United States Department of Agriculture

Forest Service

September 2007

Environmental Assessment

Mulberry Project

Pisgah National Forest, Grandfather Ranger District
Caldwell County, North Carolina

Mulberry Project

Environmental Assessment

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CHAPTER 1 – PURPOSE AND NEED

1.2 Background

This proposal is located within the 8,653 acre Lower Mulberry Forest Plan Analysis Area (AA). Additionally, it is also about 31 miles northeast of Marion, North Carolina; about seven miles northwest of Lenoir, North Carolina; and about nine miles southeast of Blowing Rock, North Carolina. Specifically, the proposal is located within compartments 2-5, 7, 16-21, and 23 (project area) and within Caldwell County (see Figure 1).

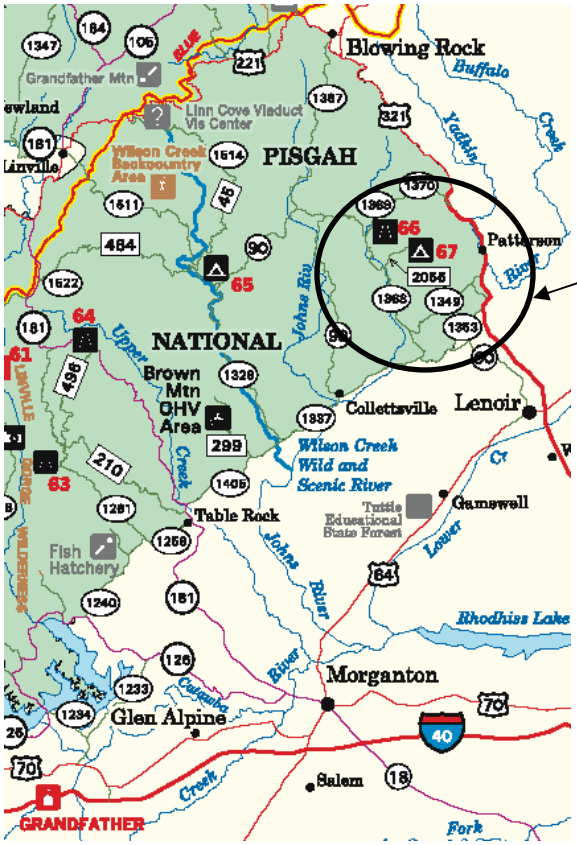

Figure 1: Vicinity Area of Mulberry Project

The proposal is within Management Area (MA) 2A, which emphasizes visually pleasing scenery (Forest Plan, pages III-63 – III-70); (MA) 3B, which emphasizes sustained yield timber management (Forest Plan, pages III-71 – III-76); and MA 18, which emphasizes riparian areas (Forest Plan, pages III-179 – III-189).

The Lower Mulberry AA contains a portion of the designated old growth Large Patch 30 which satisfies the medium patch requirement for this AA. Large Patch 30 is the only large patch within the AA of the project and has been evaluated and designated as an old growth large patch. There are no Inventoried Roadless Areas, North Carolina State proposed Natural Heritage Areas, wilderness areas, or wild and scenic river designations in the project area. In addition, there are no Research Natural Areas (RNA) or Botanical Special Interest Areas recognized by the current Forest Plan within the AA.

This Environmental Assessment (EA) tiers to the Final Environmental Impact Statement (FEIS) for the Forest Plan and incorporates by reference the FEIS for Vegetation Management in the Appalachian Mountains (VMAM).

1.1.1 Project Record

This PA incorporates by reference (40 CFR 1502.21) the project record. The project record contains specialist reports and other technical documentation used. The specialist reports provide additional detailed analysis. This PA 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 Alternative C – Preferred Alternative

On May 15, 2007, a scoping letter was mailed to interested members of the public soliciting responses to a proposal (Alternative B) for meeting objectives in the Lower Mulberry AA. Since issuance of the scoping letter, a biologically rare plant (*Hexastylis contracta*) has been located in the project area. As a result, Alternative B has been eliminated from detailed study and Alternative C was developed to meet project objectives (see also Section 2.3.3, Chapter 2). In addition since issuance of the scoping letter, it was determined that prescribed burning is occurring within the Lower Mulberry AA using rotational burning prescriptions under a previous decision. As a result, prescribed burning with the Mulberry Project is not necessary to meet Forest Plan objectives.

Alternative C would create early successional habitat for wildlife by harvesting trees that would create two-aged stands on a total of about 275 acres in 10 units ranging in size from about six acres to 40 acres. Maps of this alternative and others are located at the end of the EA.

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

Table 1: Mulberry Project Timber Harvest Proposal

Unit	Comp.-Stand #	Mgt. Area	Acres	Current Forest Type	CISC Age	Cutting Method	Residual Basal Area ft^2	Yarding Method
1	03-47	3B	29	White Pine (WP) – Upland Hardwood (Up.Hwd)	80	Two-Age	15-20	Skidder
2	03-01	3B	8	WP – Up.Hwd	80	Two-Age	15-20	Skidder
3	03-01	3B	21	WP – Up.Hwd	80	Two-Age	15-20	Skidder
	03-02	3B	19	WP – Up.Hwd	90	Two-Age	15-20	Skidder
4	03-02	3B	27	WP – Up.Hwd	90	Two-Age	15-20	Skidder
5	03-03	3B	19	WP	78	Two-Age	15-20	Skidder
6	03-37	2A	6	WP – Up.Hwd	80	Two-Age	15-20	Skidder
9	20-06	3B	40	WP	105	Two-Age	15-20	Skidder
10	21-11	3B	12	Up. Hwd – WP	76	Two-Age	15-20	Skidder
	21-12	3B	12	Up. Hwd – WP	76	Two-Age	15-20	Skidder
	21-13	3B	16	Up. Hwd – WP	76	Two-Age	15-20	Skidder
11	21-06	3B	40	White Oak-Northern Red Oak-Hickory	78	Two-Age	15-20	Skidder
12	18-09	3B	26	WP	92	Two-Age	15-20	Skidder
Total			**275**					

In addition, Alternative C would:

- Perform road maintenance on the existing roads that access the area.
- Utilize and reconstruct about 1.8 miles of existing old "woods" roads and develop about 2.0 miles of new temporary roads to access harvest stands. Following harvest activities, the 1.8 miles of old woods roads would be placed on the Forest's transportation system as authorized (system) roads, stabilized (i.e., shaped, waterbarred, and seeded), and accessed for motorized administrative use only—they would be available for future access needs. The new temporary roads would be disked, seeded, and permanently closed (about 1.5 acres of temporary roads would serve as permanent wildlife linear openings).
- Selectively apply herbicides to control/manage non-native invasive plant species along roads.
- Selectively apply herbicides and use hand tools to ensure successful regeneration of a variety of native tree species in harvested areas, especially oaks, by controlling competing vegetation.
- Designate at least 50 acres of small patch old growth communities within Compartments 3 (74 acres), 18 (50 acres), 20 (50 acres), and 21 (50 acres).
- Apply erosion control measures to protect water quality. These measures would be for all activities including roads and log landings.
- Perform stream rehabilitation on ½ mile of Boone Fork Branch; along the drainage above and below the Boone Fork Reservoir; and at the crossing on Deep Cove and Forest Service Road 2055. Rehabilitation on Boone Fork Branch would include placing about 16 rock and log vanes. Rehabilitation above and below the reservoir includes sloping back stream banks, planting trees/shrubs along stream banks, and placing rock below the culvert below the reservoir. Rehabilitation at the crossing on Deep Cove includes modifying the crossing to allow fish passage (a more detailed description is located in the project record).
- "Daylight" along either side of a portion of Forest Service Road (FSR) 189 (Spencer Branch Road), to allow more sunlight to reach the roadbed by harvesting trees within fifteen feet either side of the road (so the road would dry out more quickly, thus reducing rutting). The entire six mile length of the road would not be daylighted – only those portions where sunlight does not adequately reach the roadbed.
- Develop a 2 acre wildlife field from a log landing in Unit 11 to native grasses and forbs to enhance wildlife food sources. Plant an old variety apple trees in log landings after harvest is completed to enhance wildlife food sources in the area. There may be opportunities to plant advanced oak seedlings in Units 5, 9, and 12 based on follow-up silvicultural exams.

1.3 Purpose and Need for Action

The Mulberry area is the next area the Grandfather Ranger District has identified to ensure each compartment is scheduled for management analysis at a 10-year interval. There is a need to develop between 4%-14% early-successional (0-10 year age class) wildlife habitat in the project area because there is currently one percent 0-10 year wildlife habitat. There is also a need to provide a sustainable supply of timber from the project area. The purpose of the two-age harvesting is to develop additional early-successional wildlife habitat in the project area and increase the amount of hard mast producing tree species (oaks and hickories).

There is a need to control/manage populations of invasive-exotic plants such as princess tree, tree-of-heaven, Japanese plume grass, and others because they have been found in the project

area. The purpose of the herbicide treatment of invasive/exotic plants is to reduce potential for spread of them in the project area.

There is a need to improve water quality and fish habitat along and within stream reaches because sedimentation and erosion have been found in the project area and a culvert restricts fish passage. The purpose of rehabilitating stream channels and providing fish passage is to improve water quality, stream bank stability, and fish habitat.

There is a need to designate small patch old growth communities in Compartments 3, 18, 20, and 21 because no small patch old growth communities are currently designated in them. The purpose of designating small patch communities in Compartments 3, 18, 20, and 21 prior to harvesting is to ensure there is a network of old growth communities across the Forest.

There is a need to develop about three acres of permanent grass/forb wildlife habitat in the project area because there is currently 24 acres of permanent grass/forb wildlife habitat. The purpose of the about two acre wildlife field and 1.5 acre linear openings is to develop about 27 acres of permanent grass/forb wildlife habitat in the project area, further moving the project area towards the desired condition of 43 acres.

There is a need to reduce fuels because excess fuel loads pose a threat to resources in the project area. The purpose of prescribe burning up to about 250-500 acres in Compartments 20 and 21 is to reduce fuel loads and reduce potential for future wildfires to burn with adverse impacts. (**Note**: this objective is being achieved under a decision made on September 26, 2006, to continue rotational prescribed burning across the Grandfather Ranger District. There will not be an additional action proposed for prescribed burning under the Mulberry proposal).

1.3.1 Forest Plan Direction

This proposal was developed to address management opportunities identified for wildlife, timber, and other forest resources within the project area. Management opportunities were identified through a comparison of existing conditions with desired current and future conditions defined by the General Direction and Standards for Management Areas (MA) 2A, 3B, and 18 in the Land and Resource Management Plan, Amendment 5, for the Nantahala and Pisgah National Forests (Forest Plan, USDA March 1994). The general direction and goals for MA 2A is to: provide *visually pleasing scenery for forest visitors. Roads are generally open with the adjacent forest land managed to provide that pleasing visual experience. Timber production is permitted, but modified to meet visual quality objectives*; and MA 3B is to: *emphasize a sustainable supply of timber with few open roads while permitting road construction for resource management and to manage habitat of mixed ages of forests primarily for wildlife species such as wild turkey, deer and other animals requiring similar environments* (Forest Plan, pages III-63 and III-71). Embedded within MAs 2B and 3B is MA 18; which: *consists of the aquatic ecosystem, riparian ecosystem, and closely associated plant and animal communities and is actively managed to protect and enhance, where possible, the distinctive resource values and characteristics dependent on or associated with these systems* (Forest Plan, page III-179).

The Lower Mulberry watershed contains a portion of the designated old growth Large Patch 30 which satisfies the medium patch requirement for this watershed. Large Patch 30 is the only large patch within the analysis area of the project and has been evaluated and designated as an old growth large patch. There are no Inventoried Roadless Areas, North Carolina State proposed

Natural Heritage Areas, wilderness areas, or wild and scenic river designations in the project area.

1.4 Public Involvement

The proposal was listed in the April and July 2007 Schedule of Proposed Actions. The proposal was provided to over 120 members of the public and other agencies for comment during scoping that was initiated on May 15, 2007. In addition, as part of the public involvement process, the agency hosted an open house meeting in Collettesville, North Carolina on July 10, 2007. A post card was mailed to over 120 members of the public informing them of the open house meeting; a press release explaining the open house meeting was provided to local newspapers; and notices were placed in numerous businesses, public areas, and local residents in the surrounding area.

1.5 Issues

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

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

1.5.1 Significant Issue

1.5.1.1 Significant Issue #1: Botanical Resource: *Harvest related activities may have adverse impacts to botanical threatened, endangered, sensitive, Forest Concern, and Management Indicator Species (especially Hexastylis contracta, a Regional Forester's sensitive species)*

1.5.2 Non-significant Issues

1.5.2.1 Water Quality and Aquatic Resources – *Reconstructing roads and harvest-related activities may impact aquatic threatened, endangered, sensitive, Forest Concern, and Management Indicator Species*

1.5.2.2 Non-native Invasive Plants – *Management activities may increase infestation of invasive exotic plants*

1.5.2.3 Scenic Resources – *Harvest related activities may impact scenic resources*

1.5.2.4 Diversity of Wildlife Habitat – *The proposal may not develop enough brushy interface and early successional wildlife habitat*

1.5.2.5 Cultural Resources – *Harvest related activities may impact cultural sites*

1.5.2.6 Soil Resource – *Harvest related activities may impact soils*

1.5.2.7 Non-timber Related Economics – *Harvest related activities may have adverse effects to non-timber related markets* (see also Appendix E)

1.5.2.8 Herbicide Use – *Herbicide use may impact wildlife, aquatic, botanical resources, and humans*

1.5.2.9 Recreation – *Harvest related activities may impact recreation resources*

1.5.2.10 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

2.1 Range of Alternatives

The range of alternatives developed and analyzed by the interdisciplinary team (IDT) was driven by the purpose and need underlying the proposal (Chapter 1, Section 1.3), and by the 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 five alternatives. Following internal review, two alternatives were considered in detail and three were eliminated from consideration.

2.2 Alternatives Considered in Detail

Two alternatives were considered in detail by the IDT; Alternative A – No Action and Alternative C – Preferred. Project design features for activities in Alternative C are also described in this chapter.

2.2.1 Alternative A – No Action

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

2.2.2 Alternative C – Preferred Alternative

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

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 – No Herbicide Use

This alternative proposed to use manual methods and not herbicides for controlling competing vegetation and invasive exotic plants.

This alternative was eliminated 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 efficient as herbicide use to meet desired objectives. Part of the purpose and need of the proposal is to control/manage pest populations and the Forest Plan provides a standard for herbicide use to do this (Section 1.3, 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; the *Vegetation Management in the Appalachian Mountains* (VMAM) FEIS; design features disclosed in Appendix F; and Forest Plan standards and guidelines including *Requirements For Vegetation Management In The Appalachian Mountains* listed in Appendix I of the Forest Plan (pages I-10 – I-14). 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, pages 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 are necessary to ensure practical/cost efficient site preparation, release, and control/management of invasive exotic plants.

2.3.2 Alternative 2 – Develop Additional Early Successional Wildlife Habitat and Daylight Around Current Wildlife Openings

This alternative proposed to develop additional early successional wildlife habitat in the Lower Mulberry AA. Some members of the public responded to the May 15, 2007, scoping letter requesting that additional early successional wildlife habitat be developed over what the May 15, 2007, proposal would have developed.

This alternative was eliminated from detailed study because additional early successional wildlife habitat developed above that proposed in Alternative C (Section 1.2, Chapter 1) is not necessary to meet resource objectives.

2.3.3 Alternative B – Proposed Action

This alternative was the Proposed Action identified in the May 15, 2007, scoping letter—it was developed to meet project-level objectives. Following issuance of the scoping letter, a Regional Forester's sensitive plant was located in the Lower Mulberry AA (*Hexastylis contracta*). Units 7 and 8 are located within occupied habitat for this species (Stands 03-22, 03-24, and 18-12).

This alternative was eliminated from detailed study because timber harvest and construction or reconstruction of roads would have directly adversely affected individuals of *Hexastylis contracta* by exposure to logging activities such as moving heavy equipment, skidding logs, and road construction that damages individual plants.

2.4 Project Design Features and Monitoring 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 Appendix A and Appendix F).

2.4.1 Project Design Features

1. Trees accidentally felled across stream channels (that prevent or block stream flow) would be lifted (when possible) away from the water. If this is not possible, each tree would be

pulled away from the water where it fell and temporary decking would be used to support the weight of the tree as it is pulled across the channel. These removals would be perpendicular to the stream channel whenever possible to minimize stream bank disturbance. Bare soil would be seeded and mulched if native vegetation does not start to recolonize the area by the time timber removal from the unit is complete.

2. Skid roads would avoid stream crossings and paralleling perennial channels within designated riparian areas.
3. Temporary crossings of ephemeral streams would include temporary bridges or armoring with stone or brush.
4. Landings and skid trails should be vegetated as soon as possible after use to avoid off-site soil movement.
5. Temporary roads (if needed) would be constructed to avoid runoff into area streams. In addition, silt fence, straw bales, or brush barriers would be placed along the length of the road where it parallels or crosses a stream as needed to control runoff and stream sedimentation.
6. Marking guidelines would include the priority residual tree species of; White Oak, Red Oak, Hickory, Black Oak, Chestnut Oak, where they occur. In addition, two 12" or greater diameter Black Gum species will be left as residual within every 10 acres, where this species occurs.
7. To mitigate the possible effect of invasive plant species to this proposal, all known populations of *Miscanthus sinensis*, *Paulownia tomentosa*, *Celastrus orbiculatas,* and *Ailanthus altissima* should be controlled prior to disturbance activities. *Miscanthus sinensis* was found along Forest Roads. All populations total less than one acre. Control of *Miscanthus sinensis, Paulownia tomentosa,* and *Ailanthus altissima* is most easily and effectively done by the use of herbicide (Glyphosphate).
8. It is recommended that native plants be utilized in wildlife improvement and roadside erosion control plants.
9. Portions of harvest Units 10 & 11 are visible from US 321, NC 268, Happy Valley, and Setzer areas. These units would retain 25-30 ft^2 rba/ac from the main ridge to the eastern unit boundary. This would allow treatments to exceed the assigned M VQO, and meet PR VQO where seen from the east.
10. The lower part of Unit 9 lies adjacent to SR 1349. Areas within 200 feet of the state road would retain 25-30 ft^2 rba/ac.
11. Harvest Unit 12 is visible from Sand Mountain Trail, Globe Mountain, and Mulberry Creek valley. The unit boundary would be maintained one tree-height below the ridge to the west; this would prevent gaps or sparse forest coverage along the ridge. An uncut buffer would be retained one tree-height below the new temporary road.
12. The portions of Unit 3 would retain 25-30 ft^2 rba/ac within MA 2A in the Boone Fork area.
13. Portions of Unit 2 are visible from Boone Fork Pond, would retain 25-30 ft^2 rba/ac.
14. Where possible, temporary roads into Units 1, 2, 6, & 9, would be designed to exit the State or Forest Service Road, and turn to minimize amount of visible graded roadbed. These temporary road intersections would be disked and seeded after project completion. Landings for these units would be placed beyond sight of the State or Forest Service Road.

2.4.2 Monitoring

1. National objectives include reducing impacts from invasive species and improving the effectiveness of treating selected invasive species on the Nation's forests and grasslands. Survey areas would be established 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 monitor effectiveness of treatments).

2.5 Summary Comparison of Actions by Alternative

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

Table 2-1: Management Activities by Alternative

Activity	Alternative	
	A	C
Two-age harvest (acres)	0	275
Site prepare and subsequent release, if needed (acres)	0	275
Control/manage non-native invasive plants along Forest Service roads (Y/N)	No	Yes
Temporary roads developed. Following harvesting, they would be disked and seeded, and permanently closed for access (miles)	0	2
Improve old woods roads accessed. Following harvesting, they would be disked and seeded, closed, then placed on the transportation system (miles)	0	1.8
Designate small patch old growth communities (acres)	0	224
Apply erosion control measures (Y/N)	No	Yes
Implement stream restoration along Boone Fork Branch and Deep Cove (Y/N)	No	Yes
Permanent wildlife linear openings developed (acres)[1]	0	1.5
Permanent wildlife field developed (acres)[2]	0	2
Temporary wildlife fields developed (acres)[3]	0	4.5
Daylight Spencer Branch Road for road maintenance purposes (Y/N)	No	Yes

1 Linear openings developed from temporary roads
2 Wildlife field developed on log landing in Unit 11
3 Temporary wildlife fields developed on log landings along with planting of apple trees – these fields would not be maintained by periodic mowing

CHAPTER 3 – ENVIRONMENTAL CONSEQUENCES

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

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

Activity	Description
Wildfire/Rx Burning	Past wildfires (~60 acres)
	Past rotational prescribe burns (~100 acres)
Watershed	Impacts and improvements related to 2004 tropical storms
Timber Harvesting	Past harvesting (<11-20 years ~1,260 acres)
Road Maintenance	Periodic general maintenance (blading, ditch clearing, culvert replacement)
Private Lands	Increased development over the past 20+ years
	Little Rocky Knob Trespass
Recreation	Boone Fork Campground (~35 years old)
	Mulberry Picnic grounds (~60 years old)
	Boone Fork Pond (~20 years old)
Habitat Improvement	Existing wildlife fields and linear openings (<25 acres)

3.1 Hydrology and Aquatic Habitat

This analysis addresses activity area waters and aquatic AA waters. Activity area waters are defined as those within or directly adjacent to any proposed activity. The aquatic AA encompasses activity area waters and downstream reaches that could be impacted by project activities. The aquatic AA is larger than the activity areas. Additional analysis on aquatic habitat is disclosed in Appendix A, [Biological Evaluation (BE)]; Section 3.8 [Management Indicator Species (MIS)], and; Section 3.9 [Threatened, Endangered, Sensitive (TES), and Forest Concern (FC) Species] of this document. Also, additional information on aquatic resources can be found in; and the aquatic resource report, which is part of the official project record.

3.1.1 Existing Condition

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

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

Table 3-2: Forest Plan Watershed 60 (Johns River)

Stream Name	Unit Number	Kilometers in Activity Areas	Kilometers in Aquatic AA
Boone Fork Branch	6,7	1.2	3.7
*UT 1 Boone Fork	1, 2, 3	1.6	1.0
UT 2 Boone Fork	1	0.1	0.3
UT 3 Boone Fork	2, 3	0.2	0.2
UT 4 Boone Fork	7, 8	0.7	0.9
UT 5 Boone Fork	8	0.2	0.2
Deep Cove Branch	3, 4, 5	1.2	2.1
UT 1 Deep Cove Branch	4	0.2	0.3
UT 2 Deep Cove Branch	5	0.2	1.2
Spencer Branch	9	0.6	2.4
UT 1 Spencer Branch	9	0.2	0.2
UT 2 Spencer Branch	9	0.1	0.1
UT 3 Spencer Branch	9	0.2	0.2
UT 4 Spencer Branch	12	0.2	0.4
Mitchell Branch	10	0.2	2.6
Loving Branch	10, 11	0.9	3.7
UT 1 Loving Branch	11	0.2	0.2
UT 2 Loving Branch		0.3	0.3
UT 3 Loving Branch	11		1.3
Stapps Branch	11	0.1	2.7
Mulberry Creek			5.0
Little Mulberry Creek			1.6
Total		**8.6**	**30.6**

* Un-named tributary

Fish habitat exists within the aquatic AA of Boone Fork Branch, Deep Cove Branch, Spencer Branch, Mitchell Branch, Loving Branch, Stapps Branch, Mulberry Creek and Little Mulberry Creek. The un-named tributaries generally provide restricted flow regimes (habitat) for aquatic macroinvertebrates only (the exception is during spawning when some fish may use the mouth of these tributaries for redds). Activity area waters also provide habitat for macroinvertebrates.

Culverts along Forest Service Roads (FSR) 2055, 966, 6089, and 189, the roads themselves, and existing old roads and skid trails in the activity areas are the existing threats to streams and drainages. Impacts from these sources are limited to down slope movement of sediment from road runoff and culvert fills. In most cases, it is expected that a majority of sediments from these sources are deposited in the natural vegetative filters before they reach areas of perennial streams.

3.1.2 Effects Analysis

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

Effects are disclosed below for: 1) transportation access on aquatic resources; 2) timber harvest on aquatic resources, water quality, and riparian areas; 3) herbicide use; and 4) stream restoration in Boone Fork Branch and tributary.

3.1.2.1 Effects of Transportation Access on Aquatic Resources

Alternative A – No Action

Implementation of the No Action alternative would perpetuate the existing condition described above. Aquatic habitat quality, quantity, and populations would continue in their natural dynamic patterns. It is important to note that natural processes include aspects such as extinction of species and loss of habitat types. There would be no impacts upon the two Sensitive (S) species or the eight Forest Concern (FC) species (see Section 3.8 and 3.9, and Appendix A for species).

Alternative C

Direct Effects: There are no new stream crossings associated with this alternative. 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. As a result, no measurable direct adverse impacts to riparian areas are expected to occur within riparian areas from access.

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 reducing potential for erosion and sedimentation to impact streams.

Indirect Effects: Temporary stream crossings would 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). There may be off-site movement of soil into activity area waters from temporary road construction and drainage culvert placements. Turbidity and sediment loading can cause mortality by injuring and stressing individuals (fry) or smothering eggs and juveniles. Available habitat, including the interstitial space within substrate used as spawning and rearing areas, may be covered with sediments. This loss of individuals would be so minimal within the entire analysis area that it would not cause the decline of population trends and would not be a cause for viability to change on National Forests. The project design of the Mulberry Project minimizes sedimentation and therefore less mobile species that are affected by the implementation of this project would recolonize. Episodic fluctuations in turbidity may occur after soil disturbance ends because sediments deposited within the stream bed may be re-suspended during high flow events (Swank *et al*. 2001). Larger, more mobile aquatic species, such as fish are able to temporarily escape the effects of sedimentation by leaving the disturbed area. Over time, these species would recolonize areas as habitat conditions improve. This usually occurs after vegetation has reestablished and sediments are flushed through the system by storm events.

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

Alternative A – No Action

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

Alternative C

Direct & Indirect Effects: North Carolina Forest Practices Guidelines (NC-FPGs) and Forest Plan standards (best management practices or BMPs) would be implemented during harvest activities. Applications of Forest Plan standards are intended to meet performance standards of the state regulations. Visible sediment derived from timber harvesting, defined by state regulations, should not occur unless there is a failure of one or more of the applied erosion control practices. Should any practice fail to meet existing regulations, additional practices or the reapplication of existing measures would be implemented as specified by state regulations. According to the NC Forestry BMP Implementation survey 2000 thru 2003, [i]*mplementation of BMPs are critical in protecting water quality*. Monitoring of BMP structures for the English White Pine timber sale occurred during a two inch rain event in the summer of 2007. Straw bales, mulching and seeding had been installed two weeks prior to the event. The stream adjacent to the activity area at the stream crossing was flowing clear and void of sediment from the associated activities.

There is no plan to harvest within any 100 foot riparian area of perennial streams within the Mulberry Project area. Riparian vegetation (within 100 linear feet) would remain in tact for all other areas. According to the Land and Resources Management Plan (LRMP) Vol. 1: *Under these conditions, no increase in water temperature is anticipated under any of the alternatives. Since riparian-area treatment is not expected under any alternatives, availability of woody debris would be positively influenced if there was no harvest anywhere within the riparian zone on each streambank* (Vol. 1, page IV-36).

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

3.1.2.3 Effects of Herbicide Use

Alternative A – No Action

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

Alternative C

In accordance with the Vegetation Management Final Environmental Impact Statement (VMAM FEIS), herbicide spraying would not occur within 30 horizontal feet of water unless the herbicide has been approved for aquatic applications. The herbicide Triclopyr (ester formulation) has the potential to cause direct mortality to aquatic organisms at a concentration of 0.74 parts per million (ppm). The amine formulation of Triclopyr can be lethal at concentrations of 91 ppm (VMAM-FEIS). Concentrations of Glyphosate at 24 ppm can be lethal to some aquatic organisms (VMAM-FEIS). Sublethal effects, such as lethargy or hypersensitivity, have been observed in fish at concentrations of 0.1 mg/L – 0.43 mg/L. No adverse effects have been observed in fish or aquatic invertebrates from exposure to imazapic concentrations up to 100 mg/L. Field applications of herbicides where stream buffers have been maintained have resulted in concentrations of these herbicides in streams below the lethal concentration – generally concentrations ≤ 0.0072 ppm in the adjacent streams (Durkin, 2003a; Durkin, 2003b; and Durkin and Follansbee, 2004). Furthermore, these herbicides degrade into nontoxic compounds in

approximately 65 days (VMAM FEIS). The 30-foot buffers would prevent the Estimated Environmental Concentrations of Glyphosate or Triclopyr from reaching the LD_{50} (Lethal Dose at which 50% of the organisms suffer mortality) for any aquatic species (VMAM-FEIS) because the herbicides would not enter the streams in any measurable quantity. Concentrations of these herbicides in adjacent waters where the waters were buffered (about 33 feet) resulted in concentrations of ≤0.0072 ppm. These concentrations are too low to produce the lethal or sub lethal effects described above. Activity area streams would be protected by a 30-foot buffer (minimum) which would prevent the concentrations of these herbicides from accumulating within the activity area streams in measurable quantities. There would be no effects to coldwater streams community because the amount of herbicides in activity area waters would be immeasurable.

3.1.2.4 Effects of Stream Restoration in Boone Fork Branch and Tributary

Alternative A – No Action

Under this alternative, channel stabilization actions would not occur. Without the stabilization actions, stream banks would continue to contribute sediment to the Boone Fork Branch and the un-named tributary to Boone Fork Branch, adversely affecting water quality. The current rate of bank erosion is expected to continue or increase due to unstable bank conditions. A slight increase in the current rate of erosion could occur as the undercut trees on the bank fall over and expose more soil, putting water quality at risk. Additionally, pool habitat would remain at the current low level or decrease further with continued sedimentation.

Alternative C

The action alternative would have direct short-term (≤1 year) negative effects on turbidity and fine sediment mobilization, but positive, indirect effects on hydrology and water quality of the Boone Fork Branch in the long term. Constructed structures would redirect stream flow away from stream banks, where it is causing erosion, and back into the middle of the channel. Stream banks would be sloped back to a stable angle upstream and downstream of each vane where practical. Stream banks would be seeded, mulched, and planted with native riparian vegetation.

Vane structures would be installed to work with the existing streambed form of the channel. Therefore, location of the vanes would generally coincide with existing riffle and pool habitats. Much of the bed material removed from the channel during construction would be placed on the upstream side of the vanes against the stream bank to enhance the deposition that would naturally occur there. The areas along the bank, both upstream and downstream of the vanes, would fill in after construction as deposition occurs over the years. By doing so, the channel would narrow and generally improve water quality and aquatic habitat. A narrower channel would be deeper and less prone to water temperature warming. Pools and riffles would be well defined and of better quality than currently at the site.

The vanes are not likely to increase peak flow levels or the risk of flooding since they are designed to increase channel efficiency. Following construction of the vanes, the wetted channel width at low flow is expected to narrow by approximately 6 feet on average and deepen by about 0.2 feet. As a result, stream flow velocity is expected to increase slightly through the reach. Based on the general USGS safety standard (depth x velocity less than six) the summertime average flows would be safe for wading. The need for public river safety education would not increase with this alternative.

Additionally, the proposed vane and the associated bank work would help stabilize the channel of Boone Fork Branch. Stabilizing the bank would reduce the existing chronic source of sediment, improve aquatic habitat, and establish riparian vegetation. A short-term pulse of sediment created from the construction of the vanes is expected but would be outweighed by the long-term benefit of a stable stream channel. Implementation of Forest Plan standards and guidelines requiring erosion control while working in riparian areas would further reduce sediment input.

3.1.2.5 Cumulative Effects

Alternative A – No Action & Alternative C

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

Remnants of the past activities within the Mulberry project area where access was associated with the projects can be on-going contributors to adverse impacts to aquatic resources. In general, undersized culverts and degraded stream crossings cause constant sources of problems for aquatic resources including unstable stream banks and channelization. Within the aquatics AA, solutions to these problems have been implemented with one exception within Raccoon Cove. This project has been identified as a Forest need and is proposed to be addressed in 2008 fiscal year. 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 the riparian vegetation is unaffected. Therefore, prescribed fire does not contribute to cumulative effects to aquatic resources.

The flood events of 2004 had varying affects on streams in the Mulberry area although the return period of flooding was likely the same for the entire area. Differences in stream channel response depended on the condition of the stream and riparian vegetation at the time of flooding. Since catastrophic events such as flooding are a natural part of the evolution of a stable channel, streams that were stable at the time of flooding typically maintained a level of overall stability within a natural range of variability or within its dynamic equilibrium. Where streams have had previous disturbance to channel dimension, pattern, and profile and/or where riparian vegetation had been altered, streams were prone to adjustment. Many of these streams adjusted by scouring stream bed and/or banks in the headwaters and in entrenched channels. In the more downstream reaches in the area, sediment deposition was high as scoured material from upstream reaches dropped out of transport.

Hemlock Wooly adelgid treatment has occurred within the project area of the Mulberry Project around Boone Fork Branch. 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 will 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 the Forest is available at http://www.cs.unca.edu/nfsnc/nepa/hwa_ea.pdf.

Activities on adjacent private lands have the potential to affect aquatic habitat within the watersheds associated with the Mulberry Project. These include the Rocky Knob Watershed Restoration (partially on National Forest System lands), residential development along state road 1253 and tree and shrub farms along Little Mulberry and Mulberry Creek. The proposed action alternative is not expected to cause long term impacts to the aquatic resources within the area, therefore the Mulberry Project will not further degrade water quality.

An existing source of sediment within Raccoon Cove has been identified as a need for repair in 2008. The crossing was destroyed as a result of a large storm that moved through the area. Most of the disturbed area has temporarily stabilized. The work associated with the Mulberry action alternative will not contribute to cumulative impacts to Raccoon Cove.

As a result, the expected cumulative effects should not be any greater than the direct and indirect effects disclosed above and there should be no adverse cumulative effects to the analysis area aquatic resources, based on the project's design features included in this analysis.

3.2 Wildlife

The wildlife effects were evaluated over the Lower Mulberry Forest Plan AA (wildlife AA), a total of 8,653 acres. Compartment 7 within this AA was identified in the Nantahala & Pisgah Forest Plan as a portion of Forest Interior habitat patch # 33; however, there are no activities proposed within Compartment 7. Additional wildlife analyses are located 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 wildlife resource report, project record.

The following tables display forest type and habitat, and age-class information:

Table 3-3: Existing Forest Types within the Lower Mulberry AA

Species/Forest Type	Acres (CISC)	% of AA
White Pine	1,329	15%
White Pine - Hemlock	14	>1%
Hemlock – Hardwood	1/212	2%
White Pine – Cove Hardwood	1/331	4%
White Pine – Upland Hardwood	513	6%
Yellow pine - oak	246	4%
Yellow pine (pitch, shortleaf, virginia)	602	7%
Table mtn - Hardwood	53	>1%
Cove Hardwood – White Pine – Hemlock	1/&2/321	4%
Upland Hardwood – White Pine	2/298	3%
Bottomland Hardwood – Yellow Pine	6	>1%
N. Red Oak - Hickory - Yellow Pine	3/155	2%
Chestnut Oak – Scarlet Oak -Yellow Pine	431	5%
Yellow Poplar	1/108	1%
White Oak – N. Red Oak – Hickory	3/1,368	16%
Yellow Poplar – White Oak – Red Oak	2/2,378	27%
Chestnut Oak	3/237	3%
Scarlet Oak	3/51	1%
Total	**8,653 ac**	**100%**

1/ Cove forest type
2/ Medium level hard mast = 2,997 acres

3/ High level hard mast = 1,811 acres

Table 3-4: Age Class Representation and Proposed Change by Alternative C in Lower Mulberry AA

Age Class – Habitat Vegetation Component	Acres (CISC)	Percentage of AA
0-10 age – Early Successional	0	0%
11-20 age – Early Successional	1,261	15%
21-50 age – Mid Successional	891	10%
51-100 age – Mature Forest	5,378	62%
101-140 age – Old Forest	1,123	13%
Grass/forb habitat (high quality)[1/]	26	0.3%
Grass/forb habitat (Low Quality)[3/]	35	0.4%
[4/]**Total**	**8,653**	**100%**
Open road - mi/mi^2	[5/]2.2	

1/ Stand inclusions
2/ Includes 2 acre opening, 2.5 acre landings, and 1.3 acre linear openings
3/ Low Quality grass/forb are linear openings open to horse & mountain bike use, Boone Fork Campgrounds, and Mulberry Picnic area
4/ Total = Regeneration acres - grass/forb area to be built within regeneration area
5/ 51.8 total open road miles in and around wildlife AA; 3.98 mi/mi^2 total for wildlife AA of which 2.2 mi/mi^2 is on NFS lands

3.2.1 Effects Analysis

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

Under this alternative, the early successional habitat (ESH; 0-10 years) would remain at 0 acres and the grass/forb openings would also remain at <1 percent. The Forest Plan standard for early successional habitat is 5% - 10% in Management Area (MA) 2A and 5% - 15% in MA 3B (Forest Plan, page III-31). The Forest Plan standard for grass/forb openings is 0.5% in MAs 2 and 3 (Forest Plan, pages III-23). Under this alternative habitat connectivity would be maintained. There would be no adverse cumulative effects with this alternative when combined with other activities listed in Table 3-1 above.

3.2.1.2 Alternative C – Direct, Indirect, and Cumulative Effects

The following table discloses the forest types and age class distribution by action alternative (refer to Section 3.8.3 below for further discussion of effects to wildlife and habitat):

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

Species/Forest Type	Acres in AA (CISC)	% of AA	Alternative C (acres harvested & regenerated)
White Pine	1,329	15%	85
Upland Hardwood – White Pine	[1/]298	3%	40
White Pine – Upland Hardwood	[2/]513	6%	110
White Oak – N.Red Oak – Hickory	[3/]1,368	16%	40
Total			**275**

1/ Medium level hard mast
2/ Cove forest type
3/ High level hard mast

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

Age Class – Habitat Vegetation Component	Acres (CISC)	% of AA	Alt C (ac/% chg)
0-10 age – Early Successional	0	0%	+267/3%
11-20 age – Early Successional	1,261	15%	n/a
21-50 age – Mid Successional	891	10%	n/a
51-100 age – Mature Forest	5,378	62%	-235/<3%
101- 140 age – Old Forest	1,123	13%	-40/<1%
Grass/forb habitat (high quality)[1/]	26	0.34%	+3.5/0.04%[2/]
Grass/forb habitat (low quality)[3/]	35	0.4%	+4.5/0.05%
Total	**8,653**	**100%**	**275/3%**

1/ Stand inclusions – permanent habitat
2/ Includes new 2 acre opening in Unit 11 and 1.5 acre linear openings
3/ Low Quality grass/forb are linear openings open to horse & mountain bike use, Boone Fork Campgrounds, and Mulberry Picnic area or are temporary in nature

Creation of ESH and Soft Mast Production

Alternative C creates 275 additional acres of ESH, which equates to almost 9% of the total Management Area 3B acreage.

Creation of Grass/Forb Habitat

Alternative C creates over three additional acres of high quality grass/forb habitat and over four additional acres of low quality grass/forb habitat; equating to about 0.34% and 0.4% of the AA in high and low grass/forb habitat respectively.

Hard Mast Production

The creation of ESH has the effect of setting back the age of the forest. Alternative C harvests and regenerates acres of mature forest. In the case of hard mast producing forest communities – those with abundant oaks and hickories – hard mast production would be reduced until the young, regenerating trees again reach mast producing age. Hard mast production would be temporarily reduced on 275 acres in Alternative C.

Large Woody Debris

There would be a short term increase in down wood on the 275 acres harvested under Alternative C.

3.2.2.1 US Fish and Wildlife Service Bird Species of Concern

The US Fish & Wildlife Service (USFWS) has listed bird species of conservation concern within this region. The wood thrush was found to occur during bird surveys within proposed harvest units 3, 9, and 10.

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

The wood thrush is found in moist cove forests where deciduous shrubs and saplings occur. The wildlife AA exhibits 972 acres of this preferred forest type for the thrush. In addition there are 341 acres of riparian habitat which may not always be defined as a cove forest type. Alternative C does not propose to harvest any of this habitat. Therefore, the habitat within the wildlife AA that is considered significant for this species will not be affected.

Recent research (Vitz, 2006) found wood thrush 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

3.3.1 Existing Condition

The botanical AA or "boundary of effects" used for this proposal is defined as: the total area within two kilometers of any proposed unit (activity area) or known EO (Element Occurrence) of any plant threatened, endangered, sensitive, or Forest concern species. The botanical AA consists of 11,096 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.

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 botanical AA (see table below). The invasive plants *Microstegium vinineum*, *Lonicera japonica* and *Allium vineale* (wild garlic) are so well established in parts of the botanical AA that control by any currently known method is entirely impractical. It is not known what affect, if any, this proposal will have on the populations of *Microstegium vinineum*, *Lonicera japonica* and *Allium vineale* within the botanical AA.

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 botanical AA because 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 3-7: Non-native Invasive Species Summary

Species	Regional Category	Location in Activity Areas	Recommendation[1]
Ailanthus altissima	1	FSRs 2055 Boone Fork, 6089 Benson Hallow	Control all populations along FSRs 188, 4111 prior to disturbance on FS land
Rosa multifora	1	FSRs 189 (Spencer Branch, 1167 Laurel Branch, 6084 Benson Hollow, 2055 Boone Folk	Control all populations along FSRs 189 (Spencer Branch, 1167 Laurel Branch, 6084 Benson Hollow, 2055 Boone Folk
Celastrus orbiculatas	1	FSRs	Control all populations prior to disturbance on FS land
Lespedeza cuneata	1	Wildlife Fields,	This species does not display invasive

Species	Regional Category	Location in Activity Areas	Recommendation[1]
		roadsides	tendencies. Not recommended to control.
Paulownia tomentosa	1	FSRs 188, 4111, 4071	Control all populations prior to disturbance on FS land
Lolium arundinaceum	1	Wildlife Fields	This species does not display invasive tendencies. Not recommended to control.
Lonicera japonica	1	Alluvial Forests, Roads Etc.	No practical effective control method known. No recommendation to control.
Microstegium vinineum	1	Mostly in Alluvial Forests and coves. Very well established bottoms.	No practical effective control method known. No recommendation to control.
Miscanthus sinensis	2	FSRs	Control all population prior to disturbance on FS 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 Alternative C

The following summarizes the effects analysis focuses on non-native plant species. Additional information and effects analysis on T&E and management indicator species (MIS) plant species is disclosed in Section 3.9 and Appendix A.

3.3.2 Alternative A – Direct, Indirect, and Cumulative Effects

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

3.3.3 Alternative C – 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:

Table 3-8: Non-native Invasive Species Effect Summary by Natural Community

Natural Community	Associated Species	Potential Creation of New Habitat by Natural Community for Alt C
Acidic Cove Forest	*Celastrus orbiculatas, Rosa multifora*	91 acres would be potential habitat 8 years after harvest and 5 acres (wildlife fields) will be permanent habitat
Rich Cove Forest	*Celastrus orbiculatas, Rosa multifora, Lespedeza cuneata, Paulownia tomentosa, Lonicera japonica,*	None. The proposal does not affect this community

Natural Community	Associated Species	Potential Creation of New Habitat by Natural Community for Alt C
	Microstegium vinineum, Miscanthus sinensis, Paulownia tomentosa,	
Pine Oak Heath/ Chestnut Oak Forest	*Paulownia tomentosa, Ailanthus altissima*	184 acres would be potential habitat 8 years after harvest and 10 acres (wildlife fields) will 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 ruderal (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 Table 8 for habitat effect summary). To mitigate this effect, it is recommenced that native plants be utilized in wildlife improvement and roadside erosion control plantings. It is recognized that erosion control and wildlife production are the primary goals of seeding areas and some non-native plant species may be highly beneficial to accomplish these goals. However, 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-native mixture of species.

3.3.4 Alternative C – Cumulative Effects

The cumulative effect to potential habitat is the total affect of past, current, and foreseeable actions within the botanical AA that have directly or indirectly affected T&E, S, and FC plant species potential habitat. Within the botanical AA, only timber harvesting and controlled burns are thought to have important influence on habitat. All other activities are minor and not analyzed (2004 Storm road repair, special forest product permits, hemlock woolly adelgid control, public recreation etc.). 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 non-native invasive habitat would be <1% for Alternative C due to project design.

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 Lower Mulberry AA. Herbicide use within the landscaping shrub/tree business would continue in the Lower Mulberry AA. There are no other known foreseeable actions in the activity areas that could affect resources in the Lower Mulberry AA due to herbicide use.

3.4.2 Alternative C – Direct, Indirect, and Cumulative Effects

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

Table 3-9: Maximum Acres of Herbicides Applied Manually by Alternative[1]

Herbicide	Alternative A	Alternative C
Triclopyr/Glyphosate (ac)[2]	0	280

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; design features disclosed in Appendix F; and standards and guidelines from the Forest Plan including *Requirements For Vegetation Management In The Appalachian Mountains* listed in Appendix I of the Forest Plan (pages I-10—I-14). 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 (mobile). In addition, with the provision of riparian buffer strips on stream zones, the risk of herbicide spills or movement into stream zones is further reduced. Due to project design, effects of the treatment would be limited to individual trees/plants and the immediate area near them and is not expected to adversely affect private residences downstream. All applicable mitigation measures contained in the VMAM FEIS and Forest Plan standards and guidelines would be

followed. A complete discussion of the effects of herbicides is contained in this FEIS, to which this analysis tiers to. Current pesticide information for Glyphosate and Triclopyr may be found at: http://www.fs.fed.us/foresthealth/pesticide/risk.shtml.

Impacts of herbicide use to wildlife, water quality, and humans are expected to be low due to proper handling and application. The use of herbicides would have no measurable impact on water quality because according to the VMAM FEIS: *No herbicide is aerially applied within 200 horizontal feet, nor ground-applied within 30 horizontal feet, of lakes, wetlands, or perennial or intermittent springs and streams. No herbicide is applied within 100 horizontal feet of any public or domestic water source. Selective treatments (which require added site-specific analysis and use of aquatic-labeled herbicides) may occur within these buffers only to prevent significant environmental damage such as noxious weed infestations. Buffers are clearly marked before treatment so applicators can easily see and avoid them* (VMAM FEIS, page II-67). There would be no adverse effects (direct, indirect, or cumulative) of the usage of herbicides associated with the action alternatives if no spills occur within riparian areas—no herbicide would be applied within at least 30 feet of riparian areas. According to the VMAM FEIS: *The greatest hazards to surface and ground water quality arise from a possible accident or mishandling of concentrates during transportation, storage, mixing, and loading, equipment cleaning, and container disposal phases of the herbicide use cycle*. Herbicides would be mixed at the pesticide storage building at the 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 Mulberry area that could affect herbicide use with this proposal—the last measurable herbicide use on NFS lands in the Mulberry 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.

There are no adverse cumulative effects anticipated with Alternative C and the actions listed in Table 3-1 above because effects from each project are not expected to be cumulatively added together due to 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 activity areas. The following table lists the soil map units found by stand number:

Table 3-10: Primary Soil Map Units by Stand by Alternative

Primary Soil Map Unit Name (Series)[1]	Stands[2]	Alternative A (acres)	Alternative C (acres)[3]
Chestnut Gravelly Loam (F)	1, 12	0	30
Chestnut & Edneyville (E&F)	1, 10, 11	0	49
Chewacla (E&F)	access roads	0	<1
Evard (E&F)	2, 3, 4, 5, 6, 9, 10, 11, 12	0	175

Primary Soil Map Unit Name (Series)[1]	Stands[2]	Alternative A (acres)	Alternative C (acres)[3]
Evard & Saluda (D&E)	4, 5, 10, 11	0	41
Hayesville (D)	3, 6, 9	0	10
Tate (E)	access roads	0	<1
Wehadkee (F)	access roads		<1
Total Acres		**0**	**~305**

1 – Average slope percent ranges are for soil map units from NRCS data and are not necessarily the average slope within the stand (A = 0% - 2%, B = 2% - 8%, C = 8% - 15%, D = 15% - 30%, E = 30% - 50%, and F = 50% - 95%)
2 – Portions of soil map units make up each stand.
3 – Includes about 1.8 miles of existing unauthorized roads and about 2.0 miles of temporary roads (existing unauthorized roads were previously used for timber harvest and would require minimal clearing and shaping for proposed use).

The following table displays characteristics of each soil map unit:

Table 3-11: Comparison of Soil Map Units[1]

Soil 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 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.
Chewacla	The Chewacla series consists mostly of cultivated land. It is somewhat poorly drained with moderate permeability. Series is moderately suited for harvesting equipment, well suited for reforestation, has slight hazard for erosion due to harvest equipment, and is poor suitability for road construction.
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.
Hayesville	The Hayesville series consists of very deep, well drained soils on gently sloping to very steep

Soil Map Unit Name	Characteristics
	ridges and side slopes of the Southern Appalachian Mountains. They most commonly formed in residuum weathered from igneous and high-grade metamorphic rocks such as granite, granodiorite, mica gneiss and schist; but in some places formed from thickly-bedded metagraywacke and metasandstone. On steeper slopes the upper part of some pedons may have some colluvial influence. Series is well drained; moderate permeability in the subsoil and moderately rapid permeability in the underlying material; medium internal drainage. Runoff class low on gentle slopes, medium on strong and moderately steep slopes, and high on steeper slopes. Runoff is much lower where forest litter has little or no disturbance.
Saluda	The Saluda series consists of shallow, well drained, moderately permeable soils that formed in weathered granite, gneiss, or schist. The series is 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.
Tate	The Tate series consists of very deep, well drained, moderately permeable soils on benches, fans, and toe slopes in coves in the Blue Ridge (MLRA 130). They formed in colluvium weathered from felsic to mafic high-grade metamorphic rocks. The series is well drained; saturated hydraulic conductivity is moderately high or high, permeability is moderate in the subsoil and moderately rapid permeability in the underlying material. Index surface runoff is negligible to medium. These soils receive surface and subsurface water from surrounding uplands, and seeps and springs are possible.
Wehadakee	The Wehadkee series consists of very deep, poorly drained and very poorly drained soils on flood plains along streams that drain from the mountains and piedmont. They are formed in loamy sediments. The series is poorly drained and very poorly drained. Runoff is very slow and internal drainage is very slow. Permeability is moderate. Most areas are frequently flooded.

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

3.5.1 Alternative A – Direct, Indirect, and Cumulative Effects

There would be no adverse effects to soils with this alternative because no activities are proposed.

3.5.2 Alternative C – Direct, Indirect, and Cumulative Effects

3.5.2.1 Direct and Indirect Effects

Any effects to soils with these alternatives would be negligible because almost all of the soil types where harvesting is proposed (99%) 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 1% of the harvesting is proposed on soil map series that are shallow and poor to well drained. There would be some minor, short-term erosion with the construction of 2.0 miles of temporary road and 1.8 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 and unauthorized roads would be disked and seeded following harvest activities. Harvesting under this alternative would be with ground based logging equipment (skidders or caterpillars) on about 4% of the AA.

3.5.2.2 Cumulative Effects

Effects from past, ongoing, and reasonably foreseeable future 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 AA—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 have been addressed under separate storm-related recovery projects. There are no other known projects in the AA that could cause adverse cumulative effects on soil resources when combined with potential effects of the Mulberry proposal.

3.6 Cultural Resources

3.6.1 Existing Condition

A total of 20 Class III archeological sites were located and recorded during the survey for the proposed Mulberry Project treatment areas – no Class I or II archaeological sites were found. Class III sites are not eligible to the National Register of Historic Places (NRHP) and subsequently do not require protection from ground disturbing activities.

3.6.2 Effects Analysis – Alternatives A & C

There are no expected adverse direct, indirect, or cumulative effects to NRHP eligible Heritage Resources with these alternatives because no Class I or II archaeological sites were found during archeological surveys.

3.7 Scenery Resources

3.7.1 Existing Condition

The Mulberry project area is in Caldwell County, between Mulberry Creek and US 321. The Yadkin River, Happy Valley, and Setzer Communities lie to the east. North Carolina Highway 268 and US Highway 321 are state designated scenic byways. Setzer and Happy Valley have growing residential communities, portions US 321 are commercially developed, and Mulberry Creek valley is primarily rural residential development.

The project area includes three Forest Service developed recreation facilities: Boone Fork Campground, Boone Fork Pond, and Mulberry Picnic Area. The pond and picnic area receive moderate use; Boone Fork Campground receives low use, and is temporarily closed due to deferred maintenance needs.

The only Forest Service trail in the area is Sand Mountain Trail #251, which follows the ridges of Sand Mountain to the west of Mulberry Creek. Hunters, horseback riders, mountain bikers, and hikers recreate on gated Forest Service roads throughout the area.

Scenery in the project area consists of typical mountain landscapes, with dense mixed hardwood and evergreen forests, steep mountain slopes, and flat river valleys. The area would be classified as common in the Southern Appalachian landscape type; there are no extraordinary geologic features or outstanding scenic qualities. Forest Service lands in the area show evidence of past timber management; while views of private lands range from remote rural, or farm landscapes, to densely developed commercial and residential areas.

3.7.2 Scenery Analysis

All proposed activities lie in Management Areas (MA) 2A and 3B. Project activities in MA 2A are required to meet Partial Retention (PR) Visual Quality Objective (VQO); which means treatments must remain visually subordinate to the surrounding natural landscape. Activities in MA 3B are required to meet Modification VQO; this is defined as treatments that may dominate the surrounding landscape, but borrow from naturally occurring form, line, color and texture.

Visibility of proposed activities was assessed using a computer GIS, analyzing seen-area on a three-dimensional terrain model. This methodology uses a "bare ground" terrain, which allows visibility analysis without interference of vegetative screening.

Viewpoints considered in the analysis include all public travel corridors, water bodies, and use areas. Portions of the project area are visible from US 321, NC268, Happy Valley, Setzer, Globe Mountain, Mulberry Creek valley, Sand Mountain, and Bone Fork areas. Visible activity areas in the immediate foreground of the Bone Fork Pond and Campground, are in MA2A and must meet PR VQO. Activity areas visible from all other locations are required to meet M VQO. Due to the increased scenic sensitivity of NC 268, Happy Valley, and Setzer areas, project design features have been developed to ensure activities visible from these areas meet PR VQO; which exceeds Forest Plan standards.

3.7.3 Direct and Indirect Effects of Alternative A – No Action

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

3.7.4 Direct and Indirect Effects of Alternative C

Proposed two-age harvest treatments have a residual basal area (rba) of 15-20 sf, or 25-30 sf per acre. Two-age harvests do not typically create large openings in the canopy, as seen with clear-cut harvest methods. Immediately after harvest, a two-age treatment will reveal some areas of exposed ground in small openings, trunks of mature residual trees will be more visible, and segments of roads and landings may be seen. After one or two growing seasons, under-story vegetation will obscure exposed ground, tree crowns will fill-out, and the canopy will begin to close. Seeded roads and landings will also green-up, and be screened by vegetative growth. In some cases, increasing the residual basal area is used as a design feature to further reduce contrast between the harvest area and surrounding forest.

Typically, creation of wildlife food plots, road day-lighting, and non-commercial silvicultural treatments do not create noticeable changes in the characteristic landscape, and easily meet Visual Quality Objectives. This is true for all wildlife habitat enhancements, and non-commercial treatments proposed in this project.

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

Project design features incorporated to meet or exceed assigned Visual Quality Objectives:

- Portions of harvest Units 10 & 11 are visible from US 321, NC 268, Happy Valley, and Setzer areas. These units would retain 25-30 ft^2 rba/ac from the main ridge to the eastern unit boundary. This would allow treatments to exceed the assigned M VQO, and meet PR VQO where seen from the east.
- The lower part of Unit 9 lies adjacent to SR 1349. Areas within 200 feet of the state road would retain 25-30 ft^2 rba/ac.
- Harvest Unit 12 is visible from Sand Mountain Trail, Globe Mountain, and Mulberry Creek valley. The unit boundary would be maintained one tree-height below the ridge to the west; this would prevent gaps or sparse forest coverage along the ridge. An uncut buffer would be retained one tree-height below the new temporary road.
- The portions of Unit 3 would retain 25-30 ft^2 rba/ac within MA 2A in the Boone Fork area.
- Portions of Unit 2 are visible from Boone Fork Pond, would retain 25-30 ft^2 rba/ac.
- Where possible, temporary roads into Units 1, 2, 6, & 9, would be designed to exit the State or Forest Service Road, and turn to minimize amount of visible graded roadbed. These temporary road intersections would be disked and seeded after project completion. Landings for these units would be placed beyond sight of the State or Forest Service Road.

3.7.5 Cumulative Effects

Individual components of proposed activities will be visible in conjunction with other components, and with existing timber management activities from past projects. While traveling area view corridors, such as Sand Mountain Trail, SR 1369, US 321, and NC 268, other modifications to the scenic landscape are visible. In places, these existing or proposed future modifications would be seen in conjunction with Mulberry project treatments. Other existing or proposed future landscape modifications include surrounding private development, and the Forest Service's Globe vegetation management project.

Cumulative scenery impacts of past, currently proposed, and foreseeable future activities have been considered. It has been determined that assigned Visual Quality Objectives would be met, where effects to scenery associated with Mulberry project activities would be seen in conjunction with other existing and foreseeable future actions.

3.8 Management Indicator Species

3.8.1 Introduction

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

3.8.2 Process

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

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

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

1) **Table 3-12**: 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	Yes
Riparian forests	Acadian flycatcher	No/2
Coldwater streams	Wild trout (brook, brown, and rainbow); blacknose dace	No/2
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 Eliminated from Analysis

Habitat Components	MIS	Analyzed Further/ Evaluation Criteria*

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	No/1
Early successional (11-20)	Ruffed grouse	Yes
Soft mast producing species	Ruffed grouse	Yes
Hard mast-producing species (>40 yrs)	Black bear	Yes
Large contiguous areas with low levels of human disturbance	Black bear	No/1
Large contiguous areas of mature deciduous forest	Ovenbird**	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.

** Although the ovenbird was found during bird surveys to occur within proposed harvest Units 3 and 9, these units do not depict large contiguous forest conditions. Unit 3 is surrounded on 3 sides by stands that are less than 40 years of age and within close proximity of the Boone Fork campground. Unit 9 borders State road 1349 and Spenser Branch road. No activities are proposed within habitat represented by the ovenbird, forest interior habitat 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
Largemouth Bass	Static	Reservoirs
Ruffed Grouse	Static to decreasing	Downed woody debris, soft mast-producing species, and early successional (0-10 years old)
Black Bear	Increasing	Hard mast-producing species (>40 years)
White-tailed deer	Static to decreasing	Permanent grass/forb

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

Habitat Component	Forest-wide Estimate	Alt A	Alt C
Early successional (0-10 years old)	26,800 ac (yr 2000) 2,040 ac (5 yr avg)	No change	267 ac increase (3% increase over next 10 years)
Soft mast producing species	13,144 ac early seral (yr 2000), highest potential on 5,650 ac	No change	267 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	None affected	Up to 267 ac increase (3% short term reduction with

Habitat Component	Forest-wide Estimate	Alt A	Alt C
	Chestnut Oak/H: 8,600 ac Upland hwd (other): 6,900 ac		long term increase as suitable hard mast species regenerate)
Permanent grass/forb openings	3,000 acres	No change	5.8 ac increase (0.36% increase)
Reservoirs	36,000 acres	No change (restoration on John's River tributary)	Approximately 1 acre (Boone Fork Pond) would experience short-term (less than a season) turbidity from the stream restoration project, but would not have long-term (more than a season) impacts from the Mulberry Project
Downed woody debris	High accumulation small wood: 18,000; Large wood: 386,000; Low accumulation (approximately 600,000)	No change	267 ac increase (less than 10 years)

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

Alternative C would not affect (directly, indirectly, or cumulatively) any proposed or listed Federal threatened or endangered botanical, aquatic or wildlife species as disclosed in the biological evaluation (Appendix A). Consultation with the US Fish and Wildlife Service is not required.

3.9.2 Sensitive Species

3.9.2.1 Aquatic Species

There were no aquatic S found during activity and analysis area surveys within the Mulberry Project area; therefore, there would be no direct or indirect effects or impacts to S aquatic species.

3.9.2.2 Wildlife Species

Diana Fritillary (*Speyeria Diana)*

Direct & Indirect Impacts: The action alternative would not cause direct impacts to individuals (and therefore the populations) because the activities proposed are outside of the species' habitat (riparian areas) and the species is relatively mobile. The action alternative would increase the nectar species habitat within the newly created early successional habitat and within the

grass/forb opening. Temporary road construction would result in short-term nectar species habitat enhancement post-harvest (3-5 years). Harvest and road construction is expected to result in optimum Diana fritillary habitat within a year or two. The proposed timber stand improvement work planned, both manual and chemical, would not impact fritillary habitat as the work is planned on woody stems only.

The action alternative proposes herbicide treatment of exotic/invasive plants. This action is not expected to have an impact on the availability of nectar species within riparian areas that adjoin activity areas because they would not be treated.

Overall, the action alternative is expected to benefit the Diana fritillary and its habitat across the wildlife AA throughout the next ten years because habitat would be developed. State and Forest Service roads, Boone Fork campground, Mulberry picnic area, and private open farm land would continue to provide nectar species. No other S wildlife species would be impacted by Alternative C.

Cumulative Impacts: Southern pine beetle mortality of yellow pine has created more habitat where the canopy has been killed (openings). The past hemlock adelgid treatments near Boone Fork Campground would not affect the butterfly because the treatments occurred in a developed campground. However, the continued loss of hemlock trees within the riparian area is expected to create openings which may create additional habitat. Wildfires and prescribed burns rarely enter riparian areas. If they do occur in riparian areas, they are low intensity burns with low severity effects, but may eliminate or have eliminated individual fritillary eggs or larvae. Prescribe burning has occurred and is expected to occur outside the adult life cycle of the fritillary and would create habitat for nectar species. The adverse impact to individual larvae or eggs would have been for one season or generation while the positive impact of increased nectar species is expected to be of three to five years in duration. Therefore, the impact to the adult fritillary is an increase in habitat for three to five years and minimal adverse impacts to larvae or eggs.

3.9.2.3 Botanical Species

Mountain Heartleaf *(Hexastylis contracta)*

Direct & Indirect Impacts: The timber harvest and construction or reconstruction of roads needed for implementation of the proposal would directly adversely affect individuals of *Hexastylis contracta* by exposure to logging activities such as moving heavy equipment, skidding logs, and road construction that damages individual plants. None of the Mitchell Creek population of *Hexastylis contracta* would be impacted by the proposal and 2% of the Boone Fork Branch population would be impacted. The proposed activity would impact less than 1% of the Forest populations. A viable population of *Hexastylis contracta* would remain within the botanical AA and Forest. Although this proposal would likely adversely impact individuals of *Hexastylis contracta* it would not affect local or Forest viability of *Hexastylis contracta*.

The indirect impacts of logging and road construction such as increased light, competition of early successional plant species to the habitat of *Hexastylis contracta* are not well known (see biology discussion above). Habitat is expected to recover because no habitat would be permanently altered by this proposal and *Hexastylis contracta* is expected to recover in the proposed activity areas. No mitigation for *Hexastylis contracta* is recommended because only

individuals of a sub-population would be impacted and viability would be unaffected across the Forest. No other S botanical species would be impacted by Alternative C.

Cumulative Impacts: Within the botanical AA and the National Forest, past actions that may have affected *Hexastylis contracta* can only be inferred by potential habitat changes. No direct data (counts, known populations, etc.) exist within the botanical AA. There are no foreseeable actions that could adversely affect *Hexastylis contracta;* therefore, the cumulative effects to *Hexastylis contracta* are limited to those of the proposal.

3.9.3 Forest Concern Species

The following table summarizes the FC species that could occur within the AAs along with potential effects by species from Alternative C:

Table 3-16: FC Species and Potential Effects from Alternative C

Species	Habitat	Potential Effects
Aquatic FC Species		
Cyprinella zanema (Santee chub)	Lotic (living in) – streams and rivers	No Impact – existing condition would continue
Micrasema burksi (a caddisfly)	Lotic – streams	*May impact individuals
Rhyacophila amicus (a caddisfly)	Lotic – streams	*May impact individuals
Ophiogomphus mainensis (Maine snaketail)	Lotic – streams and rivers	*May impact individuals
Baetopus trishae (a mayfly)	Lotic – streams	*May impact individuals
Habrophlediodes sp. (a mayfly)	Lotic – streams	*May impact individuals
Bolotoperla rossi (a stonefly)	Lotic – streams	*May impact individuals
Wildlife FC Species		
Allegheny woodrat	Boulder complexes	No effect – no boulder complexes were observed within the activity areas
Yellow-bellied sapsucker, S. Appalachian population	High elevation forests	No effect – no habitat within the activity areas
Cerulean warbler	High elevation forests	No effect – no habitat within the activity areas
Botanical FC Species		
Catesbeiana ssp. Sericata (Blue ridge bindweed)	Open, sunny sites	May impact individuals. No loss of habitat or Forest viability

*No rare species were found during project surveys in the activity area but they have been included because the species' habitat exists within or immediately below the activity area of the stream restoration of Boone Fork Branch and its tributary. Although stream restoration may impact individuals, implementation would not affect viability across Forest.

3.9.3.1 Aquatic FC Species

Direct Effects: No direct impacts to *Cyprinella zanema* would occur as this species is a mobile organism that can elude areas of disturbance during the stream restoration project. Records for this species are documented in the lower reaches of Mulberry Creek and outside of the aquatic activity area.

Individuals of the aquatic FC macroinvertebrate community (*Micrasema burksi*, *Bolotoperla rossi, Baetopus trishae, Habrophlediodes sp.*and *Ophiogomphus mainensis* may be directly impacted by the stream restoration project (if they exist in the locations of the stream restoration). Because heavy equipment will be involved in the restoration, individuals could be crushed or smothered during project implementation.

Indirect Effects: Some temporary sediment and turbidity would occur from the implementation of the stream restoration project. Sediment and turbidity can result in the loss of interstitial space between substrate which is habitat that is valuable for aquatic macroinvertebrates. *Micrasema burksi*, *Bolotoperla rossi, Baetopus trishae, Habrophlediodes sp.*and *Ophiogomphus mainensis* may exist in and below the locations of the stream restoration site. Therefore, they may be directly affected by the implementation of the action alternatives.

Cumulative Effects: No cumulative effects would occur to *Cyprinella zanema*. *Micrasema burksi*, *Bolotoperla rossi, Baetopus trishae, Habrophlediodes sp.*and *Ophiogomphus mainensis* as a result of the implementation of this project. Habitat for these FC species does not appear to be limiting across the Nantahala and Pisgah National Forests. The proposed projects may impact individuals of the above FC species (if they exist) from maintenance of existing roads within the aquatic analysis area and the implementation of the proposed stream restoration project. Although some individuals and habitat may be effected short term, aquatic habitat will improve the species since chronic sources of sedimentation should be alleviated.

3.9.3.2 Wildlife FC Species

Allegheny Woodrat, *Neotoma magister*

Direct, Indirect, & Cumulative Effects: Critical nesting habitat for this species' is among boulders or under cliff edges. The nesting habitat for the woodrat is found within 24-11; however, this rock/boulder complex is being excluded. No further suitable boulder or rock habitat was found within the activity areas. Therefore, there would be no impact to the woodrat by implementation of this project proposal.

No additional past or foreseeable future actions will affect this species. Therefore, the re will be no cumulative impact to the woodrat and this project proposal is not likely to cause a trend toward federal listing or loss of viability across the analysis area.

Cerulean Warbler, *Dendroica cerulea*

Direct, Indirect, & Cumulative Effects: There is no cerulean habitat in the AA and none were recorded during bird surveys of the activity areas. Therefore, there will be no impact to this species from the proposed treatment.

No past or foreseeable future actions will affect this species. Therefore, the re will be no cumulative impact to the cerulean warbler and this project proposal is not likely to cause a trend toward federal listing or loss of viability across the analysis area.

Yellow-bellied Sapsucker, Sphyrapicus varius

Direct, Indirect, & Cumulative Effects: This species utilizes snags and dead, standing trees to excavate their nest cavity. The sapsuckers feed on insects and grubs in the bark of trees, drill holes to extract sap, and during the winter months, feed on berries and nuts. They are a high elevation species which is not present within the AA.

The sapsucker may "come down" to lower elevations to feed during the winter months if it is present at higher elevations in the AA. The Forest Service's standard of retaining all dead trees within its planned harvest areas, except where safety is an issue, would retain sufficient nesting habitat. Alternative C would result in an increased amount of soft mast throughout the harvest areas while retaining a high residual component of hard mast species. Therefore, Alternative C will not impact the sapsucker habitat within this AA.

No past or foreseeable future actions will affect this species. Therefore, there will be no cumulative impact to the Appalachian yellow-bellied sapsucker and this project proposal is not likely to cause a trend toward federal listing or loss of viability across the analysis area.

3.9.3.3 Botanical FC Species

Catesbeiana ssp. Sericata (Blue ridge bindweed)

Conclusion of Effect: This proposal would directly impact individuals of *Calystegia catesbeiana ssp. sericata* but not affect viability of the local population or Forest.

Direct Effect: The proposal may affect an estimated >10% of the population during maintenance of Forest Service Road 6089 needed to access timber harvest.

Indirect Effect: The habitat (early seral communities, ie. roadside) of *Calystegia catesbeiana ssp. Sericata* will be maintained. Therefore, there are no long term negative indirect impacts of implementation of this proposal to *Calystegia catesbeiana ssp. sericata.* The population is expected to recover within 5 years after disturbance.

Cumulative Effect: The proposal has no added cumulative effects to *Calystegia catesbeiana ssp. sericata* as a result of this proposal. *Calystegia catesbeiana ssp. sericata* has not known to be affected by any other past actions. The total cumulative effect to the habitat (early serial communities, ie. roadside) of *Calystegia catesbeiana ssp. sericata* would be the effect of the proposed road maintenance and repair.

3.10 Recreation

3.10.1 Existing Condition

Developed recreational sites include: Boone Fork Campground – 14 Sites & 2 pit toilets; Boone Fork Group Area – 19 Sites & 2 pit toilets; Boone Fork Pond – Fishing Pier, Large picnic shelter, and improved access trails; and Mulberry Picnic Area – 5 Picnic sites.

These developed recreation areas historically have received low to moderate use in the spring and summer months, and light to moderate use in the fall and winter—the Boone Fork area is especially popular with equestrian users. The Mulberry Picnic Area, Boone Fork Campground, and the Boone Fork Group Area were temporarily closed in 2007 due to deferred maintenance costs and a lack of available personnel for day-to-day maintenance and reconstruction.

There are no designated Forest Service trails within the area, but numerous routes are moderately used by horses and mountain bikes, particularly on gated roads. Both the Benson Hollow Loop

and the Spencer Branch Loop are identified and mapped in guide books for both horses and mountain bikes. Hikers also use the area, but not as frequently. Fishing is a popular activity at the Boone Fork Pond and tributaries of both Boone Fork Branch and Mulberry Creek are designated as Wild Trout Water. Hunters frequent the area during bear, deer, and turkey seasons. Some evidence of unauthorized all-terrain-vehicle (ATV) operation is dispersed in several areas within the project area.

3.10.2 Direct, Indirect, and Cumulative Effects

3.10.2.1 Alternative A

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

3.10.2.2 Alternative C

Effects on recreation of this alternative are summarized in the table below:

Table 3-17: Summary of Effects to Recreation from Alternative C

Recreational Activity	Proposed Action(s)	Possible Effect(s)
Direct Effects		
Dispersed Trail Use	Road Maintenance, Construction, and Reconstruction	1. Changes to surface condition (re-contouring, widening, gravel, etc.) 2. Routes not available during construction
Camping/Day Use	Construction/Logging Operations	Temporary access delays, increased noise during operations
Fishing	Stream Rehabilitation	Section of stream not available to fish during construction
General Recreation Use	Vegetation Composition Changes	Changes to Scenery
Indirect Effects		
Fishing	Erosion Control/Stream Rehabilitation	Increase Fish Population
Hunting	Develop Wildlife Field/ Oak & Apple Tree Regeneration	Increase Game Populations
Cumulative Effects		
General Recreation Use	D.O.T. Road Improvement Projects on Roby Martin (SR1349) and US 321 in combination with F.S. Road Improvements	Improve access and increase visitation

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 617 acres of large patch old growth communities (patch #30) designated in the Lower Mulberry AA, all within Compartment 7. Compartments 3, 18, 20, and 21 would need at least 50 acres of small patch old growth communities (at least 200 acres total) designated respectively to meet Forest Plan standards for small patch old growth communities due to the ground disturbing activities proposed within them (Forest Plan, page III-27). Additional analysis on old growth is disclosed in Appendix C below.

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 Alternative C – 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 this alternative. There would be individual trees greater than 100 years of age harvested, but old growth is a community and not an individual tree. Designating about 224 acres of small patch old growth communities averaging 108 years in age under these alternatives along with the existing large patch old growth communities in the AA (617 acres in large patch #30 already designated by the Forest Plan) would ensure old growth communities are distributed throughout both the analysis and project areas.

Under this alternative each compartment in the project area would meet Forest Plan standards for small patch old growth communities. The majority of proposed harvesting would occur within stands averaging 51-100 years in age (85% of the harvesting); however, about 40 acres (15% of the total harvesting) would occur within stands averaging 105 years in age. The following table summarizes age-classes for Lower Mulberry AA by alternative along with old growth disclosures:

Table 3-18: Age-Class for Lower Mulberry AA by Alternative and Old Growth Communities Disclosures

Measurement	Alternative A (existing)	Alternative C (after two-age harvest implementation)

Measurement	Alternative A (existing)	Alternative C (after two-age harvest implementation)
Acres treated by age-class Project Area 0-10 years old 11-20 years old 21-50 years old 51-100 years old 101-140+ years old	 0% 15% 10% 62% 13%	 3% 15% 8% 61% 13%
Acres of existing Forest Plan designated old growth or initial inventory old growth communities proposed for harvest	0	0
Acres of newly designated small patch old growth	0	224

3.11.2.2 Cumulative Effects

No adverse cumulative effects to old growth communities are expected as a result of the proposal as there are currently over 617 acres of old growth designated in the AA; no Forest Plan designated old growth communities or initial inventory old growth communities would be harvested; less than 4% of stands averaging greater than 100 years in age would be harvested with this proposal; 224 acres would be designated as small patch old growth communities and would not be scheduled for future harvest; and 1,083 acres in the AA averaging greater than 101 years are not scheduled for harvesting with this proposal.

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 C – 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 – CONSULTATION WITH AGENCIES AND OTHERS

The following individuals helped develop this Environmental Assessment:

4.1 ID Team Members

4.1.1 Core IDT

Scott Ashcraft - Archaeologist
Sandy Burnet - Wildlife Biologist
Eric Crews - Landscape Architect
David Danley - Botanist
Brady Dodd - Hydrologist
Michael Hutchins - IDT Leader
Bob Noel - Archaeologist
Lorie Stroup - Fisheries Biologist
Greg Van Orsow - Project Leader

4.1.2 Other Forest Service Personnel Providing Input

Jeff Owenby – Acting Grandfather District Resource Assistant
Joy Malone – Grandfather District Ranger

4.2 Government Agencies and Elected Officials Informed

Blowing Rock Town Manager
Caldwell County Chairman
Catawba Indian Nation
Cherokee Indian Nation
Congressman Patrick McHenry – North Carolina 10th Congressional District
NC Department of Natural Resources
NC Division of Water Quality
NC Forest Service
NC Natural Heritage Program
NC State Clearinghouse
NC State Historic Preservation Office
NC Wildlife Resources Commission
US Fish and Wildlife Service
Watauga County Chairman

4.3 Others Providing Input

Twenty members of the public provided comments on the proposal during scoping and at the July 10, 2007, open house. A complete list of individuals and their comments is located in the project record.

APPENDIX A – BIOLOGICAL EVALUATION

BIOLOGICAL

EVALUATION

OF THE

MULBERRY PROJECT ENVIRONMENTAL ASSESSMENT

PISGAH NATIONAL FOREST

GRANDFATHER RANGER DISTRICT

CALDWELL COUNTY

NORTH CAROLINA

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I. INTRODUCTION

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

This BE documents the possible biological effects of a proposed timber sale and improvements known as the Mulberry Project Environmental Assessment (EA). Included within this preferred alternative proposal (proposed action or Alternative C) are: using and maintaining existing roads and skid trails; construction of temporary road; maintaining and construction of a new wildlife field; wildlife plantings; daylighting roads; control/management of non-native invasive plants; site preparation and release of harvested areas; regeneration harvest treatment; stream restoration; and small patch old growth designation (see the EA for a complete description of acreages, distances, procedures, and areas).

A detailed description of the proposal is disclosed in Section 2.2, Chapter 2 of the Mulberry Project EA. A list of project design features and monitoring is disclosed in Section 2.4 of the same Chapter. A list of definitions, including analysis areas is located in the BE.

Location

The proposal is located in Caldwell County about 31 miles northeast of Marion, North Carolina; about seven miles northwest of Lenoir, North Carolina; and about nine miles southeast of Blowing Rock, North Carolina; it is also within the 8,625 acre Lower Mulberry Forest Plan Analysis Area and compartments 2-5, 7, 16-21, and 23.

II. METHOD OF EVALUATION AND SURVEYS

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

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

III. SURVEY INFORMATION

A. BOTANICAL SURVEYS

The proposed activity areas were surveyed by David M. Danley, Forest Botanist on April 28: May 8, 9; June 15, 18, 20, 25; and July 10 2007. All proposed units or activity areas were visited at least once during this time

Other relevant Botanical surveys include: Globe Mt. Timber sale (2005, Caldwell Co), Sand Mt. Timber Sale (2000, Caldwell Co.) An Inventory of the Significant Natural Areas of Caldwell Co, North Carolina (in preparation) by James Padgett.

B. WILDLIFE SURVEYS

Bat surveys within the analysis area were completed on August 1-3, 2006 and resulted in four common species of bats being caught or recorded. Bird surveys were completed on May 14, 2007. Snail and salamander surveys found only common species occurred within a few activity areas due to the dry, granular soil. No bog turtle, spruce-fir moss spider, or VA big-eared bat habitat was found within the activity areas. The activity areas are generally dry, granular soils with both mica and quartz present and sparse herbaceous layer. The surveys identified no T&E, or S listed species within the activity areas.

C. AQUATIC SURVEYS

Project information was obtained from Greg Van Orsow, US Forest Service (USFS) Forester. Lorie Stroup, USFS Fisheries Biologists, Kerri Lyda, USFS Biological Technician, David Finnan, Forest Technician, and Luke Decker, Forest Technician conducted aquatic habitat and aquatic insect surveys of the proposed aquatic activity and analysis areas in the spring and summer months of 2007. 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. Boone Fork and tributaries and Deep Cove were surveyed for habitat. Mulberry Creek was surveyed using a backpack electrofishing machine in May 2007 in cooperation with the North Carolina Department of Environment and Natural Resources (NCDENR).

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

IV. EXISTING BIOLOGICAL CONDITION

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

The **botanical analysis area** (AA) or "boundary of effects" used for this proposal is defined as: the total area within 2 kilometers of any proposed unit (activity area) or known EO (Element occurrence) of any plant T&E, and S, species. The botanical AA consists of 11096 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 **wildlife effects AA** were evaluated over the Lower Mulberry Forest Plan Analysis Area, a total of 8,653 acres. Compartment 7 within this analysis was identified in the Nantahala & Pisgah Forest Plan as a portion of Forest Interior habitat patch # 33. There are no activities proposed within compartment 7.

The **aquatic effects AA** encompasses waters that potentially could be impacted by project activities, in addition to activity area waters (see Table A-1 below). Activity area waters are defined as those in the area of potential site-specific impacts on aquatic habitat and populations. The AA is larger than the activity area.

A. BOTANICAL

One Regional Forester's Sensitive species (*Hexastylis contracta*) species is known to occur within the botanical AA. No other T&E or S botanical species are known to occur within the botanical AA. Of the total of 19 plant T&E, and S species known to occur in Caldwell County, North Carolina (Appendix 1), all but 4 S, and all T&E plant species (Table 1) were dropped from the list for further consideration and discussion for one of the following reasons: 1) lack of suitable habitat for the species in the 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.

Based upon habitat model information (Simon 2005), 4 plant S (Table A-1) have apparently suitable habitat[1] and may occur in the botanical AA. Only one Regional Forester's S species (*Hexastylis contracta*) species is known to occur within the botanical AA. No other T&E. or S botanical species are known to occur within the botanical AA. A list of plant T&E, and S, plants that occurs in Caldwell Counties is found in Attachment 1. A list of T&E. and S plants that potentially could occur in the project or activity areas is listed in Table A-1 and summarizes the

[1] "Apparently suitable habitat" used within in this document (same as the Natural Heritage program definition) to mean "surveyed or unsurveyed areas not known to be occupied by an element, but which appear capable (under natural conditions) of supporting viable individuals of that element, based on one or more observed or mapped factors (soils, geology, hydrology, vegetation topography, aspect, elevation, etc.) known to delimit or predict other occurrences of the same element.

list of T&E, and S, plant species that are: known to occur, or has apparently suitable habitat in the botanical analysis area.

Table A-1: Potential & Known T&E, and S Plant Species in the Mulberry Botanical AA

Species	Type	Natural Community or Habitat	Occurrence
Federally Threatened or Endangered plant species (T &E)			
None	N/A	N/A	N/A
2002 Region 8 Regional Forester's Sensitive plant species (S)			
Fissidens appalachensis	Moss	Aquatic on rocks in Acidic Coves	Not known to occur in AA or activity area.
Hexastylis contracta	Vascular Plant	Acidic Cove Forest	Known to occur within Activity area. See Analysis below.
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.	Not known to occur in AA or activity area.

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

Unit/Activity	Natural Communities or Habitat (Approx. Acres)	Occurrence of Plant T&E, S Species
Unit 1	Chestnut Oak Forest (20), Acidic Cove Forest in bottom of drain (9)	No T&E S plant species known.
Unit 2	Acidic Cove/ Chestnut Oak Forest (8)	*Hexastylis contracta* likely. No other T&E S plant species known.
Unit 3	Chestnut Oak Forest (22), Acidic Cove Forest (18)	*Hexastylis contracta* known. No other T&E S plant species known.
Unit 4	Chestnut Oak Forest (27)	No T&E S plant species known.
Unit 5	Acidic Cove Forest (19)	No T&E S plant species known.
Unit 6	Acidic Cove Forest (6)	*Hexastylis contracta* likely. No other T&E S plant species known.
Unit 9	Acidic Cove Forest (20) , Chestnut Oak Forest	No T&E S plant species known.
Unit 10	Chestnut Oak Forest (25), Acidic Cove Forest(15)	No T&E S plant species known.
Unit 11	Chestnut Oak Forest (40)	No T&E S plant species known.
Unit 12	Chestnut Oak Forest (26)	No T&E S plant species known.
Stream restoration	Acidic Cove/ Alluvial Forest	No T&E S plant species known.
Temp roads (new)	Various, mostly Chestnut Oak Forest and Acidic Cove Forest 2.1 miles	No T&E S plant species known.
Daylighting system roads (existing)	Various, mostly Chestnut Oak Forest and Acidic Cove Forest.	*Hexastylis contracta*, No other T&E S plant species known.

Creation of wildlife fields	Mostly Chestnut Oak Forest (1)	No T&E S plant species known.

Plant Communities and Habitats Found in the Mulberry Botanical AA

The Mulberry botanical analysis 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 Boone Fork, Spencer Branch, Deep and Cove Creek. A succession of south trending, interlinking ridges is found between drains. The highest points of these ridges are about 2,200 ft. on the east (Chestnut Mt.). The drainage flows downward to about 1,200 feet to the south towards Little Mulberry and Boone Fork. The analysis area 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. 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 Boone Fork and Mulberry Creek. 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 AA, 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 AAhas 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, the habitat has a general low potential for plant T&E and S 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.

Using 1) the natural vegetation predictive model (S. Simon, USFS); 2) CISC data (USFS); and field experience, the acres of natural communities are estimated in Table A-3 within the botanical AA.

Table A-3: Estimated Quantity of Communities within Botanical AA

Community	EST. Acres/ % of Total Habitat in AA	Acres over 50 years old
Acidic Cove Forest	5,774 acres / 52%	4,944 acres
Chestnut Oak Forest/Pine Oak Heath	4,602 acres/ 41%	3,755 acres
Alluvial Forest (mostly on private lands converted to pasture	5 acres/ >1%	unknown
Montane Oak-Hickory Forest	636 acres/ 6%	600 acres
White Pine Forest	79 acres/ 1%	68 acres
Totals	**11,096 acres**	**9,367 acres**

B. WILDLIFE

The wildlife analysis considered the Lower Mulberry AA in determining the habitat present and potential occurrence for T&E, S species. There are one threatened, one endangered, and one sensitive wildlife species with NC natural heritage occurrence records in Caldwell County. 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 located outside Caldwell County. Bob Currie, USFWS Wildlife Biologist, stated this cave was utilized by the bat for a winter hibernacula. This indicates that 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 has never been documented. *Corynorhinus t. virginianus* would be most probable within the extreme northwestern corner of the county, which is outside of the wildlife AA. Bat surveys completed in 2006 did not record or capture this species and surveys of the proposed treatment areas did not demonstrate cave habitat. For these reasons, this species was dropped from any further analysis.

The Diana fritillary, *Speyeria diana,* has been documented within 15 of the 18 western most counties. 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 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.

The following table lists wildlife TE&S species found within Caldwell County.

Table A-4: Wildlife TES Species Found in Caldwell County

Species	Type & Status	Potential of Occurrence
Bog Turtle	Reptile, T	No habitat within proposed activity area
Virginia big-eared Bat	Mammal, E	No record within Caldwell County
Spruce-fir Moss Spider	Arachnid, E	No habitat within wildlife AA
Diana Fritillary	Insect, S	Not known to occur, but potential habitat occurs within wildlife AA

C. AQUATIC

Eighteen aquatic sensitive species are either known to occur or may occur on the Pisgah and Nantahala National Forests (Attachment 1). The North Carolina Natural Heritage Database was queried for occurrences of sensitive species in Caldwell County. Three sensitive aquatic species remained after this initial filter. These three species were then filtered using their habitat preference information and the availability of these habitats within the aquatic analysis area.

Based upon the results of this filtering process, all three of these sensitive aquatic species (*Alamidonta varicosa, Macromia margarita,* and *Ophiogomphus edmundo*) was dropped and are not evaluated in this analysis because of their habitat preferences (Table A-6). These species are inhabitants of riverene systems found below the aquatic AA in the lower reaches of Mulberry Creek and the Johns River. Species that do not have suitable habitat within the aquatic AA were eliminated from further analysis (Attachment 1).

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

Substrate within the activity area waters (Table A-5) was evaluated and visually estimated. It is important to know what habitat type exists within the aquatic AA because of the difficulty in determining the existence of all aquatic invertebrates present within a stream. Therefore, habitat is used to determine whether a species could be present. 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 TE&S species, as well as other aquatic organisms.

Table A-5: Forest Plan Watershed 60 (Johns River)

Stream Name	Compartment/ Stand	Kilometers in Project Areas	Kilometers in Analysis Area	Classification*
Boone Fork Branch	6,7	1.2	3.7	B
UT 1 Boone Fork	1, 2, 3	1.6	1.0	B
UT 2 Boone Fork	1	0.1	0.3	B
UT 3 Boone Fork	2, 3	0.2	0.2	B
UT 4 Boone Fork	7, 8	0.7	0.9	B
UT 5 Boone Fork	8	0.2	0.2	B
Deep Cove Branch	3, 4, 5	1.2	2.1	B
UT 1 Deep Cove Branch	4	0.2	0.3	B
UT 2 Deep Cove Branch	5	0.2	1.2	B
Spencer Branch	9	0.6	2.4	C
UT 1 Spencer Branch	9	0.2	0.2	C
UT 2 Spencer Branch	9	0.1	0.1	C
UT 3 Spencer Branch	9	0.2	0.2	C
UT 4 Spencer Branch	12	0.2	0.4	C
Mitchell Branch	10	0.2	2.6	C
Loving Branch	10, 11	0.9	3.7	C
UT 1 Loving Branch	11	0.2	0.2	C
UT 2 Loving Branch		0.3	0.3	C
UT 3 Loving Branch	11		1.3	C
Stapps Branch	11	0.1	2.7	C
Mulberry Creek			5.0	C
Little Mulberry Creek			1.6	C
	Total	**8.6**	**30.6**	

*The NC Department of Environmental Management designates classifications and water quality standards known as "Classifications and Water Quality Standards Applicable to the Surface Waters and Wetlands of North Carolina." The "C"

classification denotes waters suitable for aquatic life propagation and survival, fishing, wildlife, secondary recreation, and agriculture. The "B" classification indicates waters used for primary recreation and other uses suitable for Class C. "Tr" waters are suitable for the propagation and survival of trout. "ORW" is a supplemental classification intended to protect unique and special waters having excellent water quality and being of exceptional state or national ecological or recreational significance.

In the aquatic AA, landforms can be characterized as Valley Types I, II, and VII using the Rosgen (1996) classification. Typical for these valley types, the Mulberry area has predominately stable stream types characterized an "A", "B", "C" and "E", depending on the valley type that they occur. Occurring less frequently are "F" and "G" stream types depending on local stream and riparian conditions. These two stream types are typically unstable due to high bank erosion rates (Rosgen, 1996) and are having adverse impacts to water quality and aquatic habitat. Within the Boone Fork drainage where unstable channel conditions occur, stream rehabilitation is proposed within approximately 3/4 miles of stream to improve channel stability and aquatic habitat. Implementation of this work is expected to reduce sediment loading to near background (undisturbed) levels. Rates of erosion from stream banks following this type of work are estimated to decrease by 91 percent, based on forest monitoring of storm recovery work implemented during 2006 and 2007.

Fish habitat exists within the aquatic AA of Boone Fork Branch, Deep Cove Branch, Spencer Branch, Mitchell Branch, Loving Branch, Stapps Branch, Mulberry Creek and Little Mulberry Creek. The un-named tributaries generally provide restricted flow regimes (habitat) for aquatic macroinvertebrates only (the exception is during spawning when some fish may use the mouth of these tributaries for redds). Activity area waters also provide habitat for macroinvertebrates.

Culverts along the Forest Service Roads (FSR) 2055, 966, 6089, and 189; the roads themselves; and existing old roads and skid trails in the activity area are the existing concerns to streams and drainages. Impacts from these sources are limited to down slope movement of sediment from road runoff and culvert fills. In most cases, it is suspected that a majority of sediments from these sources are deposited in the natural vegetative filters before they reach areas of perennial streams.

Aquatic TES Species

Three rare aquatic species have been listed by NCWRC, USFWS, or NCNHP as occurring or potentially occurring in Caldwell County – all three are S species (see Attachment 1, which contains occurrence information for rare aquatic species on the Pisgah National Forest). All three S aquatic species included on the original list for analysis were dropped from further analysis as a result of a low likelihood of occurrence evaluation based on preferred habitat elements and field survey results. There are no T&E species or their habitat within the aquatic AA. Table A-6 lists aquatic species for Caldwell County and indicates their occurrence within the activity and/or aquatic AA.

Table A-6: T & E and S Species in Caldwell County

Species	Type	Habitat	Occurrence
Federally Threatened and Endangered Species (There are no threatened or endangered aquatic species listed for Caldwell County)			
2002 Region 8 Regional Forester's Sensitive Species List			
Ophiogomphus edmundo (Edmund's snaketail)	Dragonfly	Lotic-fast, clean substrate rivers	Not Likely to Occur.
Macromia margarita (mountain river cruiser)	Dragonfly	Lotic-streams and rivers	Not Likely to Occur.
Alasmidonta varicosa (brook floater)	Mussel	Lotic-clean, swift waters with stable gravel, or sand and gravel substrates	Does not occur within activity analysis areas may occur well below the aquatic AA in the Johns River

V. EFFECTS/IMPACTS OF PROPOSED MANAGEMENT ON T&E, S SPECIES

A. EFFECTS/IMPACTS TO T&E, S PLANT SPECIES

Potential Effect to T&E S Plant Species

No Action Alternative (A)

The No Action alternative has no potential for effect to T&E, S species because no actions would be implemented.

Timber Harvest (Alternative C)

There is one S plant species (*Hexastylis contracta*) that is known to occur within proposed activity areas and may be impacted by this activity. There are no other known plant T&E and S species or their habitat known to occur within the proposed activity areas. See species analysis below for discussion of possible impacts to *H. contracta*.

Temporary Road Construction and Maintenance/ repair of Existing Roads (Alternative C)

Hexastylis contracta is known to occur within proposed botanical activity area and may be impacted by this activity. There is no other known plant T&E and S species is known to occur within the proposed activity areas. See species analysis below for discussion of possible impacts. See also discussion below.

Site Preparation and Timber Stand Improvement (TSI) (Alternative C)

There are no known botanical T&E, S species that would be affected by site preparation and TSI because no T&E and S species are known to occur within the proposed activity areas. Site preparation and TSI procedures will have an insignificant effect on non-target species. The procedures, using chain saws or herbicide, select individual plants for treatment and generally do not indirectly adversely affect adjacent individual plants. For example, during a controlled demonstration of herbicide use for TSI and advanced oak treatments on the Grandfather Ranger

District, the indirect effect of herbicide use seemed to have a positive effect on herbaceous plant species. Evidently, the increase in light (produced by killing the target tree) outweighed possible toxic effects of residual herbicides and increased the diversity and amount of herbaceous species near the target tree. Site preparation and TSI procedures will change tree composition (the desired effect) of the community to favor oak species.

Wildlife Planting and Stream Restoration (Alternative C)

No plant T&E, and S species are known to be affected by wildlife field creation, planting, and stream restoration because no T&E and S species are known to occur within the proposed activity areas. These actions will maintain a small amount of acreage to early successional species and community type.

Treat Non-native Invasive Plant Species with Herbicides (Alternative C)

No botanical T&E and S species are known to be affected by herbicide use because no T&E and S species are known to occur within the proposed activity areas. The proposed action would reduce the spread of non-native invasive species such as *Miscanthus sinensis*, *Rosa multiflora* and *Ailanthus altissima*. Not treating non-native invasive plants would result in continued spread along system roads and wildlife fields.

Specific Effects to T&E, S Plant Species

Direct Effects/Indirect Effect to T&E and S Plants
Regionally Sensitive species (*Hexastylis contracta)* may be impacted by the action alternative. There are no other known T&E or S plant species in the proposed activity areas. Therefore, action alternatives may impact *Hexastylis contracta* and would have no direct or indirect effects to any other S plant species. Specific effects to all other T&E, S plant are not analyzed further because there is no evidence that populations exist or would be impacted by the proposed actions.

Hexastlis contracta

Status: Federal: FSC; NC State, S1; Global G3; Forest, Regionally Sensitive.
Known Forest occurrences: Three known populations: (Boone Fork, Guys Creek and Mitchell Branch).

Biology/ Ecology and limiting factors: As with most other species of *Hexastylis*, *Hexastylis contracta* is a perennial herb with heart shaped evergreen leaves. Identification of the genus is possible throughout the year. Primary taxonomic traits delimiting species are largely differences in flower morphology. Thus, flowering specimens are generally required for positive identification. *Hexastylis* species (and presumably *H. contracta*) are associated with mature forest conditions. The biological slow growth rate (one leaf per year per stem) and ant dispersed seeds are consistent with a species that favors mature forest condition. However, *H. contracta* and other species of *Hexastylis* were observed to have vigorous populations on early successional roadsides. Indeed, the most vigorous subpopulations of *H. contracta* within the Boone Folk population were directly associated with current or old road banks. The biological limiting factors for *H. contracta* are unknown. Most of the known Forest populations occur in second

growth Acidic Cove Forest. This is a very abundant natural community within the botanical AA and throughout the Forest.

The known local populations of *Hexastylis contracta* in the botanical AA are the Boone Fork population and the Mitchell Creek population. These populations were mapped by botanist James Padgett during his 2007 Caldwell County botanical survey work for the State North Carolina Natural Heritage Dept. He mapped the Mitchell Creek populations to be 42.6 acres in three sub populations and the Boone Fork as 197.2 acres in 5 sub populations; additional Boone Folk populations were found in the Deep Cove drainage (about 40 acres). *H. contracta* individuals are not evenly dispersed within these subpopulations but are clumped with few to no individuals found between clumps. No population census was attempted; however, thousands of individuals are estimated in all populations.

Direct Impacts to *Hexastylis contracta*

The timber harvest (Alternative C) and construction/reconstruction of roads needed for implementation of this action alternative proposal would directly adversely impact individuals of *Hexastylis contracta* by exposure to logging activities such as moving heavy equipment, skidding logs, and road construction that damages individual plants. The direct (adverse) impact to the local populations of *Hexastylis contracta* would be to impact none of the Mitchell Creek population and would impact no more than 2% of the Boone Fork population and less than 1% of the Forest's Population. A viable population of *Hexastylis contracta* would remain within the botanical AA and Forest with Alternative C. Although this proposal would likely adversely impact individuals of *Hexastylis contracta,* it would not impact local or Forest viability of *Hexastylis contracta*.

Indirect Impacts to *Hexastylis contracta*

Indirect impacts of logging and road construction such as increases light, competition of early successional plant species to the habitat of *Hexastylis contracta* are not well known and somewhat contradictory (See biology discussion above). However, the habitat is expected to recover at an unknown rate. No Habitat would be permanently altered by this proposal and *Hexastylis contracta* is expected to recover in the proposed activity areas. No mitigation for *Hexastylis contracta* is recommended.

Cumulative Effects to *Hexastylis contracta*

Within the Botanical AA and Forest, past actions that may have impacted *Hexastylis contracta* can only be inferred by potential habitat changes. No direct data (counts, known populations etc.) exist within the botanical AA. See Table A-7 for quantification of this data within the botanical AA. There are no foreseeable actions that could affect *Hexastylis contracta.* Therefore, the cumulative effects to *Hexastylis contracta* are those of the current proposal and past actions. See discussion below.

Table A-7 Summary of Effect to *Hexastylis contracta*

Potential Impact	Alternative C
Boone Fork, Direct/Indirect	2% reduction of occupied habitat (Boone Fork population), may impact individual but will not affect

Potential Impact	Alternative C
	botanical AA or Forest viability.
Mitchell Creek Direct / Indirect	None
Potential habitat (by James Padgett's data)	Impacts 196 acres of potential habitat or 7% of potential habitat

Effects on Potential Habitat for T&E and S Plant Species

Potential Habitat Direct Effects/Indirect Effects

This discussion summarizes the possible effect on potential, or "apparently suitable habitat" for all potentially occurring T&E and S plant species within the botanical AA. This analysis is based upon current knowledge of species habitat parameters. Usually, these parameters are very broad habitat concepts. This discussion does not imply species occupancy in those areas. It examines potential suitable habitat based upon a predictive model of general Forest communities and current knowledge of species habitat parameters within the botanical AA. Species occupancy could be none or a very small percentage of these potential habitat acres. For example, *Carex pedunculata* is known to occur from only one small (<2 acres) population on the Forest. Since this population is found within Rich Cove Forest, the potential habitat is all known Rich Cove Forest within the Forest (56,223 acres). The known Forest occupancy for this species is then 3 one thousandths of a percent (0.003%). This example is typical of many T&E and S plant species with broad habitat definitions. As habitat definitions and botanical surveys become more complete, estimation of potential habitat may become more precise. Table A-8 summarizes the results of this analysis within the 11,096 acre botanical AA.

Table A-8 Effect (Alternative C) Upon Potential Habitat for T&E and S Plant Species within Botanical AA

Species	Natural Community or Habitat	Predicted Potential Acres Existing condition	Acres of Potential Habitat Impacted (% of Area Total - Alternative C)
Federally T&E Plant Species			
None	N/A	None	None
2002 Region 8 Regional Forester's S Plant Species			
Hexastylis contracta	Acidic Cove Forest	2,765 acres	91 acres/2%
Fissidens appalachensis	Aquatic on rocks in Acidic Coves	>1 acre	Not impacted
Monotropsis oderata	Chestnut Oak Forest	4,537 acres	184 acres impacted (4% of total potential habitat in AA)
Tsuga caroliniana	Chestnut Oak Forest, Pine Oak-Heath Forest.	4,537 acres	184 acres impacted (4% of total potential habitat in AA)

Potential Habitat Cumulative Effects

The cumulative effect to potential habitat is the total affect of past, current, and foreseeable actions within the botanical AA that have directly or indirectly affected T&E and S plant species potential habitat. Within the botanical AA, only timber harvest and controlled burns are thought to have important influence on habitat. All other activities are minor and not analyzed

(Hurricane and Storm road repair, special forest product permits, hemlock woolly adelgid control, public recreation, etc.).

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

Table A-9: Summary Cumulative Effect of Past & Future Timber Harvest Upon Potential Suitable Habitat for T&E and S Plant Species within Botanical A.A (Alternative C)

Regionally Sensitive Plant Species Potential Habitat (Alternative C)						
Habitat	**Total Acres in A.A.**	**Associated Species**	**Past impact(s) (<50 years old)**	**Proposed impact(s)/ % of total**	**Future impact(s)**	**Total Impact/ % of Total Habitat in AA**
Acidic Cove Forest	5,774	*Hexastylis contracta*	830 acres	91/ 2%	None known	921 acres/ 16%
Rich Cove Forest	none	*Helianthus glaucophyllus* *Aconitum reclinatum* *Juglans cinerea*	Habitat not affected	None proposed	None known	Not affected
Pine Oak Heath/ Chestnut Oak Forest	4,537	*Monotropsis oderata*, *Tsuga caroliniana*	874 acres	184/ 4%	None Known	1058 acres/ 23%
Montane Oak Hickory	2,393	none	none	None proposed	None known	Habitat not affected
Alluvial Forest	10	none	Largely converted to pasture on private lands	None proposed	None known	Habitat not affected
Water Fall Spray Zones & wet rocks	<1 acre	*Fissidens appalachiana*	None known	None proposed	None known	Habitat not affected

B. EFFECTS/IMPACTS TO TES WILDLIFE SPECIES

Direct and Indirect Effects to Threatened and Endangered Species and Habitat

There are no spruce-fir forests or bogs and wet meadows within the proposed Mulberry project area—as a result, the Spruce-fir moss spider (*Microhexura montivaga*) and the Bog turtle, (*Clemmys muhlenbergii*) were dropped from further analysis. There would be no adverse effect to either of these species as a result of the proposed actions.

Direct, Indirect, and Cumulative Impacts to Sensitive Species Diana Fritillary

Direct Impacts

There are no known populations of Diana fritillary within the wildlife AA. Therefore, there are no direct impacts to this species.

Indirect Impacts

Indirect impacts to Diana fritillary can be measured by impacts to potential habitat. Habitat for the Diana fritillary is found throughout the wildlife AA primarily within riparian areas where moist conditions are found. Nectar species are found along both State and Forest Service roads, Boone Fork campground, Mulberry Picnic area and private farm land, within the wildlife AA. Although no Diana fritillaries were observed during the Mulberry wildlife surveys of the roads, there is suitable habitat present within the activity areas.

Alternative C would increase potential habitat for nectar species within the newly created early successional habitat and within the grass/forb opening. Temporary road construction will result in short-term nectar species habitat and would decrease as the opening closes in with vegetation. There are currently about 341 acres of riparian habitat on National Forest System (NFS) lands in the wildlife AA. About an acre of potential habitat within Boone Fork Branch and an un-named tributary to Boone Fork Branch would be disturbed as a result of the proposed stream restoration activities (<0.3% potential habitat impacted). The proposed actions are expected to result in optimum Diana fritillary habitat within a year or two. The proposed manual and chemical timber stand improvement (TSI) work planned would not directly impact potential Diana fritillary habitat as the work is planned on woody stems only.

The proposed action would use herbicides to control/manage non-native invasive plants. This action is not expected to have an impact on the availability of larval species because they are not found on non-native invasive plants expected to be treated. Treatment of non-native invasive plants would not impact adult nectar species habitat as the proposed treated plants are not adult nectar species.

Overall, the proposed action is expected to benefit the Diana fritillary and its habitat across the wildlife AA for approximately 10 years. Therefore, there would not be any adverse impacts to the Diana fritillary as a result of the proposed action or the species viability across the Forest.

Cumulative Impacts

Southern pine beetle (SPB) mortality of yellow pine has likely created more habitat for nectar species due to the opening in the forest canopy. Also considered cumulatively would be the hemlock wooly adelgid (HWA) treatment. The treatment for this adelgid has been within the Boone Fork campground where no nectar species are found due to the continual mowed maintenance of the campground. The loss of hemlock trees within the riparian area is expected to create openings which may increase habitat for nectar species.

Wildfires and prescribe burns rarely enter riparian areas and are generally low intensity burns with minimal impacts within the moist environment. Prescribe burning has previously occurred and would occur outside the adult life cycle of the Diana fritillary but may eliminate or have eliminated individual fritillary eggs or larvae as well as create habitat for nectar species. The adverse impact to individual larvae or eggs would have been for one season or generation while the positive impact of increased nectar species is expected to be of three to five years in duration. As the adult fritillary is mobile, they would not be impacted by wildfires which may eliminate or have eliminated individual Diana fritillary eggs or larvae as well as create habitat for nectar species. As it is rare for a wildfire to occur or enter riparian areas, there is a low likelihood of

adversely impacting the larval or egg stage of the fritillary. Therefore, the impact to the adult Diana fritillary is an increase in habitat for three to five years and minimal negative impacts to larvae or eggs.

On private lands, flower gardens surrounding many home sites provide habitat for nectar species even though the initial land clearing and home construction eliminated habitat. The edge of many small fields and openings on private lands provide a corridor of brushy habitat for nectar species throughout the Mulberry wildlife AA.

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 negatively impacted on both Forest Service and private lands. There is not likely to be a trend toward federal listing or loss of viability across the analysis area because there would be a cumulative increase in habitat with only a loss of some individuals by harvest-related activities (see Table A-10). The following table summarizes expected impacts to the fritillary by alternative:

Table A-10: Summary of Potential Impacts to Diana Fritillary

Diana fritillary Effects	Alt A	Alt C	Cumulative (Alt C)
Adults	No change	No change	No change
Larvae & eggs	-Individuals	-Individuals	-Individuals
[1/]Adult habitat	No change	+307.3 ac/-<1 ac	Overall increase
Larval & egg habitat	+/-	+/-	Non-significant

[1/]Includes 0.3 miles of temporary roads and roads seeded to linear wildlife areas

C. EFFECTS/IMPACTS TO TE&S AQUATIC SPECIES

There would be no adverse effects or impacts to aquatic TE&S species due to the proposed actions because there are no aquatic TE&S species or habitat within the aquatic AA.

VI. PROJECT DESIGN FEATURES/ REQUIRED MITIGATION

Botanical Species

1. To mitigate the potential impacts of invasive plant species to the Mulberry botanical AA, all known populations of *Miscanthus sinensis, Paulownia tomentosa , Celastrus orbiculatas* and *Ailanthus altissima* should be controlled prior to disturbance activities. *Miscanthus sinensis* was found along Forest Roads. All populations total less than 1 acre. Control of *Miscanthus sinensis, Paulownia tomentosa* and *Ailanthus altissima* is most easily and effectively done by the use of herbicide (Glyphosphate).
2. It is recommended that native plants be utilized in wildlife improvement and roadside erosion control.
3. No mitigation is recommended for the action alternative to protect *Calystegia catesbeiana ssp. sericata*.

Wildlife Species

1. Marking guidelines will include the priority residual tree species of; White Oak, Red Oak, Hickory, Black Oak, Chestnut Oak, where they occur. In addition, two 12" or greater diameter Black Gum species will be left as residual trees within every 10 acre harvested, where this species occurs.

Aquatic Species

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

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

VII. DETERMINATION OF EFFECT

A. BOTANICAL

T&E Botanical Species
The proposed action will not affect (directly, indirectly, or cumulatively) any proposed or listed Federal T&E plant species. Consultation with the USFWS is not required. This proposal will have no known cumulative negative effects to any federally listed or proposed plant species.

S Botanical Species
This proposal may impact individuals (Alternative C) of the S species *Hexastylis contracta*. These impacts will not lead towards federal listing or loss of Forest viability.

B. WILDLIFE

T&E Wildlife Species
There are no known T&E wildlife species or their habitat within the proposed project area. There will be no effects to T&E species by any alternative considered in the Lower Mulberry wildlife AA; no formal consultation with US Fish & Wildlife Service is required.

S Wildlfie Species

There are no known direct impacts to populations of Diana fritillary as a result of the proposed action because the species is not known to occur in the wildlife AA. There are both positive and negative indirect impacts to potential habitat as a result of the proposed action and past or foreseeable future activities because of loss of habitat. The positive and negative indirect impacts to this species potential habitat are not considered significant because the proposed action is expected to benefit the Diana fritillary's potential habitat across the wildlife AA throughout the next ten years. As a result, the proposed action is not likely to cause a trend toward federal listing or loss of viability for this species across the wildlife AA and Forest.

C. AQUATICS

T&E Aquatic Species

No risk to population viability of any aquatic federally listed species across the Forest would occur as a result of the implementation of the Mulberry Project. The project would have no effect on any federally listed species or their habitat.

S Species

No risk to population viability of any aquatic Sensitive species across the Forest would occur as a result of the implementation of the Mulberry Project. The project would have no effect on Sensitive aquatic species or their habitat.

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Attachment 1

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

Botanical

T&E, S plant species of Caldwell County

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 Plant Species

Species	Natural Communities	Occurrence
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 Forest	4
Bazzania nudicaulis	Spruce-Fir Forest, High Elevation Rocky Summit	4
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 Forest	4
Helianthus glaucophyllus	Rich Cove Forest,	4
Hexastylis contracta	Acidic Cove Forest	1
Juglans cinerea	Rich Cove Forest	4
Lilium grayi	Grassy 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	3

Wildlife

Federally Listed Wildlife Species

Species	Habitat Characteristics	Occurrence
Clemmys muhlenbergii, Bog Turtle	Slow flow water, bogs and swamps	4

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

Regional Forester's Sensitive Wildlife Species

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

Aquatic

Rare Species List - Caldwell County (List Updated 07/11/05)

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

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

Group	Designation*	Scientific Name	Common Name	NC Status	US Status	NC Rank	Global Rank
Mollusk	Endangered	*Alasmidonta raveneliana*	Appalachian elktoe	E	E	S1	G1
Mollusk	Endangered	*Pegias fabula*	little-wing pearlymussel	E	E	S1	G1
Fish	Threatened	*Hybopsis (Cyprinella) monacha*	spotfin chub	T	T	S1	G2
Crayfish	Sensitive	*Cambarus chaugaensis*	Oconee stream crayfish	SR(PSC)		S2	G2
Crayfish	Sensitive	*Cambarus georgiae*	Little Tennessee River crayfish	SR(PSC)		S2S3	G1
Crayfish	Sensitive	*Cambarus parrishi*	Hiwassee headwaters crayfish	SR(PSC)	FSC	S2S3	G1
Crayfish	Sensitive	*Cambarus reburrus*	French Broad				G3

Group	Designation*	Scientific Name	Common Name	NC Status	US Status	NC Rank	Global Rank
			crayfish				
Crustacean	Sensitive	*Caecidotea carolinensis*	Bennett's Mill cave water slater	SR	FSC	S1	G1G2
Crustacean	Sensitive	*Stygobromus carolinensis*	Yancey sideswimmer	SR	FSC	S1	G1G2
Dragonfly	Sensitive	*Gomphus diminutus*	diminuitive clubtail	SR		S2S3	G3
Dragonfly	Sensitive	*Macromia margarita*	mountain river cruiser	SR	FSC	S2S3	G2G3
Dragonfly	Sensitive	*Ophiogomphus edmundo*	Edmund's snaketail	SR	FSC	S1?	G1G2
Dragonfly	Sensitive	*Ophiogomphus howei*	pygmy snaketail	SR	FSC	S1S2	G3
Fish	Sensitive	*Etheostoma acuticeps*	sharphead darter	T		S1	G3
Fish	Sensitive	*Etheostoma vulneratum*	wounded darter	SC		S2	G3
Fish	Sensitive	*Percina burtoni*	blotchside darter	E		S1	G2
Fish	Sensitive	*Percina macrocephala*	longhead darter	SC	FSC	SX	G3
Fish	Sensitive	*Percina squamata*	olive darter	SC	FSC	S2	G3
Mussel	Sensitive	*Alasmidonta varicosa*	brook floater	T(PE)	FSC	S1	G3
Mussel	Sensitive	*Fusconaia barnesiana*	Tennessee pigtoe	E		S1	G2G3
Mussel	Sensitive	*Lasmigona holstonia*	Tennessee heelsplitter	E	FSC	S1	G3

Endangered (E), Threatened (T), or Proposed (PE, PT): as listed by the U.S. Fish and Wildlife Service
Sensitive (S): as listed by the U.S. Forest Service (Region 8, 2001)
1. State Rank S1, S2, or S3
2. Federal Species of Concern
3. State Threatened or Endangered

Definitions

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

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

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

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

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

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

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

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

Cold Water 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.

Cool Water Streams: Represent the transitional community between coldwater streams and warm water streams. Components of the community may include elements of both coldwater and warm water habitats.

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

APPENDIX B – AGE CLASS DISTRIBUTION

Forest vegetation within the Mulberry 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 Lower Mulberry Analysis Area (AA), approximately 68% of forested acres are 71 years old or older. There is no acreage in the 0-10 year age-class, and 15% is in the 11-20 year age-class. Within the 3,883 acre project area (compartments where harvesting is proposed), approximately 64% of the forested acres are 71 years old or older. Less than one percent is in the 0-10 year age-class, and 14 percent is in the 11-20 year age-class.

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

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. Alternative C would result in bringing the 0-10 year age-class in the project area up to seven percent in 2008. The resulting sum of 0-10 and 11-20 year age-classes would be approximately 22%. All stands proposed for harvest are from 76 to 105 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 MA's with timber production (Forest Plan, pages III, 29-31). Regulation is at three scales: the AA or topographic level; the MA within the AA 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 Mulberry project compartments within each AA. Uncut inclusions and non-forested areas are not considered as 0-10 year old regeneration.

Mulberry Compartments 3, 18, 20, 21

For every AA with at least 250 acres in MAs 1B, 2A, 3B, 4A and/or 4D, the number of acres in each MA is multiplied by the maximum percent allowed and then summed to determine the amount of 0-10 year age-class allowed in the AA. This equals about 468 acres in Lower Mulberry AA.

For every MA with at least 250 acres in the AA, the amount of 0-10 year age-class allowed in the MA 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 MA. In Lower Mulberry AA there is a maximum of 465 acres allowed in MA's 1B and 3B, and a maximum of 3 acres allowed in MA 2A (Table B-1).

Table B-1: Forest Plan Allowed 0-10 Year Age-Class for Lower 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	3,098	155	465	0	155	465
2A	33	2	3	0	2	3
4A & 4D	0	-	-	-	-	-
Other	723	-	-	-	-	-
Total	**3,854**	**157**	**468**	**0**	**157**	**468**

Summary: *In Lower Mulberry, harvest 157 to 468 acres in MA's 1B, 3B and 2A.*

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 MA's 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 (Forest Plan, page II-30). If MA's 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 (Forest Plan, page II-30). The following tables display the age-class by compartment and Forest Plan standards (harvest goals):

Table B-2: Lower Mulberry AA, Compartment 3, 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	841	42	126	0	42	126
2A	33	2	3	0	2	5
4A & 4D	0					
Other	604					
Total	**1,478**	**44**	**129**	**0**	**44**	**131**

Summary: *In Compartment 3, harvest 44 to 129 acres in MA's 1B, 2A, 3B, 4A and 4D.*

Table B-3: Lower Mulberry AA, Compartment 18, 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	724	36	109	0	36	109
2A	0					
4A & 4D	0					
Other	14					
Total	**738**	**36**	**109**	**0**	**36**	**109**

Summary: *In Compartment 18, harvest 36 to 109 acres in MA's 1B, 2A, 3B, 4A and 4D.*

Table B-4: Lower Mulberry AA, Compartment 20, 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	673	34	101	0	34	101
2A	0					
4A & 4D	0					
Other	53					
Total	**726**	**32**	**101**	**0**	**34**	**101**

Summary: *In Compartment 20, harvest 34 to 101 acres in MA's 1B, 2A, 3B, 4A and 4D.*

Table B-5: Lower Mulberry AA, Compartment 21, 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	860	43	129	0	43	129
2A	0					
4A & 4D	0					
Other	52					
Total	**912**	**43**	**129**	**0**	**43**	**129**

Summary: *In Compartment 21, harvest 43 to129 acres in MA's 1B, 2A, 3B, 4A and 4D.*

APPENDIX C – OLD GROWTH COMMUNITIES 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 watershed affected by this project is 61 (Mulberry Creek). The Forest Plan standards for this project are as follows: (1) utilize large patch 30 in the Lower Mulberry Analysis Area (AA); (2) select and designate small patches for compartments 18, 20 and 21.

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 30: Approximately 3,326 contiguous acres with 617 contiguous acres located within the Lower 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 Lower Mulberry AA

Comp.	Min. Acres	Stand No.	Est. Acres	CISC Age in 2006	Initial Inv.?	Community Type
3	74	15 (partial)	46	126	Yes	Oak/Hickory
		17 (partial)	28	81	No	Oak/Hickory
18	50	02 (partial)	23	138	Yes	Oak
		03 (partial)	22	88	Yes	Yellow Pine
		12 (partial)	5	99	No	White Pine
20	50	04 (partial)	50	128	Yes	Oak
21	50	05	10	77	No	Yellow Pine
		24	34	86	No	White Pine
		35 (partial)	6	72	No	Cove Forest

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). Forest Interior Breeding Bird Habitat #38 is adjacent to the Mulberry project Lower Mulberry AA, and would not be affected by this proposal.

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 that occur in the Lower Mulberry Analysis Area (AA). 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
03-037	29	5.5	Med-High	Spotty	No	Good	WL, Vis
03-001	8	6.5	Med-High	Spotty	No	Good	WL, Vis
03-001	40	5.5	Med-High	Spotty	No	Good	WL, Vis
03-002							
03-002	27	6.5	Med-High	Spotty	No	Good	WL, Vis
03-003	19	6.5	Med-High	Spotty	No	Good	WL, Vis
03-037	6	5.5	Med-High	Spotty	No	Good	WL, Vis
03-022	28	5.5	Med-High	Spotty	No	Good	WL, Vis
03-024	30	6.5	Med-High	Spotty	No	Good	WL, Vis
18-012							
20-006	40	6.5	Med-High	Spotty	No	Good	WL, Vis
21-011	40	7.5	Med-High	Spotty	No	Fair	WL, Vis
21-012							
21-013							
21-006	40	5.5	Med-High	Spotty	No	Good	WL, Vis
18-009	26	6.5	High	Spotty	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

					Alt. B	Alt. C	Alt. B	Alt. C	Alt. B	Alt. C	Alt. B	Alt. C
Compt.-Stand	Acres	Forest Type	Age	Method Of Logging	Selection (groups <1 ac)		Shelter-wood BA[1] 30-50		Two-Age BA 15-20		Clearcut w/ Reserve Trees	
03-047	29	WP - Up. Hwd	80	Skidder					Yes	Yes	Yes	Yes
03-001	8	WP - Up. Hwd	80	Skidder					Yes	Yes	Yes	Yes
03-001	40	WP - Up. Hwd	80	Skidder					Yes	Yes	Yes	Yes
03-002			90									
03-002	27	WP - Up. Hwd	90	Skidder					Yes	Yes	Yes	Yes
03-003	19	WP	78	Skidder					Yes	Yes	Yes	Yes
03-037	6	WP - Up. Hwd	80	Skidder					Yes	Yes	Yes	Yes
03-022	28	WP	84	Skidder					Yes	Yes	Yes	Yes
03-024	40	WP	88	Skidder					Yes	Yes	Yes	Yes
18-012			98									
20-006	40	WP	105	Skidder					Yes	Yes	Yes	Yes
21-011	40	Up. Hwd - WP	76	Skidder					Yes	Yes	Yes	Yes
21-012			76									
21-013			76									
21-006	40	WO-NRO-Hickory	78	Skidder					Yes	Yes	Yes	Yes
18-009	26	WP	92	Skidder					Yes	Yes	Yes	Yes

1 – Basal Area (BA)

All Stands

These stands are located on relatively gentle slopes (< 40 percent) where skidder logging can occur 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 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

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. New road engineering and construction is estimated at $90,000/mile.
8. 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
C	3,400	$249,356

Table E-2: Sale Cost Estimates – Alternative C

Activity	Units	Number	Cost/Unit	Total Costs
Silvicultural Exams	Acres	1400	$4.50	$6,300
Sale/Contract Preparation	CCF	3,400	$8.95	$30,430
Sale Administration	Year	3	$6,000	$18,000
Road Engineering and Construction	Miles	0	$90,000	$0
Temp. Road Engineering and Construction	Miles	2.0	$30,000	$60,000
Cable Yarding	CCF	0	$17.50	0
Site Preparation – Herbicide	Acres	275	$80	$22,000
Total				**$136,730**

Table E-3: Benefit Cost Ratio – Alternative C

Year	Discount Factor	Revenue	Cost	Present Net Value	Benefit Cost Ratio
0	0	$249,356	$136,730	$112,626	1.82
60	0.04	$9,974	$5,469	$4,505	1.82

Salability of Mulberry Timber Sale

Salability is determined by accessibly of timber and current markets for timber. Mulberry project area is mainly accessible from State Roads 1368 and 1349 and Forest Service Roads 2055 and 189. Some temporary road construction is necessary to access some units; however temporary road construction costs are estimated to be $60,000; well below the value of the timber to be removed, which is estimated to be as high as $249,356. The overall timber quality is medium-high within the proposed sale. 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 Mulberry project timber sale units when offered.

APPENDIX F – PROJECT DESIGN FEATURES FOR HERBICIDE USE

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

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

APPENDIX G – PROJECT-LEVEL ROADS ANALYSIS

This roads analysis evaluates the existing condition of the transportation system within the Mulberry Project Analysis Area (AA). It is being completed for information and support of the Environmental Assessment and the decision to be made for the Mulberry project. This report includes the analysis of all system classified Forest Service Roads (FSRs) within the project AA. Objectives of the Mulberry 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 Mulberry Project.

1. Identification of Needed and Unneeded Roads

This analysis includes the Lower Mulberry AA. This AA is within the scope of the Mulberry 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 FSR's within the Mulberry Project

FSR No.	FSR Name	Analysis Area	Length in miles	Road Mgmt Objective (RMO)	Mgmt. Area	Status
189	Spencer Branch	Lower Mulberry	6.3	D3	3B	Closed
189A	Mitchell Branch	Lower Mulberry	1.9	D3	3B	Closed
966	Buckeye	Lower Mulberry	2.2	D3	3B	Closed
1167	Benson Hollow	Lower Mulberry	1.0	D1	3B	Closed
2055	Boone Fork I	Lower Mulberry	1.0	B2	2A	Open
2055	Boone Fork II	Lower Mulberry	0.5	B2	2A	Open
2055	Boone Fork III	Lower Mulberry	0.5	D3	2A	Seasonal
1001	Boone Fork R.A.	Lower Mulberry	0.6	C2	2A	Seasonal

Table G-2: Comparison of FSRs within the Mulberry 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.
Lower Mulberry	3098 (3B)	11.4	0.5 (or 2.4 miles in this AA)	0
	33 (2A)	2.6	2.0	2.6 (Access to Boone Fork Recreation Areas)

Forest Plan Direction for Transportation System Management

Management Area **3B**: (Forest Plan p. 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 **2A**: (Forest Plan p. III–63)
Emphasize visually pleasing scenery.
Manage for motorized recreation use.
Open roads through scenic forest.
Permit timber management modified to emphasize visual quality.
Permit road construction.
Manage access through an approximate density of 2.0 miles of open road per square mile.
Where existing open road densities exceed 2.0 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

Road reconditioning in response to damage received during the tropical storms Frances and Ivan of 2004 is completed on Boone Fork (FSR 2055), Spencer Branch (FSR 189) and Mitchell Branch Roads (FSR189A). 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.

Alternative C would develop approximately 2.0 miles of new temporary road. Following Mulberry 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.

Alternative C would utilize and reconstruct 1.8 miles of existing old woods roads. Following Mulberry Project use, these existing woods roads would be placed on the Forest's Transportation System as authorized (system) road, stabilized (i.e. shaped, waterbarred, and seeded with an erosion-control seed mix), and maintained closed for administrative use only.

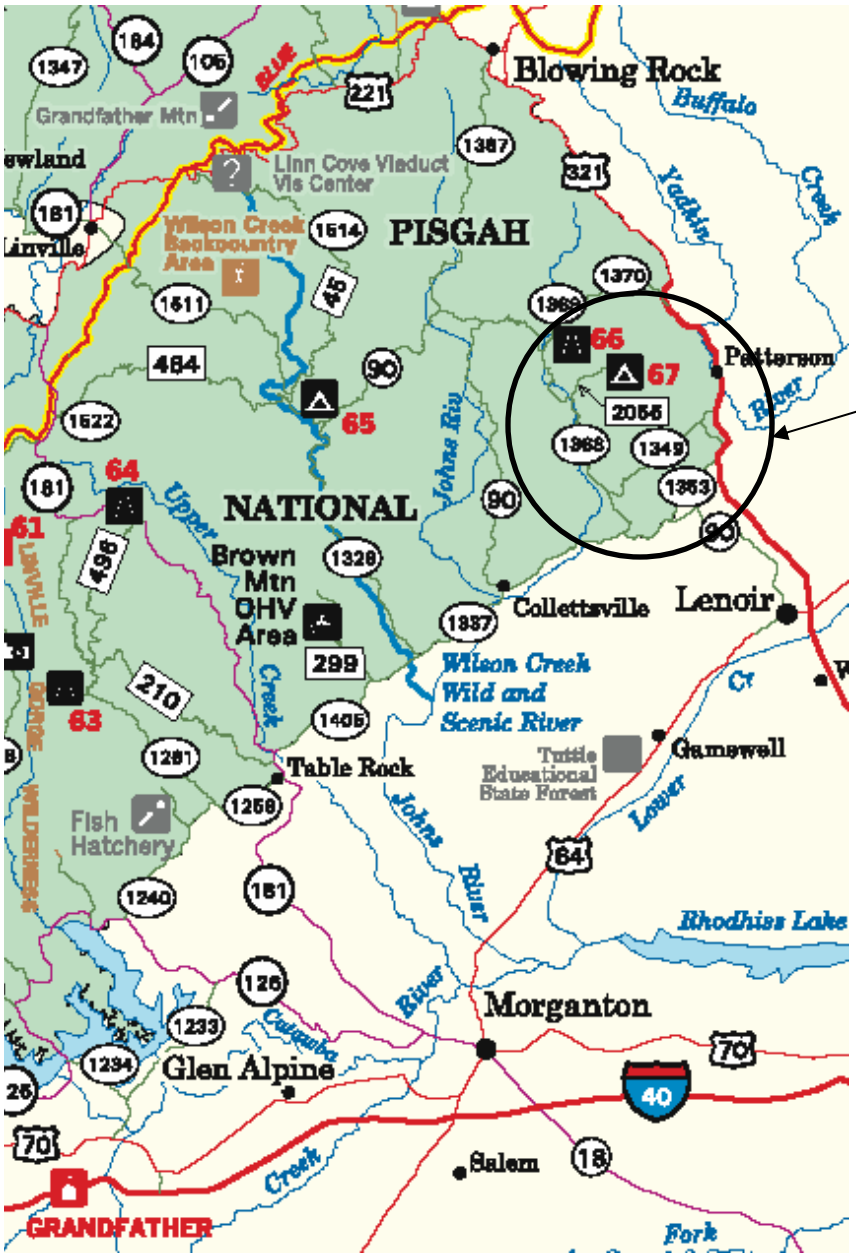
4. Identification of areas of special sensitivity or unique resource value that may require specific road management

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

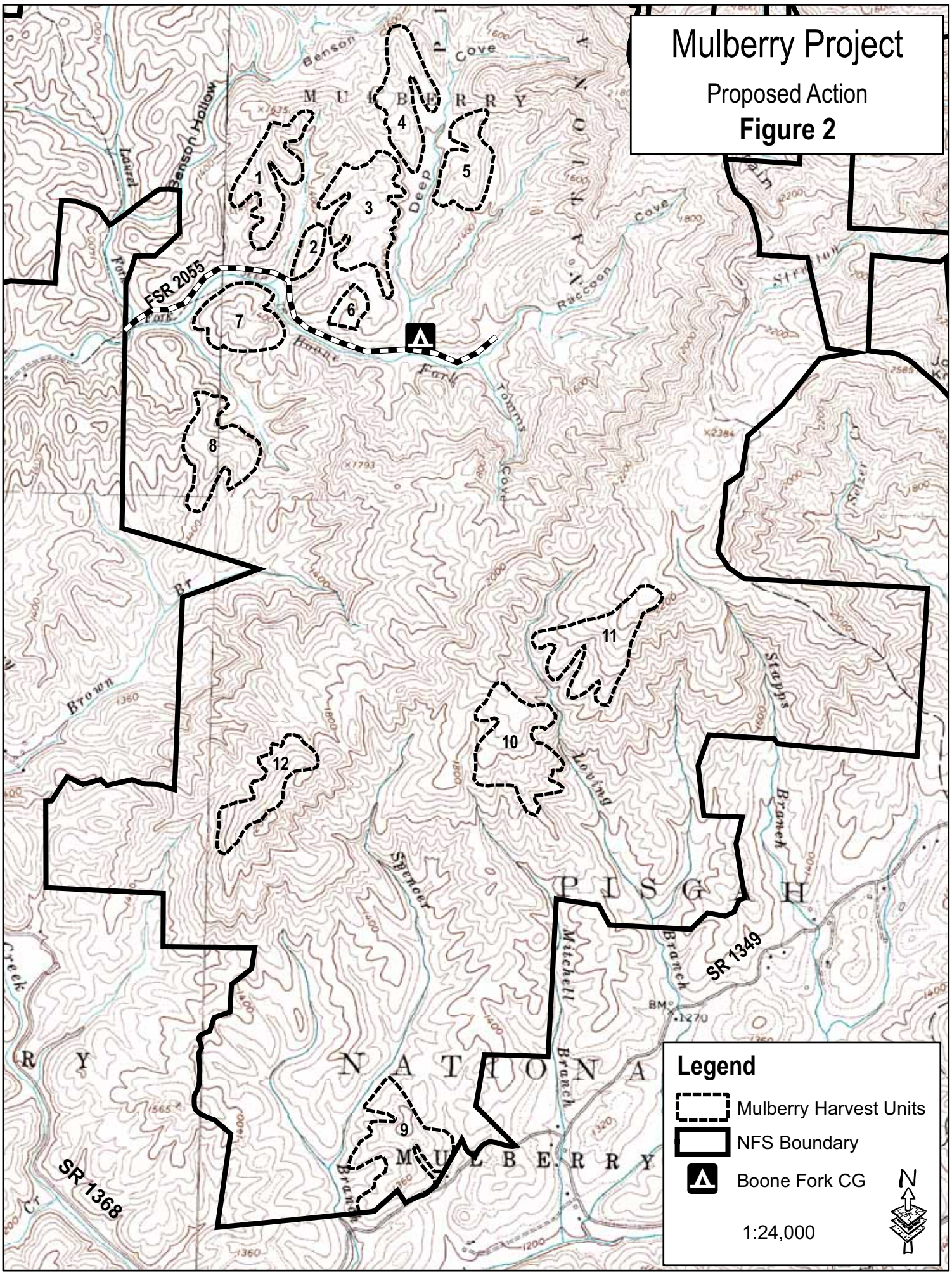
5. Provide other specific information that may be needed to support the Mulberry Project decision

The current condition of the Lower Mulberry AA and the Mulberry Project activities satisfy Forest Plan transportation system management direction.

MULBERRY PROJECT MAPS



Vicinity Area of
Mulberry Project


Mulberry Project
Proposed Action
Figure 2
Legend
Mulberry Harvest Units
NFS Boundary
Boone Fork CG
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FSR 2055
SR 1349
SR 1368
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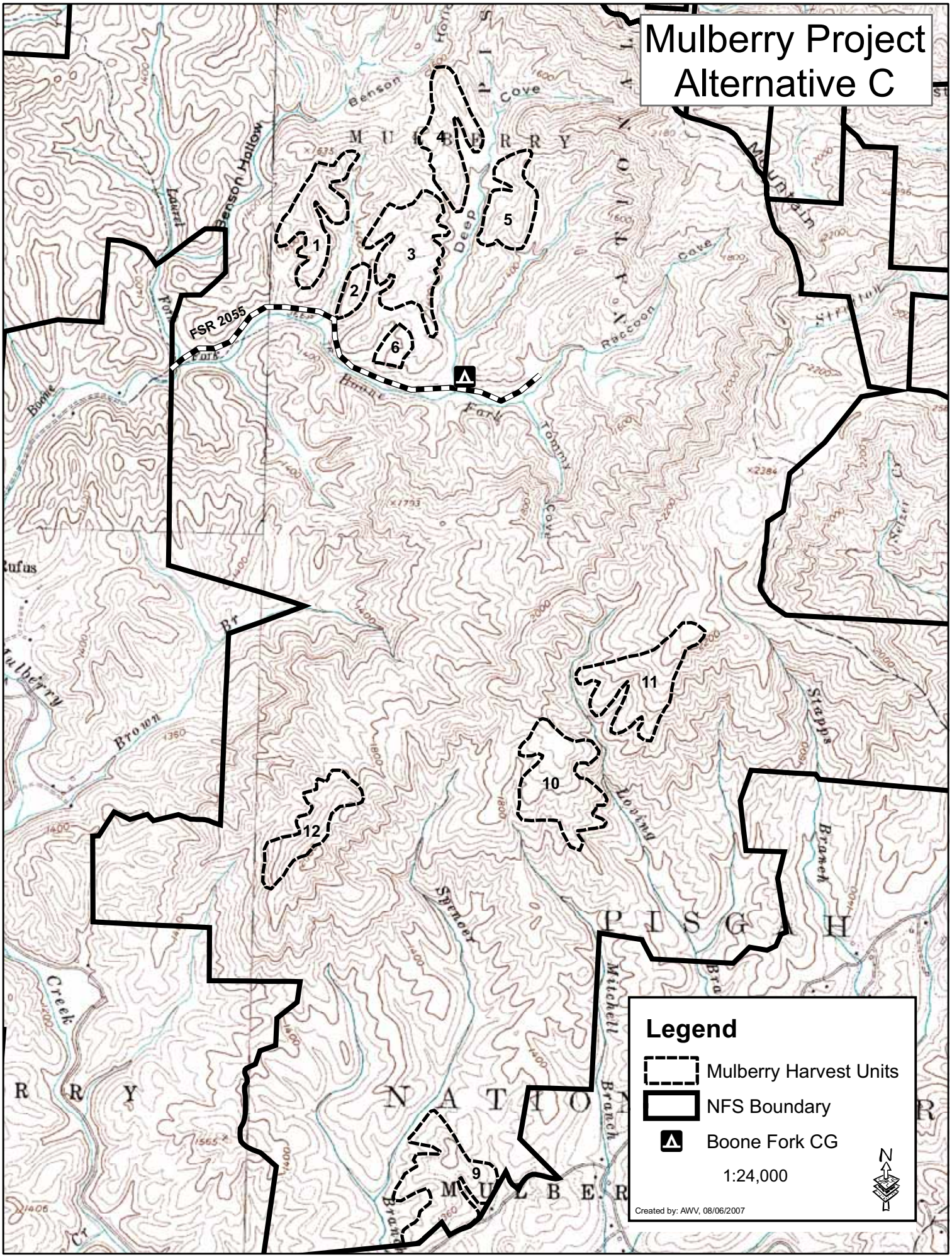
Mulberry Project
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FSR 2055
Benson Hollow
Benson Cove
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Raccoon Cove
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Tommy Cove
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Mulberry Harvest Units
NFS Boundary
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