USDA United States Department of Agriculture | Forest Service | National Forests in North Carolina
Pisgah National Forest
Grandfather Ranger District | 109 E Lawing Dr
Nebo, NC 28761-9827
828-652-2144

File Code: 1950
Date: November 17, 2006

Dear Interested Members of the Public and Forest Users:

In July 2006, an Environmental Assessment (EA) was issued for the Globe Project located in Avery, Caldwell, and Watauga Counties, North Carolina (harvesting and road-related activities are within Caldwell County). Following public review and comments received, I decided additional analysis was necessary to ensure the proposal was more responsive to concerns raised by members of the public while still meeting project objectives. This new analysis includes a new alternative; Alternative D. While Alternative D has been identified as the preferred alternative, a final decision has not been made yet. I am seeking your input on this EA before I reach a decision.

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

In accordance with 36 CFR 215.6(2)(4) and 215.5(b)(2)(i), comments must be postmarked or received within 30 days beginning the day after publication of this notice in *The McDowell News*, the Grandfather Ranger District's newspaper of record. Oral or hand-delivered comments must be received within our normal business hours of 8:00 a.m. to 4:30 p.m. Comments may be mailed electronically, in a common digital format, to: comments-southern-north-carolina-pisgah-grandfather@fs.fed.us or regular mail to: Grandfather Ranger District, Attn: District Ranger, 109 East Lawing Drive, Nebo, North Carolina, 28761.

Feel free to contact Greg Van Orsow Project Leader or me at 828-652-2144; or Michael Hutchins, Interdisciplinary Team Leader, at 828-682-6146, if you have questions or need additional information regarding this proposal.

Sincerely,

/s/Joy W. Malone
JOY W. MALONE
District Ranger

Enclosure

United States
Department
of
Agriculture

Forest
Service

November
2006

Environmental Assessment

Globe Project

Grandfather Ranger District, Pisgah National Forest
Avery, Caldwell, and Watauga Counties, North Carolina

Globe Project

Environmental Assessment

Location of Action:	Grandfather Ranger District Pisgah National Forest Avery and Caldwell Counties, North Carolina
Lead Agency:	USDA Forest Service
Responsible Official:	Joy Malone Grandfather District Ranger 109 East Lawing Drive Nebo, NC 28761
For More Information:	Greg Van Orsow Project Leader (828) 652-2144 (828) 652-9511 (fax) Michael Hutchins ID Team Leader (828) 682-6146 (828) 682-9179 (fax)
Send Electronic Comments to:	comments-southern-north-carolina-pisgah-grandfather@fs.fed.us

Table of Contents

CHAPTER 1 – PURPOSE AND NEED

1.1 Document Structure

The Forest Service has prepared this environmental assessment (EA) in compliance with the National Environmental Policy Act (NEPA) and other relevant Federal and State laws and regulations. This EA discloses direct, indirect, and cumulative environmental consequences that are expected result from the proposed action and alternatives. The document is organized into five parts:

- *Chapter 1 – Purpose and Need:* This section includes information on the history of the proposal, the purpose of and need for the proposal, 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.
- *Chapter 2 – Alternatives:* This section provides a detailed description of alternative methods for achieving the stated purpose as well as the No-action Alternative. These alternatives were developed based on significant issues raised by the public and other agencies. This discussion also includes project design features and a comparison of alternatives considered in detail.
- *Chapter 3 – Environmental Consequences:* This section describes the environmental consequences of implementing the proposed action and other alternatives. This analysis is organized by resource areas. For most resources, the affected environment is described first, followed by the effects of the No-action Alternative that provides a baseline for evaluation and comparison of the other alternatives that follow.
- *Chapter 4 – Preparers and Public Involvement:* This section provides a list of preparers and members of the public consulted during the development of the environmental assessment.
- *Appendices:* The appendices provide additional information to support the analyses presented in the EA.

1.1.1 Project Record

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

1.2 Background

This EA documents the results of site-specific analyses concerning proposed activities of the Globe Project on the Grandfather Ranger District, Pisgah National Forest.

The area to be analyzed is within the 5,338 acre Upper Mulberry and 5,887 acre Upper Johns River Forest Plan Analysis Areas (AAs) about 2 miles southwest of Blowing Rock, North Carolina and 11 miles northwest of Lenoir, North Carolina. Specifically the proposal is located within Compartments 12, 13, 14, 33, 35, 37, 38, and 39 and within Avery, Caldwell, and

Watauga Counties; however, the harvesting and road-related activities are within Caldwell County (see Vicinity Map at the end of the document). The combined 11,225 acre AAs contains Compartments 11-15, 30, 33-35, and 37-39. Individual resources may use different geographic boundaries to analyze their effects to—analysis, project, and activity areas are defined in Appendix A, Biological Evaluation (BE).

The combined AAs contain several Forest Plan Management Areas (MA), 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, pages III-54 – III-56). The proposal is within MAs 3B and 4A. MA 3B places an emphasis on a sustainable timber supply (Forest Plan, page III-71) and MA 4A places an emphasis on managing for quality scenery (Forest Plan, page III-77).

This EA 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 Changes between July 2006 and November 2006 Environmental Assessments

The following changes were made between the July 2006 and November 2006 Environmental Assessments:

- A more complete explanation was provided for the overall objectives and purposes and need for the project. This included better explaining that improving habitat conditions for wildlife includes improving hard mast species (see Section 1.5);
- The list of issues was updated to better reflect public concerns expressed during the initial comment period (see Section 1.8); this includes the potential impact of the project on scenic resources, dispersed recreation, and old growth communities;
- In response to these concerns, a new alternative, Alternative D was developed and analyzed in detail (see Section 2.2.4, Chapter2). This alternative is now the preferred alternative;
- The section Alternatives Considered but Eliminated from Detailed Study was updated (see Section 2.3, Chapter 2) to provide a more complete explanation of why these other alternatives were eliminated from detailed study;
- In response to public issues raised, additional effects analyses was completed on potential effects to dispersed recreation and old growth communities (see Sections 3.10 and 3.11, Chapter 3);
- The scenery effects analysis was updated; and includes a detailed evaluation of the new Alternative D. Alternative D was developed to further reduce overall visual impact and includes dropping one of the more visible units, reducing the size of another unit, and increasing the residual basal area (rba) of all of the units that are potentially visible from Blowing Rock, North Carolina from 15-20 rba to 30 rba per acre (see Section 2.2.4, Chapter 2 and Section 3.7.3.4, Chapter 3); and
- A project level analysis of the current and expected transportation system in the project area has been completed pursuant to 36 Code of Federal Regulations (CFR) 212 and Forest Service Manual 7712.12b (see Appendix G).

1.4 Proposed Action

The Proposed Action was developed to move resources in the area towards the desired future condition using active management and to meet the Purpose and Need (see Section 1.5). Maps of this alternative are located at the end of the EA.

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

Table 1-1: Globe Proposed Action

Stand	AC	MA	Treatment[1]	Harvest Method
12-5/12-12	25	3B	Two-age	Cable
13-7/13-19	10	3B	Two-age	Tractor
13-10	7	3B	Two-age	Tractor
13-18	10	3B	Two-age	Tractor
13-11/13-21/14-12	30	3B	Two-age	Cable
14-1a	10	3B	Two-age	Cable
14-1b	10	3B	Two-age	Cable
14-9	10	3B	Two-age	Tractor
Total MA 3B	**112**			
33-11	40	4A	Two-age	Cable
35-11	11	4A	Two-age	Cable
35-1/35-11/35-23	8	4A	Two-age	Cable
37-5a	4	4A	Two-age	Tractor
37-5b	3	4A	Two-age	Tractor
37-9	8	4A	Two-age	Tractor
38-7	12	4A	Two-age	Cable/Tractor
38-10	8	4A	Two-age	Tractor
39-4/39-13	15	4A	Two-age	Cable
39-15	10	4A	Two-age	Tractor
Total MA 4A	**119**			
Total Harvest	**231**			

1 – All treatments would retain 15-20 ft^2 of basal area per acre (see also Section 2.4, Chapter 2)

In addition, the Proposed Action would:

- Use and maintain the existing road system.
- Develop approximately 1.5 miles of new temporary road to access stands 13-18, 14-9, 14-12/13-11/13-21, 33-11, 35-11/35-23/35-1, 37-5a, 37-5b, 37-9, 38-7, 39-4/39-13, and 14-1. Following harvest activities, temporary roads, skid roads, and log landings would be appropriately shaped, waterbarred, disked and seeded with an erosion-control seed mix. All new temporary roads would be permanently closed and any new stream crossings on these roads are considered temporary and would be removed.
- Utilize and reconstruct 0.8 miles of existing unauthorized roads to access stands 13-7/13-19 and 14-12/13-11/13-21. Following harvest activities, existing unauthorized roads would be placed on the Forest's Transportation System as authorized roads, stabilized (i.e. shaped, waterbarred, and seeded with an erosion-control seed mix) and closed for administrative use only. It is expected that these roads would be used again in approximately 10-15 years to access additional stands for management—future NEPA analysis would be necessary prior to entry.
- Create up to 12 acres of permanent grass and forb habitat.

- Site prepare and subsequent release, if needed, in all stands being regenerated using herbicides and manual methods.
- Use herbicides to control/manage of invasive exotic plants along Forest Service Roads (FSRs) and log landings (about 5 acres).
- Plant individuals or groups of old variety apple trees in log landings.
- Designate 311 acres (total) of small patch old growth communities in compartments 12 (50 acres), 13 (50 acres), 14 (50 acres), 35 (108 acres), and 37 (53 acres).
- Daylight approximately two miles of Frankum Creek Road (FSR 188) by harvesting merchantable timber within 15 feet of both sides of the vegetative edge of the road – action is for road maintenance reasons due to higher maintenance level assigned to this road and not for wildlife reasons.
- Re-install a gate on the Thunderhole Road just before China Creek that was damaged by members of the public and seed with a wildlife and wild flower mix (about 3 acres). The gate is proposed to reduce impacts to wildlife, recreation, aquatic resources, and water quality.

1.5 Purpose and Need for Action

The purposes of this proposal are to:

1. Provide habitat conditions for species such as eastern wild turkey, ruffed grouse, white-tailed deer, and travel corridors and foraging habitat for black bear across the project area by dispersing early successional habitat across the landscape by regulating the amount of 0-10 year age class in MAs 3B and 4A (Forest Plan, page III-31). Habitat conditions include improving hard mast species.
2. Create a network of old growth communities across the landscape to serve as permanent reservoirs of biological diversity (Forest Plan, pages III-26 and III-27).
3. Control/manage pest populations with pesticides (herbicide) (Forest Plan, page III-52).

1.5.1 Why Here, Why Now?

The existing condition of the Globe area has been evaluated and compared against the desired future condition for the area as described in the Forest Plan. Where resources in the area are found to be outside the desired future condition, opportunities for moving the resources towards the desired future condition exist. The Globe area was chosen at this time for vegetation management over other areas on the Grandfather Ranger District because of its planned order of entry in the *Nantahala and Pisgah National Forests, A Schedule of Entry By Analysis Area*. Forest Plan standards schedule to revisit each compartment in MAs 3B and 4A every 10-15 years to meet early succession habitat standards (Forest Plan, page III-31).

The following table displays the last appreciable entries on National Forest System (NFS) lands in the activity areas (additional historic harvesting has occurred in the AAs):

Table 1-2: Past Harvest in the Globe Project Area

Comp-Stand	Stand Age	Acres Cut	Sale Name
12-2	1994	24	Frankum Creek
12-6	1989	4	Frankum Creek SPB Salvage
13-1	1991	14	Frankum Creek

Comp-Stand	Stand Age	Acres Cut	Sale Name
13-3	1989	9	Frankum Creek SPB Salvage
13-5	2001	22	Frankum Creek II
13-8	1995	27	Frankum Creek
13-13	1995	36	Frankum Creek
14-2	1991	10	Frankum Creek
14-4	1994	18	Frankum Creek
14-14	1991	18	Frankum Creek
33-9	1988	17	Thunderhole
33-10	1988	33	Thunderhole
33-13	1989	32	Thunderhole
38-9	1989	26	Thunderhole
39-4	1992	32	Thunderhole
39-7	1992	23	Thunderhole

In relation to the purpose and need, the following current conditions exist:

1. To meet Forest Plan direction (desired future condition), the early successional habitat (0-10 year age-class) should be from five percent to10 percent in MA 3B (Forest Plan, page III-31) and not to exceed 10 percent in MA 4A (Forest Plan, page III-31). Currently there is less than one percent early successional habitat in the project area (compartments that have proposed regeneration units)—there is one percent zero to 10 year age class in the Upper Mulberry AA and zero percent in the Upper Johns River AA.
2. To meet Forest Plan direction, the permanent grass and forb habitat within the MAs should be at least 0.5 percent (Forest Plan, page III-23) with a desired level of three percent (Forest Plan, pages III-74 and III-84). Currently there is no permanent grass and forb habitat on National Forest System NFS lands (NFS) within the AAs.
3. To meet Forest Plan direction, old growth across the forest is to have a network of small, medium, and large sized old growth communities (Forest Plan, page III-26). Currently Compartments 33, 38, and 39 contain small patches of designated old growth communities, while Compartments 12, 13, 14, 35, and 37 do not. The Upper Johns River watershed contains a portion of the designated Large Patch 24 which satisfies the medium patch requirement for this watershed, and a portion of Large Patch 30 is located within the Upper Mulberry watershed which meets the medium patch requirement for this watershed. Large Patches 24 and 30 are the only large patches within the AA of the project and have been evaluated and designated as large patch old growth communities.
4. To meet Forest Plan direction, integrated pest management is to be the strategy used in managing pest populations to achieve resource objectives (Forest Plan, page III-52). Currently, invasive/exotic species have been identified in the AA and include princess tree, tree-of-heaven, Japanese plume grass, and others.

1.6 Decision Framework

Based on the analysis disclosed in this EA, 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.

1.7 Public Involvement

The proposal was listed in the January, April, July, and October 2006 editions of the Schedule of Proposed Actions (SOPA). The proposal was provided to members of the public, government agencies, and private organizations by mailing a scoping package to over 100 members of the public who had previously requested to receive such information and a 30 day scoping period ran from January 18, 2006, thru February 20, 2006, when a legal notice was placed in *The McDowell News*, the Grandfather Ranger District's newspaper of record as per 36 CFR 215.5(b)(2)(i). Information on the proposal was also provided in other formats: a press release was provided to *The Blowing Rocket* on January 19, 2006, inviting comments on the proposal; a request for public comment on the proposal was placed in the January 23, 2006, edition of *The Watauga Democrat*; the January 26, 2006, edition of *The Watauga Mountain Times*; and the February 16, 2006, edition of *The High Country News*; and information on the proposal was posted online at *www.themountaintimes*.com on January 26, 2006. On April 13, 2006, several members of local and regional environmental organizations met with Forest Service employees to discuss the proposal.

Pursuant to 36 CFR 215.2 and 215.5(b)(1)(iv), a 30-day Notice and Comment period was initiated on July 12, 2006, when a legal notice was published in *The McDowell News* informing members of the public the EA was available for review. On August 1, 2006, a press release was issued stating the Forest Service would host an open-house meeting in Blowing Rock, North Carolina on August 9, 2006, to discuss aspects of the proposal. On August 2, 2006, District Ranger Joy Malone mailed a notice to the Grandfather Ranger District's mailing list stating she would consider comments from the end of the 30-day Notice and Comment period thru August 18, 2006, (see also Forest Service Handbook 1509.12, Section 11.5). Following the 30-day Notice and Comment period, the additional comment period, and up to issuance of the November EA, 1,282 total comments were submitted on the proposal.

On August 9, 2006, Forest Service officials hosted a public information meeting at the Blowing Rock, North Carolina town hall—244 members of the public signed in at the meeting.

In August and September, Forest Service staff also provided briefings to Blowing Rock town officials, Watauga County officials, and several staff of North Carolina's congressional delegation.

On September 6, 2006, a press release was made available to local media informing the public that the Forest Service [d]*ecided to develop an additional alternative for the project. The additional alternative will be designed to respond to issues raised about the scenic quality of the Thunderhole portion of the project area potentially visible from Blowing Rock.* The new alternative is described in Section 2.4, Chapter 2.

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

1.8 Issues

Issues are defined as a point of discussion, debate, or dispute about environmental effects. Issues are used to develop alternatives, mitigation measures, or analyze environmental effects. The Forest Service separated issues into two groups: significant and other. All comments received

during scoping and the 30-day notice and comment period have been reviewed and a determination on significance was made.

1.8.1 Significant Issues

1.8.1.1 Significant Issue #1: Diversity of Wildlife Habitat *The proposal may not develop enough brushy interface wildlife habitat*

Indicator

- Acres of brushy interface habitat created

1.8.1.2 Significant Issue #2: Scenic Resources *Harvest related activities may impact scenic resources*

Indicator

- Acres of harvesting
- Miles of daylighting

1.8.2 Other Issues

1.8.2.1 Water Quality and Aquatic Resources –	*Reconstructing roads and harvest-related activities may impact aquatic threatened, endangered, sensitive, Forest Concern, and Management Indicator Species*
1.8.2.2 Invasive Exotics –	*Management activities may increase infestation of invasive exotic plants*
1.8.2.3 Botanical Resource –	*Harvest related activities may have adverse impacts to botanical threatened, endangered, sensitive, Forest Concern, and Management Indicator Species*
1.8.2.4 Wildlife Resource –	*Harvest related activities may impact wildlife threatened, endangered, sensitive, Forest Concern, and Management Indicator Species*
1.8.2.5 Cultural Resources –	*Harvest related activities may impact cultural sites*
1.8.2.6 Soil Resource –	*Harvest related activities may impact soils*
1.8.2.7 Non-timber Related Economics –	*Harvest related activities may have adverse effects to non-timber related markets* (see also Appendix E)
1.8.2.8 Herbicide Use –	*Herbicide use may impact wildlife, aquatic, botanical resources and humans*
1.8.2.9 Dispersed Recreation –	*Harvest related activities may impact dispersed recreationists*
1.8.2.10 Old Growth –	*Harvest related activities may impact old growth resources*
1.8.2.11 Other Areas 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.*

CHAPTER 2 – ALTERNATIVES

Chapter 2 is the "heart" of an EA (40 CFR 1502.14) and describes alternatives the agency considered in addition to the proposed action. This chapter compares each alternative considered in detail and lists project design features.

2.1 Range of Alternatives

The range of alternatives developed and analyzed by the interdisciplinary team (IDT) was driven by the purpose and need underlying the proposal (Chapter 1, Section 1.5), and by the significant issues responding to the proposal. An alternative should (1) reasonably respond to the purpose and need, and (2) address one or more significant issue. The only exception is the No Action Alternative, which is required by regulation [40 CFR 1502.14(d)].

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

2.2 Alternatives Considered in Detail

Four alternatives were considered in detail by the IDT; Alternative A – No Action, Alternative B – Proposed Action, Alternative C, and Alternative D – Preferred. The action alternatives fulfill the specific purpose and need for these actions. Project design features for activities in each action alternative are also described in this chapter.

2.2.1 Alternative A – No Action

Under this alternative the actions described in the Proposed Action (Chapter 1, Section 1.4) 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, thinning or timber stand improvements, treatment of non-native invasive species, designation of small patches for old growth restoration, nor wildlife or aquatic habitat improvements made. This alternative serves as the environmental baseline for analysis of effects.

2.2.2 Alternative B – Proposed Action

A complete description of the Proposed Action can be found in Chapter 1, Section 1.4 above.

2.2.3 Alternative C

Alternative C was developed to address comments received during scoping. It proposes the same actions as Alternative B (Chapter 1, Section 1.4) with one exception; it would daylight about 15 feet either side of the Thunderhole Road FSR 4071 to improve wildlife habitat.

The following table summarizes harvest-related information for Alternative C:

Table 2-1: Alternative C

Stand	AC	MA	Treatment[1]	Harvest Method
12-5/12-12	25	3B	Two-age	Cable
13-7/13-19	10	3B	Two-age	Tractor

Stand	AC	MA	Treatment[1]	Harvest Method
13-10	7	3B	Two-age	Tractor
13-18	10	3B	Two-age	Tractor
13-11/13-21/14-12	30	3B	Two-age	Cable
14-1a	10	3B	Two-age	Cable
14-1b	10	3B	Two-age	Cable
14-9	10	3B	Two-age	Tractor
Total MA 3B	**112**			
33-11	40	4A	Two-age	Cable
35-11	11	4A	Two-age	Cable
35-1/35-11/35-23	8	4A	Two-age	Cable
37-5a	4	4A	Two-age	Tractor
37-5b	3	4A	Two-age	Tractor
37-9	8	4A	Two-age	Tractor
38-7	12	4A	Two-age	Cable/Tractor
38-10	8	4A	Two-age	Tractor
39-4/39-13	15	4A	Two-age	Cable
39-15	10	4A	Two-age	Tractor
Total MA 4A	**119**			
Total Harvest	**231**			

1 – All treatments would retain 15-20 ft^2 of basal area per acre (see also Section 2.4 below)

In addition, Alternative C would:

- Use and maintain the existing road system.
- Develop approximately 1.5 miles of new temporary road to access stands 13-18, 14-9, 14-12/13-11/13-21, 33-11, 35-11/35-23/35-1, 37-5a, 37-5b, 37-9, 38-7, 39-4/39-13, and 14-1. Following harvest activities, temporary roads, skid roads, and log landings would be appropriately shaped, waterbarred, disked and seeded with an erosion-control seed mix. All new temporary roads would be permanently closed and any new stream crossings on these roads are considered temporary and would be removed.
- Utilize and reconstruct 0.8 miles of existing unauthorized roads to access stands 13-7/13-19 and 14-12/13-11/13-21. Following harvest activities, existing unauthorized roads would be placed on the Forest's Transportation System as authorized roads, stabilized (i.e. shaped, waterbarred, and seeded with an erosion-control seed mix) and closed for administrative use only. It is expected that these roads would be used again in approximately 10-15 years to access additional stands for management—future NEPA analysis would be necessary prior to entry.
- Create up to 15 acres of permanent grass and forb habitat.
- Site prepare and subsequent release, if needed, in all stands being regenerated using herbicides and manual methods.
- Use herbicides to control/manage invasive exotic plants along Forest Service Roads (FSRs) and log landings (about 5 acres).
- Plant individuals or groups of old variety apple trees in log landings.
- Designate 311 acres (total) of small patch old growth communities in compartments 12 (50 acres), 13 (50 acres), 14 (50 acres), 35 (108 acres), and 37 (53 acres).
- Daylight approximately two miles of Frankum Creek Road (FSR 188) by harvesting merchantable timber within 15 feet of both sides of the vegetative edge of the road – action is

for road maintenance reasons due to higher maintenance level assigned to this road and not for wildlife reasons.
- Daylight about 15 feet of both sides of the vegetative edge of the Thunderhole Road (FSR 4071) to develop additional wildlife habitat (about 2.4 miles or eight acres).
- Re-install a gate on the Thunderhole Road just before China Creek that was damaged by members of the public and seed with a wildlife and wild flower mix (about 3 acres). The gate is proposed to reduce impacts to wildlife, recreation, aquatic resources, and water quality.

2.2.4 Alternative D – Preferred

Alternative D was developed to respond to comments received during the 30-day notice and comment period. Alternative D proposes fewer acres of two-age harvest, retains 30 square feet of basal area per acre in MA 4A stands, does not daylight along the Thunderhole Road, and reduces the amount of permanent grass/forb habitat than the Proposed Action. A summary chart comparing the actions by alternative is located below in Section 2.5. The following table summarizes harvest-related information for Alternative D:

Table 2-2: Alternative D

Stand	AC	MA	Treatment[1]	Harvest Method
12-5/12-12	25	3B	Two-age	Cable
13-7/13-19	10	3B	Two-age	Tractor
13-10	7	3B	Two-age	Tractor
13-18	10	3B	Two-age	Tractor
13-11/13-21/14-12	30	3B	Two-age	Cable
14-1a	10	3B	Two-age	Cable
14-1b	10	3B	Two-age	Cable
14-9	10	3B	Two-age	Tractor
Total MA 3B	**112**			
33-11	32	4A	Two-age	Cable
35-1/35-11/35-23	8	4A	Two-age	Cable
37-5a	4	4A	Two-age	Tractor
37-5b	3	4A	Two-age	Tractor
37-9	8	4A	Two-age	Tractor
38-7	12	4A	Two-age	Cable/Tractor
38-10	8	4A	Two-age	Tractor
39-4/39-13	15	4A	Two-age	Cable
39-15	10	4A	Two-age	Tractor
Total MA 4A	**100**			
Total Harvest	**212**			

1 – Treatments would retain 15-20 ft^2 of basal area per acre in MA 3B stands (Frankum Creek area) and 30 ft^2 in MA 4A stands (Thunderhole Creek area)

In addition, Alternative D would:

- Use and maintain the existing road system.
- Develop approximately 1.5 miles of new temporary road to access stands 13-18, 14-9, 14-12/13-11/13-21, 33-11, 35-11/35-23/35-1, 37-5a, 37-5b, 37-9, 38-7, 39-4/39-13, and 14-1. Following harvest activities, temporary roads, skid roads, and log landings would be appropriately shaped, waterbarred, disked and seeded with an erosion-control seed mix. All

new temporary roads would be permanently closed and any new stream crossings on these roads are considered temporary and would be removed.
- Utilize and reconstruct 0.8 miles of existing unauthorized roads to access stands 13-7/13-19 and 14-12/13-11/13-21. Following harvest activities, existing unauthorized roads would be placed on the Forest's Transportation System as authorized roads, stabilized (i.e. shaped, waterbarred, and seeded with an erosion-control seed mix) and closed for administrative use only. It is expected that these roads would be used again in approximately 10-15 years to access additional stands for management—future NEPA analysis would be necessary prior to entry.
- Create up to 12 acres of permanent grass and forb habitat.
- Site prepare and subsequent release, if needed, in all stands being regenerated using herbicides and manual methods.
- Use herbicides to control/manage invasive exotic plants along Forest Service Roads (FSRs) and log landings (about 5 acres).
- Plant individuals or groups of old variety apple trees in log landings.
- Designate 311 acres (total) of small patch old growth communities in compartments 12 (50 acres), 13 (50 acres), 14 (50 acres), 35 (108 acres), and 37 (53 acres).
- Daylight approximately two miles of Frankum Creek Road (FSR 188) by harvesting merchantable timber within 15 feet of both sides of the vegetative edge of the road – action is for road maintenance reasons due to higher maintenance level assigned to this road and not for wildlife reasons.
- Re-install a gate on the Thunderhole Road just before China Creek that was damaged by members of the public and seed with a wildlife and wild flower mix (about 3 acres). The gate is proposed to reduce impacts to wildlife, recreation, aquatic resources, and water quality.
- Re-install a gate at the entrance to Thunderhole Road which would be seasonally closed for wildlife, non-motorized recreation, and road maintenance (January 1 – August 31).

2.3 Alternatives Considered but Eliminated from Detailed Study

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

2.3.1 Alternative 1 – Watershed Restoration without Harvesting

This alternative proposed to install the gate on Thunderhole Road and use herbicides to control/manage invasive exotic plants but did not propose timber harvesting.

This alternative was eliminated from detailed study because without harvesting, the purpose and need was not achieved—harvesting is necessary to: *Providing habitat conditions for species such as eastern wild turkey, ruffed grouse, white-tailed deer, and travel corridors and foraging habitat for black bear across the project area by dispersing early successional habitat across the landscape by regulating the amount of 0-10 year age class in MA 3B* (Forest Plan, page III-31 and Section 1.5, Chapter 1 above).

2.3.2 Alternative 2 –No Herbicide Use including Triclopyr

This alternative proposed to use manual methods and not herbicides for controlling competing vegetation and invasive exotic plants. Concerns were raised by members of the public about adverse effects of Triclopyr and Glyphosate use and potential for off-site movement.

This alternative was dropped from detailed study because manual methods for treating competing vegetation for site preparation and managing non-native invasive plant species are not as cost effective or adequate as herbicide use to meet desired objectives. Part of the purpose and need is to control/manage pest populations and the Forest Plan provides a standard for herbicide use to do this (Section 1.5, Chapter 1 above and Forest Plan, page III-52). Use of herbicides would be pursuant to product labels; Material Safety Data Sheets (MSDSs); pesticide risk assessments; and standards and guidelines from the Forest Plan and the *Vegetation Management in the Appalachian Mountains* (VMAM) FEIS. Portions of this alternative are also met with Alternative A.

Herbicide use (primarily Glyphosate) is necessary to more efficiently and effectively treat non-native invasive plants. Manual methods are less effective at treating non-native invasives as many species resprout once cut and removing entire root masses requires extensive labor and cost (see also Section 3.4, Chapter 3 for additional disclosures on herbicide use). According to a risk assessment (http://www.fs.fed.us/foresthealth/pesticide/risk_assessments/04a03_glyphosate.pdf), Glyphosate is readily metabolized by soil bacteria.

According to another risk assessment (http://www.fs.fed.us/foresthealth/pesticide/risk_assessments/0303_triclopyr.pdf), Triclopyr is not considered soil active (mobile). Triclopyr is necessary to ensure practical/cost efficient site preparation treatments (see Veg Mgt FEIS IV-65—IV-66). As stated on page IV-66 of the FEIS: *Manual cutting tools are highly selective and can be used year round on all land types, but repeated treatments, either annually or even more frequently, may be necessary to adequately control woody vegetation*. Other herbicides such as Glyphosate are less effective at reducing woody plants. Herbicides, including Triclopyr are necessary to ensure practical/cost efficient site preparation, release, and control/management of invasive exotic plants. Use of herbicides (including Triclopyr) would be pursuant to product labels, MSDSs, and pesticide risk assessments.

2.3.3 Alternative 3 – Daylight 150 feet either side of the Frankum Creek Road for Wildlife Habitat

This alternative proposed to daylight merchantable timber along 150 feet either of the vegetative edge of the Frankum Creek road to improve wildlife habitat.

This alternative was eliminated from detailed study because this amount of daylighting would likely cause adverse impacts to scenery and other resources. Alternative C was developed to provide daylighting along the Thunderhole Road for wildlife habitat improvement that would not cause adverse impacts to scenery and other resources.

2.3.4 Alternative 4 – Drop Stands 33-11 and 38-7

This alternative was proposed by the public and is the Alternative B – Proposed Action without Stands 33-11 and 38-7—they would be dropped for old growth reasons.

One of the objectives of the Globe proposal is to create a network of old growth communities across the landscape to serve as permanent reservoirs of biologic diversity as per Forest Plan standards (see Section 1.5, Chapter 1). Currently within the two AAs, there are 5,115 acres of large patch old growth communities designated in three compartments (large patches 24 and 30)—five compartments currently do not have old growth communities designated within them. Alternatives B, C, and D propose to designate over 300 acres of small patch old growth communities within these five compartments; bringing the total designated old growth communities in the two AAs to over 5,400 acres (almost 50% of the two AAs). This alternative was eliminated from detailed study because the proposal as designed (Alternatives B, C, and D) meets Forest Plan old growth community standards. Compartments 33 and 38 already contain 1,048 acres of large patch designated old growth communities and designating additional old growth communities within them is not necessary to meet Forest Plan standards (see also Section 3.11, Chapter 3 and Appendix C). The Globe proposal designates the necessary acres of small patch old growth communities to meet Forest Plan standards and does not propose harvesting in numerous areas that future analyses and decisions could determine to set aside as old growth communities.

2.4 Project Design Features Common to Action Alternatives

The action alternatives share these project design features and would become mandatory if the responsible official selects an action alternative for implementation (see also Sections 3.7.3.2, 3.7.3.3, and 3.7.3.4, Chapter 3; Appendix A; and Appendix F).

1. Marking guidelines would include priority residual tree species of; white oak, red oak, hickory, black oak, and chestnut oak, where they occur. In addition, two 12 inch diameter or larger diameter black gum species would be left as residuals within every 10 acres, where they occur. (Purpose is for wildlife habitat and vegetation diversity).
2. Stand 37-5b exhibits a large boulder complex with evidence of woodrat nesting use between the existing unauthorized road within the stand and State Road 1367[1]. Any harvesting would exclude this area and trees immediately surrounding this boulder complex would be left during harvest and any subsequent release work planned. (Purpose is for habitat protection of a Forest Concern wildlife species).
3. To reduce the possible effects of increasing invasive plant species to this proposal, all known populations of *Miscanthus sinensis*, *Paulownia tomentosa* , *Celastrus orbiculatas* and *Ailanthus altissima* should be treated prior to disturbance activities. *Miscanthus sinensis* was found along Forest Service Roads. All populations total less than one acre. Control of *Miscanthus sinensis, Paulownia tomentosa,* and *Ailanthus altissima* is most easily and effectively done by herbicide (Glyphosphate). (Purpose is to reduce spread of non-native invasive plant species).
4. Native plants would be utilized in wildlife improvement and roadside erosion control. (Purpose is to reduce spread of non-native invasive plant species).
5. A 150-foot area near station 8+50 on the Frankum Creek Road would be excluded from daylighting to provide protection to the *Calystegia catesbeiana ssp. sericata* (Catesby's false bindweed) population. (Purpose is for habitat protection of a Forest Concern botanical species).

[1] Under Alternative C, trees providing shade to a small, rocky slope exhibiting rock shrew habitat along the Thunderhole Road 4071 would be excluded from daylighting

6. 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. Survey area would be established to monitor control efforts. Survey areas would be established before control treatment, checked during treatment, and within nine months after treatment. A post-treatment evaluation report would be completed and filed in the project file. (Purpose is to reduce spread of non-native invasive plant species).

2.5 Summary Comparison of Actions by Alternative

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

Table 2-2: Management Activities by Alternative

Activity	Alternative[1]			
	A	B	C	D
Two-age harvest	0	231	231	212
Site prepare and subsequent release, if needed	0	231	231	212
Control/manage invasive exotic plants with herbicide along Forest Service Roads (FSRs) and log landings	0	5	5	5
Designate small patch old growth communities	0	311	311	311
Temporary roads developed (miles)	0	1.5	1.5	1.5
Existing unauthorized roads accessed, disked and seeded, closed, then placed on the transportation system (miles)	0	0.8	0.8	0.8
Stream crossings (temporary–to be removed following harvest-related activities)				
Bridges (number)	0	2	2	2
Culverts (number)	0	3	3	3
Daylight Thunderhole Road (creates early-successional habitat)	0	0	9	0
Daylight Frankum Creek Road for road maintenance purposes	0	5	5	5
Disc and seed unsurfaced temporary roads, skid roads, and log landings	No	Yes	Yes	Yes
Permanent grass/forb habitat created	0	12	15	12
Plant persimmon and/or native crab apple trees in log landings	No	Yes	Yes	Yes
Re-install a gate on the Thunderhole Road just before China Creek that was damaged by members of the public and seed with a wildlife and wild flower mix (about 3 acres)	No	Yes	Yes	Yes
Re-install a gate at the entrance to Thunderhole Road which would be seasonally closed for wildlife, non-motorized recreation, and road maintenance (January 1 – August 31)	No	No	No	Yes

1 Measurements are in acres unless otherwise specified

CHAPTER 3 – ENVIRONMENTAL CONSEQUENCES

Included in this chapter are disclosures of direct, indirect, and cumulative effects of the alternatives on the different resources. Reports from different resource specialists supplied information for portions of the analysis in this chapter. Definitions of specific biological analysis areas (AA) effects are analyzed to are located in Appendix A, Biological Evaluation (BE).

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

Table 3-1: Past, Present, and Reasonably Foreseeable Future Actions within and near the Globe AAs

Activity	Description
Wildfire/Rx Burning	Globe Mountain (wildfire – 1996, 40 acres)
	Thunderhole (wildfire – 1999, 100 acres)
	Rocky Knob (Rx burn – 2005, 50 acres slash down & 150 acres burn)
	Boyd Gap (Rx burn – 2006, 160 acres)
Timber Harvesting	Frankum Creek (2001, 49 acres of regeneration)
	Frankum Creek (1991 - 1995, 220 acres)
	Thunderhole (1988 - 1992, 163 acres)
	Hugo/Boyd Gap (1991, 26 acres)
	Frankum Creek SPB Salvage (1989, 13 acres)
	Globe Mtn. (1987, 29 acres)
	<40 year old harvests
	Old House Gap (2007-2010, 136 acres of regeneration)
	Timber Stand Improvement (115 in 1997 & 1998)
Hemlock Wooly Adelgid	Soil injection with Imidacloprid[1] and insect release with predator beetles (2005+)
Road Maintenance	George's Creek Road (FSR 4111 – stabilize, seed, mulch)
	Thunderhole Road (FSR 4071 – recondition and regate)
Watershed Improvement	Little Rocky Knob (close off access from private land creating mud holes)
	Upper Johns River tributary restoration
Private Lands	Extensive landscaping shrub/tree development
	Snyder Trespass
	Residential development along US 321
	Large scale harvesting (USFS is unaware of any foreseeable large scale harvesting on private lands proposed in the AA)
Special Uses	None
Wildlife Habitat Improvement	None

[1] Imidacloprid is a systemic, chloro-nicotinyl insecticide with soil, seed and foliar uses for the control of sucking insects including rice hoppers, aphids, thrips, whiteflies, termites, turf insects, soil insects and some beetles. It is most commonly used on rice, cereal, maize, potatoes, vegetables, sugar beets, fruit, cotton, hops and turf, and is especially systemic when used as a seed or soil treatment. The chemical works by interfering with the transmission of stimuli in the insect nervous system. Specifically, it causes a blockage in a type of neuronal pathway (nicotinergic) that is more abundant in insects than in warm-blooded animals (making the chemical selectively more toxic to insects than warm-blooded animals). This blockage leads to the accumulation of acetylcholine, an important neurotransmitter, resulting in the insect's paralysis, and eventually death. It is effective on contact and via stomach action. (http://extoxnet.orst.edu/pips/imidaclo.htm)

3.1 Hydrology and Aquatic Habitat

Additional analysis on aquatic habitat is disclosed in Appendix A, [Biological Evaluation (BE)]; Section 3.8 [Management Indicator Species (MIS)]; Section 3.9 [Threatened, Endangered, Sensitive (TES), and Forest Concern (FC) Species]; and the aquatic resource report, project record. This analysis addresses activity area waters and aquatic biological AA waters. Activity 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 activity area waters. The AA is larger than the activity area.

3.1.1 Existing Condition

Existing data for aquatic resources within the aquatic AA is used to the extent it is relevant to the project proposal. This data exists in two forms: 1) general inventory and monitoring of Forest aquatic resources and 2) data provided by cooperating resource agencies from aquatic resources on or flowing through the Forest. Both of these sources are accurate back to approximately 1980 and are used regularly in project analyses. Data collected prior to 1980 is used as a historical reference. Project-specific surveys are conducted to obtain data where none exists.

Fish habitat exists within the analysis areas of Georges Creek (below activity area), Frankum Creek (adjacent to stands 13-11&13-21 and 14-12), Thunderhole Creek, and China Creek (adjacent to stand 38-7). In the remaining areas, there is limited habitat for fish species within the activity area waters, due to small stream size and restricted flow regimes. Activity area waters provide habitat for macroinvertebrates.

3.1.1.1 Thunderhole Creek

Thunderhole Creek is adjacent to Compartments 38 and 37. Forest Service Road (FSR) 4071 crosses Thunderhole Creek with a bridge on National Forest System (NFS) lands just outside of stand 38-10. This area is located adjacent to the activity area. Habitat data was collected from Thunderhole Creek. Substrate consists of 10% sand, 25% gravel, 30% cobble, 20% boulders and 15% organic material. Fish habitat exists within Thunderhole Creek to approximately 400 meters above the crossing on FSR 4071.

Each un-named tributary (UT) to Thunderhole Creek was evaluated for aquatic habitat and organisms. These seven unnamed tributaries are characterized by higher gradients and restricted flow regimes. Substrate in all of these tributaries is characterized by cobble and/or gravel embedded with silt and sand. These streams also displayed high concentrations of sand and silt embedding the cobble substrate. A greater percentage of riffle habitats exist within these tributaries as opposed to the amount of pool habitat, which is to be expected in smaller tributaries. No fish habitat is present within these tributaries with the exception of UT 5 Thunderhole Creek where there is fish habitat present. Although the other tributaries do not have fish habitat present, some fish may move into these smaller streams during spawning season, but likely only inhabit the first few hundred meters due to restricted flow regimes and gradient. Thunderhole Creek supports habitat for brown trout.

3.1.1.2 Frankum Creek

Visual habitat estimations within Frankum Creek were conducted during the spring of 2006. Substrate within Frankum Creek consisted of 20% gravel, 30% cobble and 50% sand and silt. Early 1990s data indicates that Frankum Creek historically supported a wide range of fish

species including brook trout, bluehead chubs, spottail chubs, rosyside dace, greenhead shiners, creek chubs, darters and various minnow and chub species and that the habitat within Frankum Creek is generally poor. More recent surveys (2004) indicate that brook trout no longer exist within Frankum Creek. Surveys from 2004 note there was a heavy sediment load and species present included rosyside dace, creek chubs and bluehead chubs. Our most recent habitat surveys however, show that most of the heavy sediment loads were flushed out of Frankum Creek during the fall storms of 2004. During the project activity surveys of Frankum Creek (April 2006) trout were observed at the location of the proposed crossing in stands 13-11&13-21 and 14-12. This is a good indication that habitat within Frankum Creek has improved since 2004.

There was only one UT to Frankum Creek involved in the Globe Project. This stream is small (approximately 2 feet wide) and has substrate consisting of cobble embedded with silt. There is no fish habitat present within any reach of this unnamed tributary.

3.1.1.3 Friddle Creek

Friddle Creek is located outside stands 12-5&13-12 within the Globe AA. Friddle Creek was also observed in the spring of 2004 and reportedly carried a heavy sediment load. During the fish surveys, no trout were found and only fantail darters, rosyside dace, creek chubs and bluehead chubs were found. It is likely that Friddle Creek was flushed of the heavy sediment loads during the tropical storms in late 2004 as well. Historical surveys from 1991 indicate that Friddle Creek supported natural propagation of brook trout. The habitat surveys from 1991 indicate that the habitat was fair due to small pools that were available. It is likely that Friddle Creek now supports trout habitat again due to the improvement of habitat that has occurred since the tropical storms of late 2004.

3.1.1.4 Georges Creek

Georges Creek was surveyed for habitat during project surveys conducted in April 2006. Georges Creek has some severely undercut banks and a lack of large woody debris. There is little to no fish habitat within the activity area waters due to shallow waters and the lack of pool habitat. Substrate within Georges Creek consists of 30% cobble, 30% gravel and 40% sand and silt. During macroinvertebrate surveys sculpin were observed. It appears that the riparian area of Georges Creek was historically heavily impacted. Like Friddle and Frankum Creeks, Georges Creek was surveyed for trout in the spring of 2004. Surveys indicated that the habitat was poor with unstable banks and a heavy sediment load. Habitat supported rosyside dace, creek chubs, and bluehead chubs. Historical surveys from 1991 indicate that Georges Creek supported natural propagation of brook trout due to the presence of young of the year. Greenhead shiners and chubs were also present at that time. It is likely that the storms of late 2004 flushed many of the heavy sediment load through Georges Creek improving habitat aquatic organisms. Though in low numbers historically, Georges Creek could support trout again since habitat has improved from early 2004.

3.1.1.5 China Creek

China Creek was observed at the low water crossing on FSR 4071. Substrate consisted of 30% boulders, 50% cobble and 20% gravel. Habitat within China Creek was excellent for spawning due to the large amount of gravel that was not embedded with silt and sand. The low water crossing is a barrier for non-game fish such as sculpin and most darters which do not have swim

bladders and utilize only the stream bottom. There is also good pool habitat within China Creek for refuge for larger aquatic organisms such as trout. Fish habitat is present within activity area of China Creek (adjacent to stand 38-7).

There is no historical trout data for China Creek but habitat for trout species and other non-game exist. Surveys are planned by the USFS and the North Carolina Wildlife Resources Council (NCWRC) for fall 2006.

3.1.2 Effects Analysis

Effects are disclosed below for 1) general direct and indirect effects of the alternatives on aquatic resources, 2) direct and indirect effects of access on aquatic resources, 3) direct and indirect effects of timber harvesting on aquatic resources, 4) direct and indirect effects of herbicide use, and 5) cumulative effects to aquatic resources.

3.1.2.1 General Direct and Indirect Effects of Alternatives on Aquatic Resources

Introduction

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

Examples of indirect effects of a proposed action on aquatic species include, but are not limited to, altered reproductive or foraging success and increased occurrence of disease as a result of sedimentation, degraded water quality, and altered community structure as a result of migration. Indirect effects may also include changes in the quality, quantity, or diversity of habitat available resulting from changes in riparian vegetation. Specifically, the transport of large woody debris (LWD), an integral component of aquatic habitat diversity, to stream channels is a function of riparian vegetation structure and composition. The Forest Plan does not allow vegetation management within riparian zones for perennial streams unless it is specifically for the enhancement of riparian values (Forest Plan, page III-181). This standard was designed to allow vegetation along streams to become old and decadent and to serve as a long-term source of LWD to stream channels. However, areas exist across the Forests where vegetation can be managed within designated riparian areas to facilitate LWD transport and to serve as a short-term source of habitat improvement.

Alternative A – No Action

There would be no direct or indirect effects as a result of this alternative as no actions are proposed. The existing description as described above would be maintained. Current activities such as general road maintenance, wildlife suppression, and recreation would also continue in the AA.

Alternatives B, C, & D

Alternatives B, C, and D are discussed together due to the similarity of activity associated with the three action alternatives. Alternative C proposes the same actions as Alternative B with one exception; it would daylight about 15 feet either side of the Thunderhole Road FSR 4071 and seed with a wildlife/wildflower seed mixture to develop additional eight acres of early successional habitat and three acres of grass/forb habitat. This daylighting would not occur within 100 linear feet of perennial stream crossings and 30 linear feet of intermittent stream crossings. Alternative D would not daylight Thunderhole Road FSR 4071 but would seed the closed section with a wildlife/wildflower see mixture to develop an additional three acres of grass/forb habitat. Therefore, impacts associated with each action alternative would be the same in regards to aquatic resources.

Sedimentation of aquatic habitats within the activity area may occur with the maintenance of existing system roads, the installation of the bridges on Frankum Creek, and the installation of drainage culverts in stand (13-11&13-21 and 14-12) if weather conditions are such that sediments could be carried down these ephemeral channels. Sediment loading and turbidity can result in the loss of interstitial habitat within the substrate and cause direct mortality by the crushing or smothering of less mobile organisms such as aquatic invertebrates, fish eggs and juveniles. Conditions in this area would likely improve after the implementation of the storm recovery efforts on FSRs 4111, 4110, and 4071. Slides would be rehabilitated and failed stream crossings would be replaced along the FSRs listed above in the aquatic AA.

3.1.2.2 Direct and Indirect Effects of Access on Aquatic Resources

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

Alternative A

Implementation of this alternative would perpetuate the existing condition described above. Aquatic habitat quality, quantity, and populations would continue in their natural dynamic patterns. There would be no direct or indirect impacts upon aquatic resources.

Alternatives B, C, & D

Direct Effects: Access to stands 13-11&13-21 and 14-12 would involve one bridge and three drainage culverts on approximately 0.5 miles of temporary access road (most of which currently exists). Access to stands 13-7&13-19 would involve approximately 2,800 feet of new temporary road and one bridge across Frankum Creek. Access to stand 37-9 would involve approximately 600 feet of temporary road with no stream crossings. Access to stands 35-1, 35-11&35-23 would require a spur temporary road off of State Road (SR) 1367 and no stream crossings. Access to stand 38-7 would require approximately 1,200 feet of new temporary road with no new stream crossings. These alternatives involve constructing 2.3 miles of temporary road construction as well as the development of skid trails and log landings. The temporary road construction within stands13-11&13-21 and 14-12 would involve the placement of a bridge over Frankum Creek. The placement of this bridge would directly impact approximately 20 linear feet of stream bank on each side of Frankum Creek. The access to stand 13-7&13-19 would

require a bridge across the upper reach of Frankum Creek which would impact approximately 20 linear feet of stream bank on each side of Frankum Creek. These direct impacts come from the removal of streamside, or riparian vegetation which provides cover and nutrients for aquatic organisms. These impacts are expected to be minimal and would cease with site rehabilitation. Sediment control measures such as the use of silt fences and straw bales would be implemented at the site to avoid off site movement of soil at the crossings. These control measures trap sediments on-site and prevent most of the disturbed soil material from moving downstream.

Riparian areas have been identified as 100 feet on either side of perennial channels and 30 feet on either side of intermittent channels. No activity, including the placement of log landings and skid trails, would occur in this area with the exception of access at stream crossings. As a result, no measurable direct adverse impacts to riparian areas are expected to occur within riparian areas other than the small areas impacted by the two crossings. The impacted area would be approximately 0.09 acres of the total 41.6 acres of riparian area in the Globe activity area (0.22% of the area).

The road drainage on all temporary roads within the activity area would be designed so water flows off the roaded area and enters into vegetation rather than directly into activity area streams. Following harvest activities, disc and seeding of all unsurfaced temporary roads, skid roads and log landings would occur to reduce potential for erosion or sedimentation.

Indirect Effects: There may be off-site movement of soil into activity area waters from temporary road construction, bridge and culvert placements. 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). It is unlikely that habitat complexity would be lost, but if it 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. It is unlikely that eggs and juveniles would be lost due to reduced habitat or suffocation because there is no actual in-stream disturbance associated with this project. Over time, these species would recolonize areas as habitat conditions improve. This usually occurs after vegetation has reestablished and sediments are flushed through the system by storm events.

Smaller, less mobile organisms such as crayfish and aquatic insects may not be able to move to more suitable habitat. Individuals 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 activity 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).

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

Alternative A

The existing condition of aquatic resources as described above would be maintained under this alternative. Natural fluctuations in population stability, and habitat quality and quantity would continue.

Alternatives B, C, & D

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

There is no plan to harvest within any 100 foot riparian area of perennial streams within the activity areas. According to Volume 1 of the Final Environmental Impact Statement for the Forest Plan, *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* (page IV-36). The only cutting within the riparian areas would be associated with stream crossings discussed above. 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. If the size of the tree and stream channel do not match, there is the possibility 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 (less than one year), as there is an abundance of herbaceous vegetation along the banks that would quickly recolonize bare soil.

Water quality should not be adversely affected as long as Forest Plan standards and NC-FPGs are followed, and timber sale contract clauses are implemented. Stream temperatures would not be affected because adequate shade would be maintained along perennial and intermittent streams. In the past, the implementation of the NC-FPGs have protected streams during similar past actions. Long-term adverse impacts from these similar past actions have not been apparent. When failure of any BMP or NC-FPG has occurred it has been corrected immediately. Water quality should improve following repair of highly eroded sites along FSRs 4111 and 4110 during storm recovery efforts (2006-2007).

3.1.2.4 Direct and Indirect Effects of Herbicide Use

Alternative A

The existing condition of aquatic resources has been described above. Natural fluctuations in population stability, and habitat quality and quantity would continue. It should be noted that the encroachment of exotic invasive species throughout the riparian areas of the aquatic resources within the area would likely occur as a result of non-treatment, including burning and the use of herbicides (personal communication with USFS Botanist, David Danley 2005).

Alternatives B, C, & D

Herbicides are proposed in action alternatives for the Globe proposal. 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 the VMEIS is a detailed analysis of the effects of silvicultural treatments on aquatic resources. Please refer to the VMEIS for a description of such effects. No herbicide would be used in the 30 feet of any perennial streams within the Globe proposal. No herbicide would be sprayed within the 30 foot designated riparian area of any intermittent streams within the activity area. Hand pulling may occur within these 30 feet to prevent the elimination of native riparian vegetation by oriental bittersweet. No pulling would occur on stream banks to prevent erosion. See also Section 3.4, Herbicides below.

The following table summarizes potential effects to aquatic resources by alternative:

Table 3-2: Summary of Potential Effects to Aquatic Resources by Alternative

Issue	Alternative A	Alternatives B, C, & D
Effects on water quality (associated with the amount of soil disturbance)	Slight risk of degradation from erosion issues associated with FSR 451	Turbidity and sediment loading may increase slightly during culvert installation and bridge construction. Should diminish downstream and cease with site rehabilitation.
Effects on aquatic habitat and populations	Existing habitat and population trends continue	May temporarily negatively affect aquatic habitat due to the removal of riparian vegetation within Frankum Creek (during bridge installation) but would cease with site rehabilitation.
Effects to riparian areas	Remain in present state. Aquatic habitat would improve, as riparian areas grow older	Remain in present state except at two stream crossings. There would be a loss of 0.09 acres of riparian vegetation at these crossings. Aquatic habitat would improve, as riparian areas grow older, increasing large woody debris in streams.
Effects of herbicide	No treatment may increase the risk of the replacement of native riparian vegetation with exotics	No impact as spraying would not occur within 30 horizontal feet of streams.
Effects of Wildlife Habitat Enhancement Work	Existing condition would continue	No impact to aquatic resources as no wildlife enhancement activities would occur inside the 100 foot riparian area of activity or analysis area streams

3.1.2.5 Cumulative Effects to Aquatic Resources

Cumulative effects on aquatic species and habitat are the integration of any direct or indirect effects into the existing condition—and include past, present, and future actions, including those not occurring on NFS lands. Most often, cumulative effects are seen as either a degradation or improvement of an already impacted situation, but they can also be the first step in the degradation or improvement process. Cumulative effects on aquatic habitats and populations from management activities can be positive or negative, depending on the nature of the proposed actions and site-specific conditions.

Alternatives A, B, C, & D

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

Past actions analyzed include Timber Harvest: Franklin Creek TS (2000), Thunderhole (1986); Wildfires/Rx burns: Globe Mt. (1996), Thunderhole (1991), Rocky Knob Rx (2005), Boyd Branch (2007); and Storm Damage Repair (ongoing).

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

Past monitoring on the Pisgah National Forest during prescribed burning indicates that no measurable impacts to aquatic resources occur from prescribed fire. Riparian areas generally do not burn; therefore, riparian vegetation is unaffected. As a result, prescribed fire does not contribute adverse cumulative effects to aquatic resources.

Two tropical storms moved through the project and analysis areas during September of 2004 during an eight day period. These storms released up to 14 inches of rain within 48 hours each time. Many streams within the Catawba River drainage were heavily impacted by the storm events. Streams within the Globe Activity area were affected by the storm events. As observed in other watersheds across the Pisgah National Forest, these large storms (100 year floods or greater) often act as a "restart mechanism" for cumulative effects. Substrates in the upper reaches of Frankum, Friddle, Georges, China, and Thunderhole Creeks 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.

Ongoing actions that are contributing adversely to cumulative impacts on aquatic resources include the run-off and erosion associated with FSR 4110, 4110, and 4071. These roads have several slides and inadequate culverts that are contributing sediments to the Globe aquatic AA. The Grandfather District proposes to repair these areas as a part of the storm recovery efforts in 2006-2007. These actions would improve these roads and therefore reduce adverse cumulative impacts to aquatic resources by clearing slides, upgrading culverts, and stabilizing the areas.

The implementation of any of the action alternatives for the Globe Project is not expected to contribute significant adverse cumulative effects to the aquatic resources within the analysis area. There would likely be a minimal amount of sediments enter into the stream during bridge installation but it would not cause long-term, and/or cumulative impacts to the resource. The flushing of excess sediments usually occurs during storm events.

Hemlock wooly adelgid (HWA) treatments have occurred within the Globe Project Area under separate NEPA analysis, most notably the release of predator beetles and soil injections. Hemlocks are an important riparian species supplying streams with large woody debris, shade (which affects stream temperature), and streambank stability. The treatment of hemlocks within the area would benefit aquatic resources throughout the area and therefore not contribute to adverse cumulative effects within the project area. More information on HWA treatment and expected impacts to NFS lands is available at: http://www.cs.unca.edu/nfsnc/nepa/hwa_ea.pdf.

Activities on adjacent private lands have potential to affect aquatic habitat within watersheds associated with the Globe Project. These include the Snyder Trespass (partially on USFS lands), residential development on US 321, and large scale harvesting. The proposed action alternatives are not expected to cause long-term impacts to the aquatic resources within the area because the Globe actions are not expected to significantly affect riparian areas; therefore, the Globe Project would not further degrade water quality.

3.2 Wildlife

Additional analysis on wildlife habitat is disclosed in Appendix A, BE; Section 3.8 (MIS); Section 3.9 (TES & FC); Appendix G, Roads Analysis (Table G-2, open road density discussion); and the wildlife resource report, project record. The wildlife biological analysis area (AA) is the Upper Mulberry and Upper John's River Forest Plan AAs (about 11,228 total acres). The following tables display forest type and habitat, and age-class information:

Table 3-3: Existing Forest Types within the Globe AA

Species/Forest Type	Acres (CISC)	% of AA	Alternative B (acres reduced)	Alternative C (acres reduced)	Alternative D (acres reduced)
White Pine	373 ac	3%	2		
White Pine - Hemlock	93 ac	1%			
Hemlock – Hardwood	33 ac	>1%			
White Pine – Cove Hardwood	341ac	3%			
White Pine – Upland Hardwood	176ac	2%			
Yellow pine – oak	110 ac	1%			
Yellow pine (pitch, shortleaf,Table mtn)	270 ac	2%			
Cove Hardwood – White Pine – Hemlock	[2/]818 ac	7%	40	40	40
Upland Hardwood – White Pine	[2/]762 ac	7%	39	42	28
Oak – Yellow Pine (scarlet and chestnut oak)	[2/]182 ac	2%			
N. Red Oak - Hickory - Yellow Pine	[1/] 572 ac	5%			
Yellow Poplar	427 ac	4%			
White Oak – N. Red Oak – Hickory	[1/]1,933 ac	17%	58	58	58
Yellow Poplar – White Oak – Red Oak	[2/]4,390 ac	39%	82	84	74
Chestnut Oak	[1/]445 ac	4%			
Chestnut Oak - Scarlet Oak	[1/]165 ac	1%	15	18	15
Scarlet Oak	[1/]135 ac	1%			
Total	**11,225**	**100 %**	**[3/]236**	**[3/]244**	**[3/]217**

[1/] High level hard mast = 3,250 acres
[2/] Medium level hard mast = 6,152 acres
[3/] Frankum Creek (5 ac) and Thunderhole Road (8 ac) daylighting

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

Age Class – Habitat Vegetation Component	Acres (CISC)	% of AA	Alt A	Alt B (ac/% chg)	Alt C (ac/% chg)	Alt D (ac/% chg)
0-10 age – Early Successional	45 ac	<1%	n/a	+224/2%	+228/2%	+213/2%
11-20 age – Early Successional	464 ac	4%	n/a			
21-50 age – Mid Successional	306 ac	3%	n/a			
51-100 age – Mature Forest	9,001 ac	80%	n/a	-231/2%	-244/2%	-217/2%
101- 140 age – Old Forest	1,409 ac	13%	n/a			
Grass/forb habitat	[1/]4 ac	<1%	4 ac	[2/]+12/1%	[2/]+15/1%	[2/]+12/1%
Total	**11,225**	**100%**		**236/2%**	**244/2%**	**217/2%**

[1/] stand inclusion
[2/] includes seeded & closed portion of Thunderhole Road

3.2.1 Alternative A – Direct, Indirect, and Cumulative Effects

Under this alternative, the early successional habitat (0-10 years) would remain at about 45 acres, or <1 percent of the wildlife AA; the grass/forb openings would also remain at <1 percent. The Forest Plan standard for early successional habitat is 5% - 15% in Management Area (MA) 3B and not to exceed 10% in MA 4A (Forest Plan, page III-31). The Forest Plan standard for grass/forb openings is 0.5% in MAs 3 and 4 (Forest Plan, pages III-23). Under this alternative habitat connectivity would be maintained. There would be no adverse cumulative effects with this alternative when combined with other activities listed in Table 3-1 above.

3.2.2 Alternatives B, C, & D – Direct and Indirect Effects

3.2.2.1 US Fish and Wildlife Service Bird Species of Concern

The US Fish & Wildlife Service (FWS) has listed bird species of conservation concern within this region. Two species, the worm-eating warbler and wood thrush, were found during bird surveys to occur within the proposed timber sale areas. The wood thrush was recorded within Stand 35-23 & 13-18 while the worm-eating warbler was recorded within Stand 13-18.

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

Worm-eating Warbler

The Worm-eating warbler is often found in steep areas with a thick rhododendron and laurel shrub layer. The canopy trees they favor are oak, hickory, white pine and hemlock, according to the Audubon Society. There are approximately 8,780 acres of this preferred habitat and the species was recorded within a stand of yellow poplar-white oak-red oak forest type. This forest type in particular covers 39% of the AAs. Alternative B would regenerate 194 acres or 2.2% of the warbler's habitat; Alternative C would regenerate 202 acres or 2.3% of the warbler's habitat; while Alternative D would regenerate 175 acres or 1.9% of the warbler's habitat. Therefore, the majority of habitat within these AAs considered important for this species (about 98%) would not be affected by any of the action alternatives.

Wood Thrush

The Wood Thrush is found in moist cove forests where deciduous shrubs and saplings occur. The AAs exhibit 6,009 acres of the preferred forest type for the thrush. Alternative B would regenerate 122 acres or 2% of the thrush's habitat; Alternative C would regenerate 124 acres or 2% of the thrush's habitat; while Alternative D would regenerate 114 acres or 1.8% of the thrush's habitat. Therefore, the majority of habitat within these AAs that is considered important for this species (about 98%) would not be affected by any of the action alternatives.

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

3.3 Non-native Invasive Plants

Existing Condition

There are 124 species of non-native plant species 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, both native and non-native, have benefits for wildlife and erosion control. However, as succession progresses, most weedy species tend to become much less prevalent and generally do not persist in the area. Most weedy plant species are expected to decrease to less abundant population levels within ten years after the initial disturbance.

The persistence of most non-native plant species is not considered desirable to natural ecosystem health. There are primarily two ways in which non-native plant species may persist in the forested ecosystems. A non-native plant species may persist by the introduction of an "invasive non-native species" to the ecosystem or by modification of the ecosystem in such a way that an invasive species becomes dominant. Out of the 124 species of non-native plants known to occur on the Pisgah Nantahala National Forest, 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).

Surveys for invasive species were conducted (2006) within the activity areas and around roads to the activity areas. Eleven species on the Regional Forester's invasive non native plant species are known within the AA (see table below). It is recommended that the known populations of *Miscanthus sinensis*, *Paulownia*, *Celastrus orbiculatas,* and *Ailanthus altissima* be controlled to reduce possible adverse effects of invasive plant species to this proposal. The invasive plants *Microstegium vinineum*, *Lonicera japonica,* and *Allium vineale* (wild garlic) are so well established in parts of the AA that control by any currently known method is entirely impractical because of the size of the AA. However, these species were not identified within activity areas and thus are not expected to become established where harvest or temporary road construction occurs.

The populations of *Lespedeza cuneata*, *Lolium arundinaceum,* and *Coronilla varia* are not known to be invasive within natural forested communities within the mountains. While *Lespedeza cuneata*, *Lolium arundinaceum,* and *Coronilla varia* may be invasive in Coastal Plain,

Piedmont regions and rare natural areas (i.e. serpentine glades), they are not expected to be a concern in this proposal and/or the AA as they are not known to be invasive within natural forested communities within the mountains. Therefore, it is not recommended that these species be controlled. The following table displays non-native invasive plant species in the activity areas:

Table 3-5: Non-native Invasive Species Summary

Species	Regional Category	Location in Activity Areas	Recommendation[1]
Ailanthus altissima	1	FSRs 188, 4111	Control all populations prior to disturbance on NFS land
Rosa multifora	1	FSRs Alluvial Forest along Georges Creek, Franklum Creek, FS roads 188, 4111, 4071	No effective control method known. No recommendation to control.
Celastrus orbiculatas	1	FSRs	Control all populations prior to disturbance on NFS land
Lespedeza cuneata	1	Wildlife Fields, roadsides	This species does not display invasive tendencies. Not recommended to control.
Paulownia tomentosa	1	FSRs 188, 4111, 4071	Control all populations prior to disturbance on NFS land
Lolium arundinaceum	1	Wildlife Fields	This species does not display invasive tendencies. Not recommended to control.
Lonicera japonica	1	Alluvial Forest along Georges Creek, Franklum Creek, FS roads 188, 4111, 4071	No effective control method known. No recommendation to control.
Microstegium vinineum	1	Mostly in Alluvial Forests and coves. Very well established bottoms.	No effective control method known. No recommendation to control.
Miscanthus sinensis	2	FSRs	Control all population prior to disturbance on NFS land
Allium vineale	1	Wildlife Fields	This species does not display invasive tendencies. Not recommended to control
Coronilla varia	2	Found only along system roads	This species does not display invasive tendencies. Not recommended to control

1 – Recommendation is for all action alternatives

The following effects analysis focuses on non-native plant species. Additional information and effects analysis on T&E plant species is disclosed in the BE, Appendix A, and additional information and effects analysis on MIS is disclosed in Appendix G.

3.3.1 Alternative A – Direct, Indirect, and Cumulative Effects

Under this alternative no actions are proposed. There would be no potential increase in non-native invasive plant species as a result of ground disturbing actions. However, there would also be no control measures implemented to reduce the continued spread of these species. It is expected that non-native invasive plant species would continue to increase with or without

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

3.3.2 Alternatives B, C, and D – Direct and Indirect Effects

The action alternatives all propose to treat non-native plants. The following table displays the actions and the maximum acreages of proposed herbicide and manual treatment by alternative:

The following table displays a summary of potential effects to natural communities from non-native invasives based on the action alternatives:

Table 3-6: Non-native Invasive Species Effect Summary by Natural Community

Natural Community	Associated Species	Potential Creation of New Habitat by Natural Community for Alts B, C, & D
Acidic Cove Forest	*Celastrus orbiculatas Rosa multifora,*	Up to 64 acres. Of which, 59 acres would be potential habitat 8 years after harvest and 5 acres (wildlife fields) would be permanent habitat
Rich Cove Forest	*Celastrus orbiculatas Rosa multifora, Celastrus orbiculatas Rosa multifora, Lespedeza cuneata, Paulownia tomentosa, Lonicera japonica, Microstegium vinineum, Miscanthus sinensis, Paulownia tomentosa,*	None. The proposal does not affect this community
Pine Oak Heath/ Chestnut Oak Forest	*Paulownia tomentosa, Ailanthus altissima*	Up to 167 acres. Of which, 157 acres would be potential habitat 8 years after harvest and 10 acres (wildlife fields) would be permanent habitat
Montane Oak Hickory	*Ailanthus altissima, Celastrus orbiculatas Rosa multifora, Lespedeza cuneata, Paulownia tomentosa, Lonicera japonica, Microstegium vinineum, Miscanthus sinensis, Paulownia tomentosa,*	None. The proposal does not affect this community
Alluvial Forest	*Celastrus orbiculatas Rosa multifora, Lespedeza cuneata, Paulownia tomentosa, Lonicera japonica, Microstegium vinineum, Miscanthus sinensis, Paulownia tomentosa, Ailanthus altissima*	None. The proposal does not affect this community
Water Fall Spray Zones & wet rocks	none	None. The proposal does not affect this community

The other way in which non-native plants may persist in the area is by continual disturbance. For example, a maintained road shoulder or wildlife field often has persistent weedy and non-native plant species. These areas are often maintained in an early successional state for wildlife

or human benefit. Therefore, it is expected that this proposal could slightly increase the persistence of non-native vegetation in the analysis area (see following table for summary of habitat effects). To reduce this effect, it is recommenced that native plants be utilized in wildlife improvement and roadside erosion control plantings. It is recognized that erosion control and wildlife production are the primary goals of seeding areas and some non-native plant species may be highly beneficial to accomplish these goals. However, a presidential executive order [Executive Order 11987, Title 3- The President] recognizes the need to reduce the impact of non-native species by reducing the amount in which non-native plant species are planted on federal property. All the goals of erosion control, wildlife production and encouragement of native plant species may be met by planting native plant species or a suitable mixture of native and non-persistent non-native plant species.

3.3.3 Alternatives B, C, and D – Cumulative Effects

The cumulative effect Alternatives B, C, and D would have on non-native invasive plants can be ascertained by comparison to Forest-wide condition and trend of exotic invasive plants. Suitable habitat for most non-native invasive plant species can be defined as areas with ground disturbing activities such as road construction, recent timber regeneration (0-10 years) areas, and wildlife field construction (MIS Report, pages 784-785). Therefore, the proposal would generate non-native invasive suitable habitat as follows: Alternative B – 231 acres of regeneration, 2.3 miles of temporary/existing road, and 12 acres of permanent grass/forb habitat; Alternative C – 231 acres of regeneration, 2.3 miles of temporary/existing road, and 15 acres of permanent grass/forb habitat; and Alternative D, 212 acres of regeneration, 2.3 miles of temporary/existing unauthorized road, and 12 acres of permanent grass/forb habitat. Forest-wide suitable habitat for exotic invasive plants is 2,684 miles of road and 22,874 acres in 0-10 age class across the Forest (MIS Report, pages 781-784). Thus, the cumulative effect or increase of exotic invasive habitat would be <1% for all action alternatives.

3.4 Herbicides

3.4.1 Alternative A – Direct, Indirect, and Cumulative Effects

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

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

The following table displays expected maximum acreages of herbicide treatment (Glyphosate and Triclopyr) that may occur:

Table 3-7: Maximum Acres of Pesticides Applied Manually by Alternative[1]

Herbicide	Alternative A	Alternative B	Alternative C	Alternative D
Triclopyr/Glyphosate (ac)[2]	0	253	265	234

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

2 – Acres include treatment for site preparation, non-native invasive species, daylighting, and wildlife fields

Use of herbicides is not expected to have measurable adverse effects on wildlife, water quality, and humans due to proper application as per Material Safety Data Sheets (MSDSs), product labels, risk assessments, fact sheets, mitigation measures contained in the *Vegetation Management in the Appalachian Mountains* (VMAM) FEIS, issued in July 1989, Forest Plan standards and guidelines (Forest Plan, page III-181), and design features disclosed in Appendix F. If used improperly, herbicides pose some risk to wildlife, water quality, and humans; however, any herbicides applied would be done according to the labeling information, at the lowest rate effective at meeting project objectives in accordance with guidelines for protecting the environment, and manually (not aerially). This risk is further reduced by requiring the applicator to be trained in safety precautions, proper use, and handling of herbicides. Other factors reducing risk are the low level of active ingredient per acre and placement of notice signs in areas where herbicides have been applied. The signs include information on the herbicide used, when it was applied, and who to contact for additional information.

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

Impacts of herbicide use to wildlife, water quality, and humans are expected to be low due to proper handling and application. The use of herbicides would have no measurable impact on water quality because according to the 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 herbicides associated with the action alternatives if no spills occur within riparian areas—no herbicide would be applied within at least 30 feet of riparian areas. According to the 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 the pesticide storage building at the Grandfather Ranger District Work Center and not in the field, and applicators do not carry concentrated amounts of herbicide in the field. There are no other known foreseeable applications of herbicides on NFS lands in the Globe area that could affect herbicide use with this proposal—the last measurable herbicide use on NFS lands in the Globe area was about 10-15 years ago in Compartments 11, 12, 13, 14, 35, and 39. The Forest Service is unaware of any large-scale quantities of herbicide being applied on adjacent non-NFS lands within the watershed that could cause adverse cumulative effects. Individual home owners are expected to use herbicides on their properties; however, determining

measurable amounts, formulations, locations, frequency, and timing of their use would be speculative. Additional project design features are listed in Appendix F below.

Effects from the Old House Project about six miles to the west of the Globe activity areas are not expected to cause adverse cumulative effects from herbicide use because effects from each project are not expected to be cumulatively added together due to each project being in separate watersheds, the project design of each, and adherence to standards in the Vegetation Management FEIS and Forest Plan.

3.5 Soil Resources

The following is an analysis of the soils that would be impacted by logging or temporary road construction activities in the project area. The following table lists the soil map units found by stand number:

Table 3-8: Primary Soil Map Units by Stand by Alternative

Primary Soil Map Unit Name (Series)	Stands[1]	Avg. Slope Percent[2]	Alternative A (acres)	Alternatives B & C (acres)[3]	Alternative D (acres)[3]
Chestnut Gravelly Loam (F)	14-9, 13-18, 13-10; 14-1a; 14-1b; 12-5 &12-12; 35-11; 35-1, 35-11, & 35-23; 37-9; 37-5a; 37-5b; and 33-11	50-80	0	117	98
Chestnut & Edneyville (D&E)	13-11, 13-21, & 14-12; 13-7 & 13-19; 12-5 & 12-12; 35-1, 35-11, & 35-23; 37-9; 38-7; 38-10; 39-4 & 39-13; 39-15; and 33-11	15-50	0	87	87
Evard & Saluda (D&E)	14-9; and 13-11, 13-21, & 14-12	15-50	0	27	27
Total Acres			**0**	**231**	**212**

1 – Portions of soil map units make up each stand. 149 acres would be harvested by cable logging systems (stands 13-11, 13-21, & 14-12; 14-1a; 14-1b; 12-5 & 12-12; 35-1, 35-11, & 35-23; 37-9; 38-10; 39-15; and 33-11. The remaining 82 acres would be harvested by tractor logging systems.

2 – Average slope percent ranges are for soil map units from NRCS data and are not necessarily the average slope within the stand (A = 0% - 2%, B = 2% - 8%, C = 8% - 15%, D = 15% - 30%, E = 30% - 50%, and F = 50% - 95%)

3 – Requires 1.5 miles of temporary road construction in Alternatives B, C, and D to access stands 13-18, 14-9, (14-12, 13-11, 13-21), 33-11, 35-11, (35-11, 35-23, 35-1), 37-5a, 37-5b, 37-9, 38-7, (39-4, 39-13), and 14-1. Existing unclassified roads (0.8 miles) would be used to access stands (13-7, 13-19), and (14-12, 13-11, 13-21). (Existing unclassified roads were previously used for timber harvest and would require minimal clearing and shaping for current use.)

The following table displays characteristics of each soil map unit:

Table 3-9: Comparison of Soil Map Units

Map Unit Name	Characteristics
Chestnut	The Chestnut series consists of moderately deep, well drained soils on gently sloping to very steep ridges and side slopes of the Blue Ridge (MLRA 130). They formed in

Map Unit Name	Characteristics
	residuum that is affected by soil creep in the upper part, and weathered from felsic or mafic igneous or high-grade metamorphic rocks such as granite, hornblende gneiss, granodiorite, biotite gneiss, and high-grade metagraywacke. Well drained; moderately rapid permeability. Runoff class is low on gentle slopes, medium on strong or moderately steep slopes, and high on steeper slopes. Runoff is much lower where forest cover is intact. Most of the soil is in forest. Common trees are scarlet oak, chestnut oak, white oak, black oak, hickory, eastern white pine, Virginia pine, and pitch pine. Yellow poplar and northern red oak are common in the northern portions of MLRA 130. The understory species are dominantly rhododendron, mountain laurel, flowering dogwood, sourwood, chestnut sprouts, and buffalo nut.
Edneyville	The Edneyville series consists of very deep, well drained soils on gently sloping to very steep ridges and side slopes of the Blue Ridge (MLRA 130). They formed in residuum that is affected by soil creep in the upper part, and is weathered from felsic or mafic igneous or high-grade metamorphic rocks such as granite, hornblende gneiss, granodiorite, biotite gneiss, and high-grade metagraywacke. Well drained, permeability is moderate in the subsoil and moderately rapid in the underlying material. Runoff class is low on gentle slopes, medium on strong or moderately steep slopes, and high on steeper slopes. Runoff is much lower where forest litter has little or no disturbance. Forested to oak, hickory, and pine. Understory of native grasses, wild grape, rhododendron, mountain laurel, and dogwood.
Evard	The Evard series consists of very deep, well drained, moderately permeable soils on ridges and side slopes of the Blue Ridge (MLRA 130). They formed in residuum affected by soil creep in the upper part and weathered from felsic to mafic, igneous and high-grade metamorphic rocks. Well drained; permeability is moderate in the subsoil and moderately rapid in the underlying material. Runoff class is low on gentle slopes, medium on strong or moderately steep slopes, and high on steeper slopes. Runoff is much lower where forest litter has little or no disturbance. Most of the soil is in forest. Common trees are chestnut oak, white oak, scarlet oak, black oak, and hickory with some eastern white pine, Virginia pine, pitch pine, and shortleaf pine. The understory includes flowering dogwood, American chestnut sprouts, sourwood, mountain laurel, flame azalea, blueberry, and buffalo nut. Cleared areas are commonly used for pasture and hayland and occasionally burley tobacco.
Saluda	The Saluda series consists of shallow, well drained, moderately permeable soils that formed in weathered granite, gneiss, or schist. Well drained; rapid surface runoff; moderate permeability. Most areas are in forest of oaks, hickory, white pine, hemlock, and yellow poplar with an understory of rhododendron, laurel, and dogwood.

3.5.1 Alternative A – Direct, Indirect, and Cumulative Effects

There would be no adverse effects to soils with this alternative because no activities are proposed. Soil displacement and compaction related to temporary road construction and landing construction would not occur.

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

3.5.2.1 Direct and Indirect Effects

Any effects to soils with these alternative would be negligible because the majority of the soil types in the project area where harvesting is proposed (88%) are moderately to very deep and well drained (reducing potential for compaction); would not be taken out of production through permanent road construction; and would have project design features (Section 2.4, Chapter 2) and Forest Plan standards (BMPs) applied to further reduce potential for compaction and long-

term damage. The remaining 12% of the harvesting is proposed on soil map series that are shallow and well drained. There would be some minor, short-term erosion with the construction of 1.5 miles of temporary road and 0.8 miles of existing unauthorized road. However, the effects would be short-term and limited in their extent when applied to the total area of operation—the temporary roads would be disked and seeded following harvest activities. Alternatives B and C propose to harvest 149 acres with cable logging systems (partial suspension of logs) and 82 acres of harvest with ground based logging equipment (skidders or caterpillars); only about 2% of the two AAs. Alternative D proposes to harvest 130 acres with cable logging systems and 82 acres of harvest with ground based logging equipment. 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. Alternative D would have fewer potential impacts to soils than Alternatives B or C because it proposes 19 fewer acres of harvest.

3.5.2.2 Cumulative Effects

Effects from the Old House Gap Project about six miles west of the Globe Project is not expected to cause adverse cumulative effects to soil resources because effects from each project are not expected to be cumulatively added together due to each project being in separate watersheds, the project design of each, and adherence to Forest Plan standards (BMPs). The Old House Gap Project would harvest about 136 acres (0.1% of the Upper Wilson Creek and the Anthony Creek AAs) and construct 1¼ mile of temporary road. Actions listed in Table 3-1 above are not expected to cause adverse cumulative effects to soils because they were developed to meet Forest Plan standards (BMPs), reducing potential for adverse effects. In addition, onsite reviews and evaluations have not identified large-scale or severe adverse effects to soil resources in the AAs—specific areas that have experienced small-scale erosion due to past management or the 2004 tropical storms are proposed to be addressed with this proposal or are being addressed under separate storm-related recovery projects. There are no other known projects in the Globe AAs that could cause adverse cumulative effects when combined with potential effects of the Globe proposal.

3.6 Cultural Resources

3.6.1 Alternative A – Direct, Indirect, and Cumulative Effects

There are no expected adverse direct, indirect, or cumulative effects to cultural resources with this alternative because no ground disturbing activities are proposed.

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

An archaeological review has been completed in the field and any sites eligible or potentially eligible for the National Register of Historic Places (NRHP) under Criteria D (36 CFR 60.4) have been identified. Class III sites are not eligible to the NRHP and may be affected by the proposed activities. There would be no adverse direct, indirect, or cumulative effects to Class I and unevaluated sites (Class II) with implementation of these alternatives as identified cultural sites would be protected by excluding them from the treatment areas.

Effects from the Old House Project about six miles to the west of the Globe activity areas are not expected to cause adverse cumulative effects to cultural resources because effects from each project are not expected to be cumulatively added together due to each project being in separate

watersheds, the project design of each, and adherence to Forest Plan standards and applicable laws.

3.7 Scenery Resources

3.7.1 Existing Condition

Globe project area is located on the Pisgah National Forest, Grandfather Ranger District, west of US 321 between Lenoir and Blowing Rock, NC. Management areas (MA) in the AAs include 3B, 4A, 4C, & 18. All proposed activities are located within MA 3B and MA 4A.

Management Area 3B has an assigned Visual Quality Objective (VQO) of Modification in all Distance Zones and Sensitivity Levels; except where seen from the Blue Ridge Parkway, where a Partial Retention VQO must be met in Foreground and Middleground. Management Area 4A has an assigned VQO of Retention in Foreground Sensitivity Level 1, and Partial Retention in all other Sensitivity Levels and Distance Zones.

Secondary State roads, Forest Service roads, and Forest Service trails in the project area are Sensitivity Level 2 or 3. Primary State roads, residential areas, and businesses in Blowing Rock are Sensitivity Level 1; as are the Blue Ridge Parkway and Grandfather Mountain. Based on Sensitivity Levels and viewing distances, the assigned VQO for the Frankum Creek area is Modification, while the Thunderhole Creek area is managed for Partial Retention. Under the current Forest Plan, National Forest System (NFS) lands seen from the town of Blowing Rock are managed for the same level of scenic quality as lands seen from the Blue Ridge Parkway, Grandfather Mountain, the Appalachian Trail, Roan Mountain, and other such scenic areas.

Partial Retention VQO must be met within two growing seasons, Modification VQO is allowed three (refer to the Forest Plan, Amendment 5 for specific definitions of Visual Management System terminology, and Management Area standards).

Scenery consists of the combination of landforms, rock outcrops, water bodies, and vegetation seen in the natural landscape. In general, the landscapes seen in the project area are highly variable. Areas along US 321 and in Blowing Rock are intensely developed urban landscapes. Areas seen from secondary State roads, Forest Service roads in Pisgah National Forest, and interspersed private lands are rural or forested landscapes.

The characteristic landscape in the Frankum Creek area is that of a mixed hardwood-conifer forest, with interspersed rural residential and light agricultural development on private lands, and evidence of past timber management on NFS lands. Most of the Frankum Creek area is only accessible from a closed Forest Service road which receives some incidental use from mountain bikers, horseback riders, and hunters.

The Thunderhole Creek area is visible from State roads, an open Forest Service road, businesses, and residential developments in and around Blowing Rock, NC. NFS lands in the viewshed show evidence of past timber management which pre-dates the current Forest Plan (1994). However, existing clear-cuts are 13-15 years old and have regenerated to a point where they have a predominately natural-appearing canopy cover, with color and texture similar to the adjacent forest. In Middleground views, these old harvests are only identifiable by a faint shadow-line at the upper unit boundary. Private lands in the viewshed are highly modified with dense residential development on steep slopes and ridge-tops; these structures and associated road

systems dominate the landscape from many viewpoints, and contrast greatly with the surrounding scenery.

Scenic attractions of local and national importance are in the surrounding area. The Blue Ridge Parkway passes to the west and north of the project area on its way through Blowing Rock; but offers no views of the project area. Grandfather Mountain is located eight miles to the west, though no evidence of proposed activities would be visible from there either. The "Blowing Rock", a privately owned scenic observation area, is one mile east of the project area and does offer views of proposed activities in the Thunderhole Creek drainage. NFS lands seen from The "Blowing Rock" are managed to meet Partial Retention Visual Quality Objective.

3.7.2 Scenery Analysis

Computer analysis and leaf-off field surveys were used to identify viewpoints and determine visibility of proposed management activities. All travel corridors, water bodies and use areas in and around the project area were considered for potential viewpoints. Some of these locations were found to have views of the project area, and were subject to detailed analysis using digital imagery, GIS and/or 3D computer simulations. Other viewpoints were considered, but preliminary analysis determined no proposed activities would be visible from these locations; Grandfather Mountain and the Blue Ridge Parkway fall into this category.

Some of the views would be seen as the observer is moving (in a vehicle, walking, horseback, bicycle, etc.), others are from stationary vistas. Views may be partially filtered or screened by foreground vegetation, others are open and unobstructed. The degree of potential impact varies with these and several other factors such as distance from viewer and viewer position; as well as the slope, size, shape and type of proposed harvest, road, log landing, etc. All of these factors are considered when determining what activities would meet assigned VQOs and what scenery design features should be incorporated. The following list identifies viewpoint locations considered in the analysis.

3.7.2.1 Viewpoints

- State Road (SR) 1368, FSTR 251, FSR 188 & FSR 4111 in the Mulberry area
- US Highway 321 from SR 1370 to town of Blowing Rock
- The "Blowing Rock" observation area
- Canyons Restaurant
- Laurel Park, town of Blowing Rock
- Mayview Park, town of Blowing Rock
- Globe Road (SR 1367) and Thunderhole Road (FSR 4071)
- China Creek Trail (FSTR 250) and Thunderhole Falls Trail (FSTR 253)

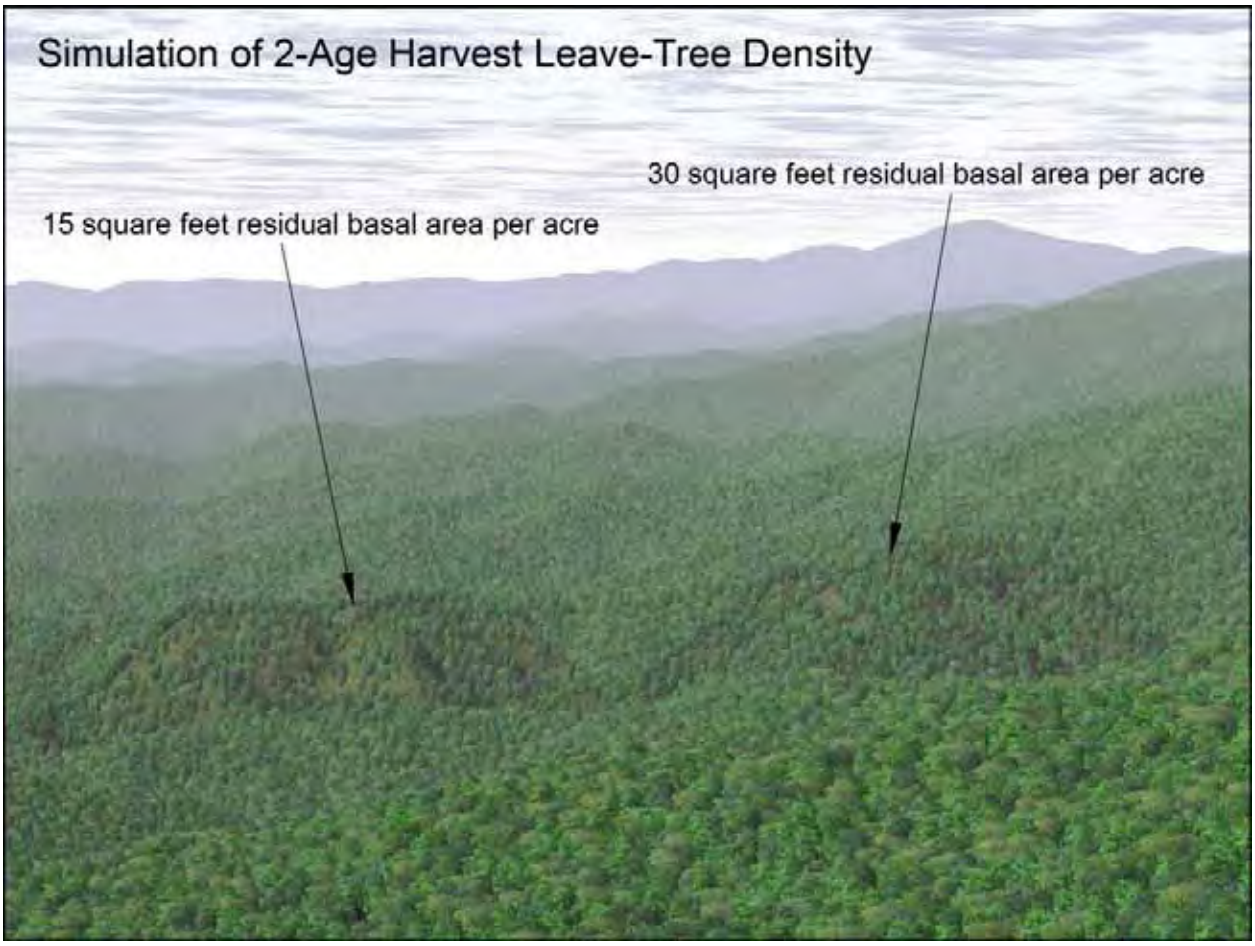
3.7.2.2 Other Viewpoints Considered (no proposed activities visible):

- Blue Ridge Parkway (from Grandmother Mt. to Blowing Rock)
- Grandfather Mountain
- SR 1369 & SR 1370
- NC Highway 90
- Johns River

3.7.3 Effects by Alternative

Proposed timber management utilizes two-age harvest techniques. When viewed in the Middleground, two-age timber harvest areas may appear to have fewer trees than adjacent un-cut stands, but do not create a distinct opening as with clear-cut harvests used in the past. To the average viewer, a two-age treatment with 15-20 square feet of residual basal area per acre (ft^2 rba/ac) may be noticeable for 8-10 years after harvest; while a 30+ ft^2 rba/ac treatment may only be noticeable for 3-5 years. The higher leave-tree density reduces textural and color contrasts between harvested areas and adjacent forest. Figure 3-1 displays a simulation of a two-age harvest stand with 15 ft^2 rba/ac and a two-age harvest stand with 30 ft^2 rba/ac (additional simulations of various viewpoints by action alternative are on the Forest's website http://www.cs.unca.edu/nfsnc/nepa/gradfather/globe.htm):

Figure 3-1: Simulation of 2-age Harvest Leave-Tree Density



In leaf-on-season, Middleground views of two-age treatments may allow varying degrees of visible ground beneath the remaining overstory trees, and in certain lighting conditions shadows beneath residual trees may make the stand appear darker and have a more coarse texture than the adjacent forest. Within 2-3 growing seasons, crowns of residual overstory trees would expand and create a denser canopy, and understory vegetation would grow to obscure views of ground exposed during harvest.

In leaf-off season, two-age treatment areas are almost indistinguishable from adjacent un-cut stands; however roads, log landings, and logging debris may be more noticeable.

In some two-age treatment areas, leave-tree density is transitioned (or feathered) from the target rba/ac to adjacent un-cut stands. This technique eliminates a hard shadow-line along upper unit boundaries, and helps blend treatment areas into the adjacent forest canopy.

In addition to increased leave-tree densities and feathering, other scenery design features used in these proposals are to retain un-cut areas between roads and treatments; maintain screening vegetation below visible log landings and roads; burn or spread accumulated logging debris; and re-grade visible portions of temporary roads to original contour.

Proposed wildlife treatments and non-commercial silvicultural treatments are not listed in the charts below. These treatments, such as wildlife openings, food plots, and daylighting roads would create minimal impacts to scenic resources as seen from analyzed viewpoints. These treatments would meet assigned VQOs as proposed.

The following tables list proposed treatment areas, assigned VQOs, and project design features for each of the action alternatives. With implementation of specified scenery design features, all actions proposed in Alternatives B, C, & D would meet VQOs identified in the Forest Plan.

3.7.3.1 Alternative A (No Action) – Direct & Indirect Effects

All VQOs would be met.

3.7.3.2 Alternative B (Proposed Action) – Direct & Indirect Effects

This alternative proposes two-age harvests with 15-20 square feet of rba/ac on 231 acres, and a variety of wildlife and other non-commercial treatments.

All commercially harvested areas would be tractor or skyline logged. Approximately 1.5 miles of temporary road would be constructed and 0.8 miles of existing unauthorized roads would be utilized. The following table summarizes stand information and project design features needed to attain specific VQOs:

Table 3.10: Alternatives B & C Scenery Analysis

Stand	Ac	MA	Treatment	Harvest Method	VQO	Project Design Features
12-5/12-12	25	3B	Two-age (15-20 rba/ac)	Cable	M	None
13-7/13-19	10	3B	Two-age (15-20 rba/ac)	Tractor	M	None
13-10	7	3B	Two-age (15-20 rba/ac)	Tractor	M	None
13-18	10	3B	Two-age (15-20 rba/ac)	Tractor	M	None
13-11/13-21/14-12	30	3B	Two-age (15-20 rba/ac)	Cable	M	3
14-1a	10	3B	Two-age (15-20 rba/ac)	Cable	M	None
14-1b	10	3B	Two-age (15-20 rba/ac)	Cable	M	None
14-9	10	3B	Two-age (15-20 rba/ac)	Tractor	M	9, 10
33-11	40	4A	Two-age (15-20 rba/ac)	Cable	PR	2, 3, 5, 6, 7, 11
35-11	11	4A	Two-age (15-20 rba/ac)	Cable	PR	1, 4, 7, 8, 12
35-1/35-23	8	4A	Two-age (15-20 rba/ac)	Cable	PR	1, 2, 4, 7, 12
37-5a	4	4A	Two-age (15-20 rba/ac)	Tractor	PR	4, 7, 8, 13
37-5b	3	4A	Two-age (15-20 rba/ac)	Tractor	PR	1, 4, 7, 8, 12
37-9	8	4A	Two-age (15-20 rba/ac)	Tractor	PR	1, 4, 5, 7, 8, 12
38-7	12	4A	Two-age (15-20 rba/ac)	Cable/Tractor	PR	4, 7, 8, 13
38-10	8	4A	Two-age (15-20 rba/ac)	Tractor	PR	None

Stand	Ac	MA	Treatment	Harvest Method	VQO	Project Design Features
39-4/39-13	15	4A	Two-age (15-20 rba/ac)	Cable	PR	5, 6, 7, 8
39-15	10	4A	Two-age (15-20 rba/ac)	Tractor	PR	5, 7, 8

1. Maintain an un-cut 100 foot buffer from edge of state road.
2. Maintain 30 rba/ac minimum in harvest area.
3. Locate unit boundary one tree height below ridge.
4. Burn or lop & scatter slash to within 2 feet of ground for 100 feet beyond edge of road or trail.
5. Feather upper unit boundary over a 100 foot distance.
6. Maintain uncut vegetative screen at least one tree height below road.
7. Screen log landings from view, and restore as close to original contour as practical.
8. Maintain 25 rba/ac minimum in harvest area.
9. Openings along road not to exceed 500 linear feet.
10. Burn or lop & scatter slash to within 4 feet of ground for 50 feet beyond edge of road.
11. To extent practical, burn or lop & scatter slash to within 4 feet of ground for 150 feet below cable landings or utilize for firewood gathering.
12. For 50 feet beyond state road, restore temporary roads and bladed skid trails to original contour, and plant native shrubs at entrance to mask disturbance.
13. Transition harvest density (feather) in 100 foot buffer from edge of FS road.

3.7.3.3 Alternative C – Direct & Indirect Effects

This alternative proposes the same treatments as Alternative B, but would also daylight 2.4 miles of Thunderhole Road (FSR 4071). The proposal would remove trees for 15 feet on either side of road. Potential scenery impacts of all other treatments (and the project design features) would be the same as Alternative B.

3.7.3.4 Alternative D – Direct & Indirect Effects

This alternative proposes two-age harvests with 15-20 square feet of residual basal area per acre on 112 acres in the Frankum Creek area, two-age harvests with a minimum of 30 square feet of residual basal area per acre on 100 acres in the Thunderhole Creek area, and a variety of wildlife and other non-commercial treatments throughout the project area.

All commercially harvested units would be tractor or skyline logged. Approximately 1.5 miles of temporary road would be constructed and 0.8 miles of existing unauthorized roads would be utilized—2.28 miles is proposed in the Frankum Creek area (MA 3B), and 0.02 miles is proposed to access stand 37-5b in the Thunderhole Creek area (MA 4A). This alternative also proposes to daylight approximately 2.0 miles of Frankum Creek Road (FSR 188) by harvesting certain canopy trees within 15 feet on each side of road. The following table summarizes stand information and project design features needed to attain specific VQOs:

Table 3.11: Alternative D Scenery Analysis

Stand	Ac	MA	Treatment	Harvest Method	VQO	Project Design Features
12-5/12-12	25	3B	Two-age (15-20 rba/ac)	Cable	M	None
13-7/13-19	10	3B	Two-age (15-20 rba/ac)	Tractor	M	None
13-10	7	3B	Two-age (15-20 rba/ac)	Tractor	M	None
13-18	10	3B	Two-age (15-20 rba/ac)	Tractor	M	None
13-11/13-21/14-12	30	3B	Two-age (15-20 rba/ac)	Cable	M	3
14-1a	10	3B	Two-age (15-20 rba/ac)	Cable	M	None
14-1b	10	3B	Two-age (15-20 rba/ac)	Cable	M	None
14-9	10	3B	Two-age (15-20 rba/ac)	Tractor	M	9, 10

Stand	Ac	MA	Treatment	Harvest Method	VQO	Project Design Features
33-11	32	4A	Two-age (Min. 30 rba/ac)	Cable	PR	3, 5, 6, 7, 11
35-1/35-23	8	4A	Two-age (Min. 30 rba/ac)	Cable	PR	1, 4, 7, 12
37-5a	4	4A	Two-age (Min. 30 rba/ac)	Tractor	PR	4, 7, 13
37-5b	3	4A	Two-age (Min. 30 rba/ac)	Tractor	PR	1, 4, 7, 12
37-9	8	4A	Two-age (Min. 30 rba/ac)	Tractor	PR	1, 4, 5, 7, 12
38-7	12	4A	Two-age (Min. 30 rba/ac)	Cable/Tractor	PR	4, 7, 13
38-10	8	4A	Two-age (Min. 30 rba/ac)	Tractor	PR	None
39-4/39-13	15	4A	Two-age (Min. 30 rba/ac)	Cable	PR	5, 6, 7
39-15	10	4A	Two-age (Min. 30 rba/ac)	Tractor	PR	5, 7

1. Maintain an un-cut 100 foot buffer from edge of state road.
2. Maintain 30 rba/ac minimum in harvest area.
3. Locate unit boundary one tree height below ridge.
4. Burn or lop & scatter slash to within 2 feet of ground for 100 feet beyond edge of road or trail.
5. Feather upper unit boundary over a 100 foot distance.
6. Maintain uncut vegetative screen at least one tree height below road.
7. Screen log landings from view, and restore as close to original contour as practical.
8. Maintain 25 rba/ac minimum in harvest area.
9. Openings along road not to exceed 500 linear feet.
10. Burn or lop & scatter slash to within 4 feet of ground for 50 feet beyond edge of road.
11. To extent practical, burn or lop & scatter slash to within 4 feet of ground for 150 feet below cable landings or utilize for firewood gathering.
12. For 50 feet beyond state road, restore temporary roads and bladed skid trails to original contour, and plant native shrubs at entrance to mask disturbance.
13. Transition harvest density (feather) in 100 foot buffer from edge of FS road.

3.7.3.5 Cumulative Effects

As previously stated, past timber harvests, clearings, roads, structures, and other landscape modifications are visible on private and NFS lands from most analyzed viewpoints. The degree to which these modifications impact scenic quality varies greatly with the type, scale, and contrast with the surrounding natural landscape. Treatments proposed in the Globe Project would create small openings, or the canopy may appear thinner. In leaf-off season, roads and log landings would be visible from some viewpoints. However, scenery design features were incorporated with consideration for cumulative effects of proposed, existing and foreseeable future landscape modifications. With implementation of specified scenery design features, all Alternatives would meet assigned VQOs; even where proposed activities would be seen in conjunction with existing landscape modifications and foreseeable future actions.

3.8 Management Indicator Species

3.8.1 Introduction

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

3.8.2 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) **Table 3-12**: This table displays biological communities and associated MIS, and reasons species were, or were not selected for analysis in the project. The source of these tables is Amendment 17 to the Nantahala and Pisgah Land and Resource Management Plan effective October 1, 2005, and the associated environmental assessment (EA) and project record.
2) **Table 3-13**: This table displays the habitat components and associated MIS, and reasons species were, or were not selected for analysis in the project.
3) **Table 3-14**: This table displays by MIS the Forest-wide population trend along with the associated biological community or habitat component. The information in this table is taken from the MIS Report for the Nantahala and Pisgah National Forests.
4) **Table 3-15**: This table compares effects (expressed as changes in habitat) by alternative to the Forest-wide estimates of habitats for each biological community and habitat component considered in the project-level analyses. This table explains how effects to communities and habitats affect Forest-wide population trends for the species considered.

Table 3-12: Biological Communities, Associated MIS, and why Species were Chosen or Eliminated from Analysis

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

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

2 Biological Community and its represented species would be protected in accordance with LRMP standards and guidelines. Populations would not be affected by management activities because the associated habitat would

not be entered by the proposed activities, pursuant to forest plan direction; therefore, there would be no change to forest-wide population trends.

Table 3-13: Habitat Components Associated MIS and why Species were Chosen or Eliminated from Analysis

Habitat Components	MIS	Analyzed Further/ Evaluation Criteria*
Old Forest Communities (100+ years old)	Black bear	No/1
Early successional (0-10 years old)	Rufous-sided (eastern) towhee	Yes
Early successional (11-20)	Ruffed grouse	No/1
Soft mast producing species	Ruffed grouse	Yes
Hard mast-producing species (>40 yrs)	Black bear	Yes
Large contiguous areas with low levels of human disturbance	Black bear	No/1
Large contiguous areas of mature deciduous forest	Ovenbird**	No/1
Permanent grass/forb openings	White-tailed deer	Yes
Downed woody debris	Ruffed Grouse	Yes
Snags	Pileated woodpecker	No/2

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

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

** Ovenbird was recorded within stand 35/11. This stand does not represent large, contiguous areas as it borders State Road 1367 and is within ¼ mile of continuous private lands and housing. The Nantahala and Pisgah National Forest Plan, Amendment 5, identified a patch of forest interior habitat with minimal edge within this AA—the patch was identified as patch #38. The proposed actions would not affect the habitat within this patch.

Table 3-14: MIS Estimated Population Trend and Biological Community or Habitat Component

Species	Estimated Population Trend	Biological Community and/or Habitat Component
Black Bear	Increasing	Hard mast-producing species (>40 yrs)
White Tailed Deer	Static to decreasing	Permanent grass-forb
Rufous-Sided (Eastern) Towhee	Decreasing	Early-successional (0-10)
Ruffed Grouse	Static	Downed woody debris
Wild Brook, Brown and Rainbow Trout; Blacknose Dace	Static	Coldwater streams

Table 3-15: Habitat Component, Forest-wide Estimates, and Expected Changes resulting from the Alternatives

Habitat Component	Forest-wide Estimate	Alt A	Alt B	Alt C	Alt D
Early successional	26,800 ac (yr 2000) 2,040 ac (5 yr avg)	No change	224 ac or 2% increase over next	232 ac or 2% increase over next	217 ac or 1.8% increase over next

Habitat Component	Forest-wide Estimate	Alt A	Alt B	Alt C	Alt D
(0-10 years old)			10 years	10 years	10 years
Soft mast producing species	13,144 ac early seral (yr 2000), highest potential on 5,650 ac	No change	224 ac increase for next 15-20 years	232 ac increase for next 15-20 years	217 ac increase for next 15-20 years
Hard mast-producing species (>40 yrs)	High El Red oak: 40,600 ac Mesic Oak/H: 283,340 ac Dry Mesic Oak/H: 21,800 ac Chestnut Oak/H: 8,600 ac Upland hwd (other): 6,900 ac	None affected	Up to 224 ac or 2.5% short term reduction with long term increase as suitable hard mast species regenerate	Up to 232 ac or 2.6% short term reduction with long term increase as suitable hard mast species regenerate	Up to 217 ac or 2.3% short term reduction with long term increase as suitable hard mast species regenerate
Permanent grass/forb openings	3,000 acres	No change	12 ac or 1% increase	15 ac or 1% increase	12 ac or 1% increase
Coldwater streams	5,060 miles	No change (restoration on John's River tributary)	Approximately 30 linear feet of stream bank would be impacted at two bridge crossings on Frankum Creek of the 12.9 miles of coldwater stream within the AAs (restoration on John's River tributary and gate protecting China Creek)	Approximately 30 linear feet of stream bank would be impacted at two bridge crossings on Frankum Creek of the 12.9 miles of coldwater stream within the AAs (restoration on John's River tributary and gate protecting China Creek)	Approximately 30 linear feet of stream bank would be impacted at two bridge crossings on Frankum Creek of the 12.9 miles of coldwater stream within the AAs (restoration on John's River tributary and gate protecting China Creek)
Downed woody debris	High accumulation small wood: 18,000; Large wood: 386,000; Low accumulation (approximately 600,000)	No change	224 ac short term increase	232 ac short term increase	217 ac short term increase

3.9 Threatened, Endangered, Sensitive, and Forest Concern Species

Introduction

This section discloses the determination of effects the proposal may have on threatened and endangered (T&E); Regional Forester's sensitive (S); and Forest Concern (FC) aquatic, wildlife, and botanical species—see Appendix A, BE for complete disclosure of surveys, habitat, species, and effects analyses. There would be no effect to any TES or FC species under Alternative A as no actions are proposed—current conditions would be maintained.

3.9.1 Threatened and Endangered Species

This proposal would not affect (directly, indirectly, or cumulatively) any proposed or listed Federal threatened or endangered botanical, aquatic or wildlife species. Consultation with the USDI Fish & Wildlife Service is not required.

3.9.2 Sensitive Species

3.9.2.1 Botanical Species

This proposal may impact individuals of Regional Forester's Sensitive species white leaf sunflower (*Helianthus glaucophyllus)* and Carolina hemlock (*Tsuga caroliniana)*. These impacts would not lead towards federal listing or loss of Forest viability.

3.9.2.2 Aquatic Species

The current records for the S dragonfly species *Macromia margarita* and *Ophiogomphus edmundo* are within larger, more riverene type habitats than what is present within the aquatic activity areas. These species could be present within the aquatic AA of the Johns River which is well away from the bridge installations on Frankum Creek. Since the stream crossings are located in Frankum Creek, which is a tributary to Mulberry Creek, *Macromia margarita* and *Ophiogomphus edmundo* would not be impacted by the project proposal. According to personal communication with Sarah McRae, North Carolina Heritage Program Freshwater Ecologist, the record of *Macromia margarita* for Caldwell County is unclear but most likely is from the lower reaches of Wilson Creek or the Johns River. Based on activity area surveys and habitat preferences, there would be no impacts to *Macromia margarita* or *Ophiogomphus edmundo* as a result from the implementation of the proposal. This proposed action is not likely to cause a trend toward federal listing or loss of viability across the Nantahala and Pisgah National Forest for either species.

3.9.2.3 Wildlife Species

All action alternatives would increase nectar species habitat for the S species Diana fritillary (*Speyeria* diana) within the newly created early successional habitat and within new grass/forb habitat. Temporary road construction would result in short-term nectar species habitat post-harvest, but because these road openings are generally narrow, the canopy closes relatively quickly therefore eliminating sunlight to the forest floor and herbaceous growth. A small amount of habitat within the riparian area (<1 ac) would be adversely affected by all action alternatives because of two proposed temporary road crossings on streams with bridge removal and erosion control seeding to follow harvest activities. As there are approximately 1,860 acres of riparian forests within these AAs, this <1 acre removal is not considered significant because it represents a temporary loss of 0.05% of the habitat. The proposed release work planned in all action alternatives, both manual and chemical, would not directly affect fritillary habitat as the work is planned on woody stems only. Alternative A would not increase the existing nectar species habitat or change in the riparian area condition across the AAs.

The action alternatives propose herbicide treatment of exotic plants, including paulownia, a potential nectar species. This action is not expected to have a significant affect on the availability of nectar species across these AAs as specific trees in activity areas would be treated. Alternative A would not affect the amount of paulownia species—allowing it to continue to flourish.

All action alternatives propose to re-install the gate at the China Creek crossing. Alternatives C and D propose to seed this closed portion of Thunderhole Road post-harvest, with a wildlife and wildflower seed mix. Alternative C also proposes to daylight this closed portion of the road, therefore the amount and diversity of nectar species growth is expected to be greater.

Adult nectar species habitat has generally been increased by past and on-going activities while individual larvae, eggs, and nectar species habitat may have been adversely impacted by past and current encroachments and trespasses. These adverse effects to individuals and habitat have also occurred on private lands and are expected to continue. The cumulative loss of individuals and increases and limited decreases in habitat by these past and foreseeable future activities in addition to the action alternatives are not likely to cause a trend toward federal listing or loss of viability across the analysis area.

No further botanical, aquatic, or wildlife Regional Forester's sensitive species would be affected by the proposal.

3.9.3 Forest Concern Species

The following table lists the FC species that could occur within the AAs along with potential effects by species from Alternatives B, C, or D:

Table 3-16: FC Species and Potential Effects from Alternatives B, C, or D

Species	Habitat	Occurrence	Potential Effect
Aquatic FC Species			
Micrasema burksi (a caddisfly)	Lotic (living in) – streams	*May occur in both the activity and AAs	**May impact individuals
Rhyacophila amicus (a caddisfly)	Lotic –streams	*May occur in both the activity and AAs	**May impact individuals
Gomphus abbreviatus (Spine-crowned clubtail)	Lotic –streams and rivers	*May occur in both the activity and AAs	**May impact individuals
Gomphus descriptus (harpoon clubtail)	Lotic –streams and rivers	*May occur in both the activity and AAs	**May impact individuals
Ophiogomphus mainensis (Maine snaketail)	Lotic –streams and rivers	*May occur in both the activity and AAs	**May impact individuals
Baetopus trishae (a mayfly)	Lotic –streams	*May occur in both the activity and AAs	**May impact individuals
Habrophlediodes sp. (a mayfly)	Lotic –very small streams	*May occur in both the activity and AAs	**May impact individuals
Bolotoperla rossi (a stonefly)	Lotic –streams	*May occur in both the activity and AAs	**May impact individuals
Wildlife FC Species			
Neotoma magister (Alleghany woodrat)	Rock/boulder areas	Found within stand 37-5b	No effect following proposed habitat exclusion in stand 37-5b
Cocctzus erythropthalmus (black-billed cuckoo)	Dark, tangled deciduous forests typically above 4,500 feet elevation	Not recorded within proposed activity areas	No effect due to negative survey results
Sorex dispar	Rock/boulder areas	May occur	No effect following

Species	Habitat	Occurrence	Potential Effect
(rock shrew)			proposed habitat exclusion around rock slope on Thunderhole Road in Alternative C
Vireo gilvus (warbling vireo)	Riparian areas	Not recorded within proposed activity areas	1 ac reduction of riparian habitat; negative survey results
Botanical FC Species			
Brachythecium populeum (matted feather moss)	Acidic cove forests	Not known to occur in AA or activity area	No effect due to negative survey results and no habitat
Calystegia catesbeiana ssp. sericata (Blue ridge bindweed)	Open, sunny sites	Known to occur in AA but not within activity areas	No effect due to negative survey results
Entodon sullivantii (Sullivant's entodon)	Acidic and Rich Cove Forests	Not known to occur in AA or activity area	No effect due to negative survey results and no habitat

* 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.

** No rare species were found during project surveys in the activity areas, but they have been included because the species' habitat exists within or immediately below the crossings. Although bridge installation may impact individuals, implementation would not affect viability across the Forest.

3.10 Dispersed Recreation

3.10.1 Existing Condition

Recreational activities that take place in the project area are primarily dispersed in nature such as fishing, hunting, hiking, mountain biking, horseback riding, driving for pleasure, and camping. The unpaved Globe Road traverses the project area and is utilized for some local traffic connecting to Blowing Rock. Except for the Globe Road corridor, the project area receives light to moderate use by recreationists. Forest Service Road (FSR) 4071 is now accessible only with high-clearance vehicles and is seasonally closed to motorized traffic, although the road gate is temporarily down. Forest Service Road 4111 is closed year-round to public motorized use. Both of these roads receive some non-motorized use from hikers, hunters, mountain bikers, and horseback riders. Forest Service Road 4071 is scheduled for light maintenance due to damage from the tropical storms that flooded many parts of Western North Carolina in the fall of 2004. It would likely receive more use after the maintenance is completed.

Forest Service Trail 250 connects FSR 4071 to the edge of Blowing Rock. Mountain bikers, hikers, and some horseback riders have been using this trail. Thunderhole Creek as well as most of the creeks and tributaries in the project area are utilized for trout fishing. Mountain bikers use FSR 4071, some loop back along Thunderhole Creek on an old logging road that crosses back and forth across the creek. This route is an unauthorized trail and biking use on it is causing sedimentation in the creek. Forest Service Trail 253 is a lightly used ½ mile trail connecting to FSR 4071 that accesses a small waterfall. There has been interest expressed in the past by some

members of the public for developing a more extensive trail system in the general vicinity of the project area.

3.10.2 Alternative A – Direct, Indirect, and Cumulative Effects

There would be no direct, indirect, or cumulative effects to dispersed recreational use under this alternative. Existing fishing, hunting, hiking, biking, horseback riding, camping, etc. would not be affected.

3.10.3 Alternative B – Direct, Indirect, and Cumulative Effects

Under this alternative, there would be temporary impacts to dispersed recreationists primarily noise from logging operations and log hauling. Timber sale contracts are typically for a two year period, and the operating period is March 15th – December 15th. The area of impact would shift as the logging operations are completed and move to other roads (i.e., once logging is completed along Globe Road and FS Road 4071, operation would move to another area, such as Forest Service Roads 4111 & 188).

Forest Service Roads 4071 and 4111 & 188 would have direct impacts – i.e. hauling and road improvement activities. This would result in a temporary impact on existing use and experience, especially during summer months.

Hunting opportunities would be improved over time as habitat is developed and improved for game species, as well as activities for non-game species (i.e., bird watching) requiring early successional habitat.

Since the primary recreation use is dispersed in nature, it is expected that impacts to recreation related tourism would be minimal and short term. The project area had harvest activities 15 years ago and there have been no known adverse impacts to tourism as a result of those activities.

The Final Supplement to the Final Environmental Impact Statement (Volume I and Appendix B of Volume II) for the Nantahala and Pisgah National Forests addresses recreational activities and economics at the Forest level. Specifically in Volume I, pages IV 60-61: *Because variation in employment among alternatives is small, the Forests can easily meet the demand for recreation of the RN2 settings* (Roaded Natural 2, Recreational Opportunity Spectrum, which is the setting for MA 4A and 4C). Page B-102 in Volume II of the Final Supplement displays employment and income values for recreation user days, particularly hunting and other dispersed recreation activities.

There are no expected adverse cumulative effects to dispersed recreation as a result of the proposal and the actions listed in Table 3-1 above. Past activities include logging in the project area, but do not contribute to the cumulative effects because they are 15 years removed from each other. Forest Service Road 4071 is scheduled for light maintenance due to the damage from the tropical storms of fall of 2004. This project is expected to be completed spring 2007, which would be before any activities from this project would begin. While there would be some very temporary impacts with the road maintenance project (primarily noise from construction) the activities would have negligible cumulative impacts related to the Globe project.

3.10.4 Alternative C – Direct, Indirect, and Cumulative Effects

The effects of Alternative C would be same as in Alternative B, except that 15 feet on either side of FSR 4071 would be day-lighted (cleared of large overstory vegetation) to improve wildlife habitat and help improve moisture control on the road surface. This would alter the trail-like experience along FSR 4071 until the roadside vegetation increases in height.

3.10.5 Alternative D – Direct, Indirect, and Cumulative Effects

The effects of Alternative D would be same as Alternative B, except the basal area remaining in several of the proposed harvest units would be greater in the Thunderhole area (see Tables 2-1 and 2-2, Chapter 2). This would reduce visual impacts of some of the harvest units (as described in Section 3.7 above) but otherwise would have negligible effects on dispersed recreationists in the project area.

3.11 Old Growth Communities

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

Currently, there are 2,462 acres of large patch old growth communities (patch #24) designated in the Upper Johns River AA and 2,653 acres of large patch old growth communities (patch #30) designated in the Upper Mulberry AA. The 5,115 total acres of designated large patch old growth communities are within Compartments 8, 9, 10, 11, 31, 33, 38, 39, 41, and 42. Compartments 12, 13, 14, 35, and 37 would need 50, 50, 50,108, and 53 acres of small patch old growth communities designated respectively to meet Forest Plan standards for small patch old growth communities (additional analysis on old growth is disclosed in Appendix C).

3.11.1 Alternative A – Direct, Indirect, and Cumulative Effects

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

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

3.11.2.1 Direct and Indirect Effects

No designated old growth communities (as defined by the Forest Plan) or initial inventory old growth communities would be harvested under these alternatives. There would be individual trees greater than 100 years of age harvested, but old growth is a community and not an individual tree. Designating about 311 acres of small patch old growth communities averaging 125 years in age under these alternatives along with the existing large patch old growth communities in the AAs (5,115 acres in large patches #24 and #30) would ensure old growth communities are distributed throughout both the analysis and project areas.

Under these alternatives each compartment in the project area would meet Forest Plan standards for small patch old growth communities. There would be no reduction of acres in stands averaging greater than 100 years of age in the project area under any of these alternatives (see also Appendix D). The following table summarizes age-classes for Upper Mulberry and Upper Johns River AAs by alternative along with old growth disclosures:

Table 3-17: Age-Class for Upper Mulberry and Upper Johns River AAs by Alternative and Old Growth Communities Disclosures

Measurement	Alternative A (existing)	Alternatives B & C (after two-age harvest implementation)	Alternative D (after two-age harvest implementation)
Acres treated by age-class Project Area			
0-10 years old	<1%	2%	1.9%
11-20 years old	4%	4%	4%
21-50 years old	3%	3%	3%
51-100 years old	80%	78%	78.1%
101-140+ years old	13%	13%	13%
Acres of existing Forest Plan designated old growth or initial inventory old growth communities proposed for harvest	0	0	0
Acres of newly designated small patch old growth	0	311	311

3.11.2.2 Cumulative Effects

There would be no adverse cumulative effects to old growth communities as a result of the proposal as there are currently over 5,100 acres of old growth designated in the two AAs; no Forest Plan designated old growth communities or initial inventory old growth communities would be harvested; no stands averaging greater than 100 years in age would be harvested with this proposal; over 300 acres would be designated as small patch old growth communities and would not be scheduled for future harvest; and about 1,400 acres in the AAs currently average greater than 140 years and are not scheduled for harvesting with this proposal. Since 1986, about 500 acres have been harvested in the AAs—these acres are continuing to move forward in age-classes since they were not converted from forest land to non-forest land. There are changes that occur in a forest ecosystem as a result of developing 0-10 year age-classes, but adverse cumulative effects to old growth communities are not expected due to reforestation efforts; designation of old growth communities that would not be scheduled for future harvest; no stands

averaging greater than 100 years in age being harvested under this proposal; and ensuring no more than 10% of each compartment in MA 4A and no more than 15% of each compartment in MA 3B would be harvested in a 10-year period.

3.12 Other Areas of Concern

3.12.1 Alternative A – Direct, Indirect, and Cumulative Effects

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

3.12.2 Alternative B – Direct, Indirect, and Cumulative Effects

There would be no measurable direct, indirect, or cumulative effects from any of these alternatives because none of them propose actions within park lands, prime farmlands, wetlands (as per 1977 Executive Orders 11988 and 11990), wild and scenic rivers, or ecologically critical areas. It also would not violate local law or requirements imposed for the protection of the environment. There are no other known foreseeable actions in the activity areas that could adversely affect park lands, prime farmlands, wetlands, wild and scenic rivers, or ecologically critical areas.

CHAPTER 4 – PREPARERS AND PUBLIC INVOLVEMENT

The following individuals helped develop this environmental assessment:

4.1 ID Team Members

4.1.1 Core IDT

Sandy Burnet	-	Wildlife Biologist: B.S. Biology, 21 years with USFS
David Casey	-	Forester Trainee: M.S. Forestry, 2 years with USFS (since transferred to the George Washington Jefferson NF)
Eric Crews	-	Landscape Architect: B.L.A., 14 years with USFS
David Danley	-	Botanist: B.S. Plant Pathology & Botany, 17 years with USFS
Michael Hutchins	-	IDT Leader: B.S. Forest Management, 19 years with USFS
Bob Noel	-	Archaeologist: B.S. Archaeology, 17 years with USFS
Lorie Stroup	-	Fisheries Biologist: B.S. Natural Resources, 9 years with USFS
Greg Van Orsow	-	Project Leader: B.S. Forest Management, 5 years with USFS

4.1.2 Other Forest Service Personnel Providing Input

Bonnie Amaral – Acting Grandfather District Ranger
Scott Ashcraft – Zone Archaeologist, Grandfather & Pisgah Ranger Districts
Miera Crawford – Grandfather District Ranger (since transferred to NFs in Alabama)
Steve Hendricks – Recreation Planner, NFs in North Carolina
Barry Jones – Acting Grandfather Resource Assistant
Dean Karlovich – Resource Assistant, Grandfather RD (since transferred to Ottawa NF)
Richard Kincaid – Silviculture Technician, Grandfather RD
Joy Malone – Grandfather District Ranger
Ronnie Thomas – Forest Technician, Grandfather RD
Barbara Watring – Acting Grandfather District Ranger

4.2 Government Agencies and Elected Officials Providing Input

Blowing Rock Town Council and Mayor J.B. Lawrence
Mr. Brian Cole – USDI Fish and Wildlife Service
Chairman James Deal, Jr. – Watauga County Board of Commissioners
Honorable Elizabeth Dole – United States Senator for North Carolina
Honorable Virginia Foxx – United States Representative for North Carolina's 5th District
Ms. Rene Gledhill-Early – North Carolina State Historic Preservation Office
Mr. Scott Hildebran – City Manager, Town of Blowing Rock
Mr. Ron Linville & Mr. Gordon Warburton – North Carolina Wildlife Resources Commission

4.3 Others Providing Input

Over 1,280 members of the public provided comments on the proposal during scoping; the 30-day notice and comment period; additional comment period; after the comment periods and before issuance of the November EA; and at the August 9, 2006, public meeting in Blowing Rock, NC. A complete list of individuals and their comments is located in the project record.

APPENDIX A – BIOLOGICAL EVALUATION

BIOLOGICAL EVALUATION

GLOBE TIMBER SALE

National Forest in North Carolina
Grandfather Ranger District
Caldwell County, NC

I. INTRODUCTION

This report documents potential impacts to the biologic resources from the proposed Globe Timber Sale (Grandfather Ranger District) and associated improvements. The potential direct, indirect and cumulative effects on Endangered, Threatened (T&E) and Regional Forester's Sensitive (S) species are evaluated. Potential direct and indirect effects to T&E and S species were analyzed in the areas where timber harvest or ground disturbance is proposed. This area is referred to as the activity area. This document also analyzes the effects to species potential habitat from the proposal. The proposed activity areas are shown on the project map in appendix of the environmental assessment. The Forest Plan analysis areas (AA), Upper John's River and Upper Mulberry are located in northern Caldwell County, North Carolina. Alternative D is the preferred alternative and fully evaluated in this Biological Evaluation (BE). Actions considered in this analysis are (See EA project description for a detailed and complete description of activities):

1. Regeneration by two age timber harvest of approximately 212 acres.
2. Construction of about 1.5 miles of temporary road, utilization of about 0.8 miles of existing unauthorized road, and use and maintain existing authorized roads.
3. Creation of 9 acres of permanent grass and forb habitat.
4. Unsurfaced temporary roads, skid roads, and log landings would be disced and seeded following harvest activities.
5. Site prepare and release, if needed, all stands being regenerated using both herbicide and manual methods.
6. Daylighting approximately 2 miles of Frankum Creek Road.
7. Control exotic and invasive plant species with herbicides along roads and landings.
8. Identify 311 acres (total) of small patch old growth in compartments 12 (50 acres), 13 (50 acres), 14 (50 acres), 35 (108 acres), and 37 (53 acres).
9. Re-install gate at China Creek on Thunderhole Road and post-harvest, seed roadbed to wildlife and wildflower seed mix.
10. Re-install a gate at the entrance to Thunderhole Road which would be seasonally closed for wildlife, non-motorized recreation, and road maintenance (January 1 – August 31).

II. SURVEYS AND ANALYSIS METHODS

Potentially affected Threatened, Endangered (T&E) and Regional Forester's Sensitive (S) species were identified by:

1. Reviewing the list of T&E and S species of the Pisgah, and Nantahala National Forests and their habitat preferences;
2. Evaluating element occurrence (EO) records of T&E and S species as maintained by the North Carolina Natural Heritage Programs;
3. Consulting with individuals both in the public and private sector who are knowledgeable of the area and its fauna; and
4. Conducting field surveys in areas of proposed activities.
5. Past surveys in the area, such as The 1996 Globe Mountain timber sale and the 2004 Rocky Knob prescribe burn.

Wildlife Methods and Surveys

Wildlife habitat surveys in the proposed activity areas were completed on May 8, 10, 11, 15 and 16, 2006. Snail and salamander surveys found only common species occurred within the proposed units. Bird surveys were completed on May 19, 2006.. No bog turtle or spruce-fir moss spider habitat was found. The proposed timber units are generally steep, gravelly soils, with a sparse herbaceous layer. The AA surveys resulted in no T&E or S listed species within the activity area habitat.

The wildlife effects analysis area (AA) included both Upper Johns River and Upper Mulberry Analysis Areas identified in the Nantahala Pisgah Land Resource Management Plan (FP) and cover a total of 11,228 acres. The Nantahala and Pisgah National Forest Plan, Amendment 5, identified a patch of forest interior habitat with minimal edge within this AA. The patch was identified by the Forest Plan as patch #38 and the proposed actions would not affect the habitat within this patch.

Botanical Methods and Surveys

The field surveys were conducted by a meander search pattern to survey all the variation in habitat within the unit. The survey was conducted until all of the habitats within the unit were surveyed and no new plant species were added to the unit species list after a minimum of 20 minute's search was made (timed meander search). Focused attention was given during the surveys to habitats within the units that may be associated with plant T&E, and S plant species, i.e., rock outcrops, seeps, etc. The intensity of the coverage varied depending on the extent of any likely T&E, and S plant species habitat, complexity of vegetation, and/or presence of indicator species. Some areas were virtually devoid of herbaceous vegetation and required very little intensive survey while other areas required considerably more time to adequately survey. Although the search was focused on the possibility of occurrences of the T&E and S plants listed on Table A-1; all T&E and S plant species were searched for during the survey. The survey was conducted so that a T&E and S plant species would not be overlooked due to phenology or time of the year that the species could reasonably be detected. A summary of the habitats and/or community(ies) in the activity area specified and the occurrence of plant T&E and S plant species may be found in the Botanical Analysis (BOTA).

The botanical AA or “boundary of effects” used for this proposal is defined as: the total area within 2 kilometers of any proposed unit (activity area) or known EO (element occurrence) of

any plant T&E and S species. The botanical AA consists of 13,194 acres. All potential effects (direct, indirect and cumulative) to botanical resources in the botanical AA were analyzed using this "boundary". The botanical AA definition was selected because it is analogous to the Natural Heritage Program and The Nature Conservancy's plant delimitation guidelines of EO. Other resource disciplines may employ different definitions to analyze this proposal.

The proposed activity areas were surveyed by David M. Danley, Forest Botanist on March 21; April 13, 14, 27, 28; and May 23, 2006. All proposed units or activity areas were visited at least once during this time. Gary Kauffman (USFS Botanist) did botanical surveys along Frankum Creek road (April, 2006).

Other relevant Botanical surveys that were analyzed include: Globe Mt. Timber sale (1996) and Rocky Knob Prescribed burn (2004).

Aquatic Method and Surveys

The aquatic analysis addresses activity area waters and AA waters. Activity 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 activity area waters. The aquatic AA is larger than the activity area.

Lorie Stroup, USFS Fisheries Biologist and Kerri Lyda, USFS Biological Technician conducted aquatic habitat and aquatic insect surveys of the proposed aquatic project and analysis areas in the late winter and spring months of 2006. The surveys consisted of examining streams within the aquatic activity area, noting habitat quality, quantity, and suitability for rare aquatic and management indicator species (MIS), as well as existing impacts and their source. Georges, Friddle and Frankum Creeks were surveyed for fish using a backpack electrofishing machine in February 2004.

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.

III. EXISTING CONDITION

Communities and Habitats Found in the Globe Botanical AA

The Globe botanical analysis area can be characterized by low-mid elevation Mountain region plant communities. The area has several southeast to south trending drainages through the analysis area. The major streams are Thunder Hole Creek and Mulberry/Mills Creek. A succession of south trending, interlinking ridges is found between drains. The highest points of these ridges are about 2,200 feet elevation (Globe Mountain and Round Mountain). The drainage flows downward to about 1,300 feet elevation towards the Johns River. The AA

exhibits many typical natural communities of the low to mid elevation southern Appalachian mountains.

Three common community types are characteristic within the analysis area. These communities are: Pine-oak Heath Forest, Chestnut Oak Forest, and Acidic Cove Forest, and, to a much lesser extent, the Montane Oak-Hickory Forest. A Montane Alluvial Forest and Rocky Shore and Bar communities are associated with the low elevation areas directly adjacent to major stream but are best developed along Frankum Creek and Johns River. Small habitat areas such as small rock outcrops and forested seeps and streams can be imbedded within these comminutes. 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 analysis area, the Acidic Cove Forest 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, Montane Alluvial Forest and anthropogenic communities have the most diverse herbaceous component of the communities found within the analysis area. However, taken in whole, the analysis area has a very poor herbaceous diversity. All of the communities are very common community types and have a relatively low probability of occurrences for Forest T&E and S plant species (See Schafale and Weakley for a detailed description and discussion of these communities); thus, making a general low potential for T&E and S plant species to occur in the potential activity areas. The primary natural communities affected by this proposal are the Chestnut Oak Forest and Acidic Cove Forest.

The Forest Plan, Amendment 5, identified a patch of forest interior habitat with minimal edge within this AA. The interior bird patch was identified as patch #38 and the proposal would not affect the habitat within this patch.

All the stands being considered for management activities exhibit sparse to non-existent herbaceous layer and fine gravel-based soils with shallow humus layer. The only exception is the daylighting being proposed along Frankum Creek road and, in Alternative C, a portion of the Thunderhole road daylighting. Portions of these road corridors exhibited a continuous herbaceous layer where sunlight from the roadbed opening and moisture were both present. In many cases, the shrub layer of the stands was dominated by a dense rhododendron shrub layer. Overall, there was no T&E wildlife habitat within the proposed action areas. There is habitat for both larval and adult stage habitat for *Speyeria diana* throughout the wildlife effects AA. No additional S species habitat was observed within the activity areas.

Existing data for aquatic resources within the aquatic AA is used to the extent it is relevant to the project proposal. This data exists in two forms: 1) general inventory and monitoring of Forest aquatic resources; and 2) data provided by cooperating resource agencies from aquatic resources on or flowing through the Forest. Both of these sources are accurate back to approximately 1980 and are used regularly in project analyses. Data collected prior to 1980 is used sparingly (mostly as a historical reference). Project-specific surveys are conducted to obtain reliable data where none exists.

Substrate within the activity area waters (Table A-1) was evaluated and visually estimated. The three primary types of substrate that exist were documented at each macroinvertebrate sample site. This information is valuable for determining the amount of habitat available for proposed endangered, threatened, and sensitive (PETS) species, MIS, as well as other aquatic organisms.

Table A-1 – Forest Plan Watershed 60 (Johns River)

Stream Name (UT denotes an unnamed tributary)	Compartment- Stand	Miles in Activity area	Miles in Analysis Area
Thunderhole Creek			3.52
UT1	37-5a	0.01	0.34
	37-5b	0.006	
UT2	33-11	0.25	0.56
UT3			0.15
UT4			0.19
UT5	37-9	0.06	0.76
UT6			0.23
UT7			0.19
UT8	37-9	0.14	0.14
John River			0.57
UT1			0.59
China Creek	38-7	0.3	0.3
Georges Creek	14-1a	0.17	1.34
	14-1b	0.19	
UT1			0.39
UT2			0.25
Friddle Creek			1.33
Frankum Creek	13-7/13-19	0.23	2.65
	13-18	0.36	
UT1			1.3
UT2			0.25
Total		**1.716**	**14.69**

Fish habitat exists within the analysis areas of Georges Creek (below activity areas), Frankum Creek (adjacent to stands 13-11&13-21 and 14-12), Thunderhole Creek, and China Creek (adjacent to stand 38-7). In the remaining areas, there is limited habitat for fish species within the activity area waters, due to small stream size and restricted flow regimes. Activity area waters provide habitat for macroinvertebrates.

IV. PAST AND FORESEEABLE FUTURE ACTIVITIES POTENTIALLY AFFECTING SPECIES AND THEIR HABITAT

The 2000 Frankum Creek timber sale was implemented from 2000 to 2002 utilized clearcuts and two-aged harvest methods on 45 acres. The increased soft mast production and 0-10 early successional habitat conditions would remain over this harvest area until approximately 2012. Although hard mast species were retained as residuals where they occurred, there remains a

decreased amount of available hard mast over this 45 acre sale area. There was also 115 acres of release work done in connection with this sale in 2000. This release work was completed to improve the tree species composition in releasing hard mast regeneration and removing the competing species of silver bell, striped maple, red maple, and other competing hardwood species.

There have been approximately 140 acres of wildfires within these analysis areas since 1981 and approximately 150 acres of prescribed fire in 2005, which included slash down on approximately 20 acres of pine trees killed by southern pine beetles (SPB), prior to the burn. There is a future prescribe burn, Boyd Branch, planned on approximately 160 acres. Where these fires occurred, the shrub layer has been reduced and scattered tree mortality occurred. During years following these fire events, soft mast shrubs regenerate with a greater vigor and production. Wild fires and prescribe burns rarely enter riparian areas or are low intensity burns with low severity effects within this moist environment.

The southern pine beetle (SPB) epidemic within the past 5 years has resulted in large clumps and scattered yellow pine species mortality, especially where they occur along ridgetops. The Rocky Knob prescribe burn in 2005 was intended to reduce the downed and dead trees and allow yellow pine to regenerate along the ridge top more freely.

There have been two recent cases of encroachments on NFS lands within the vicinity of Frankum Creek over the past three years and law enforcement is continuing to address these incidents. Past encroachment cases have mainly occurred on the eastern portion of the AA and are being resolved. There is watershed damage created by unauthorized Off Highway Vehicle (OHV) use in the vicinity of the upper tributary of John's River. Watershed repairs are planned for 2007 and law enforcement continues to address the trespass incidents. Unauthorized OHV use in several locations across the AAs continues to be a problem and a law enforcement challenge.

Mountain bike recreationists using the Thunderhole road are currently leaving the road surface and creating a "path" in the China Creek riparian area. The District is continuing to educate recreationists on proper uses to reduce impacts to riparian areas.

Hurricane damage from the 2004 events within this analysis area includes three roads scheduled for repair this year, George's Creek road #4111, Frankum Creek #188, and Thunderhole Road #4071 this year. Frankum Creek and Thunderhole rehabilitation would be within the existing ditch line, while the George's Creek road rehabilition includes some straightening and realignment for approximately 1,000 total feet.

As the Hemlock Wooly Adelgid infestation moves across the District infecting hemlock tree species, release of beetles and soil injection is being done in two small areas within the AA; however, not all the hemlock currently present in the AA would not be treated and some mortality is expected.

There are hiking trails and dispersed camping use throughout this AA. This recreational use is expected to continue. Special forest product permits have been issued in the past and are expected to continue within this AA.

Private land uses surrounding and within these AAs includes forested land, nurseries, farms, and single family dwelling. Several nurseries exhibit plantations of shrubs and tree species with herbicide application limiting grass or herbaceous growth. Due to the herbicides applied on NFS lands and project design features, adverse cumulative effects are not anticipated (see Section 3.4 and Appendix F). There is an increased amount of housing development along the north and east portions of these AAs. This housing development commonly consists of permanent tree and shrub removal on up to one acre. This amount of development is expected to continue. Overall, private lands are heavily impacted by human disturbance, roading, and elimination of natural ecosystems.

V. THREATENED, ENDANGERED, AND SENSITIVE SPECIES EVALUATION

Two S plant species (*Helianthus glaucophyllus* and *Tsuga caroliniana*) are known to occur within the botanical AA. No other T&E or S botanical species are known to occur within the botanical AA. Appendix A lists the total of 18 plant T&E and S plant species known to occur in Caldwell County, North Carolina. All T&E and all sensitive plant species but six (Table A-2) 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 botanical AA; 2) the species has a well-known distribution that does not include the analysis area; or 3) based on field surveys no habitat was seen in the activity areas. Habitats, community types and ranges of plant T&E and S 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 botanist.

Three S aquatic species have been listed by NCWRC, USFWS, or NCNHP as occurring or potentially occurring in Caldwell County. Table A-2 lists sensitive aquatic species for Caldwell County and indicates their occurrence within the activity and/or analysis area. No proposed, threatened, or endangered aquatic species or habitat is known to occur in Caldwell County. There were no aquatic PETS found during activity and analysis area surveys within the Globe Project area. However, 2 sensitive and 8 Forest concern species are included in this analysis due to their habitat preferences and the presence of this habitat within the project and analysis areas. *Alasmidonta varicosa* was eliminated from the Globe analysis because of their known distribution being far outside of the aquatic analysis area for this project. *Alasmidonta varicosa* was eliminated because mussel habitat ends in the Johns River at the confluence with House Branch where there is an obvious change in habitat availability for mussels. The Globe project is several miles upstream of this area, thus there would be no impacts to mussels or their habitat.

There are six wildlife T&E and S species listed by the NCNHP and USFWS as potentially occurring in Caldwell County (Table A-2). The proposed activity areas as well as past and foreseeable future actions within the AAs were evaluated to determine the habitat and potential occurrence for these T&E and S wildlife species.

Table A-2: Potential & Known T&E and S Species in the Globe Biological AA

Species	Type	Natural Community or Habitat	Occurrence

Species	Type	Natural Community or Habitat	Occurrence
Federally Threatened or Endangered species (T &E)			
No T&E plant or aquatic species	N/A	N/A	N/A
Bog turtle	Reptile, T	Wet meadows and bogs	No habitat within proposed activity areas
Virginia big-eared bat	Mammal, E	Cave Dwelling	Not known to occur in the wildlife AA
Spruce-fir moss spider	Arachnid, E	Moss within spruce-fir forests	No habitat within wildlife AA
2002 Region 8 Regional Forester's Sensitive species (S)			
Aconitum reclinatum	Vascular Plant	Rich Cove Forest	Not known to occur in botanical AA or activity areas.
Fissidens appalachensis	Moss	Aquatic on rocks in Acidic Coves	Not known to occur in botanical AA or activity areas.
Helianthus glaucophyllus	Vascular Plant	Anthropogenic, roadsides; Rich Cove Forests	Known to occur in proposed activity areas. See analysis below.
Juglans cinerea	Vascular Plant	Rich Cove Forest	Not known to occur in botanical AA or activity areas.
Monotropsis oderata	Vascular Plant	Chestnut Oak Forest	Not known to occur in AA or activity area.
Tsuga caroliniana	Vascular Plant	Chestnut Oak Forest, Pine Oak-Heath Forest.	Known to occur in proposed activity areas.
Ophiogomphus edmundo (Edmund's snaketail)	Dragonfly	Lotic-fast, clean substrate rivers	May occur in the riverene habitat of the Johns River within the aquatic AA.
Macromia margarita (mountain river cruiser)	Dragonfly	Lotic-streams and rivers	May occur in the AA but not within the activity areas due to small size of streams.
Alasmidonta varicosa (brook floater)	Mussel	Lotic-clean, swift waters with stable gravel, or sand and gravel substrates	Does not occur within aquatic AA; may occur well below the aquatic AA in the Johns River.
Speyeria diana, Diana Fritillary	Insect	Larvae -riparian areas with rhododendron; Adults- open areas along roads, trails, or streams	Likely to occur

"Known to occur" those species for which there is documentation that the species exists within a specified area, or it was found in the area during surveys.

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

"May 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.

"Does not occur" exhaustive surveys (past and current) have not found the species in the project and/or analysis areas. These species are not included in the analysis.

VI. EFFECTS TO THREATENED AND ENDANGERED SPECIES

An hibernacula (shelter of a hibernating animal) for the Virginia big-eared bat, *Corynorhinus t. virginianus,* was listed by the USFWS as possibly occurring within Caldwell County; however, phone conversations with the USFWS on July 20, 2005, confirmed this bat hibernacula is actually located outside Caldwell County and the activity areas. Bob Currie and Allan Ratzlaff, USFWS stated this cave was utilized by the bat for a winter hibernacula; the bats are hibernating in the cave throughout the winter months and leave the area when they emerge. While suitable summer foraging habitat may be present within Caldwell County, this species of bat has never been documented to remain and forage in the county. For that reason, this species was dropped from any further analysis.

As there are no spruce-fir forests or bogs and wet meadows within these proposed action areas for the Spruce-fir moss spider, *Microhexura montivaga,* or the Bog turtle, *Clemmys muhlenbergii,* they were dropped from further analysis.

There are no known T&E botanical or aquatic species or habitat within the project's activity areas or Caldwell County. There are no further T&E wildlife species or their habitat within this project's AA or Caldwell County.

VII. EFFECTS TO REGIONAL FORESTER'S SENSITIVE SPECIES

A. Wildlife Species

The Diana Fritillary, *Speyeria diana,* has been documented within 15 of the 18 western most counties of North Carolina. Over half of the occurrences (greater than 40) are known to occur within the Nantahala or Pisgah National Forest. As a result of all the recent documentations for this species, the North Carolina Natural Heritage Program no longer formally tracks Diana Fritillary (Legrand et al. 2004). Generally speaking, the distribution or population sizes of this species in the state are fairly well known. This butterfly prefers rich woods with host plants of both *Viola* and rhododendron for the larval stage and adjacent edges or openings with nectar species for the adult stage. Habitat for the Diana Fritillary is found throughout both AAs, within the riparian areas of George's Creek, Thunderhole Creek, and Frankum Creek. Nectar species are found along State roads and Forest Service roads within the AAs.

Alternative D would indirectly benefit the adult stage of this butterfly by increasing the nectar species habitat within harvest areas (212 ac), Frankum Creek road daylighting corridor (5 ac), on the closed and seeded portion of Thunderhole Road (3 ac) and within the grass/forb openings (9 ac). A small amount of habitat within the riparian area, estimated to be no more than one acre, would be adversely affected with the planned temporary roads. As there are approximately 1860 acres of riparian forests within these AAs, this one acre removal is not considered significant. The proposed herbicide application for the control of exotic, invasive plant species is not expected to effect the fritillary as the nectar species of paulownia does not contribute a measurable amount of nectar species. Alternative D would result in an indirect beneficial effect of increased nectar species (adult habitat) and an insignificant negative effect to larvae and eggs habitat.

Within the China Creek riparian area, the current unauthorized mountain bike traffic along and in China Creek may be affecting larval and egg habitat where violet species are eliminated by bike traffic within the riparian area. The District is continuing to educate recreationists on proper uses to reduce impacts to riparian areas and habitat. There have been two recent cases of encroachments on NFS lands within the vicinity of Frankum Creek over the past three years that together with past encroachments have altered water drainage and small segments of riparian habitat. The encroachments are limited in nature and in areas where no violet species are know to occur. The OHV trespass has generally not altered riparian habitat.

The planned storm-related hurricane road rehabilitation projects would eliminate the nectar species initially but they would return along all the road corridors within two years. The SPB caused mortality of yellow pine is expected to create more nectar species growth where the canopy has been killed. The hemlock adelgid treatment would not affect the butterfly. However, the loss of hemlock trees within the riparian area is expected to create openings which may increase the nectar species while is not expected to decrease either the rhododendron or viola species. Due to the herbicide treatment surrounding commercial nurseries, there is little nectar species available for the butterfly. Flower gardens surrounding many home sites increase nectar species availability however, the construction may have eliminated habitat. The 2000 Frankum Creek TS has provided nectar species habitat through canopy openings and temporary roads. However, these 45 acres of nectar species habitat would not persist into the next 10 year cycle as the canopy closes. Prescribe burning and wildfires may have eliminated some fritillary eggs or larvae and created habitat for nectar species. The adverse effect would have been for one season while the positive affect of increased nectar species is expected to be of three to five years in duration. No additional past or foreseeable future actions would affect this species.

Overall, Alternative D is expected to indirectly benefit the Diana Fritillary habitat across the AAs throughout the next ten years. There may have been negative direct effects to individual larvae and eggs from past disturbance actions on both private and public lands, such as illegal mountain bike traffic, housing development and wildfires. However, the increased habitat development with the Frankum Creek timber sale would have indirect beneficial effects on a larger habitat area. No further past and foreseeable future actions are expected to affect this species. This proposed action is not likely to cause a trend toward federal listing or loss of viability across the Nantahala and Pisgah National Forest.

B. Botanical Species

The known local population of *Tsuga carolinia,* Carolina Hemlock, in the analysis area occurs mostly along ridges and upper slopes (Pine-oak Forest) within the analysis area. *Tsuga caroliniana* occurs in proposed activity areas within the Boyd Gap area along FSR 4071.

Periodic maintenance of FSR 4071 may directly adversely affect approximately 10 individuals of *Tsuga caroliniana*. The proposal would have little effect on the entire population of *Tsuga caroliniana* within the botanical AA. The population of *Tsuga caroliniana* has a very large (estimated at 3,173 acres by model) viable population within the AA in areas that would not be affected by this proposal. Therefore, although this proposal would likely adversely affect individuals of *Tsuga caroliniana* it would not affect local or Forest viability of *Tsuga*

caroliniana. Furthermore, the indirect effect to the habitat of *Tsuga caroliniana* is not expected to be permanently altered by this proposal and *Tsuga caroliniana* is expected to recover from actions proposed in the activity areas. No mitigation for *Tsuga caroliniana* is recommended.

Within the Botanical AA, there have been no effects to *Tsuga caroliniana* that are a result of past actions (see project list above). Nor are there any foreseeable actions that could affect *Tsuga caroliniana.* Therefore, the cumulative effects to *Tsuga caroliniana* are those of the current proposal. On a Forest wide scale, this proposal would have very little effect on *Tsuga caroliniana*. Although the hemlock wooly adelgid infestation is likely to reduce the numbers of *Tsuga carolinana* and while the two adelgid control sites may limit the impact of the adelgid infestation, the adelgid infestation is not the result of any past or proposed action. There would be no known effect to this species by any other known past and foreseeable future activity. There are so many individuals of *Tsuga caroliniana* distributed over a wide area across the Forest that the species is not monitored in any quantified manner. Therefore, this proposal would have little effect on the total numbers of *Tsuga caroliniana* individuals throughout the Forest but would directly affect some individuals. As stated above, this proposal would have no effect upon the Forest viability of *Tsuga caroliniana.*

The only known local population of *Helianthus glaucophyllus* in the Botanical AA occurs along FSR 4071. Under Alternative D the maintenance of FSR 4071 may directly adversely affect individuals of *Helianthus glaucophyllus*. The impact to *Helianthus glaucophyllus* would have little effect on the entire population within the botanical AA. The population of *Helianthus glaucophyllus* has greater than two hundred individuals scattered along FSR 4071. The local roadside population of *Helianthus glaucophyllus* receives regular maintenance. *Helianthus glaucophyllus* thrives in open areas. The regular disturbance of road maintenance probably has created the habitat necessary for its existence within the AA. Maintenance of FSR 4071 would affect no more than 10% of this population. A viable population of *Helianthus glaucophyllus* would remain within the AA. Although Alternative D would likely adversely affect individuals of *Helianthus glaucophyllus* it would not affect local or Forest viability of *Helianthus glaucophyllus*. Furthermore, the indirect effect to the habitat of *Helianthus glaucophyllus* is not expected to be permanently altered by this proposal and *Helianthus glaucophyllus* is expected to recover in the proposed activity areas. No mitigation for *Helianthus glaucophyllus* is recommended.

Within the Botanical AA, there have been no known effects to *Helianthus glaucophyllus* that are a result of past actions, nor are there any foreseeable actions that could affect *Helianthus glaucophyllus.* Therefore, the cumulative effects to *Helianthus glaucophyllus* are those of the current proposed actions.

C. Aquatic Species

Alasmidonta varicosa, Brook floater, was eliminated because mussel habitat ends in the Johns River at the confluence with House Branch where there is an obvious change in habitat availability for mussels. The Globe project is several miles upstream of this area, thus there would be no impacts to mussels or their habitat.

There were no aquatic PETS found during activity and analysis area surveys within the Globe Project area. However, two S species are included in this analysis due to their habitat preferences and the presence of this habitat within the activity and AA.

Activities within the Globe Activity area would follow the riparian area guidelines along perennial and intermittent streams as stated in the Land and Resources Management Plan (LRMP) for the Nantahala and Pisgah National Forests and NC Best Management Practices. During specific activity area surveys, none of the members of the S species were present, however habitat did exist. Aquatic insects present during bridge 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.

Alternative A: No action would be taken associated with the Globe Project therefore there would be no bridge installations and road construction or reconstruction that would occur. There would be no direct or indirect effects to any Proposed, Endangered, Threatened, or Sensitive or Forest Concern aquatic species.

Alternatives B, C & D:

Sensitive Edmund's snaketail (*Ophiogomphus edmundo)* and mountain river cruiser (*Macromia margarita*)

Direct and Indirect Effects

The greatest likelihood of direct impact to aquatic macroinvertebrates is from the bridge installations for the temporary road projects associated with this project. Individual insects may be displaced and stressed during installation but these effects would dissipate approximately 50 feet downstream of the construction area and within 1 day. While installation techniques are designed to prevent visible sediment from entering project area waters, there would be a slight increase in sediment within the creeks substrate within the first 50 feet below the activity area. These sediments would persist until the next high flow event, which would scour these sediments from the stream channel. There may be an increase in stream turbidity during the installations. However, these effects would be minimized by application of erosion and sedimentation control measures (e.g. diversion pumps, silt fence, sediment traps, seeding, and mulch). Turbidity effects would persist for 1-2 days during construction, possibly longer depending upon the local weather conditions. The riparian disturbed areas would be seeded and mulched within 24 hours of completion to prevent or minimize erosion.

Cumulative Effects

The proposed bridge crossings on Frankum Creek with the Globe project may add to short-term (the time interval between the activity and the next storm event) negative impacts to habitat for these two species if they exist within the activity area. The previous storm events in 2004 resulted in short-term and continuing sedimentation impacts due to damage to roads and stream crossings, resulting in sedimentation that may have negatively impacted rare aquatic species within the upper Johns River watershed. Reducing or eliminating these sources of sedimentation with storm recovery projects would result in a positive effect to habitat. No other known past and foreseeable future activities are expected to affect these species. While there may be a short term negative increase in turbidity from the storm repair activities, particularly the culvert

replacements and the bridge installations associated with the Globe Project, the long term benefits of stabilizing the existing erosion problems should enhance aquatic resources in the upper Johns River watershed by improving water quality. As already stated, this should result in an improvement in suitable habitat for rare aquatic organisms.

VIII. PROJECT DESIGN FEATURES

1. Marking guidelines would include priority residual tree species of; white oak, red oak, hickory, black oak, and chestnut oak, where they occur. In addition, two 12 inch diameter or larger diameter black gum species would be left as residuals within every 10 acres, where they occur. (Purpose is for wildlife habitat and vegetation diversity).
2. Stand 37-5b exhibits a large boulder complex with evidence of woodrat nesting use between the existing unauthorized road within the stand and State Road 1367. Any harvesting would exclude this area and trees immediately surrounding this boulder complex would be left during harvest and any subsequent release work planned. (Purpose is for habitat protection of a Forest Concern wildlife species).
3. To reduce the possible effects of increasing invasive plant species to this proposal, all known populations of *Miscanthus sinensis*, *Paulownia tomentosa* , *Celastrus orbiculatas* and *Ailanthus altissima* should be treated prior to disturbance activities. *Miscanthus sinensis* was found along Forest Service Roads. All populations total less than one acre. Control of *Miscanthus sinensis, Paulownia tomentosa,* and *Ailanthus altissima* is most easily and effectively done by herbicide (Glyphosphate). (Purpose is to reduce spread of non-native invasive plant species).
4. Native plants would be utilized in wildlife improvement and roadside erosion control. (Purpose is to reduce spread of non-native invasive plant species).
5. A 150-foot area near station 8+50 on the Frankum Creek Road would be excluded from daylighting to provide protection to the *Calystegia catesbeiana ssp. sericata* (Catesby's false bindweed) population. (Purpose is for habitat protection of a Forest Concern botanical species).

No mitigation measures are recommended for Alternative D.

IX. SUMMARY OF EFFECTS

This proposal would not affect (directly, indirectly, or cumulatively) any proposed or listed Federal threatened or endangered botanical, aquatic or wildlife species. Consultation with the USDI Fish & Wildlife Service is not required.

This proposal may impact individuals of Regional Forester's Sensitive species white leaf sunflower (*Helianthus glaucophyllus)* and Carolina hemlock (*Tsuga caroliniana)*. These impacts would not lead towards federal listing or loss of Forest viability.

The current records for Regional Forester's Sensitive dragonfly species *Macromia margarita* and *Ophiogomphus edmundo* are within larger, more riverene type habitats than what is present within the aquatic activity areas. These species could be present within the aquatic AA of the Johns River which is well away from the bridge installations on Frankum Creek. Since the

stream crossings are located in Frankum Creek, which is a tributary to Mulberry Creek, *Macromia margarita* and *Ophiogomphus edmundo* would not be impacted by the project proposal. According to personal communication with Sarah McRae, North Carolina Heritage Program Freshwater Ecologist, the record of *Macromia margarita* for Caldwell County is unclear but most likely is from the lower reaches of Wilson Creek or the Johns River. Based on activity area surveys and habitat preferences, there would be no impacts to *Macromia margarita* or *Ophiogomphus edmundo* as a result from the implementation of the proposal. This proposed action is not likely to cause a trend toward federal listing or loss of viability across the Nantahala and Pisgah National Forest for either species.

Alternative D would have an indirect beneficial effect to nectar species habitat for the Regional Forester's Sensitive species, Diana Fritillary (*Speyeria Diana)* on 222 acres while there would be negative indirect effects to one acre of habitat. Overall, the proposal is expected to benefit the Diana Fritillary and its habitat across the AAs throughout the next 10 years. Past actions and foreseeable future actions, both on private and public lands may have had negative direct effects on individual larvae however; there have been positive indirect effects to habitat over the AAs. This proposal is not likely to cause a trend toward federal listing or loss of viability across the Nantahala and Pisgah National Forest.

No further botanical, aquatic, or wildlife Regional Forester's sensitive species would be affected by the proposed action.

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Attachment A

Federally Listed and Regional Sensitive Species of Caldwell County

Federally Listed Plant Species

Species	Natural Communities	Occurrence
Liatris helleri	High Elevation Rocky Summit	4
Hexastylis naniflora	Piedmont Alluvial Forests	4

Regional Sensitive Plant Species

Species	Natural Communities	Occurrence
Abies fraseri	Spruce-Fir Forest, Northern Hardwood Forest	4
Aconitum reclinatum	Rich Cove Forest, Northern Hardwood Forest Elevation Seep Boulderfield	3
Bazzania nudicaulis	Spruce-Fir Forest, High Elevation Rocky Summit	4
Calystegia catesbeiana ssp. sericata	Open, sunny sites	1
Cardamine clematitis	Spruce-Fir Forest, High Elevation Seep Boulderfield Forest	4
Fissidens appalachensis	Aquatic, on Rocks	3
Geum geniculatum	Grassey Bald, High Elevation Seep, Spruce-Fir Forest, Northern Hardwood	4
Helianthus glaucophyllus	Rich Cove Forest,	1
Juglans cinerea	Rich Cove Forest	3
Lilium grayi	Grassey Bald, Northern Hardwood Forest Appalachian Bog	4
Monotropsis odorata	Chestnut Oak Forest, Pine Oak Heath	3
Metzgeria furcata var. setigera	High Elevations on bark	4
Penstemon smallii	Montane Acdic Cliff	4
Plagiochila sullvantii var. sullvantii	Spray zones of waterfall at high elevation	4
Rhododendron vaseyi	Spruce-Fir Forest, Heath Bald, Grassey Bald	4
Tsuga caroliniana	Pine-Oak Heath, Chestnut Oak Forest, rock outcrops	1

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

Federally Listed and Regional Sensitive Aquatic Species of Caldwell County

Common Name	Scientific Name	Type
Threatened, Endangered, & Proposed Species		
NONE		
Sensitive Species (based on January 1, 2002 Regional Forester's list)		
mountain river cruiser	*Macromia margarita*	dragonfly
Edmund's snaketail	*Ophiogomphus edmundo*	dragonfly
brook floater	*Alasmidonta varicosa*	mussel

Federally Listed and Regional Sensitive Wildlife Species Caldwell County

Species	Type & Status	Occurrence
Bog Turtle	Reptile (T)	No habitat within proposed activity areas
Spruce-fir Moss Spider	Arachnid (E)	No habitat within AAs
Diana Fritillary	Insect (S)	May occur
Virginia big-eared Bat	Mammal (E)	No record within the county

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Definitions

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

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

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

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

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

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

Biological Analysis Area: The maximum geographic boundary where cumulative biological effects of analyses from past, present, and reasonably foreseeable actions are expected to be combined with effects from the proposal. Analysis areas are specific to individual resources and may have different boundaries. They are referred in the body of this report as the botanical, wildlife, and aquatic Analysis Areas.

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

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

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

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

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

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

APPENDIX B – AGE CLASS DISTRIBUTION

APPENDIX B – AGE-CLASS DISTRIBUTION

Forest vegetation within the Globe project area consists of upland and cove hardwood species such as oaks, yellow poplar, hickories, red maple, black gum, and black locust. White pine, pitch pine, shortleaf pine, and hemlock occur in varying degrees throughout the area. Understory vegetation includes rhododendron, mountain laurel, red maple, white pine, hemlock, blackgum, sourwood, oak and various other shrubs and herbs. Most overstory oaks are scarlet oak or chestnut oak with areas of white oak, black oak and northern red oak. (All stand ages discussed below were determined for the year 2008.)

Within the Upper Johns River AA, approximately 75 percent of forested acres are 71 years old or older. There is no acreage in the 0-10 year age-class, and only three percent is in the 11-20 year age-class. Within the Upper Mulberry AA, over 90 percent of forested acres are 71 years old or older. There are approximately one percent of forested acres in the 0-10 year age-class, and approximately four percent is in the 11-20 year age-class. Within the 4,837 acre project area (compartments where harvesting is proposed), approximately 80 percent of the forested acres are 71 years old or older. Less than one percent is in the 0-10 year age-class, and only seven percent is in the 11-20 year age-class.

This 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). The age-class distribution is also unbalanced for MA 4A where timber harvests are utilized to provide a wide variety of tree ages and wildlife habitat (Forest Plan, page III-77).

This analysis determines the minimum and maximum harvest levels for the project area according to the Forest Plan. Both action alternatives would help to balance the age-class distribution. Action alternatives would result in bringing the 0-10 year age-class in the project area up to about five percent by the end of the project implementation. The resulting sum of 0-10 and 11-20 year age-classes would be approximately 13 percent. All stands proposed for harvest are from 69 to 98 years old.

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 analysis area or topographic level; the management area within the analysis area or topographic area; and the compartments within the area. The tables below summarize the existing 0-10 year age-class and regeneration goals for these areas and for the Globe project compartments within each analysis area. Uncut inclusions and non-forested areas are not considered as 0-10 year old regeneration.

Globe Compartments 12, 13, 14, 33, 35, 37, 38, 39

For every AA 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, or 367 acres in Upper Mulberry and 333 acres in Upper Johns River.

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 AA by the maximum percent allowed. Each result is the amount of 0-10 year age-class allowed in that management area. In Upper Mulberry AA there is a maximum of 367 acres allowed in MA 3B (Table B-1). In Upper Johns River AA there is a maximum of 50 acres allowed in MA 3B and 283 acres in MA 4A (Table B-2).

Table B-1: Forest Plan Allowed 0-10 Year Age-Class for Upper Mulberry AA

		0-10 YEAR AGE-CLASS			HARVEST GOALS	
Mgmt. Area	Forested Acres	Min. Desired	Max. Allowed	Existing 0-10 Yr.	Min.	Max.
1B, 3B	2,446	122	367	68	54	299
2A	0	-	-	-	-	-
4A & 4D	0	-	-	-	-	-
Other	2,892	-	-	-	-	-
Total	**5,338**	**122**	**367**	**68**	**54**	**299**

Summary: *In Upper Mulberry, harvest 54 to 299 acres in MA 1B and 3B.*

Table B-2: Forest Plan Allowed 0-10 Year Age-Class for Upper Johns River AA

		0-10 YEAR AGE-CLASS			HARVEST GOALS	
Mgmt. Area	Forested Acres	Min. Desired	Max. Allowed	Existing 0-10 Yr.	Min.	Max.
1B, 3B	331	17	50	0	17	50
2A	0	-	-	-	-	-
4A & 4D	2,825	0	283	0	0	283
Other	2,731	-	-	-	-	-
Total	**5,887**	**17**	**333**	**0**	**17**	**333**

Summary: *In Upper Johns River, harvest 17 to 50 acres in MAs 1B and 3B and harvest up to 283 acres in MAs 4A and 4D .*

For every compartment with at least 250 acres in MAs 1B, 2A, 3B, 4A, and/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 MAs 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 MAs 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 tables display the age-class by compartment and Forest Plan standards (harvest goals):

Table B-3: Upper Mulberry AA, Compartment 12, 0-10 Year Age-Class

		0-10 YEAR AGE-CLASS			HARVEST GOALS	
Mgmt. Area	Forested Acres	Min. Desired	Max. Allowed	Existing 0-10 Yr.	Min.	Max.
1B, 3B	373	20	59	0	20	59
2A	0					
4A & 4D	0					
Other	19					
Total	**392**	**20**	**59**	**0**	**20**	**59**

Summary: *In Compartment 12, harvest 20 to 59 acres in MAs 1B, 2A, 3B, 4A and 4D.*

Table B-4: Upper Mulberry AA, Compartment 13, 0-10 Year Age-Class

		0-10 YEAR AGE-CLASS			HARVEST GOALS	
Mgmt. Area	Forested Acres	Min. Desired	Max. Allowed	Existing 0-10 Yr.	Min.	Max.
1B, 3B	588	32	96	22	10	74
2A	0					
4A & 4D	0					
Other	54					
Total	**642**	**32**	**96**	**22**	**10**	**74**

Summary: *In Compartment 13, harvest 10 to 74 acres in MAs 1B, 2A, 3B, 4A and 4D.*

Table B-5: Upper Mulberry AA, Compartment 14, 0-10 Year Age-Class

		0-10 YEAR AGE-CLASS			HARVEST GOALS	
Mgmt. Area	Forested Acres	Min. Desired	Max. Allowed	Existing 0-10 Yr.	Min.	Max.
1B, 3B	575	32	95	0	32	95
2A	0					
4A & 4D	0					
Other	57					
Total	**632**	**32**	**95**	**0**	**32**	**95**

Summary: *In Compartment 14, harvest 32 to 95 acres in MAs 1B, 2A, 3B, 4A and 4D.*

Table B-6: Upper Johns River AA, Compartment 33, 0-10 Year Age-Class

		0-10 YEAR AGE-CLASS			HARVEST GOALS	
Mgmt. Area	Forested Acres	Min. Desired	Max. Allowed	Existing 0-10 Yr.	Min.	Max.
1B, 3B	0					
2A	0					
4A & 4D	427	0	82	0	0	82
Other	395					
Total	**822**	**0**	**82**	**0**	**0**	**82**

Summary: *In Compartment 33, harvest up to 82 acres in MAs 1B, 2A, 3B, 4A and 4D.*

Table B-7: Upper Johns River AA, Compartment 35, 0-10 Year Age-Class

		0-10 YEAR AGE-CLASS			HARVEST GOALS	
Mgmt. Area	Forested Acres	Min. Desired	Max. Allowed	Existing 0-10 Yr.	Min.	Max.
1B, 3B	0					
2A	0					
4A & 4D	781	0	87	0	0	87
Other	92					
Total	**873**	**0**	**87**	**0**	**0**	**87**

Summary: *In Compartment 35, harvest up to 87 acres in MAs 1B, 2A, 3B, 4A and 4D.*

Table B-8: Upper Johns River AA, Compartment 37, 0-10 Year Age-Class

	0-10 YEAR AGE-CLASS	HARVEST GOALS

Mgmt. Area	Forested Acres	Min. Desired	Max. Allowed	Existing 0-10 Yr.	Min.	Max.
1B, 3B	0					
2A	0					
4A & 4D	287	0	35	0	0	35
Other	61					
Total	**348**	**0**	**35**	**0**	**0**	**35**

Summary: *In Compartment 37, harvest up to 35 acres in MAs 1B, 2A, 3B, 4A and 4D.*

Table B-9: Upper Johns River AA, Compartment 38, 0-10 Year Age-Class

		0-10 YEAR AGE-CLASS			HARVEST GOALS	
Mgmt. Area	Forested Acres	Min. Desired	Max. Allowed	Existing 0-10 Yr.	Min.	Max.
1B, 3B	0					
2A	0					
4A & 4D	536	0	62	0	0	62
Other	80					
Total	**616**	**0**	**62**	**0**	**0**	**62**

Summary: *In Compartment 38, harvest up to 62 acres in MAs 1B, 2A, 3B, 4A and 4D.*

Table B-10: Upper Johns River AA, Compartment 39, 0-10 Year Age-Class

		0-10 YEAR AGE-CLASS			HARVEST GOALS	
Mgmt. Area	Forested Acres	Min. Desired	Max. Allowed	Existing 0-10 Yr.	Min.	Max.
1B, 3B	0					
2A	0					
4A & 4D	188	0	51	0	0	51
Other	324					
Total	**512**	**0**	**51**	**0**	**0**	**51**

Summary: *In Compartment 39, harvest up to 51 acres in MAs 1B, 2A, 3B, 4A and 4D.*

APPENDIX C – OLD GROWTH COMMUNITIES ANALYSIS

APPENDIX C – OLD GROWTH ANALYSIS

Forest Plan Direction for Old Growth

The Forest Plan contains specific directions for designating large, medium, and small old growth restoration patches (Forest Plan, pages III 26-28). The administrative watersheds affected by this project are 60 (Johns River) and 61 (Mulberry Creek). The requirements for this project are as follows: (1) utilize large patch 24 in the Upper Johns River AA and large patch 30 in the Upper Mulberry AA; (2) select and designate small patches for compartments 12, 13, 14, 35 and 37, and utilize existing small patches for compartments 33, 38 and 39.

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 24: Approximately 5,900 contiguous acres with 1,049 contiguous acres located within the Upper Johns River AA.

Large Patch 30: Approximately 3,326 contiguous acres with 2,609 contiguous acres located within the Upper Mulberry AA.

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. Both action alternatives would designate the following areas as small patches:

Table C-1: Small Old Growth Patches in the Upper Johns River and Upper Mulberry AAs

Comp.	Min. Acres	Stand No.	Est. Acres	CISC Age in 2006	Initial Inv.?	Community Type
12	50	02 (partial)	3	12	No	Cove Forest
		11 (partial)	28	79	No	Cove Forest
		12 (partial)	19	96	No	Oak/Hickory Forest
13	50	11 (partial)	15	85	No	Cove Forest
		12 (partial)	15	85	No	Oak/Pine Forest
		22 (partial)	20	85	No	Oak/Pine Forest
14	50	01 (partial)	6	76	No	Cove Forest
		11	44	76	No	Cove Forest
35	108	06	27	88	No	Cove Forest
		07	51	92	No	Cove Forest
		08 (partial)	16	77	No	Cove Forest
		18	14	68	No	Cove Forest
37	53	11 (partial)	37	111	No	Oak/Hickory Forest
		13	16	111	No	Oak/Hickory Forest

The following table displays the current old growth in the two Forest Plan analysis areas where harvesting is proposed:

Table C-2: Existing Old Growth in the Upper Johns River and Upper Mulberry AAs where Harvesting is Proposed[1]

Comp.	O/G Comp Acres	Stand No.	Acres	CISC Age in 2006	Community Type
33	291	04	68	94	Pine/Hardwood Forest
		06	28	74	White Pine Forest
		07	80	74	Cove Forest
		08	96	88	Oak/Hickory Forest
		22	19	74	Cove Forest

Comp.	O/G Comp Acres	Stand No.	Acres	CISC Age in 2006	Community Type
38	466	01	52	124	Oak/Hickory Forest
		02	70	134	Oak/Hickory Forest
		03	37	88	Cove Forest
		04	105	115	Oak/Hickory Forest
		05	62	86	Oak/Hickory Forest
		06	41	74	Oak/Hickory Forest
		08	99	132	Oak/Hickory Forest
39	295	05	10	83	Cove Forest
		06	70	83	Oak/Hickory Forest
		09	57	75	Oak/Hickory Forest
		10	75	97	Cove Forest
		11	57	82	Oak/Hickory Forest
		12	16	87	Cove Forest
		14	10	89	Cove Forest

1 Total non-contiguous old growth in Upper Johns AA is 2,462 acres and in Upper Mulberry AA is 2,653

Initial Inventory of Old Growth

None of the treatments are proposed in areas included in the initial inventory of old growth, so there would be no impacts to those acres.

Forest Plan Direction for Forest Interior Birds

The Forest Plan contains specific directions for providing preferred habitat conditions for forest interior breeding birds in selected areas (see Forest Plan, page III-32 and Appendix F). About 70% (3,400 acres) of the Interior Forest Habitat Patch #38 is within the Globe project Upper Mulberry AA, and would not be affected by this proposal.

APPENDIX D – APPROPRIATENESS OF HARVEST METHODS

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 E-1 and E-2 Forest Plan, Amendment 5. 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 Upper Johns River and Upper Mulberry AAs. 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 occasionally may not 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 sale area to the mill are higher for timber in remote areas, where haul roads must be built, or for timber logged with specialized logging equipment, e.g. with cable systems or with a helicopter. As costs increase, prospective timber purchasers lower their bid prices on stumpage to compensate. If the price they can pay becomes less than the minimum acceptable stumpage price, the timber becomes inoperable (no one would buy it).

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

Much concern has been expressed over clearcutting as a management tool. In compliance with recent direction, 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 slopes are gentle enough to allow ground skidding of timber (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 appropriate in very small stands, on slopes greater than 40 percent where cable logging is required, 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 required 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, or in stands where insect or disease hazards are high and widespread.

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	Est Acres	Vol./ac (MBF)	1/ Timber Quality	2/ Leave Trees	3/ Future Removal	4/ Access	5/ Special Concerns
12-05	25	7.0	Med-High	Spotty	No	Good	WL, Vis
12-12							
13-07	10	7.0	Med-High	Spotty	No	Good	WL, Vis
13-19							
13-10	7	6.0	Med-High	Spotty	No	Good	WL, Vis
13-18	10	10.0	High	Spotty	No	Good	WL, Vis
14-01a	10	9.0	High	Spotty	No	Good	WL, Vis
14-01b	10	9.0	High	Spotty	No	Good	WL, Vis
14-09	10	7.0	Med-High	Spotty	No	Good	WL, Vis
14-12	30	8.0	Med-High	Spotty	No	Fair	WL, Vis
13-11							
13-21							
33-11	40	8.0	Med-High	Spotty	No	Good	WL, Vis
35-11	11	8.0	High	Spotty	No	Good	WL, Vis
35-11	8	8.0	Med-High	Spotty	No	Good	WL, Vis
35-01							WL, Vis
35-23							WL, Vis
37-05a	4	9.0	High	Spotty	No	Good	WL, Vis
37-05b	3	9.0	High	Spotty	No	Good	WL, Vis
37-09	8	9.0	Med-High	Yes	No	Good	WL, Vis
38-07	12	11.0	High	Spotty	No	Good	WL, Vis
38-10	8	8.0	Med-High	Yes	No	Good	WL, Vis
39-04	15	9.0	High	Spotty	No	Good	WL, Vis
39-13							WL, Vis
39-15	10	6.0	Med-High	Yes	No	Good	WL, Vis

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:	Yes	= Well distributed, long-lived, meet objectives;
	Spotty	= Available in clumps; not well distributed;
	No	= Scarce, scattered, or high mortality risk.
3/ Future Removal:	Yes	= Potential for operable removal of overstory;
	No	= Removal would not be operable within 10 years;
	Cable	= Slopes >40 percent require cable logging systems.
4/ Access:	Good	= Less than 0.5 mile from existing haul road;
	Fair	= 0.5-1.0 mile from existing haul road;
	Poor	= Greater than 1.0 mile from existing haul road.
5/ Special Concerns:	Conversion	= Risk that oak component be lost to pine; (Conv)
	Wildlife	= Modify to provide needs for wildlife; (WL)
	Visual	= Modify to mitigate aesthetic concerns; (Vis)
	Insect/Disease	= High risk of loss due to SPB and/or loss due to oak decline. (I/D)

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

					Alts. B&C	Alt. D	Alts B&C	Alt. D	Alts. B&C	Alt. D	Alts B&C	Alt. D
Compt.-Stand	Acres	Forest Type	Age	Method Of Logging	Selection (groups <1 ac)		Shelter-wood BA[1] 30-50		Two-Age BA 20-30		Clearcut w/ Reserve Trees	
12-05	25	Up. Hwd.	96	Cable					Yes	Yes	Yes	Yes
12-12												
13-07	10	Up. Hwd	82	Skidder					Yes	Yes	Yes	Yes
13-19												
13-10	7	Up. Hwd.-WP	82	Skidder					Yes	Yes	Yes	Yes
13-18	10	Up. Hwd.	82	Skidder					Yes	Yes	Yes	Yes
14-01a	10	Up. Hwd.	76	Cable					Yes	Yes	Yes	Yes
14-01b	10	Up. Hwd.	76	Cable					Yes	Yes	Yes	Yes
14-09	10	WP-Up. Hwd	71	Skidder					Yes	Yes	Yes	Yes
14-12	30	Up. Hwd.-WP-Cove Hwd.	85	Cable					Yes	Yes	Yes	Yes
13-11												
13-21												
33-11	40[2]	Up. Hwd-Cove Hwd.	68	Cable					Yes	Yes	Yes	Yes
35-11	11	Up. Hwd.-WP	75	Cable					Yes	No	Yes	No
35-11	8	Up. Hwd.-WP	75	Cable					Yes	Yes	Yes	Yes
35-01												
35-23												
37-05a	4	Up. Hwd	78	Skidder					Yes	Yes	Yes	Yes
37-05b	3	Up. Hwd	78	Skidder					Yes	Yes	Yes	Yes

					Alts. B&C	Alt. D	Alts B&C	Alt. D	Alts. B&C	Alt. D	Alts B&C	Alt. D
Compt.-Stand	Acres	Forest Type	Age	Method Of Logging	Selection (groups <1 ac)		Shelter-wood BA[1] 30-50		Two-Age BA 20-30		Clearcut w/ Reserve Trees	
37-09	8	Up. Hwd	67	Skidder					Yes	Yes	Yes	Yes
38-07	12	Up. Hwd	91	Cable/ Skidder					Yes	Yes	Yes	Yes
38-10	8	Up. Hwd	91	Skidder					Yes	Yes	Yes	Yes
39-04	15	Up. Hwd	89	Cable					Yes	Yes	Yes	Yes
39-13												
39-15	10	Up. Hwd	69	Skidder					Yes	Yes	Yes	Yes

1 – Basal Area (BA)
2 – Stand 33-11 is 32 acres under Alternative D

Stands 12-05, 12-12, 13-11, 13-21, 14-01, 14-12, 33-11, 35-01, 35-11, 35-23, 38-07, 39-04 and 39-13

Since slopes are steeper than 40 percent in these stands, cable logging systems are needed to limit soil exposure. Topography precludes the use of selection cutting. Timber volume is too low in these stands to allow leaving enough merchantable trees as "overwood" to make a future cable removal cut operable, so shelterwood is not appropriate. There is adequate timber value in the stands to cover the increased cost of leaving and logging around a few leave trees per acre; therefore, two-age harvest would be appropriate. Clearcutting would be appropriate for providing regeneration, but since the same objectives can be met with two-age, clearcutting is not the optimum method. The added expense of two-age system is warranted by wildlife habitat needs in these stands.

All Remaining Stands

These stands are located on relatively gentle slopes and all have good accessibility. However, available leave trees are not well distributed and/or stand sizes are relatively small. The small size and medium timber volume would make a future removal cut inoperable; therefore, shelterwood is not appropriate. The two-age method would be appropriate if small diameter trees are included as leave trees, and if good distribution of leave trees is not critical. In addition, many of these stands contain a significant component of mature scarlet oaks and leaving these trees in a shelterwood or thinning would result in heavy mortality losses due to wind throw, insect infestations, or disease. The added expense of the two-age system is warranted by wildlife habitat needs or aesthetic concerns in these stands. There are pockets of other tree species, which have the capacity to increase in size and value. Where white pines are left in any partial cut, thick establishment of white pine natural regeneration would occur in openings. Some of the stands contain an overstory white pine component and this would result in a reduction of the hardwood component, which would affect mast production in the long run. Therefore, a two-age cut leaving mostly hardwoods would meet wildlife objectives better than thinning or shelterwood. Clearcutting would be appropriate for providing regeneration, but since the same objectives can be met with two-age, clearcutting is not the optimum method.

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
Clearcutting is the 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, windfirm 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
Group selection cutting is cutting small areas between 0.2 and 1.0 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
Sanitation thinning is 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 a financial efficiency analysis is to present the estimated costs and revenues of the alternatives considered in the EA for the proposed timber sale and associated activities. Forest Service policy requires a financial efficiency analysis be prepared for timber sale proposals expected to exceed $100,000 in value (Forest Service Manual 2432.12).

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 2nd Quarter Adjustment Sheet for Fiscal Year 2006 issued out of the Forest Supervisor's Office in Asheville, North Carolina.
4. Sale preparation costs and timber harvest administration costs were obtained from budget figures for the 2006 National Forests in North Carolina. Sale/contract preparation costs are approximately $8.95/CCF and timber harvest administration costs are approximately $6,000 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 Grandfather Ranger District plus an additional 25% to cover district preparation and administration costs.
6. Temporary road construction is 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

The following tables display financial-related information for the alternatives:

Table E-1: Sale Revenue Estimates for all Alternatives

Alternative	Timber Volume (CCF)	Revenues
A	0	$0
B	3,750	$275,025
C	3,850	$282,359
D	3,250	$238,355

Table E-2: Sale Cost Estimates – Alternative B

Activity	Units	Number	Cost/Unit	Total Costs
Silvicultural Exams	Acres	1,053	$5.43	$5,720
Sale/Contract Preparation	CCF	3,750	$8.95	$33,562
Sale Administration	Year	3	$6,000	$18,000
Road Engineering and Construction	Miles	0	$90,000	$0
Temp. Road Engineering and Construction	Miles	1.5	$30,000	$45,000
Cable Yarding	CCF	1,268	$17.50	$22,190
Site Preparation – Herbicide	Acres	231	$80	$18,480
Total				**$142,952**

Table E-3: Benefit Cost Ratio – Alternative B

Year	Discount Factor	Revenue	Cost	Present Net Value	Benefit Cost Ratio
0	0	$275,025	$142,952	$132,073	1.92
60	0.04	$11,001	$5,718	$5,283	1.92

Table E-4: Sale Cost Estimates – Alternative C

Activity	Units	Number	Cost/Unit	Total Costs
Silvicultural Exams	Acres	1,053	$5.43	$5,720
Sale/Contract Preparation	CCF	3,850	$8.95	$34,458
Sale Administration	Year	3	$6,000	$18,000
Temp. Road Engineering and Construction	Miles	1.5	$30,000	$45,000
Cable Yarding	CCF	1,268	$17.50	$22,190
Site Preparation – Herbicide	Acres	231	$80	$18,480
Total				**$143,848**

Table E-5: Benefit Cost Ratio – Alternative C

Year	Discount Factor	Revenue	Cost	Present Net Value	Benefit Cost Ratio
0	0	$282,359	$143,848	$138,511	1.96
60	0.04	$11,294	$5,754	$5,540	1.96

Table E-6: Sale Cost Estimates – Alternative D

Activity	Units	Number	Cost/Unit	Total Costs
Silvicultural Exams	Acres	1,053	$5.43	$5,720
Sale/Contract Preparation	CCF	3,250	$8.95	$29,088
Sale Administration	Year	3	$6,000	$18,000
Temp. Road Engineering and Construction	Miles	1.5	$30,000	$45,000
Cable Yarding	CCF	1,268	$17.50	$22,190
Site Preparation – Herbicide	Acres	212	$80	$16,960
Total				**$136,958**

Table E-7: Benefit Cost Ratio – Alternative D

Year	Discount Factor	Revenue	Cost	Present Net Value	Benefit Cost Ratio
0	0	$238,355	$136,958	$101,397	1.74
60	0.04	$9,534	$5,478	$4,056	1.74

Salability of Globe Timber Sale

Salability is determined by accessibly of timber and current markets for timber. Globe project area is mainly accessible from County Road 1367 and Forest Service Roads 4071, 188, and 4111. Some temporary road construction is necessary to access some units; however temporary road construction costs are estimated to be $33,000; well below the value of the timber to be removed, which is estimated to be as high as $283,899. The overall timber quality is medium-high within the proposed sale units. Market for this quality timber is good within western North Carolina. Recent timber sales sold on the Pisgah National Forest show revenues have been higher than estimated, there are no problems anticipated in selling the Globe project timber sale units when offered.

APPENDIX F – PROJECT DESIGN FEATURES FOR HERBICIDE USE

APPENDIX F – 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. No herbicide is ground-applied within 60 feet of any known threatened, endangered, proposed, or sensitive plant. Buffers are clearly marked before treatment so applicators can easily see and avoid them.
10. Application equipment, empty herbicide containers, clothes worn during treatment, and skin are not cleaned in open water or wells. Mixing and cleaning water must come from a public water supply and be transported in separate labeled containers.
11. No herbicide is ground-applied within 30 horizontal feet of lakes, wetlands, or perennial or intermittent springs and streams. No herbicide is applied within 100 horizontal feet of any public or domestic water source. Selective treatments (which require added site-specific analysis and use of aquatic-labeled herbicides) may occur within these buffers only to prevent significant environmental damage such as noxious weed infestations. Buffers are clearly marked before treatment so applicators can easily see and avoid them.
12. During transport, herbicides, additives, and application equipment are secured to prevent tipping or excess jarring and are carried in a part of the vehicle totally isolated from people, food, clothing, and livestock feed.
13. Only the amount of herbicide needed for the day's use is brought to the site. At day's end, all leftover herbicide is returned to storage.
14. Herbicide mixing, loading, or cleaning areas in the field are not located within 200 feet of private land, open water or wells, or other sensitive areas
15. During use equipment to store, transport, mix, or apply herbicides is inspected daily for leaks.

APPENDIX G – PROJECT-LEVEL ROADS ANALYSIS

APPENDIX G – PROJECT-LEVEL ROADS ANALYSIS

This roads analysis evaluates the existing condition of the transportation system within the Globe Project Analysis Areas (AAs). This analysis incorporates the 2003 Forest-wide roads analysis. It is being completed for information and support of the environmental assessment and the decision to be made for the Globe Project. This report includes the analysis of all system classified Forest Service Roads (FSRs) within the project's AAs as well as making recommendations for some of the existing unclassified roads. Objectives of the Globe Project roads analysis are:

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

1. Existing Condition of Roads

This analysis includes the Upper Johns River and Upper Mulberry AAs. These AAs are within the scope of the Globe Project decision to be made. Forest Plan transportation system management and Road Management Objectives (RMOs) need to be reviewed concurrently with most resource management projects. The designation of RMOs is to establish the intended purpose of an individual road based on management area direction and Forest Plan access management objectives. RMOs contain design, operation, and maintenance criteria.

Table G-1: Inventory of all system classified FSRs within the Globe Project

FSR No.	FSR Name	Analysis Area	Length in miles	Road Mgmt Objective (RMO)	Mgmt. Area	Status
4071	Thunderhole I	Upper Johns River	2.5	C2	4A	Open
4071	Thunderhole II	Upper Johns River	2.5	D3	4A	Open
4072	Tolbert Cemetery	Upper Johns River	0.3	D1a	4C	Closed
4094	Globe Mtn.	Upper Mulberry	0.9	D1a	3B	Closed
188	Frankum Creek I	Upper Mulberry	1.4	C2	3B	Closed
188	Frankum Creek II	Upper Mulberry	0.4	D3	3B	Closed
4111	Georges Creek	Upper Mulberry	5.9	D3	3B	Closed
4110	Shop Branch	Upper Mulberry	0.6	D3	3B	Closed

Road Management Objectives

RMO C2:
Restricted low speed single lane gravel road.
Blade every 2 years and brush every 3 years. Maintain shoulders, drainage and turnarounds at the end of dead end roads.
Use as 2-wheel drive access for timber harvesting and fire protection.
Access closed with a gate and restricted most of the year to administrative use.

Encourage non-motorized use such as hiking, biking and horseback riding.

RMO D3:
Restricted low standard timber haul road.
Blade every 2 years and mow cut and fill slopes every 3 years. Maintain drainage and suitable turnarounds for fire equipment at the end of dead end roads.
Use as 2-wheel drive access for timber harvesting and fire protection.
Access closed with a gate and restricted most of the year to administrative use.
Encourage non-motorized use such as hiking, biking and horseback riding.

RMO D1a:
Linear wildlife opening.
Mow roadbed annually and brush shoulders once every 3 years. Maintain suitable turnarounds for fire equipment at the end of dead end roads.
Scarify, seed and fertilize roadbed. Provide access for future timber operations and fire protection.
Access closed with a gate and restricted to administrative use.
Discourage non-motorized use but do not prohibit.

Table G-2: Comparison of FSRs within the Globe Project versus Forest Plan Direction

Analysis Area	Total ac. by Mgmt Area	Total miles of FSRs	Forest Plan direction for open FSR/sq. mi.	Current miles of open FSR/sq.mi.
Upper Mulberry	2,446 (3B)	9.2	0.5 (or 1.9 miles in this AA)	0
Upper Johns River	2,825 (4A)	5.0	0.25 (or 1.1 miles in this AA)	5.0[1]
	2,266 (4C)	0.3	0.25 (or 0.9 miles in this AA)	0

1 – Currently does not meet Forest Plan standard (see Section 5 below for further discussion)

Forest Plan Direction for Transportation System Management

Management Area 3B: (Forest Plan, page III–76)
Emphasize sustained yield timber management.
Close most roads to motorized vehicles
Permit road construction.
Manage access through an approximate density of 0.5 miles of open road per square mile. Where existing open road densities exceed 0.5 square mile, and, if closure of existing roads is prohibitive for administrative or legal reasons, then document these exceptions to the standard and investigate strategies to reduce open road density.

Management Area 4A: (Forest Plan, page III–87)
Emphasize visually pleasing scenery.
Emphasize non-motorized recreation use.
Close most roads to motorized vehicles.
Permit timber management modified to emphasize visual quality and wildlife benefits.
Permit road construction.

Manage access through an approximate density of 0.25 miles of open road per square mile. Where existing open road densities exceed 0.25 mile per square mile, and, if closure of existing roads is prohibitive for administrative or legal reasons, then document these exceptions to the standard and investigate strategies to reduce the open road density.

Management Area 4C: (Forest Plan, page III–87)
Emphasize visually pleasing scenery.
Emphasize non-motorized recreation use.
Close most roads to motorized vehicles.
Classify land as not suitable for timber production.
Manage access through an approximate density of 0.25 miles of open road per square mile. Where existing open road densities exceed 0.25 mile per square mile, and, if closure of existing roads is prohibitive for administrative or legal reasons, then document these exceptions to the standard and investigate strategies to reduce the open road density.

2. Identification of road associated environmental and public safety risks

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

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

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

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

3. Identification of site-specific priorities and opportunities for road improvements and decommissioning.

The current process of road reconditioning in response to damage received during the tropical storms Frances and Ivan of 2004 is under way on Georges Creek Road (FSR 4111), is planned for spring of 2007 on Thunderhole Road (FSR 4071) and is completed on Frankum Creek Road (FSR 188). Road blading (shaping, waterbarring and dipping), ditch blading (shaping and cleaning), culvert work (replacement, installation and cleaning) and surface course placement

(gravel and natural with seeding) have been designed into all these road reconditioning contract work projects to better stabilize the current system classified road locations.

Alternatives B, C, and D of this project would develop approximately 1.5 miles of new temporary road. Following Globe Project use, temporary roads, skid roads, and log landings would be appropriately shaped, waterbarred, disked and seeded with an erosion-control seed mix. All new temporary roads would be permanently closed and any new stream crossings on these roads are considered temporary and would be removed.

Alternatives B, C, and D of this project would utilize and reconstruct 0.8 miles of existing closed unauthorized roads (RMO will be D1a). Following Globe Project use, these existing unauthorized roads would be placed on the Forest's Transportation System as authorized roads, stabilized (i.e. shaped, waterbarred, and seeded with an erosion-control seed mix) and maintained closed for administrative use only.

4. Identification of areas of special sensitivity or unique resource value that may require specific road management.

There are no areas of special sensitivity or unique resource value that will require specific road management within the scope of the Globe Project.

5. Provide other specific information that may be needed to support the Globe Project decision.

In order to fully meet Forest Plan transportation system management direction, the Thunderhole Road (FSR 4071) would need to have a gate installed at approximately the 1.1 mile post to limit year long motorized access to administrative use only. The current design of this road limits the ability to properly install a gate at that 1.1 mile post due to road width and turn-around access. As an exception to the standards, according to Forest Plan direction, the option of a combination of new gate installations and seasonal gate closures on FSR 4071 would sufficiently reduce open road density to meet Forest Plan direction (see also Alternative D, Chapter 2).

Due to access needs for fire suppression, private inholdings, and other administrative purposes, the existing system roads in the AAs are not scheduled for decommissioning.

During project level surveys, no other unauthorized roads were identified that were causing sedimentation/erosion that needed correction or decommissioning. Future analyses would be completed to address future problems should they arise.

GLOBE PROJECT MAPS