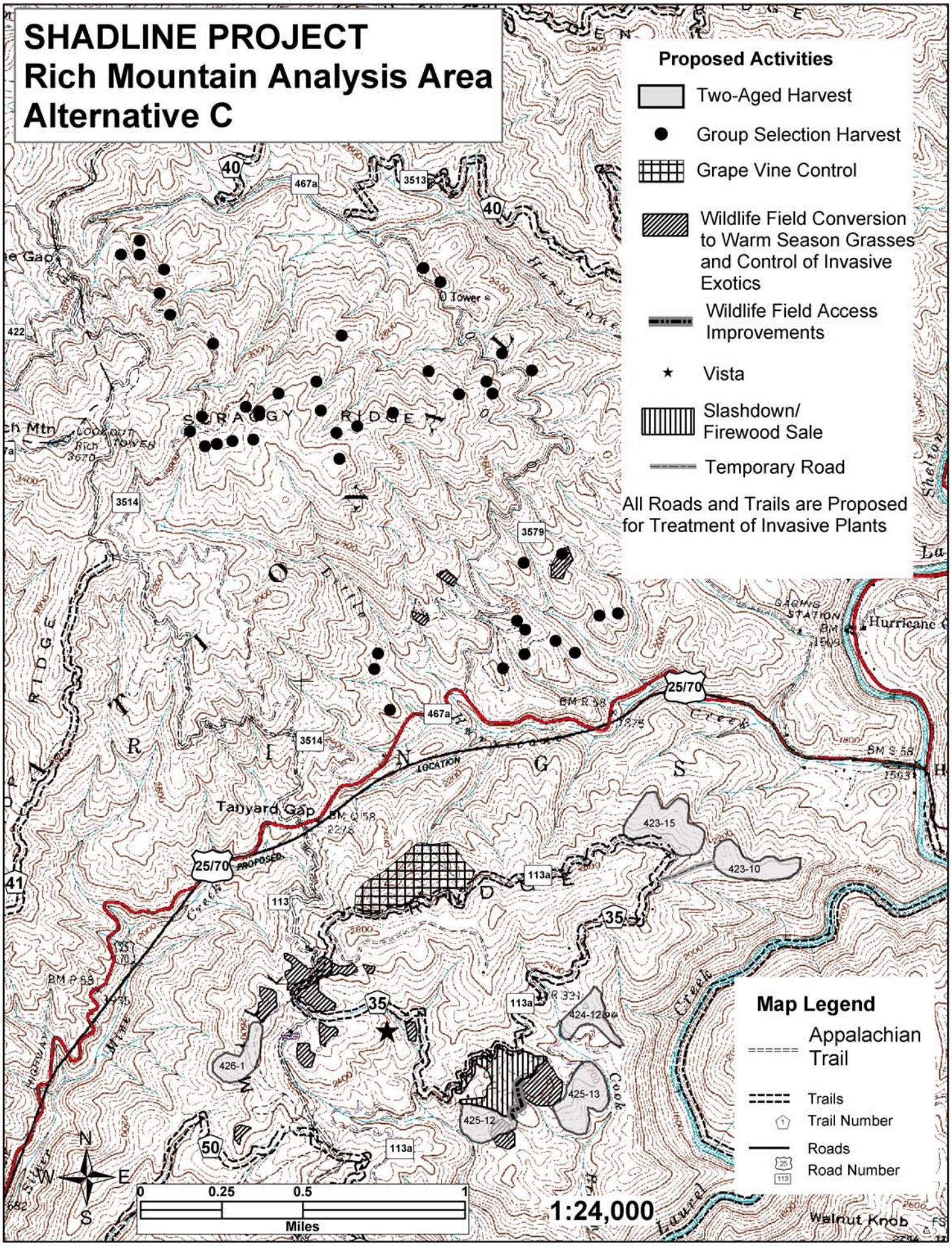
Stand	Acres	Harvest Prescription (Basal Area/Acre)	Logging System	Alt A	Alt B	Alt C
423-10	12	Two-age (20-25ft^2)	Tractor	No	Yes	Yes
423-15	20	Two-age (20-25ft^2)	Cable	No	Yes	Yes
424-12	9	Two-age (20-25ft^2)	Tractor	No	Yes	Yes
425-12	9	Two-age (20-25ft^2)	Tractor	No	Yes	Yes
425-13	15	Two-age (20-25ft^2)	Tractor	No	Yes	Yes
426-1[1]	9	Two-age (20-25ft^2)	Tractor	No	Yes	Yes
Total Acres of Two Age Harvest Proposed				0	74	74
Analysis Area 13	69	Group Selection	Tractor	No	Yes	Yes
Total Acres of Group Selection Proposed				0	69	69
Total Acres of Harvest Proposed				0	143	143
Total Volume Proposed (ccf)				0	3,929	3,469
Total Acres of Timber Stand Improvement Proposed[2]				0	74	74
Daylight along FSRs 467, 3514, 3528, and 3578, and a skid road				No	Yes	No
Refurbish Existing Fields[3]				No	Yes	Yes
Refurbish Constructed Log Landings				No	Yes	Yes
Release Apple, Pear, Peach, and Persimmon Trees				No	Yes	Yes
Control Invasive Exotic Plants				No	Yes	Yes
Improve Access to Wildlife Openings				No	Yes	Yes
Develop Non-motorized Trails[4]				No	Yes	Yes
Plant Yellow Pine Along FSR 1304				No	Yes	Yes
Improve Scenic Vista on Mill Ridge				No	Yes	Yes
Slash Down and Herbicide Use in Stands 425-10 and 425-12[5] (~19 acres)				No	Yes	Yes
Designate 186 Acres of Small Patch Old Growth				No	Yes	Yes

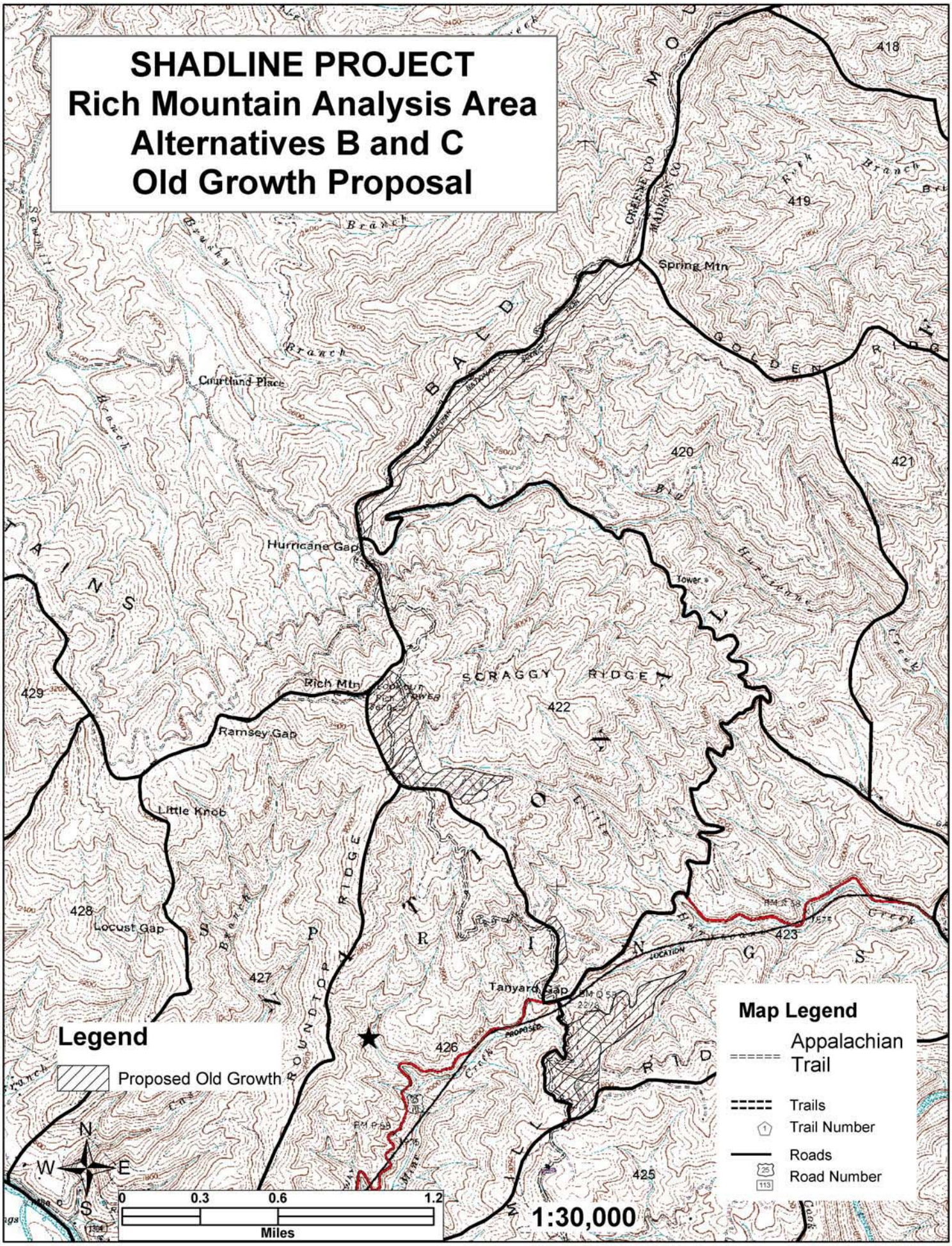
1: Additional basal area along top of stand would be retained to address scenic concerns from the Appalachian Trail
2: Retain ¼ acre of grape arbor per 10 acres treated
3: Autumn olive controlled in Alt B and eliminated in Alt C
4: 2 trails developed in Alts B & C – Moye Tract trail is not developed
5: Includes possible firewood sale


SHADLINE PROJECT
Polecat Analysis Area
Alternative B and C
Proposed Activities
Wildlife Field Conversion to Warm Season Grasses and Control of Invasive Exotics
Proposed Trails
Wildlife Field Access Improvements
All Roads and Trails are Proposed for Treatment of Invasive Plants
Map Legend
Forest Service land
Roads
Road Number
Trails
Trail Number
1:35,000
N
W
E
S
0 0.1 0.2 0.4
Miles
422
468
468a
44
1304
36
25/70
41
3514
467a
Paint Rock
Huff Island
Bartley Island
Hurricane Gap
Ramsey Gap
Little Knob
Locust Gap
Rich Mtn
Brushy Mtn
Shadleville
Mine Ridge
Roundtop Ridge


SHADLINE PROJECT
Rich Mountain Analysis Area
Alternative B
Proposed Activities
Two-Aged Harvest
Group Selection Harvest
Grape Vine Control
Wildlife Field Conversion to Warm Season Grasses and Control of Invasive Exotics
Wildlife Field Access Improvements
Vista
Slashdown/ Firewood Sale
Temporary Road
Roads Selected for Daylighting
All Roads and Trails are Proposed for Treatment of Invasive Plants
Map Legend
Appalachian Trail
Trails
Trail Number
Roads
Road Number
Tanyard Gap
LOCATION
PROPOSED
25/70
467a
3513
3514
3579
113
113a
422
40
35
50
41
423-15
423-10
424-12
425-13
425-12
426-1
Walnut Knob
Hurricane Creek
Cook Br
Laurel Creek
N
S
E
W
0
0.25
0.5
1
Miles
1:24,000

SHADLINE PROJECT
Rich Mountain Analysis Area
Alternative C




SHADLINE PROJECT
Rich Mountain Analysis Area
Alternatives B and C
Old Growth Proposal
Spring Mtn
Courtland Place
Hurricane Gap
Rich Mtn
Ramsey Gap
Little Knob
Locust Gap
Tanyard Gap
SCRAGGY RIDGE
GREENE CO
MADISON CO
418
419
420
421
422
423
425
426
427
428
429
Legend
Proposed Old Growth
Map Legend
Appalachian Trail
Trails
Trail Number
Roads
Road Number
N
S
E
W
0
0.3
0.6
1.2
Miles
1:30,000

CHAPTER 3 – ENVIRONMENTAL CONSEQUENCES

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

Effects analyses are disclosed by key issue in this chapter. The key issues associated with this proposed project were identified through a public participation process, which included input from Forest Service resource specialists, other government agencies, organizations, and individuals (see Section 1.7.1, Chapter 1 and Chapter 4). The key issues were determined to be relevant to the decision to be made concerning this proposal. Other resources and issues (non-key issues) were eliminated from discussion in this chapter (see Section 1.7.2, Chapter 1).

3.1 Effects Related to Key Issue #1; Wildlife Resource _____

Issue Statement: *Developing multi-use system trails may impact wildlife*

Indicator:

- ◊ Miles of new multi-use system trail designated

3.1.1 Alternative A – No Action

Direct, Indirect, & Cumulative Effects

Under this alternative there would be no adverse direct effects to wildlife from newly designated multi-use trails as none would be developed and the current conditions would be maintained. There are currently adverse indirect effects to the grass/forb habitat by recreational disturbance during brood and fledgling season on various species that utilize the habitat during critical reproductive stages—possibly experiencing declines in reproductive success. This recreational disturbance would continue with or without trail designation. Cumulatively, recreational disturbance on a the growing number of linear grass/forb habitat and the adjacent early-successional brushy and soft mast habitat which occurs adjacent to this habitat, is expected to reduce wildlife use of these areas across the Nantahala & Pisgah National Forests. Population declines to MIS species wild turkey, ruffed grouse, white-tail deer, and Rufous-sided towhee (eastern) may occur on National Forest System (NFS) lands.

3.1.2 Alternative B & Alternative C

Direct, Indirect, and Cumulative Effects

Summary

Under these alternatives, two new multi-use trails would be designated (about 2¼ miles total) on existing roads in the Polecat AA. Currently, eight miles of roads are being utilized as multi-use trails by horses, mountain bikes, and hikers. This recreational disturbance would continue with or without trail designation; however, the recreational use is expected to increase with this designation. No trails in the Polecat AA are currently maintained as linear wildlife grass/forb habitat; however turkey have been observed using a road proposed for trail designation during brood season. It is expected that following trail designation there would be increased adverse effects to wildlife species that prefer linear wildlife grass/forb habitat. Appendix A, Biological Evaluation, Appendix G, MIS, and the Wildlife Report, project record provide additional wildlife analyses.

Effects to Wildlife Species that Prefer Linear Grass/Forb Habitat

Various species utilize linear grass/forb habitat; wild turkey, ruffed grouse, white-tailed deer, black bear, wood thrush, and several other bird species. The majority of critical usage time is during the spring and early summer months when broods and fledglings require the habitat as the greatest concentration of invertebrate food. Black bear utilize as travel corridors and a source of concentrated soft mast food along the edges of this habitat. White-tailed deer utilize year round as a major source of forage. The wood thrush fledglings utilize the edges of early successional habitat during the early summer.

Alternatives B and C would not directly affect the eastern wild turkey. There would be adverse indirect effects to turkey brood usage on Forest Service Road (FSR) 468 with the expected increase in recreation use. The current use of mountain bikes and horses on the linear grass/forb habitat on FSR 468 limits use by broods. A large number of adult wild turkeys and one brood were observed during a survey of this road on June 1, 2005. This eight mile segment of linear opening/road has been improved and maintained by the North Carolina Wildlife Resource Commission (Commission) in the past as grass/forb habitat. This linear grass/forb habitat is now considered low quality for brood use due to continual recreation disturbance during brood season, which is expected to increase if these alternatives designate the habitat as multi-use trails. The 1,360 acre prescribed fire in April 2005 is expected to positively affect brood turkey habitat as herbaceous ground cover is expected to improve post-burn. The 143 acres of early successional habitat developed by this proposal would increase habitat for the wild turkey and their broods for up to five years. The re-vegetation of existing wildlife fields and proposed landings would improve habitat for turkey broods. These actions may offset the recreational use of FSR 468 and FSR 113A grass/forb habitat.

Research has indicated that adverse effects on all major taxa resulted from human-wildlife interactions (Boyle and Samson 1985). Some species are sensitive to disturbance during brief critical periods, such as breeding time (Sawyer 1997). Recreational use can change the habitat of an animal. This in turn affects the behavior, survival, reproduction, and distribution of animals. Human intrusion (mere presence of people in the environment) has been shown to adversely affect avian populations in many ways. These include altering activity budget (Steidl 1994); foraging patterns (Stagen 1980); distribution and habitat use (Stalmaster and Newman 1978,

Knight et al. 1991); reducing reproductive success (White and Thurrow 1985); and foraging efficiency (Knighe and Knight 1986, Knight et al. 1991).

Although more difficult to isolate and study, these indirect impacts may be as serious and long lasting as direct impacts for many species (Cole and Landres 1995). The severity of most recreational impacts on animal habitat is influenced by the amount of use that occurs. Wright and Speake (1975) found in their study site on the Land Between the Lakes in Kentucky, an increase to 100 visitors per week on a foot traffic trail significantly decreased the use of the area for wild turkey and at 125 visitors per week, wild turkey were no longer found within the area of the trail.

Foot travel use of these trails by hunters greatly increases adverse indirect effects during spring and fall hunting seasons—this linear habitat opens access to the majority of the Polecat AA. Poaching or hunting outside legal hunting seasons has not been reported by local game wardens as a problem.

Under Alternatives B and C, designation of this habitat as part of larger loop trails is expected to increase visitor use; therefore, adverse indirect effects would be greater than Alternative A. There are no other foreseeable future actions identified in the AAs that could affect wildlife habitat.

3.2 Effects Related to Key Issue #2; Invasive Exotics

Issue Statement: *Daylighting along system roads and constructing temporary roads may increase infestations of invasive exotic plants*

Indicator:

- Acres of daylighting
- Miles of temporary road construction

Existing Condition

There are 124 species of non-native plants documented to occur on the Pisgah and Nantahala National Forests (Danley and Kauffman). An increase of non-native plant species in the proposed activity area is expected. Many of these species 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. Most ruderal plant species are expected to decrease to non-significant population levels within 10 years after initial disturbance.

Twenty species on the Regional Forester's invasive non-native plant species are known within the analysis area and are disclosed in the following table:

Table 3-1: Non-native Invasive Species Summary

Species	Regional Category[1]	Location in Project Area
Ailanthus altissima Tree of Heaven	1	Scattered small populations in AA mainly along roads
Ablizia julbrissin Silk Tree	1	Scattered small populations in AA mainly along roads near French Broad River
Alliaria petiolata	1	Well established in Alluvial Forests along French Broad

Species	Regional Category[1]	Location in Project Area
Galic Mustard		River
Dioscorea batatas	1	Widely scattered populations near French Broad River
Elaeagnus umbellate Autumn Olive	1	Abundant invasive population in Mill Ridge and associated roads.
Lespedeza cuneata Sericea	1	All roadsides through out AA
Paulownia tomentosa Prince's tree	1	Widely scattered populations mainly along roads
Polygonum cuspidatum	1	Well established in Alluvial Forests along French Broad River
Pueraria Montana Kudzu	1	Well established in the Moya tract
Ligusrum japonicum	1	Well established in Alluvial Forests along French Broad River. Also along FS road 476
Lolium arundinaceum Tall fescue	1	Old roads, fields etc.
Lonicera japonica Japanese honeysuckle	1	Alluvial Forest, stream along, woods roads, through out AA
Microstegium vinineum Japanese stilt grass	1	Mostly in Alluvial Forests and coves (very well established in AA)
Celastrus orbiculatus Bittersweet	1	Mostly in Alluvial Forests (very well established in AA)
Rosa multiflora Multi floral rose	1	Alluvial Forest along French Broad River, old fields such as Moya tract, roadsides
Spiraea japonica	2	Scattered small populations near old roads
Miscanthus sinensis Plume grass	2	Scattered along River Road
Allium vineale Field garlic	1	Scattered small populations near old roads
Coronilla varia Crown vetch	2	Found mostly along system roads
Wisteria sinensis *Wisteria*	2	Mostly in Alluvial Forests. Not well established

1 - Regional categories have specific legal ramifications as per Regional Forester memo dated May 2001

3.2.1 Alternative A – No Action

Direct, Indirect, & Cumulative Effects

Under this alternative no actions are proposed. There would be no potential increase in non-native plants 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 plant species would continue to increase with or without planned activities.

3.2.2 Alternatives B & C

Direct & Indirect Effects

Each action alternative proposes to treat non-native plants. The following table displays the actions and maximum acreages of proposed herbicide and manual treatment by alternative; treatments may require up to three applications depending on success of control:

Table 3-2: Treatment of Non-native Species in the Baldwin Gap Project Area by Alternative

Species	Treatment	Alt B	Alt C
Ailanthus altissima Tree of Heaven	Control recommended where possible, activities would not likely increase population	<1 ac	<1 ac
Ablizia julbrissin Silk Tree	This species does not display invasive tendencies.	0	0
Alliaria petiolata Galic Mustard	No effective control method known (control where possible)	<1 ac	<1 ac
Dioscorea batatas	Does not seem to spread quickly. No recommendation to control.	0	0
Elaeagnus umbellate Autumn Olive	Control recommended where possible, activities would not likely increase population	<2 ac	<3 ac
Lespedeza cuneata Sericea	This species does not display invasive tendencies. Not recommended to control.	0	0
Paulownia tomentosa Princess tree	Control all populations along system roads during activities prior to disturbance.	<1 ac	<1 ac
Polygonum cuspidatum	Control recommended where possible, activities would not likely increase population	<1 ac	<1 ac
Pueraria Montana Kudzu	Control recommended where possible, activities would not likely increase population	<3 ac	<3 ac
Ligusrum japonicum	Control population along 467 road prior to disturbance	<1 ac	<1 ac
Lolium arundinaceum Tall fescue	This species does not display invasive tendencies. Not recommended to control.	0	0
Lonicera japonica Japanese honeysuckle	No effective control method known (control where possible)	<1 ac	<1 ac
Microstegium vinineum Japanese stilt grass	No effective control method known. No recommendation to control.	0	0
Celastrus orbiculatus Bittersweet	Control populations near activity areas, Control recommended else where when possible, activities would not likely increase population if populations controlled near activity areas.	<1 ac	<1 ac
Rosa multiflora Multi floral rose	An effective control method is doubtful (control where possible)	<1 ac	<1 ac
Spiraea japonica	Control population along FSR 467	<1 ac	<1 ac
Miscanthus sinensis Plume grass	Control recommended where possible, activities would not likely increase population	<1 ac	<1 ac
Allium vineale	This species does not display invasive tendencies. Not	0	0

Species	Treatment	Alt B	Alt C
Field garlic	recommended to control		
Coronilla varia Crown vetch	This species does not display invasive tendencies. Not recommended to control	0	0
Wisteria sinensis *Wisteria*	This species does not display invasive tendencies. Not recommended to control.	0	0
Total Treatment		**<15 ac**	**<16 ac**

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. Consideration was given to the possible effect this proposal may have to invasive non-native species.

Potential habitat for exotic invasive species can increase with an increase in disturbance. While disturbance from tree removal and creation of wildlife fields can offer some increased habitat for exotic invasive plants, new road is the prime habitat for many exotic invasive plants it is less clear that temporary road construction is habitat for exotic invasive plants. Therefore, a good measure of habitat for comparison potential changes of exotic invasive plants is the creation of miles of new roads (Nantahala/ Pisgah Forests MIS Report, section 4.58). The action alternatives propose ½ mile of temporary road construction; however, there are no new miles of road construction proposed. The potential for increasing non-native invasives from daylighting along existing roads and constructing temporary roads would be mitigated through treatment.

Cumulative Effects

Forest-wide, 2,684 miles of road construction has occurred within the Pisgah/Nantahala National Forest within the last 25 years or 107.3 miles per year. Alternatives B and C would not result in any new road construction, but does propose ½ mile of temporary road construction and daylighting along existing roads. With mitigation measures, there would be no cumulative effects of non-native invasives across the AAs. There are no known additional ground disturbing activities proposed in the AAs that could cumulatively be added with effects of this proposal.

3.3 Effects Related to Key Issue #3; Age-class Distribution _____

Issue Statement: *Age-class distributions within the analysis area are not balanced as desired in the Forest Plan*

Indicator

◊ Acres by age class before and after implementation

3.3.1 Existing Condition

The Shadline Project is located within two Analysis Areas; Polecat and Rich Mountain. Only the Rich Mountain AA would be analyzed for age class distribution because there is no harvesting activities proposed within Polecat AA within the Rich Mountain Analysis Area (AA), approximately 44 percent of forested acres are 81 years old or older. Only 1.5 percent is in the 0-10 year age-class, and 3.6 percent is in the 11-20 year age-class..

The area has suffered through several outbreaks of southern pine beetle (most recently in 1999-2002) and drought (most recently 1998-2002), and wildfire in 2001. Regeneration as a result of these events have been incorporated into the stands database and used in the analysis..

The age-class distribution is very unbalanced for MA 3B where sustainable timber harvest and provision of young forest is emphasized (Forest Plan, page III-71).

Additional analysis on age-class distribution is disclosed in Appendix B, Age-Class Distribution.

3.3.3 Alternatives B & C

Direct and Indirect Effects

Under these alternatives, about 207 acres would be harvested using a regeneration silvicultural treatment. Both alternatives propose to harvest the same stands and would help balance the age-class distribution. The following table illustrated the effects of the proposed harvest on age class distribution.

Table 3-3: Age-Class for Rich Mountain Analysis Area by Alternative

Measurement	Alternative A (existing)	Alternative B and C (following harvest)
Acres treated by age-class		
Rich Mtn AA (13)		
0-10 years old	1.5%	6.0%
11-20 years old	3.6%	3.6%
21-30 years old	5.0%	5.0%
31-40 years old	1.3%	1.3%
41-50 years old	0.5%	0,5%
51-60 years old	2.0%	2.0%
61-70 years old	5.1%	5.1%
71-80 years old	36.7%	37.3%
81-90 years old	31.9%	27.1%
91-100 years old	8.5%	8.5%
101+ years old	3.6%	3.6%

The 0-10 year age-class in the project area would be brought up to 5 percent in management area 3B after harvest, meeting Forest Plan standards. The resulting sum of 0-10 and 11-20 year age-classes would be approximately 9.6 percent. All stands proposed for harvest are from 70 - 88 years old. This project is the only one scheduled in the area for this ten-year period, and would stay within Forest Plan standards for the desired range of harvest for proper age-class distribution in the future.

Cumulative Effects

There are no adverse cumulative effects anticipated with this alternative when its direct and indirect effects are combined with past actions. Cumulatively, past, present, and reasonably

foreseeable future events are expected to result in the desired range of age-class distributions at any given time.

Current management direction for the Rich Mountain project area is to maintain 5%-15% of MA 1B and 3B in young forest (0 to 10 year age-class) and 5%-10% of MA 2A, 4A, and 4D in young forest. These alternatives would continue the established pattern of management in the area for which prior investments have been made. The proposed project would maintain the general land use as a forested environment in the short and long term. The 1,360 acre prescribed fire burned in April 2005 has no adverse cumulative effect to age class distribution as the burn did not change stand conditions since it was a light underburn.

CHAPTER 4 – PREPARERS AND PUBLIC INVOLVEMENT

The Forest Service consulted the following individuals, Federal, State, and local agencies, tribes and non-Forest Service persons during the development of this preliminary analysis:

4.1 ID Team Members

4.1.1 Core IDT:

Erik Crews – Forest Landscape Architect
Dave Danley – Zone Botanist
Brady Dodd – Forest Hydrologist
Sandy Florence – Wildlife Biologist
Michael Hutchins – IDT Leader
Bob Noel – Zone Archaeologist
Linda Randolph – Project Leader, District Silviculturist
Lorie Stroup – Zone Fisheries Biologist

4.1.2 Other Forest Service Personnel Providing Input:

Paul Bradley – Pisgah District Ranger
Dale Remington – Sales Forester

4.2 Federal, State, and Local Agencies Providing Input

Brian Cole – USDI Fish and Wildlife Service
Dave McHenry – North Carolina Wildlife Resources Commission

4.3 Others Providing Input

Matt Davis – Appalachian Trail Conference
Bob Gale – Western North Carolina Alliance
Howard Macdonald – Carolina Mountain Club
J. Dan Pittillo
Ben Prater – Southern Appalachian Biodiversity Project
Earl J. Rayburn – Canton Hardwood Company

APPENDIX A – BIOLOGICAL EVALUATION

BIOLOGICAL

EVALUATION

OF THE

SHADLINE PROJECT PRELIMINARY ANALYSIS

PISGAH NATIONAL FOREST

APPALACHIAN RANGER DISTRICT

MADISON COUNTY

NORTH CAROLINA

Contact Person:
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Botanist
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Hot Springs, North Carolina 28743

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 so that the Forest Service is within compliance of environmental laws such as The Endangered Species Act and the National Forest Management Act. This would prevent possible negative viability trends to these species.

This BE documents the possible biological effects of a proposed timber sale and improvements known as the Shadline Project (2005). Included within this proposal (Alternative B) are: using and maintain existing roads and skid trails, maintaining wildlife fields, wildlife plantings, improving a scenic vista along Mill Ridge, daylighting roads, treatments of exotic and invasive species, designating two trails, regeneration harvest treatments, and small patch old growth designation (see the preliminary assessment for a complete description of acreage, distances, procedures and areas). This BE draws its conclusions from the wildlife, botanical, and aquatics resource reports. These reports were written specifically for this proposal. Conclusions and opinions reached within this BE are drawn from these reports. These reports are an integral part of this BE and should be consulted where further detail is needed. Each discipline (wildlife, botanical, and aquatic) may have a defined resource analysis area that is germane to that discipline.

A detailed description of the proposal is disclosed in Section 2.2, Chapter 2 of the preliminary analysis. A list of project design features and monitoring is disclosed in Section 2.4 of the same Chapter.

Location

The proposal is located in the northern portion of Madison County; about 3 miles north and northeast of Hot Springs, North Carolina. The vicinity map located in Chapter 1 displays its general location.

Definitions

Threatened, or Endangered (T&E) is a species that has been formally 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 (2002 list). These species may or may not have a Federal or State status, but generally have a global rank of G1, G2, or G3, and a State rank of S1 or S2. 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".

II. METHOD OF EVALUATION AND SURVEYS

Potentially affected T&E (2001), 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 units were surveyed by David M. Danley, Forest Botanist on March 29, April 19, 20, May 27, June 30, 2005. All proposed units were visited at least once during this time. Additional botanical survey information was used from the Brigman Hallow Timber Sale (1992) botanical surveys conducted by Dianne Toleman in compartments 420 and 421 and The Mill Ridge Timber Sale (1993) botanical surveys conducted by David Danley in compartments 423, 424, 426, and 425. Other sources of information were: Inventory of the Natural Areas of the French Broad Ranger District, Pisgah National Forest (Hieman et. al., 1995) and the Paint Rock Botanical Report (Danley, 2002).

B. WILDLIFE SURVEYS

1) Most recent information concerning Threatened and Endangered, Regional Forester's Sensitive, Pisgah National Forest, Forest Concern species was obtained from the North

Carolina Wildlife Commission (NCWRC), U.S. Fish and Wildlife Service (USFWS), and North Carolina Natural Heritage Program (NCNHP) records.

2) Bird point surveys were conducted on June 7 and 8, 2005, by Matthew Eldridge, Silvicultural technician, Appalachian Ranger District, and on April 11, 12, and May 9, 2005, by Sandy Florence, Pisgah National Forest Wildlife Biologist, surveyed habitat presence and conducted snail and salamander surveys. Surveys were conducted to determine the suitable habitat present, survey any significant habitats located, and determine species presence. During proposed unit lay out on February 7, 2005, Matthew Eldridge spot checked large, woody debris (LWD) for salamander species. He found a, *Plethodon ventralis,* Southern Zigzag salamander, within unit 423-10.

3) Reviewing the Nantahala and Pisgah National Forest (Forest) Proposed, Endangered, Threatened (T&E) list dated 06/2001 and the Regional Forester's Sensitive (S) list dated 02/2002 of wildlife species and their habitat requirements or preferences.

4) Reviewing the findings of the 2001-2003 sensitive snail habitat analysis contract conducted by the Cumberland Mountain Research Center.

C. AQUATIC SURVEYS

Existing data for aquatic resources within the aquatic AA 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 mostly as a historical reference—project-specific surveys were also conducted.

Project information was obtained from Linda Randolph, U.S. Forest Service (USFS) Silviculturalist and Assistant Ranger. Lorie Stroup and Sheryl Bryan, USFS Fisheries Biologists and Kerri Lyda, USFS Fisheries Technician conducted aquatic habitat and aquatic insect surveys of the proposed aquatic project and analysis areas in April, 2005 and June, 2005. The surveys consisted of examining streams within the aquatic project area, noting habitat quality, quantity, and suitability for TES aquatic species and management indicator species (MIS), as well as existing impacts and their source.

Davis Branch, Silver Mine Creek and UT Silver Mine Creek, Big Laurel Creek and unnamed tributaries to Big Laurel Creek, Little Hurricane Creek and unnamed tributaries to Little Hurricane Creek, Cook Branch, Big Hurricane Creek and unnamed tributaries to Big Hurricane Creek, Little Laurel Creek and unnamed tributaries to Little Laurel Creek and Trent Branch were surveyed by the USFS and NCWRC for brook trout. The majority of these surveys were collected during 1996. Other surveys within the project areas were taken by Carolina Power biologists in the mid 1980's to the mid 1990's.

Surveys of the French Broad River have been conducted as a joint effort of the US Fish and Wildlife, the North Carolina Department of Transportation, the Tennessee Valley Authority (TVA) and the North Carolina Division of Water Quality (spring, summer and fall of 1997, 1998, 1999, 2000, 2001, 2002 and 2003. These surveys include freshwater mussels, fish and

crayfish observations from within the aquatic analysis area of the Shadline Project in the French Broad River.

Odonate surveys of the Nantahala and Pisgah National Forests were conducted by the USFS under contract with Virginia Commonwealth University in 2003. Surveys were taken from two locations within the Shadline Aquatic Analysis area of the French Broad River. Other macroinvertebrate monitoring includes the Department of Natural Resources Division of Water Quality's (DWQ) two benthic macroinvertebrate monitoring sites on Big Laurel Creek and the French Broad River.

Project area specific aquatic macroinvertebrates were sampled by the USFS in the spring and summer of 2005. Sample locations were predetermined based on location of project activity sites. Sites were located within or downstream of proposed project activities. Samples were collected by walking stream reaches and sampling various habitats by turning over rocks, investigating leaf packs and using a serber net for depositional habitats.

Substrate within the project area waters (Table 4.1, aquatics analysis, project record) was evaluated and visually estimated. The three primary types of substrate that exist were documented at each macro invertebrate sample site. This information is valuable for determining the amount of habitat available for proposed endangered, threatened, and sensitive aquatic organisms.

Additional information specifically addressing aquatic TES was obtained from North Carolina Wildlife Resources Commission (NCWRC) biologists, North Carolina Natural Heritage Program (NCNHP) records, North Carolina Department of Environment and Natural Resources (NCDENR) Division of Water Quality aquatic biologists, and US Fish and Wildlife Service (USFWS) biologists.

IV. EXISTING BIOLOGICAL CONDITION

A detailed review of species information and habitat is 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. TERRESTRIAL

The Shadline terrestrial AA can be characterized by low to mid elevation mountain regions, containing common natural communities. The AA has several southeast trending drainages throughout. The major streams are: Little Hurricane Creek, Hurricane Creek, and Horse Branch Cook Branch etc. A succession of southeast trending, interlinking ridges is found between drainages. The highest points of these ridges are about 3,670 feet on the northwest (Rich Mountain). The drainage flows downward to the French Broad River about 1,300 feet to the south. The analysis area exhibits two distinct groups of communities: 1) typical communities of the low to mid elevation southern Appalachian mountains and 2) communities directly adjacent to the French Broad River.

Mountain Communities

A few common community types are characteristic within the AA and include: 1) Pine-oak Heath Forest, 2) Chestnut Oak Forest, and 3) Acidic Cove Forest. The Montane Oak-Hickory Forest and Rich Cove Forest occurs to a much lesser extent. Small habitat areas such as small rock outcrops and 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 type often occupies areas near streams, lower cove slopes, and northern aspects. Higher cove slopes, south, and western slopes are often dominated by the Chestnut Oak Forest. Pine Oak Heath Community is found on dryer ridges and slopes. The Montane Oak-Hickory Forest and Rich Cove Forest, and anthropogenic communities have the most diverse herbaceous component of the communities found within the analysis area. However, taken in whole, the AA has a very poor herbaceous diversity. All of the communities are common types and have a relatively low probability of occurrence for TES species (see Schafale and Weakley for a detailed description and discussion of these communities)—making a generally low potential for plant TES species to occur in the potential activity areas. The primary natural communities affected by this proposal are the Chestnut Oak Forest, Acidic Cove Forest, and the Pine-oak Heath Forest. A description of the Rich Cove Forest community can be found elsewhere (Schafle et. al. and Newell).

French Broad Communities

Several unique terrestrial communities and associated unique and disjunct species are found adjacent to the French Broad River in compartments 425, 427, 428, 429, 430, 431,and 432. This area includes the North Carolina Registered Natural Area Big Laurel Creek, Paint Rock, and the proposed North Carolina Heritage Areas. These were extensively surveyed and discussed by numerous botanists (Danley, Hieman, Schafale and Sathers). These communities and species would not be adversely affected because very limited ground disturbance (planting yellow pine) is proposed along the French Broad River corridor. See references below for complete descriptions and discussions of these areas.

Terrestrial TES Species

Of the terrestrial TES species known to occur in Madison County, North Carolina; only one S species (Glossy supercoil, *Paravirea placentula*) is known to occur in the activity area (see Table A-2 and Attachment 1 below). All others were dropped from 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 or individuals were seen in the activity areas.

B. AQUATIC

The following table summarizes the aquatic resource:

Table A-1: Forest Plan Watersheds 37 & 38 (French Broad River) UT's, or Unnamed Tributaries Mapped on a USGS Quadrangle Located in the Project Record

Stream Name (UT denotes an unnamed tributary)	Compartment-Stand or Analysis Area	Miles in Project Area[1]	Miles in Analysis Area	DEM Classification[2]
Silver Mine Creek	426-1		0.23	B
UT 1 Silver Mine Creek	426-1		0.38	B
Cook Branch	424-12, 425-13	0.35	1.44	C
UT 1 Cook Branch	425-13	0.15	0.23	C
Big Laurel Creek			0.76	C;Tr
UT 1 Big Laurel Creek	425-12	0.15	1.29	C;Tr
UT 2 Big Laurel Creek			0.53	C;Tr
French Broad River			2.0	B
Unnamed Tributary to French Broad River	Polecat Analysis Area		0.61	B
Davis Branch	Polecat Analysis Area	0.76	0.76	C
Big Hurricane Creek	Rich Mountain Analysis Area		2.99	C;Tr
UT 1 Big Hurricane	Rich Mountain Analysis Area		0.42	C;Tr
UT 2 Big Hurricane	Rich Mountain Analysis Area		0.15	C;Tr
UT 3 Big Hurricane	Rich Mountain Analysis Area		0.45	C;Tr
UT 4 Big Hurricane	Rich Mountain Analysis Area		0.87	C;Tr
UT 5 Big Hurricane	Rich Mountain Analysis Area		0.27	C;Tr
UT 6 Big Hurricane	Rich Mountain Analysis Area		0.15	C;Tr
UT 7 Big Hurricane	Rich Mountain Analysis Area		0.15	C;Tr
UT 8 Big Hurricane	Rich Mountain Analysis Area		0.64	C;Tr
UT 9 Big Hurricane	Rich Mountain Analysis Area		0.19	C:Tr
Little Hurricane Creek	Rich Mountain Analysis Area		2.99	C;Tr
UT 1 Little Hurricane	Rich Mountain Analysis Area		0.38	C;Tr
UT 2 Little Hurricane	Rich Mountain Analysis Area		0.57	C;Tr
UT 3 Little Hurricane	Rich Mountain Analysis Area		0.72	C;Tr
UT 4 Little Hurricane	Rich Mountain Analysis Area		0.76	C;Tr
UT 5 Little Hurricane	Rich Mountain Analysis Area		0.38	C;Tr
UT 6 Little Hurricane	Rich Mountain Analysis Area		0.80	C;Tr
UT 7 Little Hurricane	Rich Mountain Analysis Area		0.38	C;Tr
UT 8 Little Hurricane	Rich Mountain Analysis Area		0.11	C;Tr

Stream Name (UT denotes an unnamed tributary)	Compartment-Stand or Analysis Area	Miles in Project Area[1]	Miles in Analysis Area	DEM Classification[2]
UT 9 Little Hurricane	Rich Mountain Analysis Area		0.61	C;Tr
UT 10 Little Hurricane	Rich Mountain Analysis Area		0.23	C;Tr
UT 11 Little Hurricane	Rich Mountain Analysis Area		0.15	C;Tr
Trent Branch	Polecat Analysis Area		1.1	C
UT Trent Branch	Polecat Analysis Area		0.2	C

1 If blank then none exists

2 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 "B" classification denotes freshwater protected for recreational uses including swimming and all other Class C uses. The "C" classification denotes waters suitable for aquatic life propagation and survival, fishing, wildlife, secondary recreation, and agriculture. The "Tr" classification indicates waters that are for the natural propagation of trout and survival of stocked trout.

Based on surveys, the following was found:

1) Fish habitat exists within the analysis areas of Silver Mine Creek, Big Laurel Creek, UT 1 Big Laurel Creek, Big Laurel Creek, UT 1 French Broad River, Davis Branch (lower reaches), Big Hurricane Creek, and Little Hurricane Creek. Some of the other unnamed tributaries and Cook Branch may be used by fish during spawning and for nursery areas. There is limited habitat for fish species within the other project area waters, due to small stream size and restricted flow regimes. Project area waters provide habitat for macroinvertebrates.

2) Rainbow trout or *Oncorhynchus mykiss* were found in Little Hurricane Creek and an unnamed tributary to Little Hurricane Creek and Big Hurricane Creek, and Big Laurel Creek. Brown trout were also found in Big Laurel Creek. Big Hurricane Creek surveys also indicated the presence of: *Micropterus dolomieu, Nocomis micropogon, Etheostoma flabellare, Etheostoma rufilineatum, Luxilus coccogenis, and Rhinichthys atratulus.*

3) Odonate surveys conducted at two sites within the vicinity of the Shadline Project in 2003 revealed no Sensitive odonates. These sites were surveyed during three sample periods. The DWQ benthic macroinvertebrate monitoring sites on Big Laurel Creek and the French Broad River indicate a bioclassification rating of "Good-fair" on the French Broad River and the Big Laurel Creek site was given the bioclassification ratings of "Good" (2001) and "Excellent" (2003). These bioclassification ratings are based on species present and total taxa richness of each site.

4) Fish population within Big Laurel Creek consists of *Oncorhynchus mykiss, Rhinichthys cataractae, Etheostoma swannanoa, Cyprinella galactura, Etheostoma blennioides, Etheostoma rufilineatum, Micropterus dolomieu, Ambloplites rupestris, Etheostoma chlorobranchium, Hypentelium nigricans, Campostoma anomalum, Luxilus coccogenis, Notropis leuciodus, and Nocomis micropogon* (DWQ 2002).

5) Freshwater mussel surveys conducted in 2001 and 2003 in Big Laurel Creek and the French Broad River revealed *Elimia proxima* and *Corbicula fluminea* (DOT, TVA). Crayfish

surveys indicated the presence of three species. These include *Cambarus bartonii, Puncticambarus robustus,* and *Cambarus (Hiaticambarus longirostris)*.

Culverts along FSRs 113A, 113, 467 A, 3514, and 3578, plus existing skid trails and roads previously used to access group selection stands, the roads themselves, and existing old roads and skid trails in the project area are the existing threats to streams and drainages. Impacts from these sources are limited to down slope movement of sediment from road runoff and culvert fills. It is suspected that sediments from these sources are deposited in the natural vegetative filters before they reach areas of perennial water. Forest Service Roads 113A and 3578 are closed to all vehicle traffic except for administrative and fire control purposes (i.e. road disturbance is limited).

C. SUMMARY OF KNOWN AND LIKELY TES

The following table displays the occurrence of TES in the AAs:

Table A-2: TES Species known or Likely to Occur in Shadline Project Areas or Analysis Area(s)

Species	Type	Habitat	Occurrence
Federally Threatened or Endangered (T&E) Species			
None	None	None	None known to occur in the analysis or activity areas
2002 Region 8 Regional Forester's Sensitive (S) Species List[1]			
Paravitrea placentula, Glossy Supercoil	Snail	Moist leaf litter in rich cove, northern red oak and montane oak/hickory forests with hemlock and birch.	One population known within activity area in stand 423-15
Allium cuthbertii	Vascular Plant	Low elevation granite domes, rocky areas with high pH soils.	Known to occur within the analysis area (Big Laurel) but not within activity areas.
Asplenium x ebenoides	Vascular Plant	Montane Calcareous Cliff	Known to occur within the analysis area (Paint Rock) but not within activity areas.
Buckleya distichophylla	Vascular Plant	Montane Acidic Cliffs	Known to occur within the analysis area (Lovers Leap & Big Laurel) but not within activity areas.
Cleistes bifaria	Vascular Plant	Pine-Oak Heath Woodland	Not known to occur in project or activity area.
Euphorbia purpurea	Vascular Plant	Northern Hardwood Forest, Rich Cove Forest.	Not known to occur in project or activity area.
Heuchera longiflora var. aceroides	Vascular Plant	Rich Cove Forest, Glade, Mesic Oak-Hickory Forest	Known to occur within the analysis area (Lovers Leap, etc.) but not within activity areas.
Hydrotherria venosa	Lichen	Aquatic on rock in fast moving streams.	Not known to occur in project or activity area.
Juglans cinerea	Vascular Plant	Rich Cove Forest, Montane Alluvial Forest, Mesic Oak Hickory Forest.	Known to occur within the analysis area (North side of Lover's Leap) but not within project or activity areas.
Penstemon smallii	Vascular	Rock outcrops, woodlands	Known to occur within the

Species	Type	Habitat	Occurrence
	Plant		analysis area (near French Broad River) but not within project or activity areas.
Plagiochila austinii	Liverwort	Rich Cove Forest, Spray Cliff, Northern Hardwood Forest	Not known to occur in project or activity area.
Saxifraga caroliniana	Vascular Plant	Northern Hardwood Forest, Montane Acidic Cliff,High Elevation Rocky Summit	Not known to occur in project or activity area.
Silene ovata	Vascular Plant	Rich Cove Forest, High Elevation Red Oak Forest	Not known to occur in project or activity area.
Thaspium pinnatifidum	Vascular Plant	Rich Cove Forest, Mesic Oak-Hickory, Roadside	Known to occur within the analysis area (near French Broad River) but not within project or activity areas.
Trillum simile	Vascular Plant	Rich Cove Forest	Not known to occur in project or activity area.
Trillum rugellii	Vascular Plant	Rich Cove Forest	Not known to occur in project or activity area.
Tsuga caroliniana	Vascular Plant	Chestnut Oak Forest, Pine Oak-Heath Forest.	Not known to occur in project or activity area.
Cambarus reburrus (French Broad crayfish)	Crayfish	Lotic-streams in upper French Broad Drainage	May occur in aquatic analysis area.
Percina squamata (olive darter)	Fish	Lotic	May occur in aquatic analysis area.
Etheostoma vulneratum (wounded darter)	Fish	Lotic	May occur in aquatic analysis area but not known since 1870 and is likely extirpated in the drainage since no observations have been made of this species since.

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

V. EFFECTS/IMPACTS OF PROPOSED MANAGEMENT ON TES SPECIES

This section and Table A-3 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-3: Summary of Impacts to Affected TES Species

Species	Impacts (Alternative B)
Federal T&E Species	
None known	None known
2002 Region 8 Regional Forester's S Species	
Paravitrea placentula, Glossy Supercoil	No direct or indirect impacts because of project design; cumulative impact may be beneficial as disclosed in Section B below
Allium cuthbertii	No direct, indirect, or cumulative impacts because no species or their habitats are not found in activity areas.
Asplenium x ebenoides	
Buckleya distichophylla	
Cleistes bifaria	

Species	Impacts (Alternative B)
Euphorbia purpurea	
Heuchera longiflora var. aceroides	
Hydrotherria venosa	
Juglans cinerea	
Penstemon smallii	
Plagiochila austinii	
Saxifraga caroliniana	
Silene ovata	
Thaspium pinnatifidum	
Trillum simile	
Trillum rugellii	
Tsuga caroliniana	
Cambarus reburrus (French Broad crayfish)	No direct, indirect, or cumulative impacts because species' habitat would not be affected by proposal.
Percina squamata (olive darter)	
Etheostoma vulneratum (wounded darter)	No direct, indirect, or cumulative impact because species' habitat would not be affected by proposal (probably extirpated in the drainage since no observations have been made since 1870)

A. EFFECTS/IMPACTS TO REGIONAL FORESTER'S SENSITIVE PLANT SPECIES

There are no impacts to S plant species because there are no known species or their habitats within the activity or project areas (botanical report, project record and Table A-2 above). There are seven known occurrences of S plants species and habitats in the AA, all of which are known not to occur in the activity or project areas; therefore there would be no direct, indirect, or cumulative impacts to these species and habitats because the proposed activities are far enough removed from them.

B. EFFECTS/IMPACTS TO REGIONAL FORESTER'S SENSITIVE WILDLIFE SPECIES

Glossy Supercoil

There are two historic records and 11 records from recent surveys (2001-2003) of this species within the Nantahala & Pisgah National Forests; eight records from the French Broad unit of the Appalachian Ranger District. This species favors moist forest habitat.

Direct/Indirect Effects

A local population of this species was found in stand 423-15 at the base of a moss covered talus slope within the immediate vicinity of a spring and the beginning of a perennial stream (about 1/10 acre of about 230 acres of total habitat in the AA). Above this talus slope is a large rock or small cliff face. A few trees occur within the talus slope area; however large trees occur around the peripheral of the rocks and the spring head. To maintain the diversity of gastropod species on the Nantahala & Pisgah National Forests, protection of this snail and its habitat is critical to the species expanding into the Silver Mine Creek riparian area.

The proposed activity of two-age regeneration within this unit is to be accomplished utilizing cable logging systems. Removing the canopy trees over the population of Glossy supercoil would raise soil temperature and dry it. Both these result in unsuitable habitat conditions for the

snail; possibly causing the local population to perish. The project has been designed to protect this local population's habitat by placing cable corridors outside the talus slope and spring head. The trees immediately surrounding the talus slope and spring head would be retained, thereby maintaining canopy cover, soil moisture, and temperature conditions. The habitat for this local population is restricted to moist and shaded conditions in the immediate area where tulip poplar dominates. The terrain found immediately outside of this area is dryer and does not exhibit similar soil conditions; therefore any expansion of the snail species population is limited. The harvest of trees outside this protected site would result in tulip poplar regeneration, possibly expanding snail habitat over the long-term. Removing canopy trees outside of this area would not limit the expansion of this species population.

Cumulative Effects

Due to project design, there would be no direct or indirect effects to this local population by any alternative; and because the local population would not be directly or indirectly affected, there would be no adverse cumulative effects. The likely expansion of tulip poplar may result in a positive cumulative effect of expanding this local population's habitat. There are no foreseeable future actions that could adversely affect this local population. Past timber sales (listed in Table 1-9, Chapter 1 of the preliminary analysis), the Larman wildfire north of Paint Rock, and the Rocky Knob prescribed burn are not expected to contribute adverse cumulative effects because these past actions either do not affect the moist Glossy supercoil habitat or the areas impacted by the actions were not within suitable habitat.

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

There are three aquatic sensitive species listed for Madison County by the North Carolina Heritage Program within the aquatic AA of the Shadline Project in the French Broad River. It is expected that *Etheostoma vulneratum* is extirpated from the French Broad River since no element occurrences (EOs) have been documented since 1870. *Percina squamata* was last documented in the French Broad River in Madison County in 1977. It is likely that this species is extirpated from the French Broad River in Madison County since no EOs have been documented for 28 years. *Cambarus reburrus* was last documented within the French Broad River Basin in 1981.

Recent surveys indicate that this species is no longer present within the Shadline AA of the French Broad River. Even if these species were to reappear within the French Broad AA, no impacts to sensitive species *Percina squamata, Cambarus reburrus,* and *Etheostoma vulneratum* would occur as a result of implementation of any of the action alternatives because habitat for these species would be located in the lower reaches of the aquatic analysis area (in the French Broad River) and away from the proposed culvert installation in UT Cook Branch. Any disturbances associated with the culvert installation in UT Cook Branch would be diminished downstream long before reaching the French Broad River. All other ground disturbances within the activity areas are located outside the 100 foot riparian area of perennial streams.

D. CONFLICTS

There are no known conflicts between the proposal and the objectives of federal, regional, state, and local land use plans, policies, and controls in place for the project area. The proposal has

been designed to comply with standards and guidelines of the Nantahala and Pisgah National Forests Land and Resource Management Plan.

VI. PROJECT DESIGN FEATURES

Botanical Species

No specific project design features are required.

Terrestrial Species

The following project design feature would ensure protection of the local population of Glossy supercoil located in 423-15: cable corridors would be outside the immediate area of the talus slope and spring head. The trees contributing shade directly to this habitat would be retained. The retention of one tree height buffer surrounding habitat would be sufficient to maintain shade conditions and the local population's habitat. This project design feature is sufficient to protect this regionally sensitive species. No other specific project design features are required.

Aquatic Species

Project design features for protection of aquatic resources are sufficient to protect all regionally sensitive species (see section 2.4, Chapter 2, preliminary analysis and section 4.1.7, aquatic analysis, project record for detail of measures). No other specific project design features are required.

VII. DETERMINATION OF EFFECT

This proposal would have no adverse effects upon any species that is federally listed as threatened or endangered because no T&E species or their habitat is known to occur in the AAs. Due to project design, there would be no adverse impacts to the local populations of the Regional Forester's Sensitive species listed in Table A-2 above. There would be no adverse impacts to any Sensitive species or their habitat listed in Tables A, B, and C below because no other Sensitive species or their habitat are known to occur or is likely to occur. There is no occupied or unoccupied habitat recognized as essential for listed or proposed species recovery, or to meet Forest Service objectives for Sensitive species. Formal consultation with the USDI Fish and Wildlife Service is not required.

Prepared by:

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Attachment 1

Botanical

Table A: Madison County TES Plants

Species	Natural Communities, Habitat	Status/Occurrence*
Threatened, Endangered, or Proposed Species		
None Occur in Madison County		
Sensitive Species		
Allium cuthbertii	Low Elevation Granitic Dome	Sensitive/2
Arabis patens	Montane Mafic Cliff, Montane Calcareous Cliff	Sensitive/3
Asplenium x ebenoides	Montane Calcareous Cliff	Sensitive/2
Berberis canadensis	Rich Cove Forest, Glade, mafic rock	Sensitive/4
Buckleya distichophylla	Hemlock Hardwood Forest, Acidic Cove Forest, Montane Acidic Cliff, Mesic Oak-Hickory	Sensitive/2
Cleistes bifaria	Pine-Oak/Heath Forest, Pine-Oak Woodland	Sensitive/3
Euphorbia purpurea	Northern Hardwood Forest, Rich Cove Forest, Mesic oak-hickory	Sensitive/3
Heuchera longiflora var. aceroides	Rock outcrops in Rich Cove Forest, mafic rock	Sensitive/2
Hydrothyria venosa	Stream	Sensitive/3
Juglans cinerea	Rich Cove Forest, Mesic Oak-Hickory, Montane Alluvial Forest	Sensitive/2
Penstemon smallii	Rock outcrops, woodlands	Sensitive/2
Plagiochila austinii	Moist Montane Acidic Cliff	Sensitive/3
Prenanthes roanensis	Northern Hardwood Forest, Grassy Bald, Meadow, Roadside, High Elevation Red Oak Forest	Sensitive/4
Saxifraga caroliniana	Northern Hardwood Forest, Montane Acidic Cliff, High Elevation Rocky Summit	Sensitive /3
Silene ovata	Rich Cove Forest, Mesic Oak-Hickory, Roadside, mafic rock	Sensitive /3
Thaspium pinnatifidum	Rich Cove Forest, Mesic Oak-Hickory, Roadside, mafic rock	Sensitive /2
Trillium simile	Rich Cove Forest	Sensitive /3

*1=known to occur within activity area
2=known to occur in AA but not within activity area
3=not known to occur within activity area or AA but may contain (limited) habitat for species
4=not known to occur within AA and no habitat is known to occur within AA.

Wildlife

Table B: Madison County TES Wildlife*

Species	Habitat	Type & Status	Reason for Elimination
Threatened, Endangered, or Proposed Species			
Canus rufus, Red wolf	Forests with large deer populations	Mammal, E	Reintroduction into GSMNP failed
Corynorhinus town. Virginianus, VA big-	Caves within forested habitat	Mammal, E	No known caves/mines within analysis areas Caves/mines protected if they

Species	Habitat	Type & Status	Reason for Elimination
eared bat			occur
Myotis grisescens, Gray Bat	Cave dwelling bat	Mammal, E	Known to forage on Pigeon River at the TN/NC line
Glaucomys sabrinus coloratus, Carolina northern flying squirrel	Mature spruce/fir & N. hardwoods, generally above 4000' elevation	Mammal, E	No spruce/fir within activity area, N. hardwoods sporadic
Felis concolor cougaur, Eastern cougar	Remote habitats within mountains	Mammal, E	Believed extirpated
Clemmys muhlenbergii, Bog turtle	Marshy meadows, large seeps, and bogs	Reptile, T	French Broad River potential habitat outside of activity areas
Haliaeetus leucocephalus, Bald Eagle	Mature forests near large bodies of water	Bird, T	French Broad River potential habitat outside of activity areas
Sensitive Species			
Corynorhinus rafinesquii, Rafinesque's big-earred bat	Cave dwelling bat, Abandoned building preferred during the summer	Mammal, S	1909 Historic county record. No occurrence record within analysis area.
Lanius ludovicianus migrans, Migrant loggerhead shrike	Pasture and agricultural areas with hedge rows	Bird, S	French Broad River potential habitat outside of activity areas
Thryomanes bewickii altus, Appalachian Bewick's wren	Brush and fence rows in open country	Bird, S	No occurrence during surveys within activity areas. No habitat within activity areas,
Incisalia irus, Frosted elfin	Open, dry woods and edges. Host-lupines	Invertebrate, S	No occurrence record, no lupines found during botanical surveys
Cicindela ancocisconensis, a tiger beetle	Sandy soil within floodplain of rivers	Invertebrate, S	French Broad River potential habitat outside of activity areas
Melanoplus divergens, Divergent Melanoplus	Open grassland/balds	Invertebrate, S	No occurrence record and no activity within habitat areas
Scudderia septentrionalis, Northern bush katydid	Woodlands, current research has not yet defined habitat	Invertebrate, S	No occurrence records in the county and none found within vicinity during current research study
Trimerotropis saxatilis, Rock-loving grasshopper	Rocky/boulder field exposed to sunlight	Invertebrate, S	No occurrence records or habitat within activity areas
Micotus chrotorrhinus carolinensis, Southern rock vole	Rocky/boulder field within forest	Mammal, S	No occurrence records, habitat within 423-15 protected by mitigation measure
Sorex palustris puntculatus, Southern water shrew	12-15' streams and banks with rhododendron in N. hardwood or spruce/fir forests	Mammal, S	No occurrence record or habitat within activity areas. Protected by forest riparian standard
Pallifera hemphilli, Black mantleslug	Acidic & rich coves, spruce/fir forests	Invertebrate, S	None recorded from surveys of activity areas

*Those TES and FC species without a historical occurrence record within the French Broad unit on the Appalachian Ranger District were not considered for evaluation of effects.

TES species dropped from further consideration for any of the following reasons:

- ◊ lack of suitable habitat,
- ◊ suitable habitat is located outside of the proposed project area for effects analysis,
- ◊ lack of NCNHP historical or current record, or
- ◊ the species has a well known distribution that does not include the analysis area.

Aquatic

Table C: Madison County TES Aquatics

Common Name	Scientific Name	Type	Likelihood of Occurrence
Threatened, Endangered, or Proposed Species			
spotfin chub	*Cyprinella monacha*	fish	Does Not Occur (6)
Sensitive Species (based on January 1, 2002 Regional Forester's list)			
wounded darter	*Etheostoma vulneratum*	fish	Does Not Occur (6)
olive darter	*Percina squamata*	fish	May Occur (1)
French broad river crayfish	*Cambarus reburrus*	crayfish	May Occur (1)

Evaluation Criteria:
1 = Recent survey data within or downstream the aquatic analysis area (<5 yrs old)
2 = Historical survey data within or downstream the aquatic analysis area (>5 yrs old)
3 = Vicinity records (within or downstream the analysis area, not necessarily within project area)
4 = Suitable habitat present, but no vicinity records
5 = No suitable habitat present or vicinity records within analysis area, but species may be present in county
6 = Extirpated species listed for river system

APPENDIX B – AGE CLASS DISTRIBUTION

APPENDIX B – AGE CLASS DISTRIBUTION

The Shadline project extends across two administrative watersheds, Analysis Area 13, referred to as the Polecat analysis area and Analysis Area 14, referred to as the Rich Mountain analysis area. Each of these analysis areas are dominated by management areas that are suitable for timber production.

In the areas suitable for timber production both analysis areas are dominated by management area 1B or 3B, timber emphasis (Forest Plan, page III-71). The age-class distribution for both areas are unbalanced for MA 3B.

This analysis determines the minimum and maximum harvest levels for the project area 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 the existing 0-10 year age-class and regeneration goals for the Rich Mountain (13) and Polecat (14) analysis areas and for the Shadline project compartments within each analysis area. Uncut inclusions and non-forested areas are not considered as 0-10 year old regeneration.

Analysis Area 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 analysis area.

Table B-1: Analysis Area Calculations 0-10 Year Age-Class

		0-10 YEAR AGE CLASS			HARVEST GOALS		SHADLINE PROPOSAL	
Analysis Area	Suitable Acres	Min. Desired	Max. Allowed	Existing 0-10 Yr.	Min.	Max.	Proposed Harvest Acres	Percent* 0-10 Yr
13 Rich Mtn	7,081	-	878	140	-	728	207	5
14 Polecat	2,944	-	439	296	-	142	0	10

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

Management Area Analysis

For every management area 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 Rich Mtn Analysis Area 13 (Compartments 418-426)

		0-10 YEAR AGE CLASS			HARVEST GOALS		SHADLINE PROPOSAL	
Mgmt. Area	**Forested Acres**	**Min. Desired**	**Max. Allowed**	**Existing 0-10 Yr.**	**Min.**	**Max.**	**Proposed Harvest Acres**	**Percent 0-10 Yr**
2A	758	34	76	0	34	69	4	0.6
2C	237	-	-	0	-	-	-	-
3B	3,416	170	512	85	85	427	96	5.3
4C	912	-	-	0	-	-	-	-
4D	2,907	145	290	55	90	235	107	5.6
13	573	-	-	0	-	-	-	-
14	970	-	-	0	-	-	-	-
Uninventoried	781							
Total	**10,554**	**349**	**878**	**140**	**209**	**731**	**207**	**-**

Table B-3: Management Area Calculations 0-10 Year Age-Class Polecat Analysis Area 14 (Compartments 427-432)

		0-10 YEAR AGE CLASS			HARVEST GOALS		SHADLINE PROPOSAL	
Mgmt. Area	**Forested Acres**	**Min. Desired**	**Max. Allowed**	**Existing 0-10 Yr.**	**Min.**	**Max.**	**Proposed Harvest Acres**	**Percent 0-10 Yr**
1B	1,071	54	160	50	4	109	-	4.7
2C	38	-	-	0	-	-	-	-
3B	1,873	93	279	53	40	226	-	2.9
4C	1,998	-	-	189	-	-	-	9.5
13	106	-	-	0	-	-	-	-
Uninventoried	353							
Total	**5,439**	**147**	**439**	**292**	**44**	**335**		

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 display the age-class by compartment:

Table B-4: Rich Mtn Analysis Area 13 Compartment 420 0-10 Year Age-Class

		0-10 YEAR AGE CLASS			HARVEST GOALS		SHADLINE PROPOSAL	
Mgmt. Area	**Forested Acres**	**Min. Desired**	**Max. Allowed**	**Existing 0-10 Yr.**	**Min.**	**Max.**	**Proposed Harvest Acres**	**Percent 0-10 Yr**
3B	1,012	54	162	0	54	162	24	2.4
14	68	-	-	-	-	-	-	-
Total	**1,080**	**54**	**162**	**0**	**54**	**162**	**24**	**2.4**

Table B-5: Rich Mtn Analysis Area 13 Compartment 422 0-10 Year Age-Class

		0-10 YEAR AGE CLASS			HARVEST GOALS		SHADLINE PROPOSAL	
Mgmt. Area	**Acres**	**Min. Desired**	**Max. Allowed**	**Existing 0-10 Yr.**	**Min.**	**Max.**	**Proposed Harvest Acres**	**Percent 0-10 Yr**
4D	961	48	96	0	48	96	64	
14	137	-	-	-	-	-	-	-
Total	**1,098**	**48**	**96**	**0**	**48**	**96**	**64**	**5.8**

Table B-6: Rich Mtn Analysis Area 13 Compartment 423 0-10 Year Age-Class

		0-10 YEAR AGE CLASS			HARVEST GOALS		SHADLINE PROPOSAL	
Mgmt. Area	**Acres**	**Min. Desired**	**Max. Allowed**	**Existing 0-10 Yr.**	**Min.**	**Max.**	**Proposed Harvest Acres**	**Percent 0-10 Yr**
3B	272	16	32	0	16	32	26	-
2A	311	16	31	0	16	31	4	-
4D	184	9	18	0	9	18	26	-
14	40	0	0	-	-	-	-	-
Total	**807**	**41**	**81**	**0**	**41**	**81**	**56**	**6.9**

Table B-7: Rich Mtn Analysis Area 13 Compartment 424 0-10 Year Age-Class

		0-10 YEAR AGE CLASS			HARVEST GOALS		SHADLINE PROPOSAL	
Mgmt. Area	**Forested Acres**	**Min. Desired**	**Max. Allowed**	**Existing 0-10 Yr.**	**Min.**	**Max.**	**Proposed Harvest Acres**	**Percent 0-10 Yr**
3B	218	-	-	8	-	-	9	-
4C	212	-	-	-	-	-	-	-
2C	57	-	-	-	-	-	-	-
13	573	-	-	-	-	-	-	-
Total	**1,060**	**-**	**-**	**8**	**-**	**-**	**9**	**1.6**

Table B-8: Rich Mtn Analysis Area 13 Compartment 425 0-10 Year Age-Class

		0-10 YEAR AGE CLASS			HARVEST GOALS		SHADLINE PROPOSAL	
Mgmt. Area	**Forested Acres**	**Min. Desired**	**Max. Allowed**	**Existing 0-10 Yr.**	**Min.**	**Max.**	**Proposed Harvest Acres**	**Percent 0-10 Yr**
3B	750	89	267	9	81	258	47	2.5
4C	700	-	-	-	-	-	-	-
14	321	-	-	-	-	-	-	-
Total	**1,771**	**89**	**267**	**9**	**81**	**258**	**47**	**2.5**

Table B-9: Rich Mtn Analysis Area 13 Compartment 426 0-10 Year Age-Class

		0-10 YEAR AGE CLASS			HARVEST GOALS		SHADLINE PROPOSAL	
Mgmt. Area	**Forested Acres**	**Min. Desired**	**Max. Allowed**	**Existing 0-10 Yr.**	**Min.**	**Max.**	**Proposed Harvest Acres**	**Percent 0-10 Yr**
3B	165	26	53	0	26	53	8	0.8
2A	447	22	44	0	22	44	-	
2C	102	-	-	-	-	-	-	-
14	253	-	-	-	-	-	-	-
Total	**967**	**48**	**97**	**0**	**48**	**97**	**8**	**0.8**

APPENDIX C – OLD GROWTH ANALYSIS

APPENDIX C – OLD GROWTH RESTORATION

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 – III-28). The administrative watersheds affected by this project are 13 and 14, Rich Mountain and Polecat. The requirements for this project are as follows: (1) utilize large patch #19 in Rich Mountain Analysis Area (2) select small patches, if needed, for Compartments 423; and (3) field check stands in the initial inventory of old growth that would be directly affected by this project.

The purpose of the **large patches** is to serve as permanent reservoirs of biological diversity and to provide preferred habitats for forest interior birds across the landscape.

Large Patch #19 Rich Knob

Distribution of old growth types are shown below:

Table C-1: Distribution of Old Growth Types

OG Code	OG Type	Acres	% of Patch
05	Cove Hardwoods	900	20
21	Upland Hardwoods	2,800	64
05	White Pine	200	4
24	Yellow Pine	500	12
Total		**4,400**	**100%**

Initial Inventory of Old Growth and Small Patch Designation

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 either watershed.

In Compartments 424, 425, and 426 there is a large patch of old growth designation (Large Patch #19). No small patch old growth would be designated within these compartments in this proposal. 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-2: Small Old Growth Patches Proposed in Rich Mtn Analysis Area (Compartment s 420, 422, 423)

Comp.	Acres	Stands	Age in 2005	Initial Inv.?	Community Type
420	78	3	120	No	Mixed mesophytic forest and dry mesic forest
422	55	2,3	Stand 2 90 Stand 3 74	No	Mixed mesophytic forest and dry mesic forest
423	53	8,16 and a portion of 7	Stand 8 87 Stand 16 84 Stand 7 84	No	Mixed mesophytic forest and dry mesic forest

APPENDIX D – APPROPRIATENESS OF HARVEST

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 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 will 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

Compt. -Stand	Acres	Vol./ac (MBF)	1/ Timber Quality	2/ Leave Trees	3/ Future Removal	4/ Access	5/ Special Concerns
423- 10	12	12	Med	Y	No	Good	
423-15	20	12	Med	Y	No	Good	Visual
424-12	9	9	Med	Y	No	Good	
425-12	15	9	Med	Y	No	Good	
425-13	9	9	Med	Y	No	Good	
426-1	9	12	Med	Y	No	Good	Visual
420,422,425 Group Selects	69	14	Med	Y	No	Good	

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 will 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 20-25
423- 10	12	Up. Hwd.	87	Tractor			Yes B,C
423-15	20	Up. Hwd.	83	Cable			Yes B,C

Compt -Stand	Acres	Forest Type	Age	Method Of Logging	Selection (groups <1 ac)	Shelterwood BA 30-50	Two-Age BA 20-25
424-12	9	Up. Hwd.	87	Tractor			Yes B,C
425-12	15	Up. Hwd.	87	Tractor			Yes B,C
425-13	9	Up. Hwd.	87	Tractor			Yes B,C
426-1	9	Up. Hwd.	83	Tractor			Yes B,C
420,422,425 Group Selects	69	Up. Hwd./WP	69-83	Tractor	Yes B,C		

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

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 Shadline 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 is 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 2005 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 2005 National Forests in North Carolina. Sale preparation costs are approximately $8.40/CCF and timber harvest administration costs are approximately $4,000 per year of Sale (generally sale runs 3 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 construction was estimated at $60,000/mile and road reconstruction was estimated at $30,000/mile.
7. A 60-year long-term projection was used to simulate the time for high quality hardwood sawtimber and as per Forest Service Handbook 2409.18, Section 13.05, Long-Term Efficiency Analysis.

Financial Analysis Worksheets

Table E-1: Sale Revenue Estimates for all Alternatives

Alternative	Timber Volume (CCF)	Revenues
A	0	0
B	3,929	$222,841
C	3,469	$178,859

Table E-2: Sale Cost Estimates – Alternative B

Activity	Units	Number	Cost/Unit	Total Costs
Stand Examinations	Acres	800	10.00	8,000
Sale Preparation	CCF	3,929	$8.40	$33,003
Harvest Administration	Year	3	$4,000	$12,000
Site Preparation – Herbicide	Acres	141	$175	$24,675
Pre- Haul Maintenance	Miles	~3	$5,000	$15,000
Temp Road Construction	Miles	0.5	$30,000	$15,000
Cable Yarding	MBF	241	$35	$8435

Activity	Units	Number	Cost/Unit	Total Costs
Total				**$116,113**

Table E-3: Benefit Cost Ratio – Alternative B

Year	Discount Factor	Revenue	Cost	PNV	BCR
0	0	$222,841	$116,113	$106,728	1.92
60	0.04	$8,914	$4,645	$16,747	1.92

PNV – present net value
BCR - benefit cost ratio

Table E-4: Sale Cost Estimates – Alternative C

Activity	Units	Number	Cost/Unit	Total Costs
Stand Examinations	Acres	800	10.00	8,000
Sale Preparation	CCF	3469	$8.40	$29,139
Harvest Administration	Year	3	$4,000	$12,000
Site Preparation – Herbicide	Acres	141	$175	$24,675
Pre- Haul Maintenance	Miles	~3	$5,000	$15,000
Temp Road Construction	Miles	0.5	$30,000	$15,000
Cable Yarding	MBF	241	$35	$8435
Total				**$112,249**

Table E-5: Benefit Cost Ratio – Alternative C

Year	Discount Factor	Revenue	Cost	PNV	BCR
0	0	$178,859	$112,249	$66,610	1.59
60	0.04	$7,154	$4,490	$2,664	1.59

Salability of Shadline Timber Sale

Salability is determined by accessibly of timber and current markets for timber. Shadline is accessible from Forest Service Road (FSR) 467 and FSR 113A. Temporary road construction and pre-haul maintenance is necessary to access some units; however road costs are estimated to be approximately $30,000, well below the value of the timber to be removed. The timber quality is medium within the proposed sale units. Market for quality timber is high 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 Shadline timber sale if offered.

APPENDIX F – STANDARD PROJECT DESIGN FEATURES FOR HERBICIDE USE

APPENDIX F – STANDARD PROJECT DESIGN FEATURES FOR HERBICIDE USE

Herbicide Application Project Design Features

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. Triclopyr is not ground-applied within 60 feet of known occupied gray, Virginia big-eared, or Indiana bat habitat. Buffers are clearly marked before treatment so applicators can easily see and avoid them.
10. 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
11. 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.
12. 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.
13. 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.

14. 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.
15. 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
16. During use equipment to store, transport, mix, or apply herbicides is inspected daily for leaks.

APPENDIX G – MANAGEMENT INDICATOR SPECIES

APPENDIX G – MANAGEMENT INDICATOR SPECIES

Introduction

An assessment of habitat changes linked to management indicator species (MIS) is documented in this section. 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 preliminary analysis and the wildlife, aquatics, and botanical resource reports located in the project record.

Process

The Forest-wide list of MIS was considered as it relates to this project analysis area. Only those MIS that occur or have habitat within the project analysis area 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) **Tables G-1** and **G-2:** These tables display the biological communities, special habitats, associated MIS, and reasons species were, or were not selected for analysis in the project. The source of these tables is the Final Supplement to the Final Environmental Impact Statement (FSFEIS), Vol. I, Tables III-8 and III-9.
2) **Tables G-3** and **G-4:** These tables compare the effects (expressed as changes in habitat) by alternative to the Forest-wide estimates of habitats for each biological community and special habitat considered in the project-level analysis. Following these tables is a discussion of the cumulative effects for the selected species and habitats.
3) **Table G-5:** This table displays by MIS the Forest-wide population trend along with the associated biological community or special habitat. The information in this table is taken from the MIS Report for the Nantahala and Pisgah National Forests. This table is used in conjunction with the information presented in Tables G-3 and G-4 to explain how the project's effects to habitats affect Forest-wide population trends for the species considered.

Table G-1: Biological Communities, Associated MIS (per the Final Supplement to the Final Environmental Impact Statement Volume I, Table III-8), and why Species were Chosen or Eliminated from Analysis

Biological Community	MIS	Analyzed Further/ Evaluation Criteria
Fraser fir forests	Fraser fir, golden-crowned kinglet, Carolina northern flying squirrel	No/1
Red spruce/fraser fir forests	Golden crowned kinglet, Carolina northern flying squirrel, solitary vireo	No/1
Grassy and heath balds	Mountain oat-grass, Catawba rhododendron	No/1
Northern hardwood forests	Carolina northern flying squirrel, twisted stalk, solitary vireo	No/1
Carolina hemlock bluff forests	Golden-crowned kinglet, Carolina hemlock	1

Biological Community	MIS	Analyzed Further/ Evaluation Criteria
Cove forests	Ginseng, black cherry, buckeye, basswood, solitary vireo	No/2
Oak and oak/hickory forests	Red oak, white oak, hickories	Yes
White pine forests	White pine (natural community only)	No/1
Yellow pine mid-successional communities	Pine warbler (low elevational shortleaf/Virginia pine)	No/2
Xeric yellow pine forests	Pine warbler (pine/oak/heath low elevation habitats) pitch pine, table mountain pine, turkey beard, mid-successional)	No/2
Reservoirs	Index of biotic integrity, largemouth bass, bluegill	No/1
Forested seep wetlands	Golden saxifrage, umbrella leaf, mountain lettuce	No/1
Bogs	*Sphagnum spp.*	No/2
Mountain ponds and ephemeral pools	Spotted salamander (vernal pools)	No/2
Barrens and glades	Prairie dropseed, slender wheatgrass	No/1
Shaded rock outcrops and cliffs	Green salamander (granitic gneiss rock outcrops with crevices and mesic conditions), Jordan's salamander, alumroots, saxifrages	No/2
Open rock outcrops and cliffs	Raven, peregrine falcon, Biltmore sedge, wretched sedge, mountain oat-grass	No/2
Caves	Bats (all cave-using species)	No/2
Alluvial forests	Two-lined salamander (mid-late successional stages), raccoon (all forest types), mink	No/2
Coldwater streams	Brook, brown, and rainbow trout; sculpin, blacknose dace	Yes
Coolwater streams	Smallmouth bass, white sucker, moxostoma spp., index of biotic integrity	Yes
Warmwater streams	Index of biotic integrity, smallmouth bass, freshwater mussels, spotfin chub	Yes
Invasive exotic plant species	Japanese honeysuckle, Japanese grass, Chinese privet, periwinkle	Yes

1 Biological Community and its represented species are not known to occur within the project area; 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 is imbedded in the project area, but would not be affected by management activities because the biological community would not be entered by the proposed activities. 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.

Table G-2: Special Habitats, Associated MIS (per Final Supplement to the Final Environmental Impact Statement Volume I, Table III-9), and why Species were Chosen or Eliminated from Analysis

Special Habitat	MIS	Analyzed Further/ Evaluation Criteria
Old forest communities (100+ years old)	Black bear (dens, low levels of disturbance), bats (roosting and foraging habitats in mature forests), pileated woodpecker (cavities, foraging habitat), lung lichens	No/2
Early successional (0-10 years old)	White-tailed deer (all communities and elevations), eastern wild turkey (all communities), ruffed grouse (early and mid-successional all communities) rabbits, rufous-sided (eastern) towhee, bobcat, field sparrow (brushy, riparian thickets)	Yes
Early successional (11-20)	Rufous-sided (eastern) towhee, ruffed grouse (early and mid-successional all communities)	Yes

Special Habitat	MIS	Analyzed Further/ Evaluation Criteria
Soft mast-producing species	Wild grape (*vitus spp.)*, cedar waxwing (all communities soft mast)	Yes
Hard mast-producing species (>40 yrs)	Black bear, wild turkey, gray squirrel, white-tailed deer	Yes
Mixed pine/hardwood forest types (successional stage and hard mast)	Black bear, eastern wild turkey, gray squirrel, white-tailed deer	No/2
Permanent grass/forb openings	Eastern wild turkey, eastern meadowlark, rabbit	Yes
Contiguous areas with low disturbance (<1 mile open travelway/4 square miles	Black bear (all communities)	No/1
Contiguous areas with moderate disturbance levels (<1 mile open travelway/2 square miles)	Eastern wild turkey (all communities)	No/2[3]
Den trees (>36" dbh)	Black bear (large dens)	No/2
Snags and dens (>22" dbh)	Pileated woodpecker, raccoon (moderate sized dens)	Yes
Small snags and dens	Gray squirrel, white-breasted nuthatch, yellow-bellied sapsucker (breeding populations)	Yes
Downed woody debris – all sizes (foraging and cover habitats)	Black bear (all communities), pileated woodpecker, ruffed grouse (down logs for drumming), Jordan's salamanders	Yes
Large contiguous forest areas	Ovenbird (in breeding range, moderately productive sites), northern parula warbler (in breeding range, requires cover and riparian habitats) veery, solitary (blue-headed) vireo	Yes

1 Special Habitat and its represented species are not known to occur within the project area; therefore, this special habitat 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 habitat.

2 Special Habitat is imbedded in the project area, but would not be affected by management activities because the special habitat would not be entered by the proposed activities. 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.

3 See description of defined AA's within Wild Turkey write-up on page 11 of the wildlife report, project record

Table G-3: Biological Communities, Forest-wide Estimates, and Expected Changes Resulting from the Alternatives[1]

Biological Community	Forest-wide Estimate	Estimated Changes		
		Alternative A	Alternative B	Alternative C
Oak and oak/hickory forests	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	143 acres harvested	143 acres harvested
Cold Water Streams	2,000 miles	None affected	Approximately 22.2 miles of coldwater streams exist within the analysis area for Shadline. 22 to 24 linear feet of UT 1 Trent Branch will be impacted by culvert installation (no fish habitat at crossing). Off site movement of soil is expected during installation but should diminish with site rehabilitation.	Approximately 22.2 miles of coldwater streams exist within the analysis area for Shadline. 22 to 24 linear feet of UT 1 Trent Branch will be impacted by culvert installation (no fish habitat at crossing). Off site movement of soil is expected during installation but should diminish with site rehabilitation.
Cool Water Streams	300 miles	None affected	There is approximately 0.76 miles of Big Laurel Creek within the project analysis area. No impacts are expected to occur from project activities associated with the Shadline Project.	There is approximately 0.76 miles of Big Laurel Creek within the project analysis area. No impacts are expected to occur from project activities associated with the Shadline Project.
Warm Water Streams	210 miles	None affected	Approximately 2.0 miles of the French Broad River is considered in the analysis area. No impacts are expected to occur from project activities associated with the Shadline Project	Approximately 2.0 miles of the French Broad River is considered in the analysis area. No impacts are expected to occur from project activities associated with the Shadline Project
Invasive Exotic Plant Species	2,684 miles of road construction <25 years	No change	0.5 miles of temporary road constructed	0.5 miles of temporary road constructed

[1] See section "Evaluating the Effect of Project-level Activities on Forest-wide Population Trends for MIS" below for additional analysis by alternative and on population trends

Table G-4: Special Habitats, Forest-wide Estimates, and Expected Changes Resulting from the Alternatives[1]

Special Habitat	Forest-wide Estimate	Estimated Changes		
		Alternative A	Alternative B	Alternative C
Early successional (0-10 years old)	26,800 ac (yr 2000) 2,040 ac (5 yr avg) downward trend	None affected	207[2]	162[3]
Early successional (11-20 years old)	46,290 ac (yr 2000) Peak of upward trend	None affected	None affected	None affected
Soft mast producing species	13,144 ac early seral (yr 2000), highest potential on 5,650 ac downward trend	No Change	110 ac increase	110 ac increase
Hard mast producing species (>40 years old)	681,000 acres, increasing trend	No Change	120.5 acre decrease	120.5 acre decrease
Permanent grass-forb openings	3,000 acres	No Change	9.7 ac from high to low quality Daylighting and seeding would improve habitat	9.7 ac from high to low quality Daylighting and seeding would improve habitat
Small snags and dens	Ave. at 80 year Cove=4/acre Upland=3/acre Pine=2/acre	No Change	143 ac increase (slash down in stands 425-10 and 12	143 ac increase (slash down in stands 425-10 and 12
Downed woody debris, all sizes (foraging and cover habitats)	High Accumulation Small wood: 18,000 Large wood: 386,000 Low Accumulation (approx: 600,000)	No Change	Increase, all sizes	Increase, all sizes
Large contiguous forest areas	600,000 – 800,000 acres (approx)	None affected	None affected	None affected

1 – See section "Evaluating the Effect of Project-level Activities on Forest-wide Population Trends for MIS" below for additional analysis by alternative and on population trends
2 – Includes harvest acres, daylight acres, and slash down acres
3 – Includes harvest acres and slash down acres

Table G-5: MIS, Estimated Population Trend, and Biological Community or Special Habitat Indicated by the Species

		Biological Community or Special Habitat					
Species	**Estimated Population Trend**	**1**	**2**	**3**	**4**	**5**	**6**
Black Bear	Increase	Old Forest Communities	Hard mast-producing species	Mixed Pine/hardwood forest types	Contiguous areas with low disturbance	Den trees (>36" dbh)	Downed woody debris- all sizes
Carolina northern Flying Squirrel	Static	Fraser Fir Forests	Red Spruce/fraser fir	Northern hardwood forests			
White Tailed Deer	Static to decreasing	Early-successional (0-10)	Hard mast-producing species	Mixed pine/hardwood forest types			
Raccoon	Increase	Alluvial Forests	Snags and dens (>22 dbh)				
Rabbit	Decrease	Early successional (0-10)	Permanent grass/forb openings				
Gray Squirrel	Static	Hard mast-producing species	Mixed pine/hardwood forest types	Small snags and dens			
Bobcat	Static	Early successional (0-10)					
Mink	Static	Alluvial Forests					
Bats	Varies by species	Caves	Old Forest Communities				
Pileated Woodpecker	Increase	Old Forest Communities	Snags and dens (>22 dbh)	Downed woody debris – all sizes			
Golden Crowned Kinglet	Decrease	Fraser Fir Forests	Red Spruce/Fraser Fir Forests	Carolina Hemlock bluff forests			
Veery	Static	Large Contiguous Forest Areas					
Solitary (Blue headed) Vireo	Increase	Red Spruce/Fraser fir	Northern Hardwood Forests	Cove Forests	Large Contiguous forests		

		Biological Community or Special Habitat					
Species	**Estimated Population Trend**	**1**	**2**	**3**	**4**	**5**	**6**
		Forests					
Northern Parula Warbler	Static	Large Contiguous Forest Areas					
Ovenbird	Decrease	Large Contiguous Forest Areas					
Yellow-Bellied Sapsucker	Decrease	Small snags and dens					
Rufous-Sided (Eastern) Towhee	Decrease	Early-successional (0-10)	Early successional (11-20)				
White-breasted Nuthatch	Increase	Small snags and dens					
Cedar Waxwing	Static	Soft mast-producing species					
Pine Warbler	Static	Yellow pine mid-successional forests					
Raven	Static	Open rock outcrops and cliffs					
Field Sparrow	Decrease	Early successional (0-10)					
Eastern Wild Turkey	Northern mtns = increase; Southern mtns = decrease	Hard mast-producing species	Mixed pine/hardwood forest types	Contiguous areas with moderate disturbance	Permanent grass/forb openings		
Ruffed Grouse	Static	Early successional (0-10)	Early successional (11-20)	Downed woody debris			

		Biological Community or Special Habitat					
Species	**Estimated Population Trend**	**1**	**2**	**3**	**4**	**5**	**6**
Peregrine Falcon	Increase	Open rock outcrops and cliffs					
Eastern Meadowlark	Absent	Permanent grass/forb openings					
Green Salamander	Static	Shaded rock outcrops and cliffs					
Jordan's Salamander	Static	Shaded rock outcrops and cliffs					
Spotted Salamander	Static	Mountain ponds and ephemeral pools					
Blue Ridge two-lined salamander	Static	Alluvial Forests					
Brook, Brown and Rainbow Trout, sculpin	Static	Coldwater streams					
Largemouth Bass, Bluegill	Static	Reservoirs					
Blacknose Dace	Static	Coldwater streams					
Freshwater mussels	Varies by species	Warmwater streams					
Smallmouth Bass, white/redhorses	Static	Coolwater streams	Warmwater streams				
Spotfin Chub	Static	Warmwater streams					
Red Oak	Static	Oak and oak/hickory forests					
White Oak	Static	Oak and					

		Biological Community or Special Habitat					
Species	**Estimated Population Trend**	**1**	**2**	**3**	**4**	**5**	**6**
		oak/hickory forests					
Buckeye	Static	Cove forests					
Basswood	Static	Cove forests					
Black Cherry	Increase	Cove Forests					
Hickory (All Species)	Static	Oak and oak/hickory forests					
White Pine	Increase	White Pine Forests					
Pitch and Table Mountain Pine	Decrease	Xeric yellow pine Forests					
Fraser Fir	Decrease	Fraser Fir Forests					
Carolina Hemlock	Increase	Carolina hemlock bluff forests					
Ginseng	Decrease	Cove Forests					
Mountain Oatgrass	Decrease	Grassy and heath glades					
Catawba Rhododendron	Increase	Grassy and heath glades					
Wild Grape	Decrease	Soft mast-producing species					
Twisted Stalk	Increase	Northern Hardwood Forests					
Turkey Beard	Decrease	Xeric yellow pine forests					
Mountain Lettuce	Static	Forested seep wetlands					
Umbrella Leaf	Static	Forested seep wetlands					

		Biological Community or Special Habitat					
Species	**Estimated Population Trend**	**1**	**2**	**3**	**4**	**5**	**6**
Golden Saxifrage	Static	Forested seep wetlands					
Slender Wheatgrass	Increase	Barrens and glades					
Prairie dropseed	Increase	Barrens and glades					
Alum root	Increase	Shaded rock outcrops and cliffs					
Saxifraga Spp.	Increase	Shaded rock outcrops and cliffs					
Wretched sedge	Decrease	Open rock outcrops and cliffs					
Biltmore sedge	Decrease	Open rock outcrops and cliffs					
Lobaria	Increase	Old Forest Communities					
Sphagnum	Static	Bogs					
Aquatic Invertebrates	Static	Coldwater streams	Coolwater streams	Warmwater streams	Reservoirs		

Evaluating the Effect of Project-level Activities on Forest-wide Population Trends for MIS

Oak Hickory Forest Community

Either action alternative selected (Alternative B or C), would temporary convert 143 acres of Oak Hickory Forest to an earlier succession stage of Oak Hickory Forest by harvest. Regardless of the selected action alternative, it would affect <0.03% of the 640,840 acres of Oak Hickory Forest within the Forests. The proposed action would have an very little impact on the Oak Hickory Forest in the Nantahala/Pisgah Forests because the proposed action is <0.1% of the total amount of Oak Hickory Forest within the Nantahala/Pisgah Forests and the proposed action does not convert communities. Red oak, white oak and hickory species were selected as MIS species for this community. The action is not expected to greatly influence the Forest-wide trends of Oak-Hickory Forests.

White Oak and Red Oak: The overall Forest trend in both of these species has been downward due to fire suppression and succession. However, local increase can occur within areas of silviculture treatments that favor oak regeneration. The proposal should positively favor oak regeneration on 143 acres because of harvest and post-harvest treatments. However, the cumulative positive impact on these treated acres would not be great enough to influence the AA or Forest-wide downward trend (see MIS report sections 4.44, 4.45 for detailed Forest habitat and trend discussion). The proposal is not expected to greatly influence Forest wide trends or population numbers of red oak, white oak, and hickory species. Locally (within harvest units) red oak, white oak, and hickory species are expected to have a temporary decrease of larger mature individuals and an increase in seedlings. This would become less apparent as succession continues.

Hickory: The overall Forest-wide trend in both oak and hickory has been downward in the last few decades but appears to be stable from pre-settlement data. This mid century increase is due to the increase in hickories after the loss of the chestnut and past logging practices (see MIS report section 4.49 for detailed Forest habitat and trend discussion). The proposed regeneration of 143 acres of Oak-Hickory will not have a great influence (positive or negative) of the local (Shadline) population of hickories because hickories would be favored as leave trees, where present (Linda Randolph, pers. comm.). The proposed prescribed fire may decrease small individuals of hickories, but would not affect mature trees. The overall, net cumulative effect of the proposal upon hickory species is near zero and the current downward Forest-wide trend would remain static.

Invasive Exotic Plant Species Community

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

Forest-wide, 2,684 miles of road construction has occurred within the Pisgah/Nantahala National Forest within the last 25 years or 107.3 miles per year. Alternative B and C would contribute 0.5 miles of temporary road construction or increase exotic plant species habitat by <1% of the yearly average. On the other hand, Alternative A would contribute no new road construction or increase exotic plant species habitat. All action alternatives would not greatly contribute to an

undesirable the Forest-wide trend in exotic plant species habitat. Alternative A would not increase exotic plant species habitat (see discussion in selection concerning individual invasive exotic plant species in botanical report, project record).

Japanese Honeysuckle & Japanese Grass: Japanese Honeysuckle & Japanese Grass was selected as an MIS species to represent exotic invasive species habitat. The Forest trend for these species is positive. Both species occur in disturbed habitats. Japanese Honeysuckle & Japanese Grass is well established in roadsides, wildlife fields and bottomland areas near large streams such as the French Broad River within the project area. The action alternatives would only slightly increase the populations of either of these species because their populations are so well established within the watershed and the amount of permanent open habitat needed for the establishment of these species is small (0.5 temporary road). Cumulatively, the action alternatives add only .5 linear miles of new habitat for Japanese Honeysuckle & Japanese Grass. This is less than the Forest trend of 107 miles per year.

Chinese Privet & Periwinkle: Chinese Privet & Periwinkle were selected as an MIS species to represent exotic invasive species habitat. The Forest trend for these species is positive. Both species occur in disturbed habitats. Neither of these species is known to occur within the activity (or near) area. Populations of both of these species occur near the French Broad River. Therefore, there are no known effects (positive or negative) to these species.

Early Successional Habitat

White-tailed deer, eastern wild turkey, ruffed grouse, rufous-sided towhee (eastern towhee), bobcat, field sparrow, and rabbit species were the wildlife species chosen by the Forest Plan as representative of this habitat. Ruffed grouse and the eastern towhee also represent the 11-20 age early successional community.

Eastern or Rufous-sided Towhee: These species represent both early and mid-successional stage of both 0-10 and 10-20 aged forest communities. It was recorded during bird point surveys within the area of the proposed group selection. There is currently 8% of the analysis area in this habitat age class. Alternatives B and C would increase early successional habitat by 1.3% which would maintain the availability of towhee habitat to the next planning period. The slash down is proposed within a stand that currently has dead yellow pine as a result of the southern pine beetle epidemic. Scattered, hardwood tree species are found within this slash down area however, the stand is not fully stocked so all standing trees are to be slashed down to allow the area to revegetate to a fully stocked 0-10 age class stand and the action alternatives would maintain and enhance the early successional habitat within the analysis area over the next planning period. The towhee is ground or shrub nesting and usually found within deciduous habitat, however, they may be within the slash down stand(s). As; the probability of occurrence in this habitat is low; they were recorded within the Rich Mountain portion of the analysis areas; and the slash down operation would be done utilizing ground crews, not equipment; the potential direct affect of destroying a nest on this 19 acres is low. The proposed daylighting of ½ mile of linear grass/forb habitat would improve the habitat conditions within the area the species was recorded. The action alternatives would maintain the current eastern towhee population across the Nantahala and Pisgah National Forests. The BBS trend shows the population since 1966 to be down. As early successional habitat has been reduced significantly on the national forests in the past 10 years, this downward population trend is to be expected.

Field Sparrow: This species represents the brushy, riparian thicket portion of early successional communities in 0-10 year age range. Riparian areas would be protected from harvesting activities throughout implementation of any alternative selected. This species is ground nesting

during early nest attempts than later nests are more often found within shrubs. The old fence row habitat and edge surrounding the Moye tract fields that are now under hay use as well as the Moye tract fields not being mowed or managed would be highly suitable habitat for this species. No changes in management are planned within the Moye tract fields; therefore, there would be no adverse direct or indirect affects to this species by the activities proposed. This species habitat does not include the proposed 19 acre slash down area; therefore this action would have no effect on the sparrow. The BBS trend shows the population since 1966 to be considerably down. The need to increase the early successional habitat across the SAA, especially bordering riparian areas, is paramount to maintaining this species across the forest. A couple of the proposed group selection cuts found in Alternatives B or C would be within close proximity of the riparian area surrounding Hurricane Creek which would increase high potential habitat for this species. Alternative A would not create any habitat for the species; therefore, would negatively affect this sparrow cumulatively by contributing to the downward trend of the habitat and population across the area. The proposed daylighting of ½ mile of linear grass/forb habitat is on the top of Rich Mountain and does not have riparian characteristics in close proximity. Therefore, this action would have no affect on the sparrow. Cumulatively, Alternatives B and C would contribute positively to the maintenance of the species habitat across the Nantahala & Pisgah National Forests. However, during plan revision, when the Moye Tract management is determined, this species may lose a majority of its highest potential habitat.

Ruffed grouse: This species was selected in the Nantahala & Pisgah Forest Plan as a representative utilizing both 0-10 and 11-20 year age class habitat. Ruffed Grouse survey routes along FSR 468 have shown a small population of grouse for the past four years, with the lowest years being recorded in 2003 and 2004.

Ruffed grouse require both mature forests with a conifer understory and dense, early successional habitat. Seeps and riparian areas provide much of the herbaceous food during early spring, however the limiting component for this species is early successional and brood (grass/forb) habitat. Grass/forb habitat provides habitat for a diverse insect component, in sufficient quantity, necessary for the high protein required for brood survival. The dense habitat found in early successional habitat provides both protection from prey, and soft mast, buds, and invertebrate food throughout the year for the grouse. Mature stand are used during drumming season by the adult birds and provides both soft and hard mast food while the conifer understory provides thermal cover during winter months. Recommendations include retention of any hemlock understory and soft mast producing species within two-age harvest areas. The ruffed grouse population across the Nantahala and Pisgah National Forests is low, due in large part to the lack of early successional habitat on Forest Service lands. Private lands, if they are harvested, generally tend to be developed into residential use after any timber is harvested. The early successional habitat tends to be sporadic and not well connected or distributed across the landscape of both public lands and private ownership Nesting success was considered as a possible reason for the lower densities of grouse within the southern portion of its range by Dobony et al (2001). Their research has indicated poor survival of broods. Brood habitat is within grass/forb habitat where high protein invertebrates are numerous and within reach of the young birds (Dobony et al 2001). Hollifield and Dimmick (1995) demonstrated that linear grass/forb is the preferred grass/forb habitat as cover from predators is within close proximity. Dobony et al (2001) determined that nest success rate was lower due to two common predators of raccoons and black rat snakes, *Elaphe o. obsolete*, and re-nests were considerably lower within the southern range of the ruffed grouse. The 2003 Monitoring & Evaluation (M&E)

report for the National Forests of NC reported that ruffed grouse populations were down from 2002, but overall the population is static on the Nantahala & Pisgah National Forests.

The proposed treatment of grape vines within an existing 21 year old stand would slightly reduce the availability and amount of soft mast over 33 acres. This stand is beyond the early successional stage and as the canopy closes, the number of stems per acre and soft mast production is reduced. With the retention of ¼ acre grape arbors within the stand, soft mast availability would continue and may increase production of grape within the arbor areas where sunlight is expected to persist.

The group selection harvest proposed would benefit ruffed grouse habitat. However, 1.5 to 2 acres openings are not enough area to sustain one adult and small enough to increase potential predation by bobcats and other predators. Recommendations include group selection cuts be 3-5 acres in size with a reduced number of group areas which would benefit the largest number of ruffed grouse over the planned compartment.

The proposed 19 acre slash down within stands 10 and 12 to fell the pine killed during the recent southern pine beetle epidemic would improve the early successional stand conditions for ruffed grouse as it is restored to fully stocked stand with a dense number of stems.

Alternative B and C both increase the early successional by 1.3% at both the higher and lower elevations within these analysis areas. The total amount of early successional habitat would remain below the LRMP guidelines and suitability for the grouse. Alternative A would have an adverse effect on this species due to the decreasing early successional habitat as the community's continue to age. The proposed harvest would not decrease the large patches of older forest as they would remain connected but would increase the spatiality of the early successional habitat.

The Moye tract fields appear to increase the grass/forb habitat within the Polecat Analysis area. However, these fields are currently very dense fescue which is not available for brood use. The larger field which is under a hay use permit is not useable over 15 acres due to being too far from shrub or tree cover to limit predation and is therefore considered poor habitat. The proposal to plant yellow pine along the road/field interface would not improve this habitat usage by grouse broods. Once the LRMP is revised, the Moye tract property would be assigned management area designation, some of these fields may be designated as wildlife management and the eradication of the present fescue and conversion to clover and wildflowers would change these fields to high quality grass/forb habitat.

The current use of mountain bikes and horses on the linear grass/forb habitat on FSR 468 limits the use by broods. This eight mile segment of linear opening/road has been improved and maintained by the NC Wildlife Resource Commission (Commission) since 1974. The Commission limited or stopped maintaining the opening in 1995 due to the heavy bike and horse use. A large number of adult wild turkeys and one brood were observed during a survey of this road on June 1, 2005, and the Commission maintains a bear bait station on the linear opening that has shown a large number of bears utilizing this habitat in past years. This linear grass/forb is now considered low quality grass/forb habitat for brood use due to the continual recreational disturbance during brood season which is expected to increase with Alternative B or C designating the habitat as a multi-use trail. Female adult ruffed grouse were observed on April 11 and 12, 2005, utilizing habitat bordering FSR 113A and FSR 3578. Recreational use during this early spring time frame is generally light. Alternative B and C would maintain the current ruffed grouse population within the analysis areas but would not be significant enough to change the N&P population trend.

The past action of the scraggy ridge prescribe burn within the Rich Mountain portion of Analysis Area 13, the 299 acres of fire damaged stands converting those stands to an early successional stage, and the southern pine beetle epidemic increasing 0-10 age re-growth would all improve habitat conditions for the ruffed grouse.

The actions proposed in Alternative B and C would not directly affect the ruffed grouse. There would be adverse effects to the ruffed grouse brood usage on FSR 468 with the expected increase in recreation use. Cumulatively, Alternative A would adversely affect the ruffed grouse as the N&P trend of reduced 0-10 age class availability would be continued. The varied harvest and cutting proposed with Alternative B and C would slow the N&P trend and improve ruffed grouse habitat within the analysis areas.

Rabbits and bobcat: These species were both selected by the LRMP as MIS of early successional habitat. They represent both the predator and prey common within this habitat. Bobcats are generally most abundant in early to mid-successional habitats (N&P MIS report 2002). This report defined bobcat populations based on their prey habitat and the majority of the bobcats prey within the southeast has been found to be rabbits/cottontail. The bobcat is territorial and is not often found in large numbers on a particular area. The MIS report stated that although bobcat would remain across the N&P Forests, their numbers would decline and home range size increase due to the limited amount of early successional habitat. This proposed action alternatives would not change the bobcat population trend across the N&P Forests. Rabbit species in general utilize woody stems within early successional habitat during the winter months and utilize the more open environment of grass and forb habitat for feeding at night during the summer. The Moye tract fields would be heavily utilized by rabbits. There is no known affect to the rabbit use of FSR 468 with the expected increased recreational use.

The action alternatives, past actions, and conditions would increase the early successional habitat which may increase the local rabbit and therefore bobcat populations. Harvest of both species through trapping and hunting has been on a downward trend for the past 30 years and this trend is expected to continue (NCWRC, MIS 2002). Any of the alternatives proposed would not change the decreasing rabbit population trend across the N&P Forests that is occurring due to the reduced early successional habitat across the Forests.

Eastern wild turkey: This species utilizes grass/forb habitat for critical brood rearing as the invertebrates across these areas are more numerous and readily available to broods. Soft mast also contributes to the food source of both broods and adult during the summer and early fall. The current use of mountain bikes and horses on the linear grass/forb habitat on FSR 468 limits use by broods. A large number of adult wild turkeys and one brood were observed during a survey of this road on June 1, 2005. This eight mile segment of linear opening/road has been improved and maintained by the North Carolina Wildlife Resource Commission (Commission) since 1974. The Commission recently limited or stopped maintaining the opening due to the heavy bike and horse use. This linear grass/forb habitat is now considered low quality for brood use due to continual recreation disturbance during brood season which is expected to increase if these alternatives designate the habitat as multi-use trails. The 1,360 acre prescribed fire in April 2005 is expected to positively affect brood turkey habitat as herbaceous ground cover is expected to improve post-burn. The 143 acres of early successional habitat developed by this proposal would increase habitat for the wild turkey and their broods for up to five years. The re-vegetation of existing wildlife fields and proposed landings would improve habitat for turkey broods. These actions may offset the recreational use of FSR 468 and FSR 113A grass/forb habitat.

The Moye tract fields appear to increase the grass/forb habitat within the Polecat Analysis area. However, these fields currently exhibit a very dense mat of fescue and as such, not utilized by broods as they are unable to maneuver through the thick mat of vegetation. The larger field, which is under a hay use permit, is not useable over a 15 acre area due to the distance from shrub or tree cover that limits predation and is therefore considered poor habitat. The proposal to plant yellow pine along the road/field interface would not improve this habitat usage by broods. Once the LRMP is revised, the Moye tract property would be assigned management area designation; some of these fields may be designated as wildlife management and the eradication of the present fescue and conversion to clover and wildflowers would change these fields to high quality grass/forb habitat. The proposed daylighting of ½ mile of linear grass/forb would improve brood habitat. The wild turkey population is increasing across the N&P Forests (M&E 2003) and this proposed action would not change the forest trend.

The past prescribe burn on Rich Mountain portion of Analysis Area 13 is expected to improve the herbaceous ground cover over the area. This past action, as well as the 299 acres of severe burn sites on the Polecat Analysis Area 14 and the southern pine beetle epidemic mortality is all expected to benefit wild turkey habitat over the next 10 years.

White-tailed deer: This species' population on the N&P Forests is static and has declined since 2002 (M&E 2003). The regenerating forest provides forage for the deer as well as escape cover. The small amount of acres (1.3%) proposed by the action alternatives to provide early successional habitat may increase local populations but is too limited to affect the current population trend across the N&P forests. The Moye tract fields are habitat that would be utilized by deer throughout the year. However, while surveying the existing structures within the hay use field area, it was observed that these structures are being utilized during hunting season. The planting of yellow pine along the interface between the open public road and these fields is expected to reduce the potential of illegal spot light hunting.

The past action of the scraggy ridge prescribe burn is expected to result in a more vigorous re-growth of shrubs and herbaceous layer, therefore benefiting any deer within the area. The severe burn areas within Polecat Analysis Area and the southern pine beetle epidemic have resulted in early successional habitat. The habitat conditions within the southern pine beetle killed pine are not expected to re-grow sufficiently in some areas to create fully stocked stands. Therefore, the proposed slash down would improve growing conditions for a fully stocked, 0-10 age class stand.

Overall, these proposed actions, together with past actions, would not affect the N&P Forest downward trend of this species population.

Soft Mast Producing Habitat

Cedar Waxwing and Wild Grape: This species population has been shown by the BBS population trend data to be increasing across North Carolina. This species was not recorded during surveys within the project area; therefore, although this project proposal would increase the soft mast habitat in regeneration areas and is expected maintain soft mast throughout timber stand improvement (TSI) activities and harvest treatments, it would not affect the area population or change the forest population trend. Holly, black gum, and dogwood soft mast species are recommended for retention during TSI and harvest treatments therefore ensuring soft mast is maintained for many wildlife species at adequate levels across the AAs.

Hard Mast Producing Habitat (40+ years of age)

Black bear, eastern wild turkey, gray squirrel, and white-tailed deer were selected by the Forest Plan as representing this community type. High quality hard mast producing communities are forest types 42, 43, 45, 47, 48, 51-55, 59, and 60. Hard mast production declines at an average of 100 years old where high production of hard mast is found in stands ranging from 41–100 years of age. These wildlife species were also chosen to represent the low quality hard mast forest type of the pine/hardwood community (forest type 9, 10, 15, 16, 41, 56 and high oak component forest types over 100 years of age).

The total current acreage of high quality hard mast is 7,600 acres across the inventoried analysis areas and the current acreage of low quality hard mast is 2,597 acres. Alternatives B and C would reduce the inventoried high quality hard mast community by 120.5 acres or 0.85 %. The action alternatives would reduce the inventoried low quality hard mast community by 80.5 acres or 0.57%. Recommendations have been made for residual tree species marking priority that would ensure hard mast production continues on all the regeneration activities in Alternative B and C. Hickory, white oak, and red oak are the priority species to leave as the residuals within two-aged harvest areas and within timber stand improvement activities. The N&P MIS report found that all hard mast tree species, with the exception of the shade tolerant red oak, are decreasing across as the forests age beyond >100 years and the regenerating forests are dominated by shade tolerant tree species. This habitat trend led to the conclusion that gray squirrel habitat and populations were experiencing a downward trend across the N&P Forests (MIS 2002). This proposed project is not sufficient in size or potential hard mast loss to affect the current gray squirrel population downward trend across the N&P forests. The black bear and wild turkey are both experiencing an increasing population trend for the N&P forests (M&E 2003). White-tailed deer is experiencing a static to downward trend in population (M&E 2003. The proposed activities are not of sufficient size to significantly influence the habitat availability across the analysis areas to affect the population trend across the N&P Forests.

Black bears require large areas free from disturbances of motorized vehicles, frequent human activity, and intensive timber harvesting and was selected in the LRMP as representing communities of old forests, hard mast producing communities, and downed woody debris and very large diameter dens within vegetative communities. Black Bear in much of the eastern United States depend on hard mast for the energy needed for reproduction and hibernation. A bears' home range would increase as the amount of area in regeneration increases, resulting in greater potential rates of mortality where open road density is high. However, research studies carried out by Dr. Van Manen found many female bears to utilize brush/slash piles within clearcuts for denning, even when suitable den trees were adjoining the regeneration areas.

Across the Forest, black bear populations have increased due to many factors, habitat management, state black bear sanctuary system, and reduced hunting. As young bears migrate from protected sanctuary areas, they increasing occupy habitats with reduced hunting pressure, allowing the population to increase further. Mountain population models, based on age structure and reproductive information collected by NCWRC personnel, indicate that populations have grown considerably over the last decade. Models are most accurate at predicting populations up to 2-3 years prior to the last year for which we have age and reproductive data. Therefore, one can be confident in a population increase experienced from 1980-1996. These models indicate the system of regulations, enforcement, and sanctuaries in place in the region should be effective in protecting females and in maintaining a viable mountain population despite hunting harvests. The 2003 M&E report for the Forests of NC stated the black bear population is increasing across the Nantahala & Pisgah National Forests. The proposed activities are not of sufficient size to influence area populations or the population trend across the N&P Forests.

Permanent Grass/forb Habitat

Eastern wild turkey and rabbit (discussed above) and eastern meadowlark species were selected to represent this community in the Forest Plan. Alternatives B or C would not increase the current grass/forb community sufficiently to affect any local populations.

Eastern meadowlark: This species was not recorded during bird surveys and has not been recorded on the forest during any of the R8 bird point surveys done over the past 4 years. The BBS population trend demonstrates the meadowlark is on a significant downward trend of 3.96. Alternatives B and C would benefit the local wild turkey brood and rabbit populations but is not sufficient to increase the potential of any local meadowlark population. The N&P LRMP standard recommends up to 5% grass/forb; all alternative proposed do not increase the grass/forb across the analysis areas with the exception of seeding landings post harvest and the re-seeding and daylighting of a 0.6 acre half mile skid road. These landings, estimated to involve up to 5.2 acres, are generally not maintained and do not persists as grass/forb habitat beyond the 10 year planning period. With the proposed designation of 8 miles of linear grass/forb habitat as a multi-use trail reducing up to 9.7 acres to low quality grass/forb habitat, these analysis areas would not increase grass/forb towards the LRMP standards.

Snags and Dens Habitat (>22" dbh)

The raccoon and pileated woodpecker are the wildlife species that represents this community in the LRMP. Two snags or dens per acre would be retained during harvest activities as stated in the LRMP standards. See Downed Woody Debris Habitat below for pileated woodpecker.

Raccoons: Raccoons utilize live, den trees to a greater extent than large, hollow dead trees and were selected as an indicator of 15 inch diameter snags/dens. These den trees withstand the potential increased wind post harvest, therefore are expected to remain over any regeneration area throughout the next planning period. If raccoons are utilizing a snag and the increased wind fells the snag or it is damaged by harvest activities, there is little chance of mortality occurring, however, during the spring, a raccoon would have to quickly find a suitable site for any young present. During daylight movement, young are susceptible to overhead predators and a loss may occur. The action alternatives would not occur in 100+ age stands and over only 1.3% of the analysis areas, therefore any loss would not affect the raccoon population within the analysis areas or across the Nantahala and Pisgah National Forests.

Small Size Snags and Dens Habitat

White-breasted nuthatch represents the small snags/den communities (LRMP, L-12).

White-breasted nuthatch: This species was selected as an indicator of small diameter snags. The BBS population trend from 1966 to 2003 demonstrates a large increase in this species population of 3.7. The species depends on small cavities for nesting and are most commonly found in open, mature hardwood forests. This forest type is found throughout the analysis but is not in a particularly open condition, thinning would benefit this species the most. The proposed slash down activity would not affect the nuthatch as pine snags are not this species habitat. Timber stand improvement activities before and after any harvest activities would increase the amount of small, hardwood snags for cavity building and insect or larvae foraging. Alternatives B and C would not significantly benefit or have negative affects on this species due to the amount of habitat found across the analysis area that would not be affected. Therefore, any alternative considered would not affect the population across the Nantahala and Pisgah National Forest. This species winters within Western North Carolina where it feeds on seeds and nuts. The mitigation measure to retain soft mast species would benefit the nuthatch wintering habitat.

Yellow-bellied sapsucker: The current estimated population trend of this species is downward. Since implementation of any of the actions alternatives would not change the trend of this special habitat, the project would not change the decreasing population trend of the yellow-bellied sapsucker.

Downed Woody Debris Habitat (all sizes)

Black bear, pileated woodpecker, ruffed grouse (discussed above), and Jordan's salamander, were all chosen as wildlife representing this forest community. Black bear and pileated woodpecker utilize this community for food, grubs and larvae whereas the grouse utilizes large diameter debris and stumps for drumming and the salamander utilizes the woody debris as cover

There would be an increase in both small and large woody debris by the harvesting activity that would be suitable for bear and woodpecker foraging and grouse drumming activities. However, the exposure to sunlight of both the woody debris and the soil in the harvest area would dry and raise the temperature of the upper layer of the forest soils. This would result in less Jordan's salamander habitat for approximately 20 years. Surveys in the areas proposed for harvest found the soils to be poor habitat for salamanders with the exception of the seep and riparian area within 423-15, small portions of 423-10, and a cove forest type within the area of the proposed group selection. Although no Jordan's salamanders were found, the displacement or reduction in salamander habitat may increase mortality of salamander species within this area. The small amount of habitat that would be altered would not affect the Nantahala and Pisgah National Forest population.