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Environmental Assessment

Laurel Creek Property Owners Association Access Across National Forest System Lands

Tusquitee Ranger District, Nantahala National Forest
Clay County, North Carolina

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Chapter 1 – Proposed Action and Purpose and Need

1.1 Introduction

The Nantahala National Forest is proposing a project to grant legal access, through an easement, to a private inholding near the town of Hayesville in Clay County, North Carolina. This inholding is a parcel of privately owned land which is completely surrounded by National Forest land. If the decision is made to grant this access, the landowners will use the easement to reconstruct two Forest Service roads and to construct 1,766 feet of new road across the Nantahala National Forest to their privately owned inholding. This document is an environmental analysis of the proposed action. In the assessment, the Forest Service describes the process and considerations used in developing alternatives, the environment where the proposed action would occur, and the resources potentially affected by the alternatives. The Forest Service discloses the effects of the alternatives on these resources and evaluates their effectiveness in achieving the goals and objectives of the Forest Plan and in fulfilling statutory requirements for access. Enclosed are maps that display the privately owned parcel involved, the surrounding area and the proposed access to the parcel.

This Environmental Assessment (EA) discloses the direct, indirect, and cumulative impacts that would result from the proposed action. The EA has been prepared in compliance with the National Environmental Policy Act (NEPA) of 1969 (42 U.S.C. 4321-4347, January 1, 1970) and other relevant federal and state laws and regulations. The document is organized into five sections:

1.0: Introduction and Purpose and Need for the Action: This section includes detailed information about the project proposal, the purpose and need for the project, the Forest Service's proposal for addressing the purpose and need, and a summary of the public involvement process.

2.0: Comparison of Alternatives: This section provides alternatives to the proposal.

3.0: Affected Environment and Environmental Consequences: In this section the potential environmental impacts of each of the alternatives are examined. The chapter is organized by the environmental resource being examined. The chapter also includes design criteria, or measures that are taken to prevent potential adverse effects of an action.

4.0: Consultation and Coordination: This section provides a list of preparers and agencies consulted during the development of the environmental assessment.

5.0: Appendices: The appendix contains the Biological Evaluation and other supporting documents.

1.2 Background

The inholding is surrounded on all sides by public land under the management of the U.S. Forest Service. In cases such as this, the Alaska National Interests Lands Conservation Act (ANILCA) authorizes the Secretary of Agriculture to provide, subject to reasonable rules and regulations, such access to non-Federal lands within the boundaries of the National Forest System as deemed adequate to secure the owner the reasonable use and enjoyment of his land (Public Law 96-487 Section 1323(a)).

In this case, the Forest Service is obligated by this statute to grant reasonable access and retains the discretion to determine the location, design, type and extent of access. Access is granted under the authority of Title V of the Federal Land Policy and Management Act of 1976 and is conditioned to insure that the use and occupancy of NFS lands is exercised in a manner that complies with all applicable laws and regulations, including the National Historic Preservation Act of 1966 and the Endangered Species Act of 1973.

1.3 Purpose and Need for the Project

The purpose of this project is to secure legal access for the owners of a privately owned inholding within the National Forest located within the Fires Creek Watershed. A formal request was made by the current landowners seeking access to their property through an Application for Transportation and Utility Systems and Facilities on Federal Lands (Standard Form 299), received in this office in April 9, 2008. The legal framework for evaluating this application includes Forest Service Manual 2701.1(18), Special Uses Management, and ANILCA (Title 16 U.S. Code Section 3210(a)), reprinted as follows:

(a) Reasonable use and enjoyment of land within boundaries of National Forest System. Notwithstanding any other provision of law, and subject to such terms and conditions as the Secretary of Agriculture may prescribe, the Secretary shall provide such access to non-federally owned land within the boundaries of the National Forest System as the Secretary deems adequate to secure to the owner the reasonable use and enjoyment thereof: Provided, that such owner comply with rules and regulations applicable to ingress and egress to or from the National Forest System.

The Forest Service does not have regulatory authority over the density of development on the private land and any parcel of non-federal land surrounded by Forest Service land could have a range of reasonable uses. The Forest Service does not decide which use of the private property within the range of reasonable uses will be allowed. In cases like this, the Forest Service must provide reasonable access over National Forest System lands to allow use and enjoyment of the private property when owners of private inholdings formally request it.

The Nantahala National Forest has been in contact with the current landowners to determine a mutually satisfactory access route, which was agreed upon and applied for as the proposed access for consideration in this project. The need for this project is to process the application for access, submitted by the landowners, and to fulfill the Forest Service's requirements under ANILCA.

1.4 Proposed Action

The Nantahala National Forest is proposing to grant access, through the issuance of an easement, for the owners of an inholding to their property located within the Fires Creek Watershed. The easement would be for the purpose of allowing the landowners to make improvements to Forest Service Roads (FSR) Rockhouse Branch Road (FSR 340A) and Phillips Ridge Road (FSR 340A1), and to build a 1,766 foot section of new road to connect their property to Fires Creek Road (FSR 340). Phillips Ridge Road and the 1,766 foot road segment would be closed to vehicular use by the general public, but would be open to use by hikers and horseback riders. The easement would allow for permanent, year-round access to the tract of private land.

Engineering plans for the proposed access road construction are available for viewing at the Tusquitee Ranger Station in Murphy and include the following design criteria:

- A 14 foot travel way with one foot wide shoulders, for a maximum width of 16 feet, excluding turnouts.
- Aggregate base course four inches compacted depth.
- Crowned gravel surface.
- 3:1 sloped ditch on the uphill side.
- 1:1 sloped cut bank on the uphill side.
- 1.5:1 sloped fill slope on the downhill side.

Additionally, road design and construction would comply with National Forest in North Carolina standards for single lane roads with turnouts serving five homes or fewer (Appendix 5.1).

This standard provides for a minimum width of 13 feet (including shoulders) with curve widening, aggregate surface, upslope ditches, a 1:1 cut slope, and 2:1 fill slope. Overall clearing limits would vary depending on terrain cross-slope, but would average 32 feet in width. Cut and fill slopes would be seeded with a native grass mix and allowed to re-vegetate.

While the proposed action is limited to the issuance of an easement, the Nantahala National Forest performed this environmental analysis on the effects of constructing and maintaining the road and the expected change in use of a section of existing road. If the decision is made to grant the easement, the costs associated with constructing the new access would be the responsibility of the landowners. The cost of any improvements necessary to upgrade any sections of the road to year round standards would also be at the expense of the landowners. The Forest Service would not construct this access; rather this proposed action would secure the legal authority for the landowners to construct the access in compliance with Forest Service standards

Pursuant to Forest Service Handbook (FSH) 7709.55, Chapter 20, a Travel Analysis Plan (TAP) has also been prepared for the area including the proposed action.

1.5 Where Actions Would Occur

The easement and subsequent road construction actions would be limited to the public lands managed by the Nantahala National Forest. The project area is located in a portion of the Fires

Creek watershed north of Hayesville, North Carolina (Figure 1.5.1) that includes segments of Rockhouse Creek, Laurel Creek, Hickory Cove Creek, and Phillips Ridge (Figure 1.5.2).

Elevations range from approximately 2,200 feet to 3,700 feet. Vegetation varies by elevation, aspect, and slope position and spans a diverse range of forest types including upland and cove hardwoods, hemlock, hardwood/yellow pine, and northern hardwood forest types. The area has a long history of use for timber and wildlife habitat management along with traditional recreational and social uses, including hunting, fishing, hiking, firewood cutting, as well as gathering of special forest species such as ramps, ginseng, and medicinal plants.

All of the proposed actions would occur in lands identified in the Forest Plan as Management Area 2C and Management Area 4C. Management Area 2C emphasizes pleasant scenery for people who experience the forest by driving through it (Forest Plan at III-5) and Management Area 4C emphasizes visually pleasing scenery and habitats for wildlife requiring older forests (Forest Plan at III-77). The proposed easement and its subsequent purpose to reconstruct portions of two Forest Service Roads and to build a section of new road for motorized access is permissible and consistent with the uses allowed in Management Areas 2C and 4C.

Figure 1.5.1: General Vicinity Map and Analysis Area

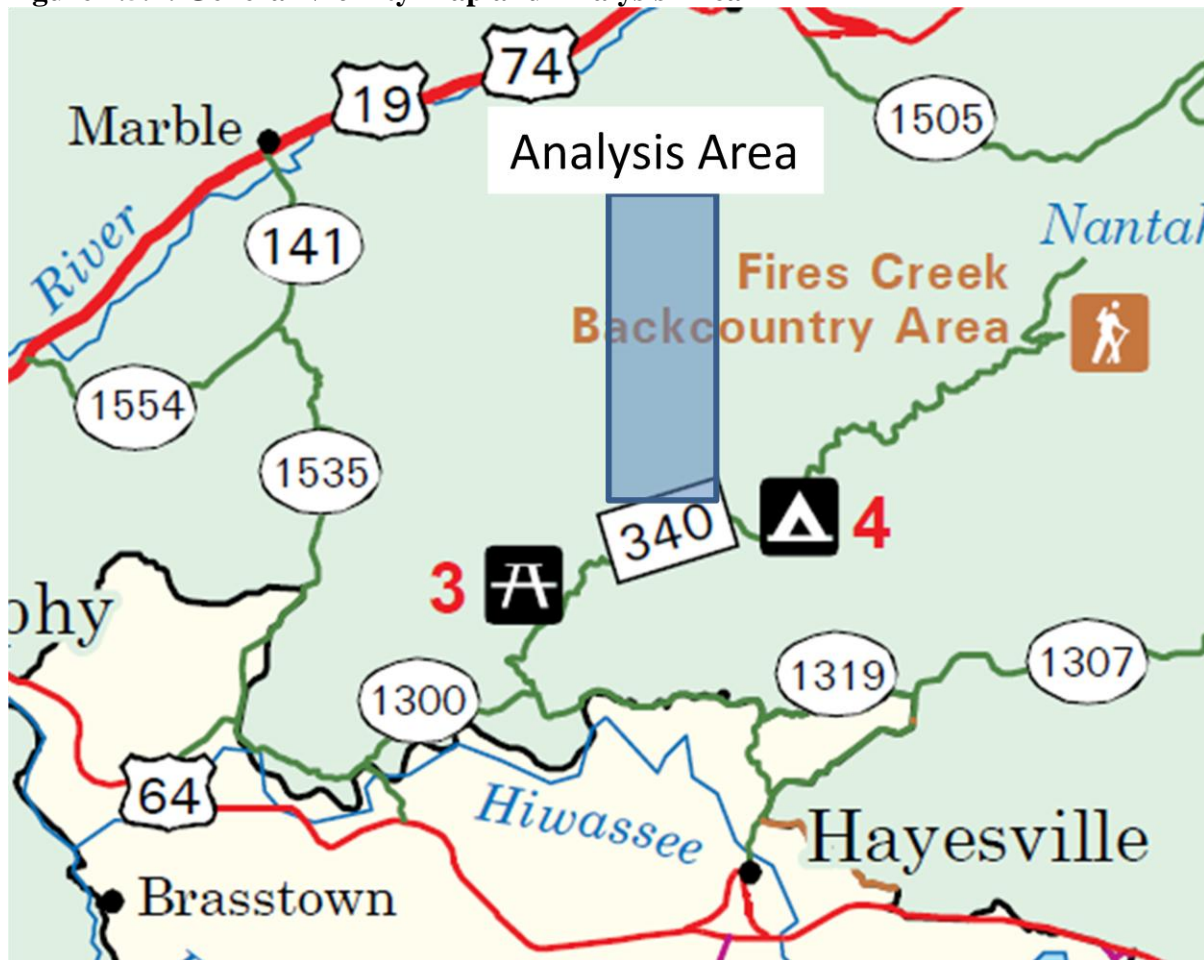


Figure 1.5.2: Detailed Location Map

1.6 What the Decision Will Address

The framework of the decision focuses on whether or not the access conforms to regulation and direction and best protects the public's long-term interest in the management of the areas surrounding the access. A decision on this proposal is limited to the following:

- The route of access to be provided in an easement.
- The standards of construction which will be used to achieve the access, including any site specific design criteria necessary to minimize the impacts of the construction and use of the access.
- Any limitations or restrictions associated with use of the access.
- The design criteria that will be required to minimize impacts of constructing the access.

This proposal and decision would not require amendments to the Nantahala National Forest Plan. The Responsible Official for this decision is the Forest Supervisor.

1.7 Scoping

Scoping is defined by the National Environmental Policy Act as “an early and open process for determining the scope of issues to be addressed, and for identifying the issues related to a proposed action.” Scoping continues throughout project planning and analysis.

Public scoping began on April 21, 2008 when District Ranger Steve Lohr mailed a letter to individuals known to be interested in activities on the lands managed by the Tusquitee Ranger District. In the letter Ranger Lohr requested comments from the public in regards to a proposal. Approximately 160 responses were received from the public.

Notice of the project has also been listed in the National Forests in North Carolina Quarterly Schedule of Proposed Actions (SOPA) each quarter of the calendar year since July, 2008. This SOPA is posted on the Forest’s internet site.

1.8 Issue Identification

An interdisciplinary team reviewed the comments received during the initial public scoping period to identify significant issue(s) that would either have to be addressed with design criteria or the development of one or more alternatives for further analysis. Issues are defined as a point of discussion, debate, or dispute about environmental effects. Issues are used to develop alternatives, design criteria, or analyze environmental effects.

The significant issues associated with this project, as identified through the public scoping process, are as follows:

- The level and type of access that should be granted to the landowner. What constitutes reasonable access? This issue is addressed in **Section 1.10** of this EA.
- Impact to recreation use of Phillips Ridge Road, Rockhouse Branch Road and the Rim Trail, as well as impact to the backcountry experience of hikers and other recreationists. This issue is addressed in **Section 3.1** of this EA.
- The impact to the wild and primitive character of the area. This issue is addressed in **Section 3.7** of this EA.
- Visual impacts. This issue is addressed in **Section 3.2** of this EA.
- Impacts to wildlife habitat, particularly wildlife corridors and fragmentation of habitat. This issue is addressed in **Section 3.8** of this EA.

- Impact to native brook trout streams, water quality, and rare aquatic species. This issue is addressed in **Section 3.8** of this EA, as well as the accompanying Biological Evaluation for this project.
- The potential for encountering acidic rock during road construction and the suitability of soils for road construction. This issue is addressed in **Section 3.4** and **Section 3.5** of this EA, respectively.

1.9 Other Issues

Issues are not considered significant under the National Environmental Policy Act (NEPA) if they are outside the scope of the proposal; are already decided by law or the Forest Plan; are not in conflict with the proposed action; are not supported by scientific evidence; or are limited in duration, extent, or intensity (Council on Environmental Quality (CEQ) NEPA regulations, Sections 1501.7 and 1506.3). Based on the ID Team's evaluation, the following issues were determined to be non-significant issues.

- Native brook trout reintroduction.
 - *This is beyond the scope of the actions being proposed. Water quality and impacts to aquatic species are addressed in **Chapter 3** and the accompanying Biological Evaluation for this project. Both of these sections discuss the indirect implications for trout reintroduction.*
- Concern that the proposal does not comply with Forest Plan and Management Area 4C.
 - *The proposal would comply with the Forest Plan.*
- Wilderness designation of the Fires Creek watershed.
 - *This is beyond the scope of the proposal.*
- Concerns regarding who is responsible for costs incurred from road construction and maintenance.
 - *The landowner would incur costs of road maintenance beyond what is necessary for forest management.*
- Public requests for placing restrictions on what the landowner can do on the private inholding.
 - *This is beyond the scope of the proposal as well as the jurisdictional authority of the Forest Service.*
- Concern that the proposal would increase potential for wildfires, poaching and other illegal activities and increase invasive nonnative plants in the area.
 - *These concerns are speculative of what could happen, but would not necessarily happen due to the proposal.*

1.10 Alaska National Interest Lands Conservation Act Access Analysis

Two sections of the Alaska National Interest Lands Conservation act of 1980 (ANILCA), Section 1323(a) and Section 1323(b), affect non-federal landowners. Section 1323(a) granted non-federal landowners, whose ownership is completely surrounded by National Forest System (NFS), the statutory right of access over public lands when federal lands are needed to provide for the reasonable use and enjoyment of non-federal lands. This section applies to NFS lands throughout the United States. Section 1323(b), not pertinent to this EA, applies only to public lands administered by the Bureau of Land Management in Alaska.

ANILCA applies to this situation as NFS lands completely surround the private parcel and utilizing NFS lands is the only practical option available for the landowner to access their land for its reasonable use and enjoyment. In this case, the Forest Service is obligated by this statute to grant reasonable access and the Forest Service retains the discretion to determine the location, design, type and extent of access. Access is granted under the authority of Title V of the Federal Land Policy and Management Act of 1976 and is conditioned to ensure that the use and occupancy of NFS lands is exercised in a manner that complies with all applicable laws and regulations, including the National Historic Preservation Act of 1966 and the Endangered Species Act of 1973.

1.10.1 Adequate Access to Inholdings

Adequate access is defined as “a route and method of access to non-Federal land that provides for reasonable use and enjoyment of the non-Federal land consistent with similarly situated non-federal land and that minimizes damage or disturbance to NFS lands and resources” (36 C.F.R. §251.111). To make this access determination, both federal and local land use restrictions are reviewed to ensure compliance with all applicable laws.

National Forests in North Carolina – Access Guidelines

On February 13, 2003, the National Forests in North Carolina (NFsNC) revised the guidelines for the construction of roads that serve private property. These guidelines addressed the level and type of roads needed to serve single-family residences, subdivisions and commercial establishments on NFS Lands and were developed using the standards contained in the American Association of State Highway and Transportation Officials “Guidelines for Geometric Design of Very Low-Volume Roads (ADT <400)” (2001); the North Carolina Department of Transportation “Minimum Construction Standards for Subdivisions Roads” (January 1, 2000); and Forest Service regulations contained in Forest Service Handbook 7709.57, Road Construction Handbook.

With this, the guidelines established a minimum level of road construction needed for vehicular access for five single-family residences or fewer and this standard is within the range of the request submitted by the private landowners. Construction guidelines include, but are not limited to, a minimum width of 13 feet, inter-visible passing areas, sustained grades not exceeding a 12% grade and short pitches (less than 150 feet) not to exceed a 20% grade. Should

access be granted, all construction standards would meet NFsNC minimal construction standards and include any site-specific design criteria for the protection of NFS lands and resources.

Clay County Land Use Restrictions

Clay County, North Carolina has developed land-use ordinances for sub developments that became effective on July 1, 1996 and were amended on March 1, 2006. With regard to road access, the county ordinance for roads within a subdevelopment provides for a “right-of-way of at least 30 feet in width with a minimum width of 16 feet of surfaced road bed except where fewer than five lots are being served by a spur roadway, the roadway width may be set in the discretion of the developer” (Section 4.4.2.B).

Accordingly, there are no restrictions being placed on interior roads by Clay County as the tract is subdivided into four tracts and four, single-family residents are being proposed for construction. It should be noted that these ordinances apply only to privately owned land within Clay County and do not govern NFS Lands.

1.10.2 Similarly Situated Non-Federal Land

For the purposes of this analysis, similarly situated tracts of lands were identified in Cherokee, Clay, Graham and the western portion of Macon County. Tracts that were similar in nature involved those that were surrounded by National Forest System lands and were not sub-divided more than five times or extensively developed. Lands that exceeded these standards were dropped from consideration to ensure that similar road construction standards for five or fewer residences could be applied. Concurrent with this, small tracts with a single owners and smaller than five acres were also excluded from the analysis as they are not similar in nature to the applicant’s property.

In the four-county area, 73 private tracts were considered with 40 tracts identified as being similar to the applicants as shown in Figures 1.10.1 - 1.10.4. The average tract size was approximately 61 acres and the majority of the tracts were owned by a single owner. The type of access was then identified using USGS maps, aerial photography and county GIS/Tax information. Approximately 70% of the tracts were accessed by state and/or private road systems capable of being used by a typical passenger vehicle. Access to 15% of the tracts was by trail systems and the remaining 15% did not appear to have any type of established access route.

In comparing the applicant’s request for access to non-federal land for four single-family residents, both the level and type of access requested would be considered reasonable and typical of what would be provided to similarly situated parcels of non-federal land.

1.10.3 Existing Access Rights

Under 36 C.F.R. § 251.112(a) the property owners have to demonstrate a lack of any existing rights of access available by deed or under State or common law.

Deeded Access Rights – Federal Tract

The United States of America acquired USA Tract N-134b consisting of 800 acres from F. P. Cover & Sons, Inc. on August 10, 1937 through condemnation proceedings (No 386 at Law) that involved approximately 17,886.60 acres in Clay and Cherokee Counties, North Carolina. In a review of the judgment filed on March 23, 1937, the Court made only one reservation for mineral rights that expired on January 1, 1955 and the entire estate was condemned for public with no additional encumbrances.

The survey for this acquisition was completed in August of 1935 and it clearly shows the inholding in Will Bumgarner's ownership. The survey also shows existing road locations at the time. No roads were identified as providing access to Mr. Bumgarner's tract.

Deeded Access Rights – Private Tract

The chain of title was reviewed to establish if there were any outstanding or reserved access rights on the private tract of land that preceded the federal acquisition of the adjacent tract in 1937 from F. P. Cover & Sons, Inc.

In a review of the deed issued from W.T. (Will) Bumgarner and wife, Eugenia Bumgarner to George G. Westfeld on October 3, 1935 – the estate conveyed only the real property as described in the deed (Book 147, Page 140, Clay County Register of Deeds) and did not provide for access to the tract. The proceeding deeds from 1935 to the current landowners were also reviewed and there were no outstanding or reserved access rights conveyed in these documents.

Access Rights Under State Law

Under North Carolina State laws, the Bumgarners had several avenues in which to claim access to their property prior to federal acquisition of the adjoining tract in 1937. These claims would have been adverse in nature, based on the use of existing road systems to access private land. Another venue would have been to petition for access under the North Carolina Cartway Act (NCGS §136-69) which allows adjudication of access for the management of natural resources.

As there is no evidence that there was a road or trail that provided access to the private tract prior to federal acquisition, this process under state law is not available to the current landowners as all claims against the federal tract would have had to have been made within 12 years of the condemnation decree in accordance with Title 28, Part VI, Chapter 161, §2409a.

1.10.4 Findings

Based on the above information, lack of existing access rights, and that the majority of similarly situated properties enjoy road access by private passenger vehicle, it would be reasonable to grant legal access to the applicant to construct a road on National Forest System lands for access for four, single-family residences (primitive cabins); *Provided*, that the owner can comply with Forest Service regulations for ingress and egress through NFS lands and the standards and guidelines contained in the Nantahala/Pisgah Land and Resource Management Plan, as amended.

Figure 1.10.1 ANILCA Analysis - Similarly Situated Properties, Cherokee County, NC.

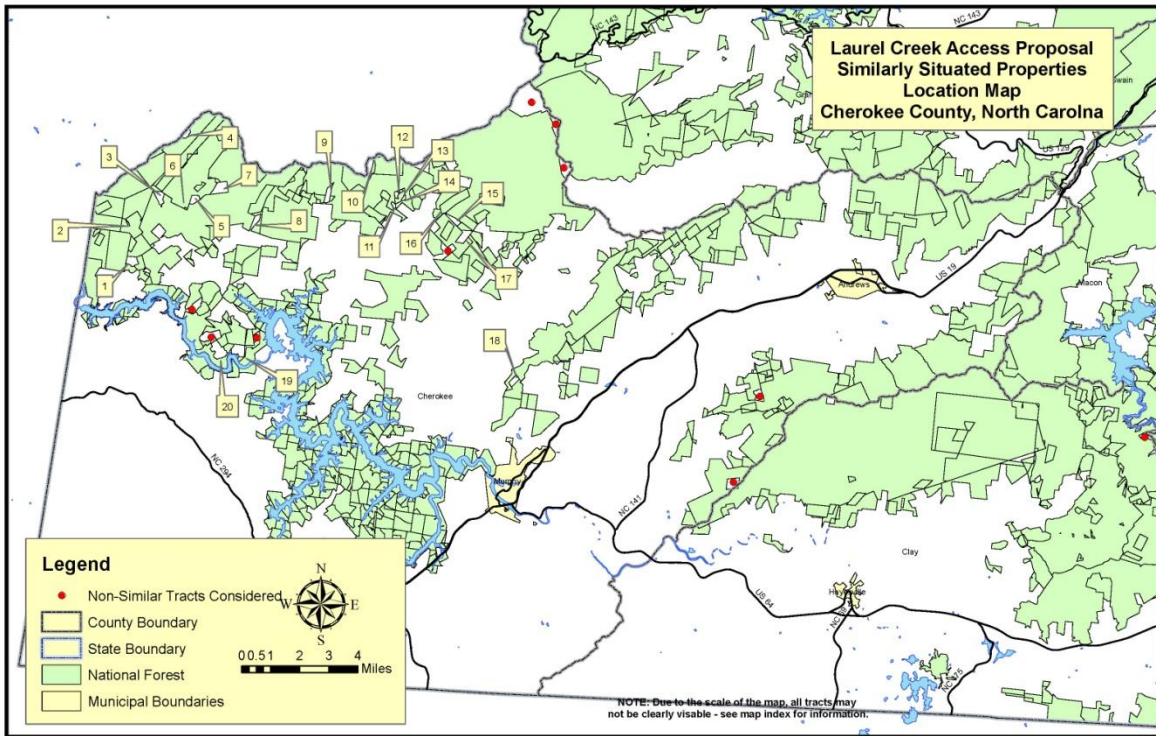


Figure 1.10.2 ANILCA Analysis - Similarly Situated Properties, Clay County, NC.

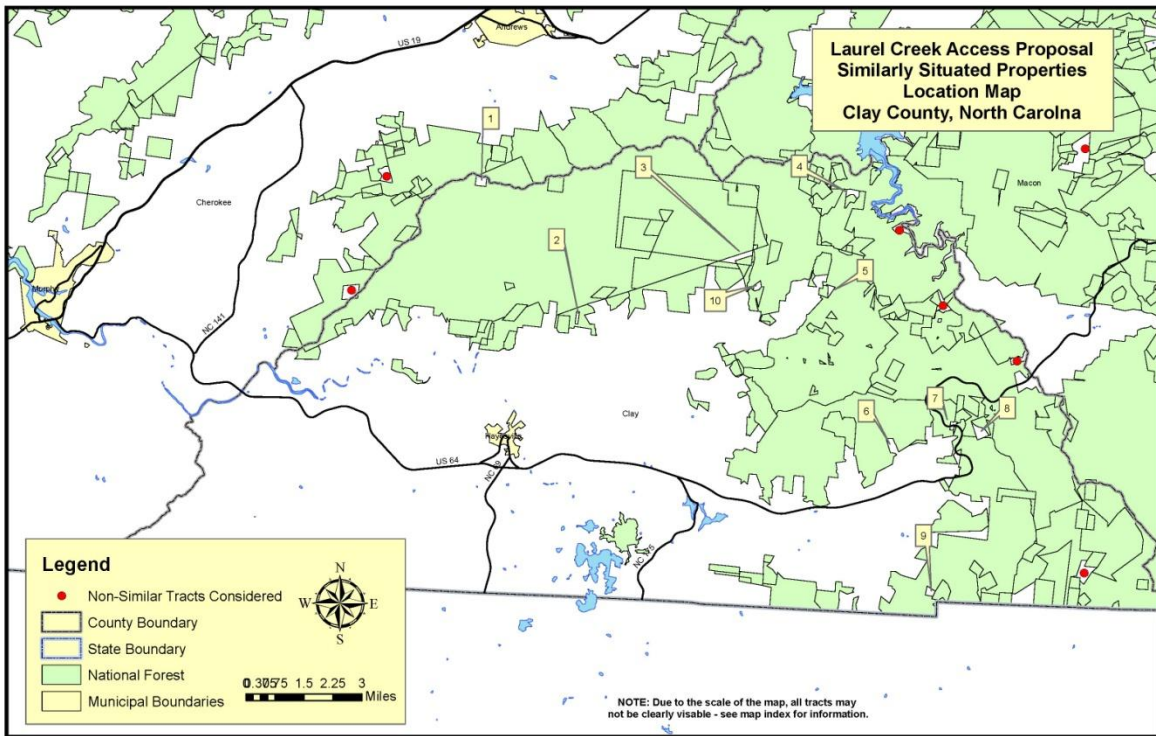


Figure 1.10.3 ANILCA Analysis - Similarly Situated Properties, Graham County, NC.

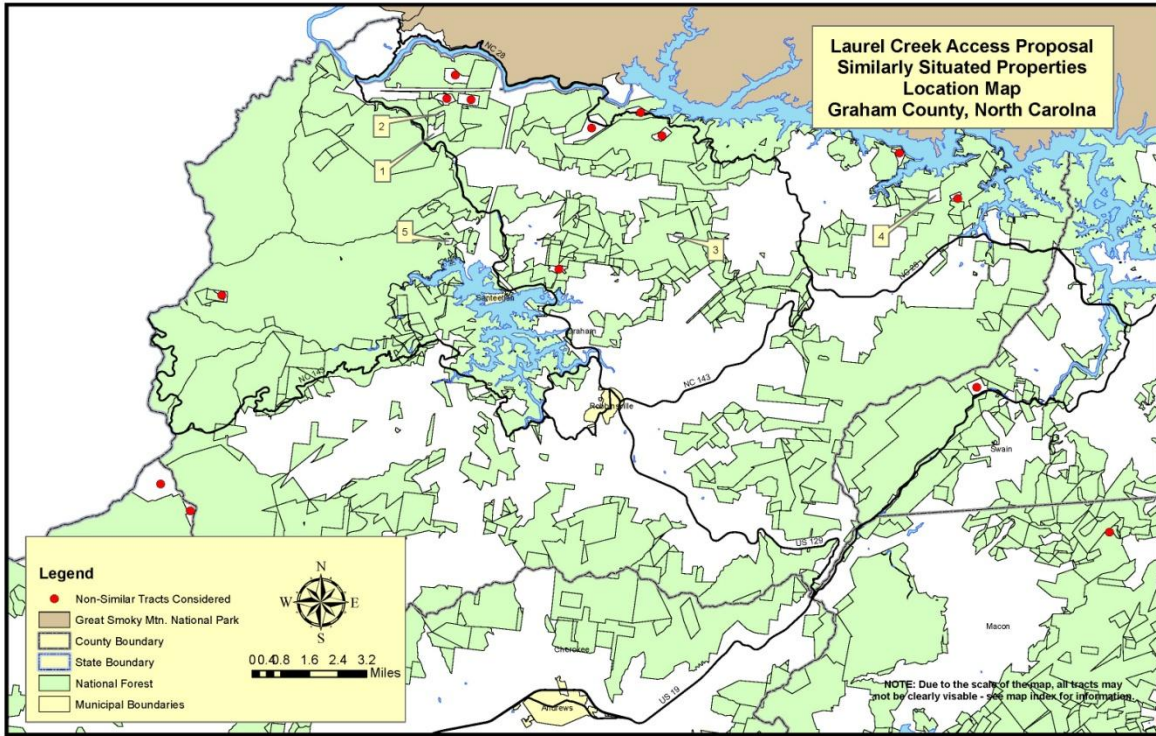


Figure 1.10.4 ANILCA Analysis - Similarly Situated Properties, Macon County, NC.

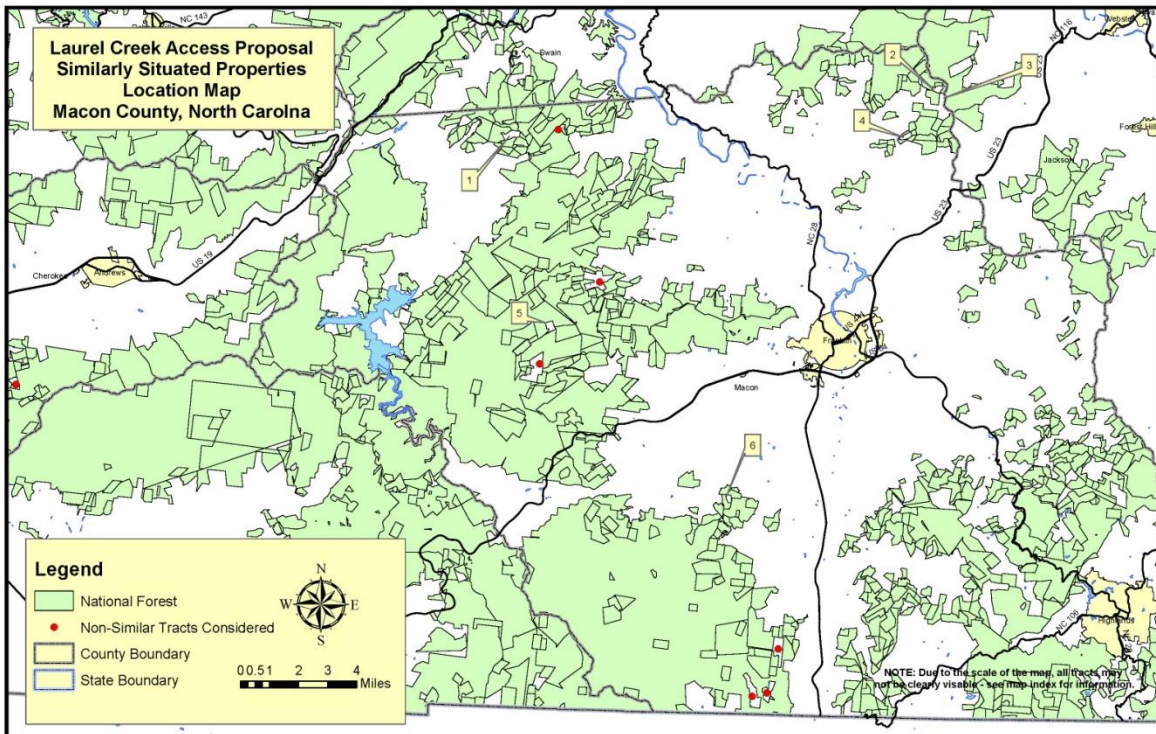


Table 1.10.1 ANILCA Analysis - Map Key for Similarly Situated Properties in Cherokee, Clay, Graham and Macon Counties, NC.

**Privately Owned Inholdings Surrounded by National Forest System Lands
Nantahala National Forest - Cherokee, Clay, Graham and Macon Counties**

| Private Tract No. | County | App. Acres | Developed? | Type of Access | Subdivided | # Tracts |
|-------------------|----------|------------|------------|---------------------|------------|----------|
| 1 | Cherokee | 67 | Yes | SR 1322 | No | 1 |
| 2 | Cherokee | 10 | Yes | SR 1326 | No | 1 |
| 3 | Cherokee | 75 | No | SR 1325/Pvt Road | No | 1 |
| 4 | Cherokee | 45 | No | Tenn - Trail Access | No | 1 |
| 5 | Cherokee | 37.5 | Yes | RS 1327 | Yes | 2 |
| 6 | Cherokee | 4 | No | SR 1325 | No | 1 |
| 7 | Cherokee | 81.5 | Yes | SR 1328 | Yes | 4 |
| 8 | Cherokee | 155.47 | Yes | FS 408 | Yes | 3 |
| 9 | Cherokee | 61.64 | Yes | SR 1333/FS 80 | Yes | 5 |
| 10 | Cherokee | 71.4 | No | Tenn - Pvt Road | No | 1 |
| 11 | Cherokee | 15.24 | No | SR 1335 | No | 1 |
| 12 | Cherokee | 21.12 | No | SR 1335 | No | 1 |
| 13 | Cherokee | 7.58 | No | SR 1335 | No | 1 |
| 14 | Cherokee | 10 | Yes | SR 1335 | No | 1 |
| 15 | Cherokee | 29.5 | No | FS 6266/Pvt Rd | No | 1 |
| 16 | Cherokee | 6.05 | No | NONE | No | 1 |
| 17 | Cherokee | 82.81 | No | FS 420 | No | 1 |
| 18 | Cherokee | 50 | Yes | FS 625 | No | 1 |
| 19 | Cherokee | 95.75 | Yes | FS 333/Pvt Rd | Yes | 5 |
| 20 | Cherokee | 141.22 | Yes | FS 333a/Pvt Rd | No | 1 |

| Private Tract No. | County | App. Acres | Developed? | Type of Access | Subdivided | # Tracts |
|-------------------|--------|------------|------------|----------------|------------|----------|
| 1 | Clay | 49.33 | No | Trail Access | Yes | 4 |
| 2 | Clay | 15.3 | No | None | No | 1 |
| 3 | Clay | 54 | No | None | No | 1 |
| 4 | Clay | 35.17 | No | SR1307 | Yes | 4 |
| 5 | Clay | 22.5 | No | No R-O-W | No | 1 |
| 6 | Clay | 49.29 | Partial | Pvt Rd | Yes | 6 |
| 7 | Clay | 8.11 | No | US64E | No | 1 |
| 8 | Clay | 53.2 | No | Trail Access | No | 1 |
| 9 | Clay | 33.66 | No | None | No | 1 |
| 10 | Clay | 22 | No | Trail Access | No | 1 |

| Private Tract No. | County | App. Acres | Developed? | Type of Access | Subdivided | # Tracts |
|-------------------|--------|------------|------------|----------------|------------|----------|
| 1 | Graham | 109.02 | Partial | SR1249 | Yes | 4 |
| 2 | Graham | " | " | " | Yes | " |
| 3 | Graham | 50 | No | FS 438 | No | 1 |
| 4 | Graham | 80 | No | Trail Access | No | 1 |
| 5 | Graham | 28 | No | None | No | 1 |

| Private Tract No. | County | App. Acres | Developed? | Type of Access | Subdivided | # Tracts |
|-------------------|--------|------------|------------|----------------------|------------|----------|
| 1 | Macon | 87.65 | Yes | FS 7030 & Pvt Rd | Yes | 3 |
| 2 | Macon | 10.5 | No | NONE | No | 1 |
| 3 | Macon | 20 | No | NONE | No | 1 |
| 4 | Macon | 35 | No | Unknown - Old Trail? | No | 1 |
| 5 | Macon | 54.31 | Yes | FS 69 & Pvt Rd | Yes | 3 |
| 6 | Macon | 26.96 | Yes | SR 1128 | Yes | 5 |

Chapter 2 – Alternatives

2.1 Introduction

Alternatives to a proposed action are developed to fulfill the purpose and need for the proposal and to address unresolved conflicts related to the proposal.

2.2 Alternatives Considered

2.2.1 Alternative A – No Action

The no-action alternative provides a baseline for estimating the effects of the proposed action. The proposal to authorize access to the private tract would not be approved. The Forest Service would not be in compliance with the Alaska National Interest Lands Conservation act of 1980 (ANILCA).

2.2.2 Alternative B – Proposed Action

The Forest Service would authorize vehicular access to owners of a privately held tract of land that is surrounded by National Forest System (NFS) lands in Clay County, North Carolina. Access would involve use of existing roads as well as new road construction.

Access to the private tract would be across existing Forest Service System Roads: Rockhouse Branch Road (340A) and Phillips Ridge Road (340A1). The Road Management Objective (RMO) of the Phillips Ridge Road would be changed, opening it to private vehicular access by the owners of the private inholding. Approximately 1,766 feet of new road would be constructed from the upper terminus of Phillips Ridge Road to the boundary of the private tract. Both Phillips Ridge Road and the 1,766 foot road segment would be closed to vehicular use by the general public, although Phillips Ridge Road would remain open to the general public for hiking, horseback riding, and non-motorized recreation.

Roads would comply with National Forest in North Carolina standards for single lane roads with turnouts serving five homes or fewer. This standard provides for a minimum width of 13 ft. with curve widening, aggregate surface, upslope ditches, a 1:1 cut slope, and 2:1 fill slope. Overall clearing limits would vary depending on terrain cross-slope, but would average 32 ft. in width. Cut and fill slopes would be seeded with a native grass mix and allowed to re-vegetate.

2.3 Alternatives Not Considered in Detail

An alternative was considered which would provide access from Andrews, North Carolina via the Vengeance Creek watershed north of the inholding. This alternative was not subjected to detailed analysis for two reasons. First, the area between Andrews and the private land is largely unroaded. Providing access from the north would have resulted in a greater amount of new road construction than Alternative B. Second, the terrain north of the private tract contains slopes as

great as 80%. Meeting Forest Service road gradient standards would have resulted in greater environmental impacts than Alternative B.

An alternative was considered that would have authorized construction of a trail or a passageway less than a single-lane Class “D” road. This alternative was dropped from consideration as it would not have provided “reasonable” access (as described in Section 1.10) to the private tract under ANILCA and therefore would not meet the purpose and need for action.

Chapter 3 – Affected Environment and Environmental Consequences

3.1 Recreational Analysis

3.1.1 Existing Condition

The Fires Creek area is a recreation destination popular with picnickers, hikers, horseback riders, mountain bikers, hunters, and fishers. The project area is contained within the Fires Creek watershed and is adjacent to Forest Service system trails and roads connecting nearby developed recreation facilities. Two system trails and one system road exist in the immediate area around the proposed access route. Phillips Ridge Road (340A1) is gated and closed to vehicular traffic, but is open to hikers, horseback riders, and mountain bikers. Phillips Ridge Trail (TR388), open to hikers and horseback riders, connects the Phillips Ridge Road’s northern terminus with the Rim Trail (TR72). From its intersection with Phillips Ridge Trail, the Rim Trail is open to horseback riders and hikers to the west.

The road and trails get moderate-to-high recreational use overall, with most hiking, horse and bike use occurring spring through fall. Although the primary late-fall and winter use is hunting, there is some year-round use by these other groups.

The area within the Fires Creek watershed features a Development Level 3 (DL3) camping experience at the Bristol Horse Camp on Forest Service Road 340. This campground features seven total camping units (2 double and 5 single sites), a primitive toilet facility, horse support facilities, and a water supply during the summer months. A fee of \$5.00 for the single sites and \$10.00 for double sites is required for an overnight stay. The Fires Creek Picnic Area, at the entrance of the Fires Creek area along Forest Service Road 340, is a day-use area that provides 10 picnic units and provides hiking access to the Leatherwood Loop Trail (TR73) and the Rim Trail. These facilities are not access by Rockhouse Branch Road or by Phillips Ridge Road.

Lands in the analysis area are managed for a Roaded Natural 2 (RN2) Recreation Opportunity Spectrum (ROS), LRMP p.III-83. The desired RN2 ROS **setting** described on LRMP p.G-4 states:

Area is characterized by predominately natural-appearing environments with moderate evidences of the sights and sounds of people. Such evidences usually harmonize with the natural environment.

The desired RN2 ROS character for **experience** is described on LRMP p. G-5:

About equal probability to experience affiliation with other groups and for isolation from sights and sounds of humans. Opportunity to have a high degree of interaction with the natural environment. Opportunities for both motorized and nonmotorized forms of recreation are possible, but nonmotorized opportunities dominate.

The desired RN2 ROS character for **evidence of humans** is described on LRMP p. G-6:

Natural-appearing setting may have modifications which range from being easily noticed to strongly dominant to observers within the area. However, from sensitive travel routes and use areas, these alterations generally remain unnoticed or visually subordinate. There is strong evidence of designated roads and/or highways.

The desired RN2 ROS character for **social setting** is described on LRMP p. G-6:

Frequency of contact is: Moderate on roads; Low to moderate on trails and away from roads.

Table 3.1.1. Modified ROS Management Objectives by Management Area

| Table G-5, p. G-7 LRMP - Modified ROS Management Objectives by Management Area | | | |
|--|---|---------------------|-----------------------------------|
| Management Area | 4C | | |
| ROS | Roaded Natural 2 (RN2) | | |
| Acceptable Environmental Modifications | | | |
| • Type | Roads | Structures | Resource Management |
| • Degree | Evident to Dominant | Evident-Subordinate | Evident to dominant but harmonize |
| Motorized Access | | | |
| • Open Roads | Low Level | | |
| • ORV | Some – 4WD Only | | |
| Favored Recreation Activities | Non-motorized. Hike, Horse, Hunt, Fish, View WL, Bike | | |
| Isolation From Sights/Sounds of Man | Low to Moderate Probability | | |
| Contact w/Other Users | Low to Moderate Incidence | | |
| Evidence Other Users | Moderate | | |
| Challenge/Risk | May or may not be important | | |
| Interact with Nature | Moderate to High Level | | |
| Use/Test Skills | Important | | |

3.1.2 Effects to Recreation

Alternative A (no action): Authorization would not be granted. Effects to recreation would not be affected beyond current conditions.

Alternative B (proposed action): The Forest Service would grant the authorization to reconstruct existing Forest Service roads 340A (Rockhouse Branch Road) and 340A1 (Phillips Ridge Road) and to construct 1,766 feet of new road to reach the tract of private property.

An increase in vehicular traffic by forest visitors is expected to occur on the shared section of FSR 340A / Rockhouse Branch Road, but given the lack of a destination and the dead-end aspect of the road, use is expected to be fewer than 10 vehicles per week. The Roaded Natural character of the hiking experience would not change as open road density in the watershed would not increase. Modest increases in recreation opportunity are expected along FSR 340A1 as improvements to the road would facilitate use by hikers and horseback riders. The Forest Service does not anticipate substantive positive or substantive negative impacts to recreation in the analysis area as a consequence of Alternative B.

3.1.3 The Rim Trail

The Rim Trail is a 25 mile foot and horse path that traverses the rim of the Fires Creek Watershed. Its origins are unknown, but sections of the trail are believed to predate the area's acquisition by the Forest Service in the 1930s. The Rim Trail was designated a Forest Service trail prior to the middle 1970s despite there being a short segment crossing the private inholding. In November 2010, the Forest Service rerouted the Rim Trail so that the public would no longer be invited to cross through the private tract. This action by the Forest Service was conducted separately from this EA and that decision is not part of this analysis. Discussion is included here to further inform the public of the reroute and to demonstrate that the Forest Service did not fail to consider the Rim Trail in the EA.

3.2 Scenery Analysis

3.2.1 Existing Condition

The sites for scenery analysis occur in Management Area 4C. Management direction for this area is summarized on p.III-77 of the Nantahala and Pisgah Land and Resource Management Plan (LRMP): "Emphasize visually pleasing scenery and habitats for wildlife requiring older forests". Scenery management standards for the area are to meet "Retention (R) in all distance zones and sensitivity levels, except for Partial Retention (PR) in Sensitivity Level 3", LRMP p.III-80. Retention and Partial Retention are Visual Quality Objectives (VQO) identified in the US Forest Service Visual Management System Handbook (VMS), and the LRMP on p.G-1-2. Sensitivity Level (SL) and Distance Zone (DZ) are also VMS terminologies found in the LRMP on p.G-2.

Relevant VMS terminology:

Retention VQO: To the average viewer, management activities are not visually evident. Meet within 1 growing season.

Partial Retention VQO: To the average viewer, management activities remain visually subordinate within the characteristic landscape. Meet within 2 growing seasons.

SL1: Primary travel route, use area or water body where at least 1/4 of users have a major concern for scenic quality, OR secondary travel route, use area, or water body where at least 3/4 of users have a major concern for scenic quality.

SL2: Primary travel route, use area, or water body where less than 1/4 of users have a major concern for scenic quality, OR secondary travel route, use area, or water body where at least 1/4, and not more than 3/4 of users, have a major concern for scenic quality.

SL3: Secondary travel route, use area, or water body where at less than 1/4 of users have a major concern for scenic quality.

Foreground (FG) DZ: from viewer up to 0.5 miles away.

Middleground (MG) DZ: from FG up to 5 miles away.

Background (BG) DZ: from MG to horizon.

The area is also managed for a Roaded Natural 2 (RN2) Recreation Opportunity Spectrum (ROS), LRMP p.III-83. The desired RN2 ROS setting described on LRMP p.G-4 states, "Area is characterized by predominately natural-appearing environments with moderate evidences of the sights and sounds of people. Such evidences usually harmonize with the natural environment".

3.2.2 Scenery Analysis

A field review of the proposed access road was conducted to identify viewpoint locations on nearby trails. An assumed viewpoint was identified along FSR340A1 where the proposed road would begin; this section of FSR340A1 has a dual designation with Phillips Ridge Trail.

Rim Trail Viewpoints 1 and 2 were analyzed prior to the November 2010 reroute of the Rim Trail and are no longer pertinent to this EA due to the reroute. The dually designated portion of FSR340A1 and Phillips Ridge Trail at Viewpoint 3 meets the SL3category and since this road is used primarily by horseback riders, cyclists, and hunters, relatively few users would have substantial concerns about scenic quality. Findings are supported by research referenced in the VMS Handbook; it states, "Major concern for aesthetics is usually expressed by people hiking scenic trails". The proposed road is within ½ mile of all three viewpoints, and would be seen in the foreground where visible. Therefore proposed activities must meet a Partial Retention (PR) VQO from Viewpoint 3.

3.2.3 Effects to Scenery

Alternative A (no action): There would be no change to the existing scenic condition. Assigned VQO's would be met.

Alternative B (proposed action): The Forest Service would grant the authorization to reconstruct existing Forest Service roads 340A (Rockhouse Branch Road) and 340A1 (Phillips Ridge Road) and to construct 1,766 feet of new road to reach the tract of private property.

Based on road construction standards, field reviews, and potential visibility shown on photo-simulations, the Forest Service has determined that the action will meet VQOs. The proposed roads will not be visible from viewpoints on nearby segments of the Phillips Ridge Trail. The viewpoint where the proposed segment of private access road intersects with the Phillips Ridge Road will meet PR VQOs within two growing seasons.

3.2.4 Cumulative Effects to Scenery

Alternative A (no action): No cumulative effects to scenery would occur.

Alternative B: Other activities which may be seen in conjunction with the authorization would include development of the four residential lots on a privately owned tract the proposed road reconstruction and construction intends to serve. Specific home locations, size, exterior colors, and clearing limits are unknown. Therefore, their potential visibility or degree of cumulative scenic impact cannot be determined. There is no knowledge of other past, present, or foreseeable future activities on private or National Forest lands within the viewshed.

3.3 Water Quality and Hydrologic Analysis

The waterbodies in the analysis area - - Laurel Creek and Hickory Cove Creek - - are both classified by the North Carolina Division of Water Quality as waters protected as a water supply, for natural trout propagation and survival of stocked trout, and as Outstanding Resource Waters (ORW). These classifications as well as the stream's designated uses are to be protected.

3.3.1 Findings

Road reconstruction occurred on a portion of the Phillips Ridge Road following the 2004 hurricanes. This work constructed rolling dips and placed gravel on the road surface. This section of road looked stable with adequately spaced drainage features e.g., rolling dips. Several culverts were also replaced as a result of 2004 hurricane rehabilitation funding. Three of these culverts, although properly sized to pass the calculated 50 year flood, were not sized to the stream's bankfull channel width nor installed with aquatic organism passage in mind. As a result, passage is restricted by a perched outlet and excessive velocities through the pipes.

Reconstruction ended at the second Hickory Cove Creek crossing (going upstream), leaving about three stream crossings in poor condition. The uppermost Hickory Cove Creek crossing was blown out, leaving the culvert and a gate in the fish bearing stream channel (Figure 3.3.1), while the other two crossings were plugged or partly plugged by debris and channel substrate.

Figure 3.3.1. Hickory Cove Creek crossing blow-out.



Stream channels in the Laurel Creek drainage are characterized by a B3 stream type as defined by the Rosgen Stream Classification system. Stream channels are stable without excessive scour or deposition. This stream type has a “low” sensitivity to disturbance and to increases in sediment supply (Rosgen 1996).

3.3.2 Effects to Water Quality

Alternative A (no action): Currently, erosion from the existing road network is minimal, except for during large storm runoff events such as the 2004 hurricane flooding. These events can produce relatively large volumes of sediment when road crossings fail. In the absence of additional culvert failures, no change to the existing condition is anticipated under Alternative A.

Alternative B (proposed action):

Proposed road reconstruction would reduce the risk of failure of existing crossings, where current culverts are currently non-functional, or where the current crossing consists of a ford. New road construction would necessitate the installation of properly-sized, functional culverts at stream and wet weather conveyance crossings. With the implementation of BMPs and recommendations discussed below, the proposed road work would not adversely impact water quality.

3.3.3 Project Design criteria Under Alternative B

1.) During road reconstruction and construction, implement National Forests in North Carolina (NFsNC) road Best Management Practices (BMPs) to reduce the risk of sediment moving to adjacent stream channels. These BMPs include features such as:

- Frequent rolling dips to drain the road surface,

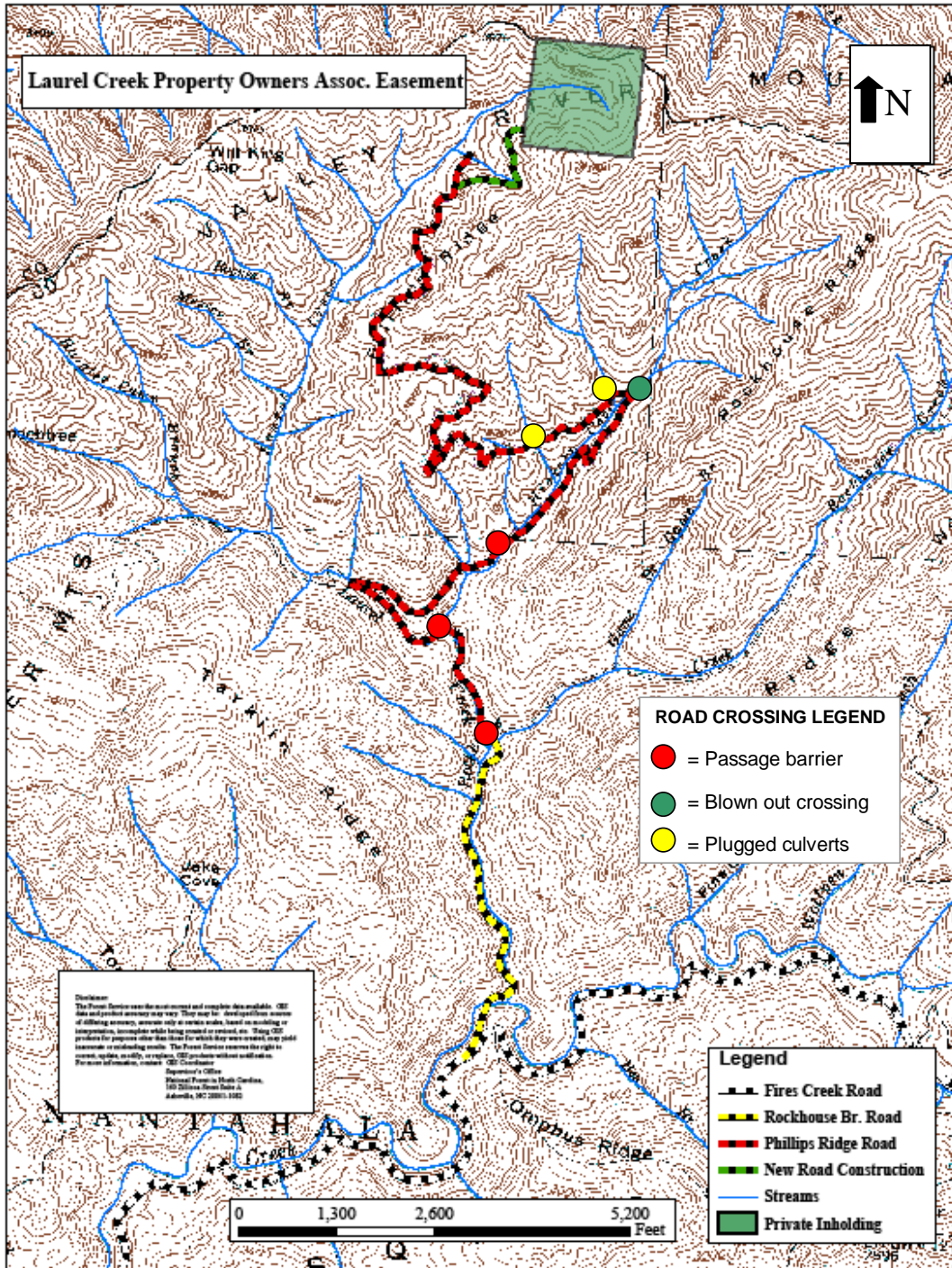
- Gravel on the road surface, and
- The installation of a slash filter windrow along the entire length of road work.

The implementation of the NFsNC road reconstruction and construction BMPs have proven to be 97 percent effective at controlling sediment from roads (NFsNC 2009 BMP Monitoring).

2.) Replace the existing three stream crossings and the blown out crossing with structures that provide passage for aquatic organisms and reduce the risk of road failure during flood events. Such structures could include bridges or open bottom arch pipes, sized to meet the bankfull width at a minimum.

3.) Replace the existing plugged culverts with larger sized pipes to pass the 50 year discharge for those drainages.

Figure 3.3.2 Map of the Phillips Ridge Road and proposed road work. Dots on map represent current condition of several stream crossings.



3.3.4 Anticipated Impacts and Permits Required Under Alternative B

Personnel from Fish and Wildlife Associates, Inc. (LCPOA contractor) conducted a field survey of aquatic resources along the proposed project corridor on October 21, 2009. The purpose of the survey was to document the location of Waters of the U.S. within the project corridor, as well as anticipated impacts to these waters.

An application for Jurisdictional Determination was submitted to the U.S. Army Corps of Engineers (USACE) on November 11, 2009. The purpose of this submittal was to initiate correspondence and establish concurrence with USACE regarding jurisdictional waters to be impacted under Alternative B. An on-site visit was conducted on March 17, 2010 with personnel from FWA, the Forest Service, and the USACE. Thirteen jurisdictional streams (11 perennial and two intermittent) and one wetland were located within the project corridor. A portion of these streams were located within some part of the project corridor; however, not all of the streams would be impacted under Alternative B. The locations of anticipated stream and wetland impacts under Alternative B are shown in Figure 3.3.3.

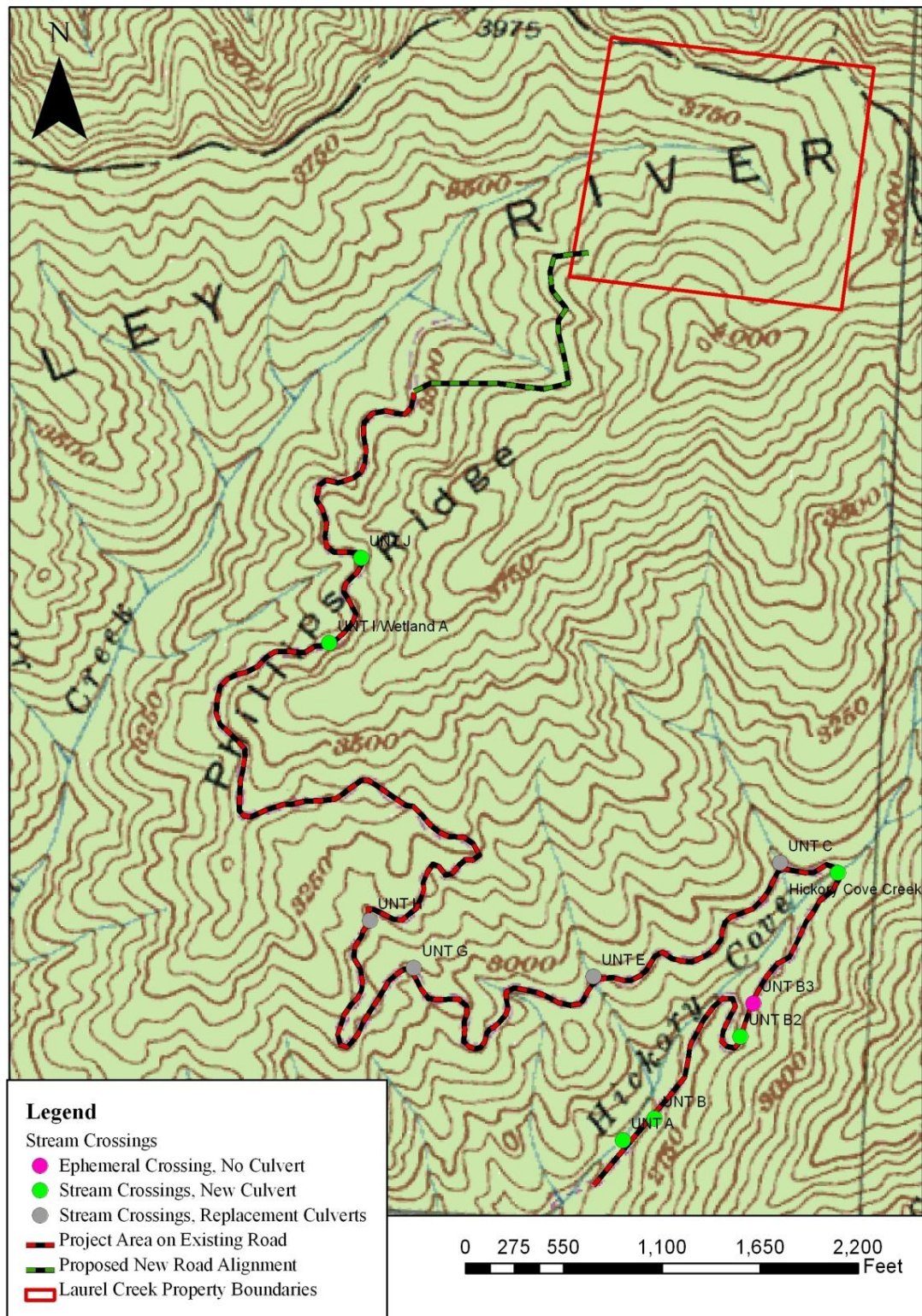
Culverts are currently present at four perennial stream crossings. All four culverts are proposed to be replaced because they were plugged or eroding. Three of the culverts are 20 feet in length and 12 to 18 inches in diameter. One culvert is an old log culvert. New culverts would be 20 feet in length and 24 to 36 inches in diameter. No permits from USACE are required for replacing these existing culverts. Two of these culverts are shown above in Figure 3.3.2 as plugged culverts. The three culverts shown in Figure 3.3.2 as passage barriers are outside of the project area and are not currently scheduled for replacement under Alternative A or Alternative B.

Seven additional culverts are proposed for perennial stream crossings. With the exception of Hickory Cove Creek, perennial streams typically began on the cut slope of the existing road as a spring. The streams then flow down the existing roadbed as sheet flow and eventually flow off of the road into a stream channel or became subsurface. The length of stream flowing down the road ranges from 27 to 80 feet. Section 404 Permits would be required for the seven additional culverts. Culvert diameters range from 18 to 24 inches. The total length of perennial stream to be placed in new culverts is 242 feet.

Two intermittent streams had the same channel characteristics as the majority of perennial streams (i.e. flowing down existing roadbed). Rather than using culverts, these streams would be moved into a roadside ditch. The total anticipated length of impacts to intermittent streams impacts is approximately 200 feet; however, these impacts would be the result of channel relocation rather than culvert installation.

The wetland located within the project corridor (Wetland A, Figure 3.3.3) is a small, poorly-developed wetland area associated with an unnamed perennial tributary (UNT-I). This wetland area is located within the existing roadbed and has likely formed due to inadequate drainage off of the roadbed.

Figure 3.3.3. Location of stream and wetland impacts on the Laurel Creek Access Road.



If Alternative B is selected, the Laurel Creek Property Owners Association would be required to submit a revised application for Jurisdictional Determination and application for a Section 404 Permit. This permit will cover impacts to jurisdictional features listed above, as well as design criteria required by USACE for these impacts.

3.4 Geological Analysis

3.4.1 Scope

This analysis is based on a field reconnaissance level geologic investigation of the proposed road location on February 19, 2009, and research of available geologic reports and maps. The purpose of this analysis is to make a preliminary evaluation of the acid producing Nantahala Formation and its possible occurrence along the proposed road access to the private property.

3.4.2 Geologic Setting

The project area is located within the Blue Ridge Physiographic Province. This province is located eastward from the Tennessee line for distances ranging from 24 to 80 kilometers (15 to 50 miles). This province is characterized by rugged, though somewhat subdued, mountainous terrain and deep constricted valleys, developed predominantly in schists and gneisses of pre-Cambrian age. Intrusive granitic rocks of pre-Cambrian and Paleozoic ages are present in many scattered localities. Structurally, the rocks are complexly folded into highly contorted and faulted anticlines and synclines within a broad regional synclinorium. Thrust faulting is not uncommon. Elevations range from 1829 meters (6,000 feet) in the west to a minimum of 610 meters (2,000 feet) near the contact with rocks of the Piedmont Plateau to the east (Councill, 1954).

The proposed road rests on the Nantahala Formation. This formation lies in the extreme southwest corner of North Carolina. It occurs as a long, narrow, irregular belt that lies on the periphery of the Murphy belt. It enters the State from Georgia and strikes northeast-southwest across Cherokee and Graham Counties to about the Swain County line. Here it wraps around the north end of the Murphy belt and returns to the Georgia state line across Graham, Macon, and Clay Counties (Stuckey and Conrad, 1958). The age of the Nantahala Formation is placed at the Cambrian-Precambrian boundary which would be approximately 550 million years.

The Nantahala Formation consists of medium to dark gray graphitic and sulfidic phyllite, schist, and metasilstone interbedded with subordinate to subequal amounts of quartzose metasandstone (Figure 3.4.1). The unit coarsens and becomes less well sorted downward. Maximum thickness is about 2500 meters. The upper 1000 meters consists principally of graphitic phyllite with thinner interbeds of graphitic metasilstone and subordinate quartzose metasandstone. Graphitic phyllite becomes more silty down section where it grades to graphite-bearing micaceous metasilstone. The basal 1500 meters consists principally of graphitic metasilstone interlayered with quartzose metasandstone and graphitic phyllite (Ausburn and Others, 1998).

The graphitic phyllite is permeated by finely disseminated and iron-sulfide minerals producing a characteristic dark gray to black color. Graphitic micaceous metasilstone contains fine-grained

quartz and plagioclase in a dominantly muscovite groundmass. Graphite occurs mostly as dense, finely disseminated clots interstitial to clastic grains. Small garnet and biotite porphyroblasts occur in graphitic phyllites near the base of the formation (Ausburn and others, 1998).

Figure 3.4.1. Graphitic and sulfidic phyllite, schist, and metasiltstone interbedded with quartzose metasandstone of the Nantahala Formation.



White quartzose metasandstone commonly occurs interbedded with the graphitic metasiltstone producing a distinctive “zebra-striped” appearance (Figure 3.4.2). The quartz-rich interlayers and sequences range from a few meters to over 300 meters in thickness and are distinctive, almost traceable layers in many areas. The quartz metasandstone is typically white, fine grained, well-sorted, and micaceous. The most prominent metasandstone sequences occur near the base of the unit. Where mapped separately, white quartzose metasandstone at approximately this stratigraphic position is called Tusquittee Quartzite. Individual metasandstone sequences commonly contain thin, wavy, graphitic partings and laminations that are thicker and more abundant toward the upper and lower contacts. Laminations commonly define delicate ripple cross laminations and ripple-drift structures. Low-angle planer cross bedding is occasionally observed in cleaner metasandstone layers. Compositional layering is easily observed in the more silty and quartzitic rocks whereas deformational structures are dominant in the phyllitic and schistose rocks (Ausburn and others, 1998).

Figure 3.4.2. Distinctive zebra like appearance of quartzose metasandstone interbedded with graphitic metasiltstone.



3.4.3 Evaluation of Geologic Hazards and Risks

The Nantahala Formation is one of many formations known to the North Carolina Geologic Survey as posing a high risk of generating acid runoff because of the abundance of iron sulfides in the rock. According to Paul Rawls, from the North Carolina Division of Water Quality, surface excavation can pose significant area of sulfide rich rocks to weathering. This weathering of freshly exposed iron sulfide minerals produces an acidic runoff which can have a pH as low as 2.5. Migration of acid runoff to surface water or leaching of acid runoff to groundwater can seriously degrade water quality by significantly lowering the pH. In addition, the acidic runoff produced by the oxidation and hydrolysis of the iron sulfide minerals can act to dissolve these heavy metal sulfides as well as other heavy metal carbonates and oxides that may also be present.

The field reconnaissance conducted on February 19, 2009 gave no indication of vegetation degradation. The vegetation on the sides of the road appeared to be in good shape. It is unknown when the road was originally constructed. No preconstruction or post construction water quality monitoring program was undertaken so no baseline data are available for this area.

Alternative A (no action): There would be no change to the existing geologic condition.

Alternative B (proposed action): The upgrading of the current road and the new road construction to the private inholding could pose a high risk of generating acid runoff because of the abundant sulfides in the freshly exposed rock. There is a strong possibility that the acid producing minerals have been leached out of the Nantahala Formation which underlies the road.

Acidic runoff from road construction which is underlain by graphitic-sulfidic rock types can increase the potential for damaging slope failures. In addition to the potential for acid runoff that can adversely affect aquatic life, acid-producing rocks can be prone to slope failure in natural settings. The potential for slope movement increases when these rocks are exposed in cut slopes and used in embankments (Wooten, 2006).

3.4.4 Effects

Alternative A (no action): Currently, erosion from the geologic strata in the assessment area is occurring at natural levels and no change to the existing condition is anticipated under Alternative A.

Alternative B (proposed action):

Proposed road reconstruction could expose fresh surfaces of rocks and rock layers from the Nantahala Formation. This exposure could result in acidic runoff and impacts as discussed in section 3.4.3. To reduce the risk of acid runoff, the landowners would implement the design criteria as detailed in section 3.4.5.

3.4.5 Project Design Criteria Under Alternative B – Proposed Action

Under Alternative B (proposed action), improvements to the existing road and construction of the new road alignment would be subject to the following requirements to reduce the risk of acid runoff from acid-bearing rock. A majority of the following requirements have been adopted from the December 14, 2007 Memorandum issued by the North Carolina DWQ, *Assessing and Controlling Acid Rock Drainage on Projects Requiring Section 401 Water Quality Certification*.

1. If less than 50 cubic yards of fresh acidic rock material will be removed by excavation or blasting on the entire project, then no further action is required. However, no amount of fresh acidic rock shall be placed in contact with surface waters or groundwater.
2. If more than 50 cubic yards of fresh, un-weathered acidic rock from the project site needs to be removed, then rock samples must be collected from each excavation or blasting location. The samples may be collected from outcrops, exposed surfaces, geotechnical drilling, or drilling from blasting. Outcrop samples should be palm sized. If a drill rig is used, drilling samples should consist of a 2-length of rock core ore 6 to 8 ounces of rock dust. The specific location of each sample shall be recorded.
3. The samples will be tested for Acid Potential and Neutralization Potential and the results reported as Net Neutralization Potential (Neutralization Potential minus Acid Potential). All samples must be analyzed by a testing laboratory appropriately certified by a nationally recognized certifying organization. Areas of acid rock with sample values of Net Neutralization Potential (NNP) between 0 and -10 do not require treatment. If the

- cumulative total of excavated and/or blasted acid rock for an entire project is less than 1,000 cubic yards and all samples have NNP values between 0 and -10, then no treatment is necessary and no further action is required. The acid rock material shall not be placed in any surface waters or wetlands nor be allowed to come into contact with groundwater.
4. If the cumulative total of excavated or blasted acid rock is greater than 1,000 cubic yards, or if all sample values of NNP are between -10 and -20 for volumes greater than 50 cubic yards, then the acid rock must be placed in a designated waste area located in a dry, stable upland area of the project. This waste area must be designated to ensure that no flowing surface water or any ground water comes into contact with the acid rock. Any runoff from a fresh cut surface in acid rock must be neutralized.
 5. Where more than 50 cubic yards of acid rock are excavated or blasted, and samples have values of NNP greater than -20, the rock shall be placed in a designated waste area as described in requirement #4. It shall also be treated by mixing with crushed limestone aggregate having a calcium carbonate (CaCO₃) equivalent of 90%. For each 1,000 tons of acid rock, the amount of limestone aggregate required equals 1 ton multiplied by the absolute value of the NNP. The acid rock shall be treated by placing four inches of crushed limestone at the base of the acid rock and then adding a four-inch layer of crushed limestone to every three-foot lift of acid rock.
 6. If acid material is to be used on the fill portion of a cut and fill road, this material is not to be used since it is known that this type of rock is prone to slope failure. If there is no other source of material for the road construction then it is recommended that the fill portion of the road be constructed in compacted lifts treated with lime and limestone or encapsulating the acid material in lime and limestone. Both of these methods neutralize the acid runoff and improve the stability of the road.

3.5 Soils

3.5.1 Existing Condition

Information regarding soils types on the proposed treatment area was obtained from the USDA Natural Resources Conservation Service. The soils in the proposed treatment area include Spivey-Santeetlah complex, Soco-Ste-coah complex, Sylco-Cataska complex, Cheoah channery loam, and Junaluska-Tsali complex. None of the soils is classified as Prime Farmland. Each soil is discussed briefly below.

All soils in the proposed treatment area have an Erosion Hazard Rating of *Severe*. This rating indicates that significant erosion is expected, roads will require frequent maintenance, and costly erosion control measures are needed.

Spivey-Santeetlah complex, 30 to 50 percent slopes, stony (SrE), 50 to 95 percent slopes, stony (SrF) – The Spivey component of this soil complex occurs on coves on mountain slopes and the Santeetlah component occurs on fans on mountain slopes. Both components are well drained with a depth greater than 60 inches to a root restrictive layer. Water movement in the most restrictive layer is moderately high in the Spivey component and high in the Santeetlah component. The pH of both components ranges from 3.5 to 6.0. This soil is common throughout the proposed treatment area and occurs on portions of the proposed new road.

Soco-Stecoah complex, 50 to 90 percent slopes (SoF), windswept, 30 to 50 percent slopes (SpE), 30 to 50 percent slopes (SoE) – This soil complex occurs on mountain slopes. Both soil components are well drained and have high water movement in the most restrictive layer. The depth to a root restrictive layer is 20 to 40 inches in the Soco component and 40 to 60 inches in the Stecoah component. The pH of both components ranges from 3.5 to 5.5. This soil is common throughout the proposed treatment area and occurs on portions of the proposed new road.

Slyco-Cataska complex, 50 to 95 percent slopes (SxF), 30 to 50 percent slopes (SxE) – This soil complex occurs on mountain slopes. In both components, water movement is high in the the most restrictive layer. The Slyco component is well drained with a depth of 20 to 40 inches to a root restrictive layer. The Cataska component is excessively drained with a depth of 10 to 20 inches to a root restrictive layer. The pH of both components ranges from 3.5 to 5.5. This soil complex is fairly common throughout the proposed treatment area; however, this soil does not occur on the proposed new road.

Cheoah channery loam, 50 to 95 percent slopes (ChF) – This soil occurs on mountain slopes. It is well drained with a depth of 40 to 60 inches to a root restrictive layer. Water movement is high in the most restrictive layer. The pH of this soil ranges from 3.5 to 5.5. This soil was not common throughout the proposed treatment area; however, it does occur on portions of the proposed new road.

Junaluska-Tsali complex, 30 to 50 percent slopes (JtE) – This soil occurs on mountain slopes. Both components are well drained and have moderately high water movement in the most restrictive layer. Depth to a root restrictive layer is 20 to 40 inches in the Junaluska component and 10 to 20 inches in the Tsali component. The pH of both components ranges from 3.5 to 6.0. This soil complex was not common throughout the proposed treatment area.

3.5.2 Environmental Consequences

Alternative A (no action): Alternative A would no have direct, indirect, or cumulative impacts on soils.

Alternative B:

Direct and Indirect Impacts –Alternative B would have direct impacts to soil during construction activities. Because all the soils on the proposed treatment area are prone to erosion, sedimentation and erosion could occur. Design criteria, including the guidelines, recommendations, and BMPs discussed elsewhere in Chapter 3 would be utilized to control or minimize indirect impacts to soils outside of the proposed treatment area. BMPs would also be established for sediment and erosion control during construction activities to prevent soils from departing the road prism.

Cumulative Impacts – Although soils within the proposed treatment area will sustain direct impacts due to road construction, indirect impacts to soils outside the proposed treatment area are expected to be minimal if appropriate guidelines, recommendations, and BMP's are utilized.

In the absence of other large heavy maintenance or road building projects in the area, cumulative impacts to soils due to Alternative B are expected to be minimal.

3.6 Air Quality

3.6.1 Existing Condition

Air quality monitoring in the Great Smoky Mountains National Park and along the Blue Ridge Parkway indicates that pollution in the Southern Appalachians has greatly increased over the past 50 years. Much of the pollution is produced by power plants, industry, and automobiles, both within and outside the Southern Appalachians. Air quality within the proposed treatment area appears to be consistent with the surrounding areas, with no major local activities contributing to airborne pollution.

3.6.2 Environmental Consequences

Alternative A (no action): Alternative A will not have direct, indirect, or cumulative impacts on air quality.

Alternative B:

Direct and Indirect Impacts – Short term, temporary impacts to air quality will result under Alternative B during construction activities. Longer term, dust and particulates generated by vehicular traffic on the reconstructed road segments could be generated, particularly in dry weather. As traffic volumes are expected to be low, these impacts will not result in measurable impacts to air quality.

Cumulative Impacts – Direct impacts will be temporary and short term. These impacts will not result in measurable cumulative impacts to air quality.

3.7 Cultural and Historic Resources

3.7.1 Existing Condition and Survey Results

Blue Ridge Archaeological Consultants (BRAC) conducted an archaeological survey of the project corridor in February 2009. The surveyed area included the centerline of the existing road and 50 feet on each side of the centerline. The portion on new construction was surveyed in a similar fashion, based on the proposed centerline. Four archaeological resources were found within or in close proximity to the existing road. Each of these four archaeological resources was characterized as including prehistoric lithic and/or historic period Native American ceramic components. Two of the sites (31CY369 and 31CY370) and the isolated artifact find (31CY371) included only lithic artifact materials – none of which were diagnostic for a specific cultural/temporal component or series of components, occupations, or events in time. However, given the apparent absence of any Native American pottery at any of these sites (or isolated find locations), an Archaic period association is perhaps likely for each. Archaeological site 31CY372 demonstrated the presence of lithic and ceramic artifact assemblages, deeply buried artifact-bearing strata at depths of up to one meter, and associated archaeobotanical remains. Site

components include early nineteenth-century historic Cherokee and probable Middle Woodland and Archaic period occupations or site use.

3.7.2 Environmental Consequences

Alternative A (no action): Alternative A will not have direct, indirect, or cumulative impacts on cultural/historical resources.

Alternative B:

Direct and Indirect Impacts – The current route of the existing access road, and the proposed road improvements under Alternative B, passes directly through archaeological sites 31CY369 and 31CY370. The proposed road improvements also lie along the periphery of isolated find 31CY371. These are evaluated as ineligible for nomination to the National Register of Historic Places (NRHP); the Forest Service has received concurrence from the North Carolina State Historic Preservation Office (SHPO) and the Eastern Band of Cherokee Indians Tribal Historic Preservation Office (THPO).

Archaeological site 31CY372 was determined to be eligible for nomination to the NRHP; BRAC recommended that any adverse effect to this site should be avoided. Per these recommendations, the Laurel Creek Property Owners Association will work closely with Forest Service archaeologists and engineers to ensure that no direct or indirect impacts to this site occur by avoiding disturbance to this site.

Cumulative Impacts – Any remaining artifacts at locations 31CY369, 31CY370, and 31CY371 may be directly impacted as a result of this project. However, these sites are recommended as ineligible for the NRHP, and no protection to these locations is recommended. Archaeological site 31CY372 is recommended as eligible for the NRHP, and any direct or indirect impacts to this site will be avoided. In the absence of direct or indirect impacts to this site, no cumulative effects to eligible archaeological resources are anticipated under Alternative B.

3.8 Biological Resources

3.8.1 Existing Condition - Botanical, Terrestrial Wildlife, and Aquatic Resources

3.8.1.1 Botanical Resources

Existing Condition Due to the immobility of botanical resources, only species occurring within the project area were considered in the analysis. The project area includes elevations from 2,800 to 3,800 feet, and traverses Rich Cove, Acidic Cove, and Montane Oak-Hickory forest types. A variety of plant species occur within the project area, including *Houstonia purpurea*, *Tradescantia sp.*, *Potentilla canadensis*, *Tiarella cordifolia*, *Urtica dioica*, *Impatiens sp.*, *Dichanthelium sp.*, *Oxalis sp.*, *Lysimachia quadrifolia*, *Agrimonia ssp.*, *Maianthemum racemosa*, *Microstegium vimineum*, *Packera aurea*, *Rubus ssp.*, *Hydrangea arborescens*, *Polystichum acrostichoides*, and *Thelypteris noveboracensis*. Other species present in lesser abundance are *Trillium rugelii*, *Thalictrum pubescens*, *Cypripedium acaule*, *Hepatica sp.*, *Diphysastrum digitatum*, *Aster sp.*, *Adiantum pedatum*, *Thelypteris hexagonoptera*, and *Hypoxis hirsuta*.

3.8.1.3 Terrestrial Wildlife

Without conducting targeted surveys for rare terrestrial wildlife species, it is difficult to positively determine presence or absence of these species within the project area. As a result, analysis of effects or impacts on terrestrial wildlife are based on 1) proximity of a known occurrence of a rare species to the project area, and 2) presence or absence of suitable habitat within the project area. When applicable, adjacent habitat is also considered when evaluating the potential of wildlife use in the project area.

Existing Condition

Based on observed community types within the project area, a variety of terrestrial wildlife are likely to utilize habitat in the project area and project vicinity, including birds, mammals, reptiles, amphibians, and terrestrial invertebrates. During field surveys, evidence and/or sightings of the following species were documented: *Sus scrofa*, small mammals (unidentified rodent tracks), *Canis latrans*, *Lynx rufus*, *Odocoileus virginianus*, *Procyon lotor*, *Sciurus carolinensis*, *Meleagris gallopavo*, *Bonasa umbellus*, *Helmitheros vermivorus*, *Mniotilta varia*, *Dryocopus pileatus*, *Catharus guttatus*, *Junco hyemalis*, *Eurycea bislineata*, *Desmognathus quadramaculatus*, and *Thamnophis sirtalis*.

3.8.1.5 Aquatic Resources

Species occurring in streams within the project area, as well as those likely to be affected or impacted downstream of the project area were considered in the analysis.

Existing Condition Laurel Creek and Hickory Cove Creek are both classified by North Carolina as waters protected as a water supply, for natural trout propagation and survival of stocked trout, and as Outstanding Resource Waters (ORW). These classifications as well as the stream's designated uses are to be protected. Stream channels in the Laurel Creek drainage are characterized by a B3 stream type as defined by the Rosgen Stream Classification system. Stream channels are stable without excessive scour or deposition. This stream type has a "low" sensitivity to disturbance and to increases in sediment supply (Rosgen 1996).

Thirteen jurisdictional streams (11 perennial and two intermittent) and one small, poorly-developed wetland are located within the project corridor. A portion of these streams were located within some part of the project corridor; however, not all of the streams will be impacted under Alternative B. Culverts are currently present at four perennial stream crossings; all four of these culverts are either plugged or eroding. Seven additional perennial streams are crossed by the existing roadbed crossings. With the exception of Hickory Cove Creek, these perennial streams typically begin on the cut slope of the existing road as a spring. The streams then flow down the existing roadbed as sheet flow and eventually off of the road into a stream channel or became subsurface. The two intermittent streams have similar channel characteristics as most of the small perennial streams described above (i.e. flowing down existing roadbed).

3.8.1.6 Design Criteria to Avoid Sedimentation Impacts

Under Alternative B (proposed action), improvements to the existing road and construction of the new road alignment would be subject to the following requirements to reduce the risk of sediment loss:

- Implement National Forests in North Carolina (NFsNC) road Best Management Practices (BMPs) to reduce the risk of sediment moving to adjacent stream channels. These BMPs include features such as: frequent rolling dips to drain the road surface, gravel on the road surface, and the installation of a slash filter windrow along the entire length of road work.
 - *The implementation of the NFsNC road reconstruction and construction BMPs have proven to be 97 percent effective at controlling sediment from roads (NFsNC 2009 BMP Monitoring).
- Culvert replacement/installation will be designed to provide passage for aquatic organisms and reduce the risk of road failure during flood events.

3.8.1.6.1 Design Criteria to Avoid Acid Runoff Impacts

Under Alternative B (proposed action), improvements to the existing road and construction of the new road alignment would be subject to the following requirements to reduce the risk of acid runoff from acid-bearing rock. A majority of the following requirements have been adopted from the December 14, 2007 Memorandum issued by the North Carolina DWQ, *Assessing and Controlling Acid Rock Drainage on Projects Requiring Section 401 Water Quality Certification*.

1. If less than 50 cubic yards of fresh acidic rock material will be removed by excavation or blasting on the entire project, then no further action is required. However, no amount of fresh acidic rock shall be placed in contact with surface waters or groundwater.
2. If more than 50 cubic yards of fresh, un-weathered acidic rock from the project site needs to be removed, then rock samples must be collected from each excavation or blasting location. The samples may be collected from outcrops, exposed surfaces, geotechnical drilling, or drilling from blasting. Outcrop samples should be palm sized. If a drill rig is used, drilling samples should consist of a 2-length of rock core ore 6 to 8 ounces of rock dust. The specific location of each sample shall be recorded.
3. The samples will be tested for Acid Potential and Neutralization Potential and the results reported as Net Neutralization Potential (Neutralization Potential minus Acid Potential). All samples must be analyzed by a testing laboratory appropriately certified by a nationally recognized certifying organization. Areas of acid rock with sample values of Net Neutralization Potential (NNP) between 0 and -10 do not require treatment. If the cumulative total of excavated and/or blasted acid rock for an entire project is less than 1,000 cubic yards and all samples have NNP values between 0 and -10, then no treatment is necessary and no further action is required. The acid rock material shall not be placed in any surface waters or wetlands nor be allowed to come into contact with groundwater.
4. If the cumulative total of excavated or blasted acid rock is greater than 1,000 cubic yards, or if all sample values of NNP are between -10 and -20 for volumes greater than 50 cubic yards, then the acid rock must be placed in a designated waste area located in a dry, stable upland area of the project. This waste area must be designated to ensure that no flowing surface water or any ground water comes into contact with the acid rock. Any runoff from a fresh cut surface in acid rock must be neutralized.

5. Where more than 50 cubic yards of acid rock are excavated or blasted, and samples have values of NNP greater than -20, the rock shall be placed in a designated waste area as described in requirement #4. It shall also be treated by mixing with crushed limestone aggregate having a calcium carbonate (CaCO₃) equivalent of 90%. For each 1,000 tons of acid rock, the amount of limestone aggregate required equals 1 ton multiplied by the absolute value of the NNP. The acid rock shall be treated by placing four inches of crushed limestone at the base of the acid rock and then adding a four-inch layer of crushed limestone to every three-foot lift of acid rock.
6. If acid material is to be used on the fill portion of a cut and fill road I would recommend this material not be used since it is known that this type of rock is prone to slope failure. If there is no other source of material for the road construction then it is recommended that the fill portion of the road be constructed in compacted lifts treated with lime and limestone or encapsulating the acid material in lime and limestone. Both of these methods neutralize the acid runoff and improve the stability of the road.

3.8.2 Threatened, Endangered, and Forest Sensitive Species

The Nantahala-Pisgah National Forest maintains a list of Threatened, Endangered, and Forest Sensitive (TES) species on NFS lands; all of these species were originally considered. The list was first filtered by considering only those species listed by the North Carolina Natural Heritage Program (NCNHP) or the United States Fish and Wildlife Service (USFWS) as occurring or probably occurring in Clay County, with the exception of terrestrial wildlife. Due to the mobility of terrestrial wildlife, the filtered list also included species occurring or probably occurring in adjacent counties (Cherokee, Graham, Macon, and Swain). A total of 52 species remained after this initial step, and included 21 plant species, 30 terrestrial animal species, and 1 aquatic animal species. A list of the 52 species, including a brief habitat description, is provided in the full Biological Evaluation in Section 5.1.

The list was then subjected to a second filtering step, eliminating species whose associated natural community type (general habitat), or specialized habitat type *within* a community did not occur within the project area. Examples of natural community types include Rich Cove, Acidic Cove, Montane Oak-Hickory, Northern Hardwood, and High Elevation Red Oak communities. Examples of specialized habitat types include spray cliffs, granitic domes, caves, rock outcrops, talus slopes, bogs, wetlands, spruce-fir forests, etc. Habitat preferences and ranges of these plant and animal species were based on a variety of sources, including the NCNHP database, Forest Service lists, NatureServe© database, personal communication with Forest Service personnel, and other reference materials. Natural community classification followed Schafale and Weakley (1990).

The NCNHP database was also queried for TES element occurrences at two spatial scales. The first query included TES element occurrences within the project area, whereas the second query included TES element occurrences within two miles of the project area. Results of NCNHP database queries are discussed for each species group in below.

Site visits and pedestrian field surveys of the project area were conducted by Fish and Wildlife Associates, Inc. (FWA) in March 2007, June 2008, June 2009, and March 2010.

3.8.2.1 Botanical Threatened, Endangered, and Sensitive Species Evaluated

After filtering by county, 1 Endangered and 20 Forest Sensitive botanical species remained for consideration (Table 3.8.2.1). The list was narrowed further by eliminating those species whose associated natural community type was not present within the project area. Where possible, specialized habitat types (spray cliffs, granitic domes, rock outcrops, talus slopes, spruce-fir forests, etc.) were also used to narrow the list. Habitat preferences and geographic ranges were based on a variety of sources, including the NCNHP database, Forest Service lists, NatureServe© database, personal communication with Forest Service personnel, and other reference materials. Ten species were not evaluated further in this analysis due to a lack of habitat within the project area. The analysis evaluates the 11 remaining species; background information and potential effects/impacts to these species are discussed below. Although Southern Nodding Trillium (*Trillium rugelii*) was initially eliminated from consideration because it had not previously been documented in Clay County, this species was observed within the project area during a June 2008 field survey. As a result, an analysis of impacts to this Forest Sensitive species is included below.

The NCNHP database was queried for TES element occurrences at two spatial scales. The first query included TES element occurrences within the project area, whereas the second query included TES element occurrences within two miles of the project area. None of the 10 remaining botanical species are known to occur within the project area; *Megaceros aenigmaticus* and *Monotropis odorata* have been documented within two miles of the project area.

Botanical field surveys of the project area were conducted by Fish and Wildlife Associates, Inc. (FWA) in March 2007, June 2008, and June 2009.

Table 3.8.2.1 Botanical Species Considered in the Analysis.

| Group | Designation | Scientific Name | Common Name | Associated Natural Community Type or Specialized Habitat Type | Analyzed Further/Evaluation Criteria* |
|----------------|-------------|-------------------------------------|---------------------|---|---------------------------------------|
| Vascular plant | Endangered | <i>Sarracenia oreophila</i> | Green Pitcher Plant | Low Elevation Southern Appalachian Bog | No/1 |
| Vascular plant | Sensitive | <i>Carex misera</i> | Miserable Sedge | High Elevation Rocky Summit, Montane Acidic Cliff, High Elevation Granitic Dome | No/1 |
| Liverwort | Sensitive | <i>Drepanolejeunea appalachiana</i> | A Liverwort | Acidic Cove, Montane Oak-Hickory, Serpentine Woodland, Serpentine Forest | Yes |
| Vascular plant | Sensitive | <i>Euphorbia purpurea</i> | Glade Spurge | Northern Hardwood Forest, Rich Cove Forest, Mesic Oak-Hickory | Yes |
| Vascular plant | Sensitive | <i>Helianthus glaucophyllus</i> | Whiteleaf Sunflower | Rich Cove Forest, Northern Hardwood Forest, High Elevation Red Oak Forest, Mesic Oak-Hickory Forest, Roadside | Yes |
| Vascular plant | Sensitive | <i>Juglans cinerea</i> | Butternut | Rich Cove Forest, Mesic Oak-Hickory Forest, Montane Alluvial Forest | Yes |
| Vascular plant | Sensitive | <i>Juncus caesariensis</i> | Rough Rush | Low elevation Southern Appalachian Bog | No/1 |
| Hornwort | Sensitive | <i>Megaceros aenigmaticus</i> | A Hornwort | On rocks in streams | Yes/2 |
| Vascular plant | Sensitive | <i>Monotropis odorata</i> | Sweet Pinesap | Rich Cove Forest, Mesic Oak-Hickory Forest, Xeric Oak-Hickory Forest, Pine-Oak/Heath Forest | Yes/2 |
| Lichen | Sensitive | <i>Peltigera venosa</i> | An Aquatic Lichen | Bare, moist soil on stream and road banks | Yes |
| Liverwort | Sensitive | <i>Plagiochila caduciloba</i> | A Liverwort | Spray Cliff, Rock Outcrop in Acidic Cove Forest in Gorge | No/1 |
| Liverwort | Sensitive | <i>Plagiochila sharpii</i> | A Liverwort | High Elevation Rocky Summit, Rock Outcrop in Acidic Cove Forest in Gorge | No/1 |

| Group | Designation | Scientific Name | Common Name | Associated Natural Community Type or Specialized Habitat Type | Analyzed Further/Evaluation Criteria* |
|----------------|-------------|--|---------------------------|---|---------------------------------------|
| Vascular plant | Sensitive | <i>Prenanthes roanensis</i> | Roan Rattlesnakeroot | Northern Hardwood Forest, Grassy Bald, Meadow, High Elevation Roadside, High Elevation Red Oak Forest | No/1 |
| Liverwort | Sensitive | <i>Radula sullivanii</i> | A Liverwort | Spray Cliff, Rock Outcrop in Acidic Cove Forest in Gorge | No/1 |
| Vascular plant | Sensitive | <i>Sceptridium jenmanii</i> | Alabama Grape Fern | Rich Cove Forest | Yes |
| Vascular plant | Sensitive | <i>Thalictrum macrostylum</i> | Small-leaved Meadowrue | Serpentine Woodland, Serpentine Forest | No/1 |
| Vascular plant | Sensitive | <i>Trillium pusillum</i> var. <i>ozarkanum</i> | Alabama Least Trillium | Rich Cove Forest, Mesic Oak-Hickory Forest, associated with mafic rock | Yes |
| Vascular plant | Sensitive | <i>Trillium rugelii</i> | Southern Nodding Trillium | Rich Cove Forest (low elevation) | Yes |
| Vascular plant | Sensitive | <i>Tsuga caroliniana</i> | Carolina Hemlock | Carolina Hemlock Forest, Montane Acidic Cliff, Pine-Oak/Heath, High Elevation Rocky Summit | No/1 |
| Vascular plant | Sensitive | <i>Viola appalachiensis</i> | Appalachian Violet | Serpentine Woodland, Serpentine Forest, Rich Cove Forest, Mesic Oak-Hickory | Yes |

*1 Based on available habitat descriptions for this species, no habitat is present within the project area; no habitat for this species will be impacted by the proposed action.

*2 NCNHP database indicates that this species has been recorded within 2 miles of the project area (however, no records for this species exist within the project area).

A Liverwort (*Drepanolejeunea appalachiana*)

Environmental Baseline – General habitat for this species includes Acidic Cove Forest, Montane Oak-Hickory Forest, and Serpentine Forest. This species is most likely to occur in gorges and near flowing water. In gorges it typically occurs on the bark and twigs of *Kalmia latifolia*, *Rhododendron sp.*, *Ilex opaca*, and less often on a variety of other species. This species has a low potential to occur outside of gorges. When it does occur outside of gorges, it occurs on the bark of *Betula sp.* and *Tsuga canadensis* near the borders of cascading streams (Natureserve 2009).

This species was not observed during FWA’s surveys of the project area. The NCNHP database indicates no records for *Drepanolejeunea appalachiana* in the project area, nor within two miles of the project area. Limited potential habitat was observed within the project area, where *Betula sp.* and *Tsuga canadensis* occurs along streams.

Direct and Indirect Impacts – This species is not present within the project area; no direct impacts are anticipated. Limited potential habitat was observed within the project area. No additional clearing of trees along the existing roadbed is anticipated; some clearing will be necessary along the new alignment, which will eliminate a small amount of potential habitat at stream crossings. Indirect impacts are limited to the loss of a small amount of potential habitat where the new portion of the road alignment will cross streams.

Cumulative Impacts – Cumulative impacts will consist of loss of a limited amount of potential habitat along the project area. Due to the small amount of potential habitat to be impacted, versus the much larger amount of potential habitat across the Forest, no measurable cumulative impacts are anticipated.

Determination of Effect – This project will have **no impacts** on the viability of this species.

Glade spurge (*Euphorbia purpurea*)

Environmental Baseline – Associated natural community type for glade spurge includes Rich Cove Forest, Northern Hardwood Forest, and Mesic Oak-Hickory Forest. Glade spurge has a high potential to occupy the following habitats: saturated (but not flooded) areas, including seeps and wetlands (Natureserve, 2009). It also occurs in rich, moist, forests on bottomlands or slopes, near rock outcrops, especially over calcareous or mafic rock (Weakley, 2008).

This species was not observed during FWA's surveys of the project area. The NCNHP database indicates no records for this species in the project area, nor within two miles of the project area. Potential habitat for this species appears to be present at a few places within the project area, where headwater seepage habitats are present in rich, forested areas.

Whiteleaf sunflower (*Helianthus glaucophyllus*)

Environmental Baseline – Associated natural community type for whiteleaf sunflower includes Rich Cove Forest, Northern Hardwood Forest, High Elevation Red Oak Forest, Mesic Oak-Hickory Forest, and roadsides. This species has a high potential to occur in moist forests or woodland edges at mid-elevations, 3,200 to 4,900 feet. This species has a lower potential to occur at elevations below 3,200 feet (Weakley, 2008).

This species was not observed during FWA's surveys of the project area. The NCNHP database indicates no records for this species in the project area, nor within two miles of the project area. Potential habitat for this species does exist within the project area, in the form of Rich Cove and Montane Oak-Hickory forests and edges above 3,200 feet in elevation.

Butternut (*Juglans cinerea*)

Environmental Baseline – Associated natural community type for butternut includes Rich Cove Forest, Mesic-Oak Hickory Forest, and Montane Alluvial Forest. This species has a high potential to occur in moist, nutrient-rich forests (Weakley 2008). It also occurs on ravines, lower slopes, bottomlands, floodplains, and banks or terraces of streams (Natureserve 2009).

This species was not observed during FWA's surveys of the project area. The NCNHP database indicates no records for this species in the project area, nor within two miles of the project area. Potential habitat for this species may exist within the project area, as the proposed access road passes through Rich Cove and Montane Oak-Hickory forest types. However, impacts to these habitats will be limited to the removal of trees on the 1,766 feet of new alignment at the end of the proposed project.

A hornwort (*Megaceros aenigmaticus*)

Environmental Baseline – This hornwort occurs on shaded rocks in small streams, springs, or spray zones of waterfalls. Streams are typically clear, cool streams in mixed hardwood forests.

The NCNHP database and Forest Service records indicate that this species is known to occur in Rockhouse Creek, within two miles of the project vicinity. FWA personnel placed particular emphasis on this species at proposed stream crossing locations during field survey efforts.

Megaceros aenigmaticus was not documented during these surveys.

Direct and Indirect Impacts – Potential habitat for this species exists within the project area; however, this species was not present at proposed crossing locations and will not sustain direct impacts. Indirect impacts may occur in the form of localized habitat loss and/or disturbance where culverts are placed at stream crossings along the existing roadbed and new alignment.

Cumulative Impacts – Cumulative impacts will consist of loss of a limited amount of potential habitat at stream crossings along the project area. Due to the small amount of potential habitat to be impacted, versus the amount of potential habitat across the Forest, no measurable cumulative impacts are anticipated.

Determination of Effect – This project **may impact individuals** but is not likely to cause a trend to federal listing or loss of viability of the species across the Forest..

Sweet pinesap (*Monotropis odorata*)

Environmental Baseline – Sweet pinesap occurs in dry to mesic upland slopes under oaks and pines. It has a high potential to occur on slopes or bluffs with an abundance of heaths, especially *Rhododendron maximum*.

This species has potential habitat within the project area, particularly under pines in Montane Oak-Hickory Forest. In addition, this species has been documented within two miles of the project vicinity. Because sweet pinesap can best be detected during the flowering period, FWA personnel conducted a targeted survey for sweet pinesap in March 2007. FWA conducted intensive searches by sight and smell in high potential habitats along the project area.

Monotropis odorata was not documented during these surveys.

An aquatic lichen (*Peltigera venosa*)

Environmental Baseline – *Peltigera venosa* occurs along the banks of streams or roadbanks on bare soils in moist, shaded, small crevices (Brodo et al. 2001).

This species was not documented by surveys conducted by FWA personnel. The NCNHP database indicates no records for this species in the project area, nor within two miles of the project area. Potential habitat for this species does exist within the project area, in the form of moist soil on streambanks and road banks.

Direct and Indirect Impacts – Potential habitat for this species exists within the project area; however, this species is not known to occur within the project area. No direct impacts are anticipated. Indirect impacts may occur in the form of localized habitat loss and/or disturbance where road shoulders are graded and where new culverts are placed at stream crossings along the existing roadbed and new alignment.

Cumulative Impacts – Cumulative impacts will consist of loss or disturbance of a limited amount of potential habitat along the project area. Due to the small amount of potential habitat to be impacted, versus the amount of potential habitat across the Forest, no measurable cumulative impacts are anticipated.

Determination of Effect – This project **may impact individuals** but is not likely to cause a trend to federal listing or loss of viability of the species across the Forest.

Alabama grape fern (*Sceptridium jenmanii*)

Environmental Baseline – Associated natural community type for *Sceptridium jenmanii* is described as rich cove forest, moist to moderately dry forests and disturbed areas (Weakley 2008). More detailed habitat associations for this species are not available.

Given the broad habitat description for this species, as well as the high variability of “disturbed areas”, potential habitat may occur within the project area. However, the NCNHP database indicates no records for this species in the project area, nor within two miles of the project area. This species was not documented in surveys conducted by FWA personnel.

Direct and Indirect Impacts – Although potential habitat for this species occurs in portions of the project area, no direct impacts are anticipated because this species is not currently present. Indirect impacts may occur in the form of a small increase in potential habitat, in the form of disturbed area along road shoulders and along the new road alignment.

Cumulative Impacts – Cumulative impacts may consist of a minor increase in potential habitat (disturbed areas) along the proposed access road. Due to the small increase in potential habitat, versus the amount of this habitat already present across the Forest, no measurable cumulative impacts are anticipated.

Determination of Effect – This project will have **no impacts** on the viability of this species.

Alabama least trillium (*Trillium pusillum* var. *ozarkanum*)

Environmental Baseline – Alabama least trillium occurs in dry to dry-mesic slopes. In North Carolina, it has high potential to occur under *Quercus coccinea* and *Kalmia latifolia* (Weakley 2008). In Missouri and Arkansas, where it is more common, it occurs in thin, acidic soils under a partially open canopy (Natureserve 2009).

Associated natural community type for this species was present in the project area, although individual associate species listed above were not observed. The NCNHP database indicates no records for this species in the project area, nor within two miles of the project area. This species was not documented in surveys conducted by FWA personnel.

Southern nodding trillium (*Trillium rugelii*)

Environmental Baseline – *Trillium rugelii* has been documented within 20 North Carolina counties, 13 of which occur within the western North Carolina Mountains (Buchanan & Finnegan 2008; David Danley, Pisgah National Forest botanist, personal communication; Gary Kauffman, National Forests in NC forest botanical specialist, personal communication). The species primarily occurs at lower elevations in the mountains, from 1200-3000 feet above sea level. *Trillium rugelii* requires a fairly rich, moist microhabitat most often found in rich coves and bottomlands with a closed canopy. Twenty *Trillium rugelii* populations have been documented within the Nantahala or Pisgah National Forests. These populations vary in abundance from 20-50 individuals covering less than 1 acre to more than ten thousand

individuals covering an area greater than 100 acres. No records indicated that this species has been previously documented on public or private land in Clay County; four populations have been documented on NFS lands within Cherokee County.

During the June 2008 field survey of the project area, eight *Trillium rugelii* stems were observed on the east side of the existing roadbed, approximately 150 feet southwest of the crossing of Unnamed Tributary A (see **Figure 2-1**, UNT A). During a June 2009 field survey, an additional (single) *Trillium rugelii* plant was also located on the west side of the existing roadbed, approximately 15 feet from the southern bank of Hickory Cove Creek (see **Figure 2-1**, Hickory Cove Creek).

Direct and Indirect Effects – None of the documented *Trillium rugelii* individuals were rooted in the existing roadbed, but were located on the side of the road. If these two populations are delineated and conspicuously marked prior to road construction activities, direct impacts to these plants can be avoided. Indirect impacts to these plants could consist of compaction of adjacent soil, or increased surface stormwater flow near these plants. If these areas are adequately avoided and protection measures implemented during construction, indirect impacts should also be avoidable.

Cumulative Effects - During the last 10 years, *Trillium rugelii* has been impacted in 2 projects on the Pisgah Ranger District and one project in the Nantahala Ranger District. These projects did not result in the complete loss of the species from the respective project area.

Determination of Effect – If protection and avoidance measures are taken to protect the plants at these two locations, no direct or indirect impacts are anticipated. The proposed project **may impact individuals but is not likely to cause a trend to federal listing or a loss of viability of this species.**

Appalachian violet (*Viola appalachiensis*)

Environmental Baseline – Associated natural community type for Appalachian violet includes serpentine woodlands or rich cove forest. This species has a high potential to occur on old roadbeds through coves (Weakley 2008).

Habitat for this species was present in the project area, particularly where the existing roadbed passes through rich cove forest. However, the NCNHP database indicates no records for this species in the project area, nor within two miles of the project area. This species was not documented in surveys conducted by FWA personnel.

3.8.2.2 Terrestrial Wildlife Threatened, Endangered, and Sensitive Species Evaluated

After filtering by county, 5 Endangered, 2 Threatened, and 24 Forest Sensitive species remained for consideration (Table 3.8.2.2). The list was further narrowed by eliminating those species whose associated natural community type was not present within the project area. Where possible, species whose specialized habitat types (spray cliffs, granitic domes, rock outcrops, talus slopes, spruce-fir forests, etc.) were absent were also eliminated from further consideration. Habitat preferences and ranges of these species were based on a variety of sources, including the

NCNHP database, Forest Service lists, NatureServe© database, personal communication with Forest Service personnel, and other reference materials. Natural community classification followed Schafale and Weakley (1990). Twenty one species were not evaluated further in this analysis because the project area did not have the associated natural community type and/or specialized habitat type, or the species is restricted to a well-defined geographical area outside of the project vicinity. The proposed action will therefore have will have no effect or impact on these species. The analysis of potential effects or impacts focused on the 10 remaining species; these species are listed in **Table 2** and discussed below.

The NCNHP database was queried for TES element occurrences at two spatial scales. The first query included TES element occurrences within the project area, whereas the second query included TES element occurrences within two miles of the project area. None of the 13 remaining species are known to occur within the project area. Three TES species have been documented within two miles of the project vicinity: *Corynorhinus rafinesquii*, *Myotis leibii*, and *Sorex palustris punctulatus*. The project area was surveyed for specialized habitat types and evidence of TES species. FWA personnel conducted these field surveys in June 2008 and June 2009.

Table 3.8.2.2. Terrestrial Wildlife Species Considered in the Analysis.

| Group | Designation* | Scientific Name | Common Name | Associated Natural Community Type or Specialized Habitat Type | Analyzed Further/Evaluation Criteria* |
|-----------|------------------|--|-----------------------------------|---|---------------------------------------|
| Mammal | Endangered | <i>Glaucomys sabrinus coloratus</i> | Carolina Northern Flying Squirrel | Mature spruce-fir and northern hardwoods generally above 4000 feet | No/1 |
| Insect | Endangered | <i>Microhexura montivaga</i> | Spruce-fir Moss Spider | Spruce-fir forests on well-drained moss mats | No/1 |
| Mammal | Endangered | <i>Myotis grisescens</i> | Gray Bat | Caves in summer and winter | No/1 |
| Mammal | Endangered | <i>Myotis sodalis</i> | Indiana Bat | Roosts in caves, hollow trees or under loose bark of trees in riparian areas | Yes |
| Reptile | Threatened (S/A) | <i>Clemmys muhlenbergi</i> | Bog Turtle | Sunlit, marshy meadows, bogs, and wet pastures | No/1 |
| Mollusk | Threatened | <i>Mesodon clarki nantahala</i> | Noonday Globe | Cliffs; cool, wet areas under vegetation and leaf litter | No/1 |
| Insect | Sensitive | <i>Callophrys irus</i> | Frosted elfin | Open woods and borders, usually in dry situations; host plants - lupines(Lupinus) and wild indigos (Baptisia) | Yes |
| Insect | Sensitive | <i>Cicindela ancocisconensis</i> | A tiger beetle | High elevation forests, >4000 feet | No/1 |
| Mammal | Sensitive | <i>Corynorhinus rafinesquii</i> | Rafinesque's Big-eared Bat | Roosts in old buildings, caves, and mines, under loose bark, usually near water | Yes/2 |
| Amphibian | Sensitive | <i>Desmognathus santeetlah</i> | Santeetlah Dusky Salamander | Headwaters, seepage in hardwood, coves and spruce-fir, generally higher than 2220 feet | Yes |
| Insect | Sensitive | <i>Euchlaena milnei</i> | Milne's Euchlaena | No information available, not documented in project vicinity | No |
| Amphibian | Sensitive/FSC | <i>Eurycea junaluska</i> | Junaluska salamander | Streams; wider, base level portions of streams below 2395' | No/1 |
| Bird | Sensitive | <i>Haliaeetus leucocephalus</i> | Bald Eagle | Mature forests near large bodies of water | No/1 |
| Insect | Sensitive | <i>Melanoplus divergens</i> | Divergent Melanoplus | Glades and balds, 1800' - 4717'; no records | No/1 |
| Insect | Sensitive | <i>Melanoplus serrulatus</i> | Serrulate Melanoplus | Valleys and lower slopes | No/1 |
| Mammal | Sensitive | <i>Microtus chrotorrhinus carolinensis</i> | Southern Rock Vole | Rocky areas in spruce-fir, n. hardwoods and grassy balds; above 3200' | Yes |
| Mammal | Sensitive | <i>Myotis leibii</i> | Eastern Small-footed Bat | Hemlock forests, rock crevices, caves, mines or buildings, above 2000 ft | Yes/2 |

| Insect | Sensitive | <i>Nesticus cooperi</i> | Lost Nantahala Cave spider | Caves and along Nantahala River | No/1 |
|-----------|--------------|------------------------------------|---------------------------------|---|---------------------------------------|
| Insect | Sensitive | <i>Nesticus sheari</i> | Cave spider | High elevation, n-facing rocky slopes, apparently endemic to Graham county, NC | No/3 |
| Group | Designation* | Scientific Name | Common Name | Associated Natural Community Type or Specialized Habitat Type | Analyzed Further/Evaluation Criteria* |
| Mollusk | Sensitive | <i>Pallifera hemphilli</i> | Black mantleslug | High elevation forests, mainly spruce-fir | No/1 |
| Mollusk | Sensitive | <i>Paravitrea placentula</i> | Glossy Supercoil | Under leaf litter on wooded hillsides and ravines | Yes |
| Amphibian | Sensitive | <i>Plethodon aureolus</i> | Tellico Salamander | Mixed forest; hardwood forests with fallen logs, leaf litter and organic soil, known only from Graham and Cherokee Counties in NC | No/3 |
| Amphibian | Sensitive | <i>Plethodon teyahalee</i> | Southern Appalachian Salamander | Moist forests at all elevations | Yes |
| Insect | Sensitive | <i>Scudderia septentrionalis</i> | Northern Bush Katydid | In the treetops of edges of broadleaved forests | Yes |
| Insect | Sensitive | <i>Semiothisa fraserata</i> | Fraser Fir Angle | Spruce-fir forests with fraser fir | No/1 |
| Mammal | Sensitive | <i>Sorex palustris punctulatus</i> | Southern Water Shrew | Streambanks w/rhododendron cover in n. hardwood or spruce-fir forests; known from > 3000', mostly over 4000' | Yes/2 |
| Insect | Sensitive | <i>Speyeria diana</i> | Diana Fritillary | Mature deciduous and pine woodlands near streams; mostly along roadsides incoves below 4000'; nectar - joe-pye-weed, ironweed, butterflyweed; host plants - violets | Yes |
| Bird | Sensitive | <i>Thryomanes bewickii altus</i> | Appalachian Bewick's wren | Woodland borders or openings at high elevations | No/1 |
| Insect | Sensitive | <i>Trechus luculentus unicolor</i> | A ground beetle | Beneath rocks and moss in wet ravines and near seeps and springs > 3000' | No/1 |

*1 Associated natural community type and/or specialized habitat type do not occur in the activity area; therefore, these habitats will not be affected. Given no effects to the habitat, the proposal alternatives will not cause changes to forest-wide trends or changes in population trends of species associated with this habitat.

*2 NCNHP database indicates that this species has been recorded within 2 miles of the project area (however, no records for this species exist within the project area).

*3 Project area is outside of the known, localized geographic range for the species.

Indiana bat (*Myotis sodalis*)

Environmental Baseline – In summer, habitat consists of wooded or semiwooded areas, mainly along streams. This species has high potential to occur in hollow trees or under loose bark of living or dead trees standing in sunny openings. This habitat is used by solitary females or small maternity colonies to bear their offspring. Though maternity sites have been reported as occurring mainly in riparian and floodplain forests, recent studies indicate that upland habitats are used by maternity colonies much more extensively than previously reported. In winter, caves are utilized for hibernation. Indiana bats are known to use highly altered and fragmented landscapes. They may respond favorably to habitat disturbance, particularly where forests are even-aged and closed-canopied. A diverse landscape may benefit Indiana bats, provided that adequate areas of mature forest and suitable roost trees remain.

The Indiana bat has not been recorded in Clay County, but is currently known to occur in adjacent Cherokee and Graham Counties during the summer months. The NCNHP database indicates no records for this species in the project area, nor within two miles of the project area.

No mist net surveys were conducted for this project; however, a qualitative assessment for potential roost trees was conducted. Due to the lack of suitable maternity colony trees (large trees with exfoliating bark located in sunny areas), this species does not have a high potential to utilize trees adjacent to the project corridor for maternity sites.

Direct and Indirect Effects – **The potential for direct effects to individuals will be eliminated by felling any trees during the winter months when the bats are hibernating in caves (between October 15 and April 15).** This direction is consistent with Terms and Conditions in the Biological Opinion of the U.S. Fish and Wildlife Service for the protection of the Indiana bat on the Nantahala and Pisgah National Forests. No indirect effects due to loss of maternity colony trees are anticipated. No suitable maternity colony trees have been observed within or adjacent to the existing or proposed access road corridors. The Indiana bat may forage in portions of the project area. Construction activities on the existing roadbed are not anticipated to affect current foraging habitat; construction of the new road alignment could create an additional corridor for foraging/travel.

Cumulative Effects – Cumulative effects are not anticipated due to the absence of direct effects to individuals, as well as the lack of indirect negative effects associated with the proposed action.

Determination of Effect – Terms and Conditions in the Biological Opinion of the U.S. Fish and Wildlife Service for the protection of the Indiana bat on the Nantahala and Pisgah National Forests will ensure that no tree felling activities occur during summer months; these terms ensure that no direct effects to individuals occur. Indirect effects are limited to the creation of a small amount of potential foraging/travel corridor habitat. Due to the absence of negative indirect effects, and the small amount of potential foraging habitat created under the proposed action, no cumulative effects to the Indiana bat are anticipated. This project **is not likely to adversely affect** the Indiana bat (*Myotis sodalis*).

***** The proposed action is to authorize new road construction and use of existing roads for access of a private tract surrounded by NFS lands. This access is intended to serve the tract and the future construction of up to five, single-family residences (primitive cabins). Development and associated impacts to federally protected species within this private tract is considered a *connected action* in the context of the Forest Service authorizing this access across NFS lands. LCPOA and the Asheville Field Office of the USFWS have cooperatively developed a Habitat Protection Plan with the purpose of avoiding impacts to the Indiana bat on the private tract. This Habitat Protection Plan is included in Section 5.2.**

Frosted elfin (*Callophrys irus*)

Environmental Baseline – This butterfly species is found in open woods and borders in dry situations. This species has not been documented in Clay County, but has been documented in Cherokee County. The NCNHP database does not indicate that this species has been documented within the project area or within 2 miles of the project area.

Direct and Indirect Effects – If individuals are present within the project area during road improvement/construction, direct impacts could occur in the form of crushing or displacement. The likelihood of direct impacts is relatively low, since it is unlikely that this species is present within the project area. The forest within the project area is relatively contiguous, containing little or no edge habitat; only a very limited portion of the project area contains forest that could be considered “open” or “dry” habitat. Indirect impacts are also very unlikely. No existing

suitable habitat will be destroyed, and little or no suitable habitat will be created as a result of the proposed action.

Cumulative Effects – Cumulative impacts are not anticipated because of the low likelihood of direct impacts to individuals, or indirect impacts in the form of habitat loss or gain.

Determination of Effect – Forest-wide this species has probably benefited from past forest management, which created new edge or border habitat. Whereas the proposed action could directly impact individuals in the unlikely event that they are present within the project area during construction, it is not expected to eliminate or measurably create suitable habitat. This project **may impact individuals but is not likely to cause a trend to federal listing or a loss of viability** of this species.

Rafinesque's big-eared bat (*Corynorhinus rafinesquii*)

Environmental Baseline – Information on the habitat and life history of this bat is not extensive. In the southern portions of its range, this species has a high potential to utilize abandoned buildings or caves for summer roosting and maternity colonies. This species has a lower potential to utilize hollow trees. This species appears to prefer more open and often lighted areas for day roosts.

This species has not been documented in Clay County, but has been documented in adjacent Cherokee and Graham Counties. The NCNHP database does indicate that this species has been documented within 2 miles of the project area, but has not been documented within the project area.

Due to the lack of caves or buildings, this species is not likely to utilize the project area for roosting or maternity colonies. The species may use the project area for foraging, however.

Direct and Indirect Effects – No direct impacts are anticipated; possible indirect impacts are limited to the creation of a small amount of potential foraging/travel corridor associated with construction of the new road alignment.

Cumulative Effects – Due to the absence of direct impacts, negative indirect impacts, and the small amount of potential foraging habitat created under the proposed action, no cumulative impacts to the Indiana bat are anticipated.

Determination of Effect – This project will have **no impacts** on the viability of this species.

Santeetlah dusky salamander (*Desmognathus santeetlah*)

Environmental Baseline – This species occurs in headwaters or seepage areas in hardwood or spruce-fir forests in higher elevations. It has a high potential to occur in the Unicoi Mountains, Great Smoky Mountains National Park, and Great Balsam Mountains, where it has been documented (Petranka 1998). It has a high potential to occur in headwaters or seepage areas in hardwood or spruce-fir forests in higher elevations, usually over 2,220 feet in elevation. Eggs are laid under moss growing on rocks or logs, typically within few feet of open water.

This species has been documented in Graham and Swain Counties, but not in Clay County. The NCNHP database indicates no records for this species within the project area, nor within two miles of the project area. Potential habitat for this species is present in the project area; however, it is not likely to occur in the project area based on current knowledge of its limits of geographic distribution.

Direct and Indirect Effects – *Desmognathus santeetlah* is not likely to occur in the project area, due to the limitations of its range. No direct or indirect impacts are anticipated.

Cumulative Effects – Due to the lack of direct and indirect impacts, there will be no cumulative impacts as a result of this project.

Determination of Effect – This project will have **no impacts** on the viability of this species.

Southern rock vole (*Microtus chrotorrhinus carolinensis*)

Environmental Baseline – This species occurs as scattered populations in patches of suitable habitat in the Appalachian Mountains. Associated natural community type requirements are cool, damp, coniferous, and mixed forests at higher elevations in the Appalachians. This species has a high potential to occur in ferns/mossy debris near flowing water in coniferous forests. It has a lower potential to occur in deciduous forest/spruce clearcuts (mainly recent cuts), forest ecotones, grassy balds near forest, and talus slopes associated with road banks.

This species has been documented in Swain County, but not in Clay County. Possible habitat for this species is present within the project area in the form of rocky drainages in deciduous forest; however, optimal habitat listed above is not present. This species is not highly likely to occur within the project area.

Direct and Indirect Effects – *Microtus chrotorrhinus carolinensis* is not highly likely to occur in the project area, due to the lack of optimal habitat. No direct impacts are anticipated. Indirect impacts to the marginal habitat located within the project area are limited to clearing of the new road alignment, and construction activities associated with the existing roadbed.

Cumulative Effects – No direct impacts are anticipated; indirect impacts to the marginal habitat located within the project area are very limited. Due to the limited extent of indirect impacts to marginal habitat versus the availability of marginal and optimal habitat across the Forest, any cumulative impacts to this species are expected to be imperceptible.

Determination of Effect – This project will have **no impacts** on the viability of this species.

Eastern small-footed bat (*Myotis leibii*)

Environmental Baseline – *Myotis leibii* roosts in hollow trees and rocky crevices during the summer months, but has also been documented in buildings, caves, mines, and expansion joints in concrete bridges. During the winter, it typically hibernates in caves and mines. This species does not have a high potential to occur because no suitable roosting habitat was observed within the project area. *Myotis leibii* may use the project area for foraging.

The Eastern small-footed bat has been recorded in Clay County, several adjacent counties, and is considered to be widespread but generally uncommon in western North Carolina. The NCNHP database indicates that this species has been documented within two miles of the project area, but has not been documented within the project area.

No mist net surveys were conducted for this project; however, a qualitative assessment for potential roost/maternity sites was conducted. No rock outcrops with crevices, buildings, caves, mines, or concrete bridges are located within the project area; optimal roost habitat was not observed along the existing roadway or new road alignment.

Direct and Indirect Effects – The prohibition on felling trees during the summer months (see *Effects* discussion for *Myotis sodalis* above), will ensure that no direct impacts to *Myotis leibii* will occur. This species may forage in portions of the project area. Construction activities on the existing roadbed are not anticipated to affect current foraging habitat; construction of the new road alignment could create an additional corridor for foraging/travel.

Cumulative Effects – Terms and Conditions in the Biological Opinion of the U.S. Fish and Wildlife Service for the protection of the Indiana bat on the Nantahala and Pisgah National Forests will ensure that no tree felling activities occur during summer months; these terms will also ensure that no direct impacts to *Myotis leibii* individuals occur. Indirect impacts are limited to the creation of a small amount of potential foraging/travel corridor. Due to the absence of negative indirect impacts, and the small amount of potential foraging habitat created under the proposed action, no cumulative impacts to the Eastern small-footed bat are anticipated.

Determination of Effect – This project will have **no impacts** on the viability of this species.

Glossy supercoil (*Paravitrea placentula*)

Environmental Baseline – Associated natural community type for this species includes Acidic Cove, Rich Cove, High Elevation Red Oak, and Montane Oak-Hickory Forests. Associated species included *Betula alleghaniensis* and *Tsuga canadensis* (Pilsbry, 1946).

The NCNHP database indicates that this species has not been documented within two miles of the project area. Although associate species are present, this species has not been documented in Clay County. Among the adjacent counties this species has only been documented in Swain County. Associated natural community types and associated tree species are present within the project area. However, due to the limited mobility of gastropods, limited distribution outside the project area, and obscure record, this species is not likely to occur within the project area.

Direct and Indirect Effects – *Paravitrea placentula* is not likely to occur in the project area. No direct or indirect impacts are anticipated.

Cumulative Effects – Due to the lack of direct and indirect impacts, there will be no cumulative impacts as a result of this project.

Determination of Effect – This project will have **no impacts** on the viability of this species.

Southern Appalachian salamander (*Plethodon teyahalee*)

Environmental Baseline - This species occurs in forests made up of birch, beech, hemlock, witch hazel, mountain laurel, and rhododendron. Adults have been found up to 5,000 feet in elevation. The highest densities of this species were in mature, mesic, hardwood forests (Petranka 1998); however the species has been recorded in a wide variety of forest types and elevations within the Nantahala National Forest.

The geographic range of this species covers much of the southwestern tip of North Carolina, including the project vicinity. Based on the presence of many of the associate botanical species listed above, this species may occur within the project area.

Direct and Indirect Effects – Direct impacts to *Plethodon teyahalee* may result during road construction activities. Individuals within the project area could be subject to crushing or displacement during construction. Due to the limited extent of new road alignment included in the proposed action, indirect impacts in the form of habitat loss are expected to be minimal.

Cumulative Effects – Due to the limited extent of direct and indirect impacts to this species, versus the distribution of this species and availability of optimal habitat across the Forest, any cumulative impacts to this species are expected to be imperceptible.

Determination of Effect – Potential direct impacts to *Plethodon teyahalee* individuals could occur during construction; indirect impacts to habitat are expected to be imperceptible. This project **may impact individuals but is not likely to cause a trend to federal listing or a loss of viability** of this species.

Northern bush katydid (*Scudderia septentrionalis*)

Environmental Baseline – This species is known to utilize treetops at the edges of broadleaved forest. No information regarding the geographic distribution of this species was available via NCNHP database queries, as NCNHP does not track this species.

If individuals are present within the project area during road improvement/construction, direct impacts could occur in the form of crushing or displacement. The likelihood of direct impacts is relatively low, since it is unlikely that this species is present within the project area. The forest within the project area is relatively contiguous, containing little or no edge habitat; it is unclear whether the narrow corridor and canopy gap associated with the access road would provide suitable habitat for this species. Indirect impacts are also very unlikely. Little or no existing suitable habitat will be destroyed or created as a result of the proposed action.

Cumulative Effects – Cumulative impacts are not anticipated because of the low likelihood of direct impacts to individuals, or indirect impacts in the form of habitat loss or gain.

Determination of Effect – Forest-wide this species may have benefited from past forest management, which created new edge or border habitat. The proposed action could directly impact individuals (if present) during construction; the proposed action is not expected to eliminate or measurably create suitable habitat. This project **may impact individuals but is not likely to cause a trend to federal listing or a loss of viability** of this species.

Southern water shrew (*Sorex palustris punctulatus*)

Environmental Baseline – *Sorex palustris punctulatus* occurs near swift, rocky streams with *Rhododendron* cover. This species may occur in the project area; it has been documented along Fires Creek within two miles of the project area. This species has been documented in several locations from Macon and Cherokee Counties.

Direct and Indirect Effects – If the species is present within the project area, direct impacts to *Sorex palustris punctulatus* could result during road construction activities, particularly at stream crossings. These direct impacts are considered to be unlikely. Little or no existing riparian vegetation will be cleared during road construction or culvert replacement. Due to the relatively small amount of activity occurring near streams, any indirect impacts in the form of riparian habitat loss are expected to be imperceptible.

Short-term indirect impacts to individuals could result from increased sedimentation associated with road construction and culvert replacement/installation within the project area. Similarly, short-term indirect impacts to individuals could also result from acid runoff during road construction if fresh, un-weathered acidic rock is exposed and is not appropriately treated or disposed of. Short-term and long-term sedimentation and acid run off will be avoided or minimized through the successful use of BMP's, design criteria, and requirements listed in heading 3.1.3 of the BE in Section 5.1.

It is also possible that long-term indirect impacts associated with the proposed action could be positive, in that the replacement of the dislodged culvert at the Hickory Cove crossing will likely increase stability of the stream channel and banks at that location and may reduce sediment loss at that location during high-flow events. Replacement of other existing, non-functional (plugged) culverts associated with the proposed action may also prevent similar failures and sediment loss during future high-flow events.

Cumulative Effects – Due to the limited extent of potential direct and indirect impacts to this species, versus the availability of suitable habitat across the Forest, no cumulative impacts to this species are expected as a result of this project.

Determination of Effect – Potential direct impacts to individuals of this species could occur during construction, but are unlikely. Indirect impacts to riparian habitat are expected to be imperceptible; indirect impacts to aquatic habitat will be avoided or minimized through the successful use of BMP's design criteria, and requirements listed under heading 3.1.3 of the BE in Section 5.1. This project **may impact individuals but is not likely to cause a trend to federal listing or a loss of viability** of this species.

Diana fritillary (*Speyeria diana*)

Environmental Baseline – The species is found in moist forests in the southwestern mountains at all elevations and has been observed in various habitats. The adults nectar on joe-pye-weed, ironweed, and butterflyweed; violets are important for the larvae which feed on the foliage. This species occurs in different forest types, but seems to prefer roadsides through cove forests.

The proposed treatment area contains mesic deciduous forests; however, does not support an abundance of violets. It is thought to be fairly common across Graham, Swain, Cherokee, Clay and Macon counties. The NCNHP database does not indicate that this species has been documented within the project area or within 2 miles of the project area.

Direct and Indirect Effects – If individual adults or larvae are present within the project area during construction, direct impacts to *Speyeria diana* could occur in the form of crushing or displacement. The likelihood of direct impacts is relatively low, since the project area does not appear to support an abundance of violets, and this species is not known to occur within the project area. Indirect impacts are limited to the creation of a small amount of habitat in the form of additional permanent edge habitat along the new road alignment.

Cumulative Effects – Cumulative impacts are not anticipated because of the low likelihood of direct impacts to individuals, as well as the possible favorable indirect impacts associated with a small amount of additional permanent edge habitat.

Determination of Effect – Forest-wide this species has probably benefited from past forest management, which created new forest roadside habitat. The proposed action will not eliminate current roadside habitat. A small amount of additional permanent edge habitat along the new road alignment will be created, which could provide new habitat for this species. This project **may impact individuals but is not likely to cause a trend to federal listing or a loss of viability** of this species.

3.8.2.3 Aquatic Threatened, Endangered, and Sensitive Species Evaluated

After filtering by county, one Forest Sensitive species (*Cambarus parrishi*) remained for consideration (Table 3.8.2.3). The NCNHP database also indicates that this species has been recorded within two miles of the project area (in Rockhouse Branch), but is not known to occur within the project area. The analysis evaluates this species; background information and potential impacts to this species are discussed below.

Table 3.8.2.3 Aquatic Species Considered in the Analysis.

| Group | Designation | Scientific Name | Common Name | Associated Natural Community Type or Specialized Habitat Type | Analyzed Further/Evaluation Criteria* |
|----------|-------------|--------------------------|------------------------------|--|---------------------------------------|
| Crayfish | Sensitive | <i>Cambarus parrishi</i> | Hiwassee Headwaters Crayfish | Hiwassee River headwaters, Rockhouse Creek; swift, clear headwater streams | Yes* |

* NCNHP database indicates that this species has been recorded within 2 miles of the project area (however, no records for this species exist within the project area).

Hiwassee headwaters crayfish (*Cambarus parrishi*)

Environmental Baseline – This species has only been documented in headwaters of the Hiwassee River. It has a high potential to occur in streams with swift, clear, flowing water over sand and rocks (Natureserve 2008). The streams within in the project area are headwaters of the Hiwassee River, and appear to contain suitable habitat for this species.

Available Inventories Information – No previous surveys have been conducted within the project area. However, this species has been documented within two miles of the project area in

Rockhouse Creek. Hickory Cove Creek and Laurel Creek are tributaries of Rockhouse Creek, and join Rockhouse Creek downstream of the project area.

Direct and Indirect Effects – *Cambarus parrishi* may occur in the project area due to close proximity of known occurrences in nearby streams, and due to apparently suitable habitat in Laurel Creek and Hickory Cove Creek within the project area. Direct impacts to individuals could occur in the short term, as individuals could be crushed or displaced during culvert replacement/installation at the crossing of Hickory Cove creek. This appears to be the only stream crossing involved in the proposed action that includes a stream of sufficient size to support *Cambarus parrishi*. Given the relatively short time period of direct stream disturbance associated with this culvert installation, and the relatively limited footprint of the anticipated culvert, direct impacts to individuals may occur, but are probably unlikely.

Short-term indirect impacts to individuals could result from increased sedimentation associated with road construction and culvert replacement/installation within the project area. The effects of increased turbidity and sedimentation would be highest during culvert installation, which would occur for approximately 1 day. This installation would alter the stream channel's pattern and profile for approximately 100 feet where the new culvert is installed and short segments upstream and downstream of the new culvert. Any newly deposited sediments downstream of the culvert installation area would persist until the next bankfull flow event, which occurs approximately every 1.5 years. Similarly, short-term indirect impacts to individuals could also result from acid runoff during road construction if fresh, un-weathered acidic rock is exposed and is not appropriately treated or disposed of. Short-term and long-term sedimentation and acid run off will be avoided or minimized through the successful use of BMP's, design criteria, and requirements listed in Section 3.8.1.

It is also possible that long-term indirect impacts associated with the proposed action could be positive, in that the replacement of the dislodged culvert at the Hickory Cove crossing will likely increase stability of the stream channel and banks at that location and may reduce sediment loss at that location during high-flow events. Replacement of other existing, non-functional (plugged) culverts associated with the proposed action may also prevent similar failures and sediment loss during future high-flow events.

Cumulative Effects – The existing condition of the aquatic resources, described in Existing Condition Section above in this document, is the result of all past effects. Previous activities within the project area include timber harvest and road construction. Portions of Rockhouse Road, Phillips Ridge Road, and Little Fires Creek Road have been repaired following the 2004 hurricanes. These repairs involved applying aggregate surface to the roads, constructing water bars, reconditioning roads and ditches, placing riprap, replacing culverts, installing silt fences, geotextile, and seeding. The effects of past actions on water quality were basically the same as the effects described for the proposed actions. These activities were designed to prevent erosion; therefore, the effects of these actions were minimal and would not be cumulative with this project. Specifically, the effects would have included sedimentation from the ground disturbing activities. These effects have since dissipated because of the amount of time that has elapsed. Therefore, the current condition of the water quality is representative of any past effects because many of these actions occurred more than 10 years ago.

Ongoing Actions: There are no ongoing activities occurring on federal lands within the Laurel Creek POA Project area; therefore, there are no ongoing effects to the Laurel Creek POA Project area waters. There are no ongoing activities on private lands that are known to be affecting the aquatic resources in the Laurel Creek POA Project Area.

Future Actions: There are no reasonably foreseeable future actions proposed for the Laurel Creek POA Project area on federal lands; therefore, there would be no effects from any other future actions. There are no known actions planned on private lands that would affect the Laurel Creek POA Project area waters.

In the absence of effects from any past, ongoing, or foreseeable future actions, the cumulative effects of this project are represented by the direct and indirect effects described above. There is a relatively low likelihood of direct impacts to individuals. Negative indirect impacts are possible, but can be avoided or minimized with successful implementation of BMP's and requirements regarding sediment/erosion control measures and proper treatment/disposition of acidic rock. Positive indirect impacts are also possible, as a major stream crossing in the project area will be stabilized, and non-functional culverts in the project area will be replaced under the proposed action. Due to the low likelihood of direct impacts, and the minimal negative and positive indirect impacts associated with the proposed action, no net cumulative impacts to this species are anticipated.

Determination of Effect – The proposed action may directly and indirectly impact individuals during construction activities, particularly during the installation/replacement of culverts at stream crossings. The proposed action **may impact individuals but is not likely to cause a trend to federal listing or a loss of viability** of this species because required project design criteria should avoid chronic sedimentation and acid runoff impacts to habitat for this species.

3.8.2.4 Determination of Effect

Table 3.8.2.4. Summary of Determination of Effect or Impact for Threatened, Endangered, and Forest Sensitive species evaluated in the effects analysis.

| Group | Designation | Scientific Name | Common Name | Determination of Effect or Impact |
|-------------------------------------|-------------|--|---------------------------------|--|
| BOTANICAL SPECIES | | | | |
| Liverwort | Sensitive | <i>Drepanolejeunea appalachiana</i> | A Liverwort | No impacts |
| Vascular plant | Sensitive | <i>Euphorbia purpurea</i> | Glade Spurge | No impacts |
| Vascular plant | Sensitive | <i>Helianthus glaucophyllus</i> | Whiteleaf Sunflower | No impacts |
| Vascular plant | Sensitive | <i>Juglans cinerea</i> | Butternut | No impacts |
| Hornwort | Sensitive | <i>Megaceros aenigmaticus</i> | A Hornwort | No impacts |
| Vascular plant | Sensitive | <i>Monotropis odorata</i> | Sweet Pinesap | No impacts |
| Lichen | Sensitive | <i>Peltigera venosa</i> | An Aquatic Lichen | No impacts |
| Vascular plant | Sensitive | <i>Sceptridium jenmanii</i> | Alabama Grape Fern | No impacts |
| Vascular plant | Sensitive | <i>Trillium pusillum</i> var. <i>ozarkanum</i> | Alabama Least Trillium | No impacts |
| Vascular plant | Sensitive | <i>Trillium rugelii</i> | Southern Nodding Trillium | May impact individuals but not likely to cause a trend to federal listing or a loss of viability |
| Vascular plant | Sensitive | <i>Viola appalachiensis</i> | Appalachian Violet | No impacts |
| TERRESTRIAL WILDLIFE SPECIES | | | | |
| Mammal | Endangered | <i>Myotis sodalis</i> | Indiana Bat | Not likely to adversely affect |
| Insect | Sensitive | <i>Callophrys irus</i> | Frosted Elfin | May impact individuals but not likely to cause a trend to federal listing or a loss of viability |
| Mammal | Sensitive | <i>Corynorhinus rafinesquii</i> | Rafinesque’s Big-eared Bat | No impacts |
| Amphibian | Sensitive | <i>Desmognathus santeetlah</i> | Santeetlah Dusky Salamander | No impacts |
| Mammal | Sensitive | <i>Microtus chrotorrhinus carolinensis</i> | Southern Rock Vole | No impacts |
| Mammal | Sensitive | <i>Myotis leibii</i> | Eastern Small-footed Bat | No impacts |
| Mollusk | Sensitive | <i>Paravitrea placentula</i> | Glossy Supercoil | No impacts |
| Amphibian | Sensitive | <i>Plethodon teyahalee</i> | Southern Appalachian Salamander | May impact individuals but not likely to cause a trend to federal listing or a loss of viability |
| Insect | Sensitive | <i>Scudderia septentrionalis</i> | Northern Bush Katydid | May impact individuals but not likely to cause a trend to federal listing or a loss of viability |
| Mammal | Sensitive | <i>Sorex palustris punctulatus</i> | Southern Water Shrew | May impact individuals but not likely to cause a trend to federal listing or a loss of viability |
| Insect | Sensitive | <i>Speyeria diana</i> | Diana Fritillary | May impact individuals but not likely to cause a trend to federal listing or a loss of viability |
| AQUATIC SPECIES | | | | |
| Crayfish | Sensitive | <i>Cambarus parrishi</i> | Hiwassee Headwaters Crayfish | May impact individuals but not likely to cause a trend to federal listing or a loss of viability |

3.8.3 Communities, Special Habitats, and Management Indicator Species (MIS)

The following tables support the analysis that follows for biological communities, special habitats, and management indicator species.

Table 3.8.3.1 MIS species, estimated population trend, and biological community or special habitat indicated by the species.

| MIS | Estimate | Associated Biological Community or Special Habitat Component | | |
|--------------------------------|----------|--|------------------------------|---------------------------------------|
| Black Bear | Increase | Old Forest Communities | Hard mast-producing species | Contiguous areas with low disturbance |
| White Tailed Deer | Stable | Early-successional (0-10) | Hard mast- producing species | |
| Pileated Woodpecker | Increase | Old Forest Communities | Snags and dens (>22 dbh) | Downed woody debris – all sizes |
| Ovenbird | Decrease | Large Contiguous Forest Areas | | |
| Rufous-Sided (Eastern) Towhee | Decrease | Early-successional (0-10) | Early successional (11-20) | |
| Pine Warbler | Stable | Yellow pine mid-successional forests | | |
| Ruffed Grouse | Stable | Early successional (0-10) | Early successional (11-20) | Downed woody debris |
| Acadian flycatcher | Increase | Riparian | | |
| Brook, Brown and Rainbow Trout | Stable | Coldwater streams | | |
| Largemouth Bass | Stable | Reservoirs | | |
| Blacknose Dace | Stable | Coldwater streams | | |
| Smallmouth Bass | Stable | Coolwater and warmwater streams | | |
| Fraser Fir | Decrease | Fraser Fir Forests | | |
| Carolina Hemlock | Increase | Carolina hemlock bluff forests | | |
| Ginseng | Decrease | Rich cove forests | | |
| Ramps | Stable | Northern hardwoods | | |

Table 3.8.3.2. Biological communities and associated Management Indicator Species (Amendment 17, 2005).

| Biological Community | Management Indicator Species (MIS) | Analyzed Further/Evaluation Criteria* |
|---|--------------------------------------|---------------------------------------|
| | | Alt B |
| Fir dominated communities at high elevations | Fraser fir | No/1 |
| Northern hardwood forests | Ramps | No/1 |
| Carolina hemlock forests | Carolina hemlock | No/1 |
| Rich Cove forests; mesic mixed mesophytic communities | Ginseng | Yes |
| Xeric yellow pine forests | Pine warbler | No/1 |
| Reservoirs | Largemouth bass | No/1 |
| Riparian forests | Acadian flycatcher | Yes |
| Coldwater streams | Wild Brook, Brown, and Rainbow Trout | Yes |
| Coldwater streams | Blacknose dace | Yes |
| Warmwater streams | Smallmouth bass | No/1 |

***1-Biological community is not known to occur in the activity area; therefore, this biological community will not be affected. Given no effects to the community, the alternatives will not cause changes to forest-wide trends or changes in population trends of species associated with this community.**

Table 3.8.3.3. Special habitats and associated Management Indicator Species (using Forest Plan EIS, Table III-9).

| Special Habitats | Management Indicator Species (MIS) | Analyzed Further/Evaluation Criteria* |
|---|------------------------------------|---------------------------------------|
| | | Alt B |
| 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 years old) | Ruffed grouse | No/1 |
| Soft mast-producing species | Ruffed grouse | Yes |
| Hard mast-producing species (>40 years) | Black bear | Yes |
| Large contiguous areas with low levels of human disturbance | Black bear | Yes |
| Large contiguous areas of mature deciduous forest | Ovenbird | Yes |
| Permanent grass/forb openings | White-tailed deer | No/1 |
| Snags | Pileated woodpecker | Yes |
| Downed woody debris | Ruffed Grouse | Yes |

***1-Special Habitat is not known to occur in the activity area; therefore, this habitat will not be affected. Given no effects to the habitat, the alternatives will not cause changes to forest-wide trends or changes in population trends of associated species.**

Table 3.8.3.4. Estimated change in biological communities and special habitats.

| Biological Community | Alternative A | Alternative B |
|---|----------------------|---|
| Fir dominated communities at high elevations | None affected. | None affected. |
| Northern hardwood forests | None affected. | None affected. |
| Carolina hemlock forests | None affected. | None affected. |
| Rich Cove forests; mesic mixed mesophytic communities | None affected. | Approximately 0.7 acres will be permanently impacted in the area of new road construction. |
| Xeric yellow pine forests | None affected. | None affected. |
| Reservoirs | None affected. | None affected. |
| Riparian forests | None affected. | Project area includes riparian forests adjacent to the existing roadbed; no additional impacts to riparian forest are anticipated. |
| Coldwater streams | None affected. | Short term: limited areas at stream crossings will be impacted by culvert installation/replacement. Long term: Successful implementation of BMP's, project design criteria, and increased stabilization at stream crossings will ensure that long-term negative impacts to these communities do not occur. |
| Warmwater streams | None affected. | None affected. |
| Special Habitats | Alternative A | Alternative B |
| Old forest communities (100+ years old) | None affected. | None affected. |
| Early successional communities (0-10 yr) | None affected. | None affected. |
| Early successional communities (11-20 yr) | None affected. | None affected. |
| Soft mast-producing species | None affected. | Short term: soft-mast producing species may be impacted minimally where they occur within and adjacent to existing roadbed. Long term: soft-mast producing species may reestablish along roadsides. |
| Hard mast-producing species | None affected. | Approximately 0.7 acres will be permanently impacted in the area of new road construction. |
| Contiguous areas with low disturbance | None affected. | The amount of disturbance along the project area will temporarily increase during construction activities. |
| Large contiguous mature forest | None affected. | Approximately 0.7 acres will be permanently impacted in the area of new road construction. |
| Permanent grass/forb openings | None affected. | None affected. |
| Snags | None affected. | Approximately 0.7 acres, containing some snags within the footprint of the new road alignment will be impacted. |
| Downed woody material | None affected. | Approximately 0.7 acres, containing downed woody material in the footprint of the new road alignment will be impacted. |

3.8.3.1 Species Evaluated and Rationale

All MIS potentially affected by project activities were initially considered (Table 3.8.3.1, Table 3.8.3.2 and Table 3.8.3.3). Ginseng, Acadian flycatcher, wild brook trout, brown trout, rainbow trout, blacknose dace, ruffed grouse, black bear, ovenbird, and pileated woodpecker were further evaluated, as the corresponding biological communities and/or special habitats for these MIS species occurred within the project area (Table 3.8.3.4).

Ginseng (*Panax quinquefolius*) prefers rich cove forest on slopes or ravines in the Southern Appalachians. Often these forests have a relatively sparse shrub understory. Although soil characteristic can vary, vigorous populations are typically found in soils that are acidic, well-drained, and have a good humus component. Ginseng often occurs on north- and east-facing slopes, but has also been documented in all aspects. The Forest-wide population trend for ginseng is downward based on 1) historical accounts, i.e. harvest levels in the 1800's indicate a much greater population size than is currently present on the Forest, 2) permanent plots re-measured from 1979 to 2000 on the Forest, 3) decline in North Carolina harvest amounts within the counties with Forest Service lands, and 4) absence of ginseng on 24% of random plots inventoried in 2002 where species should occur.

Ginseng was not observed within or immediately adjacent to the existing or new road alignments. Impacts associated with the proposed action are limited to the permanent loss of 0.7 acres of potentially suitable habitat within the project area. Due to the limited extent of habitat loss, versus the much larger amount of habitat available across the Forest, no measurable cumulative impacts are anticipated. This project will not alter the existing estimated population trends on Nantahala/Pisgah National Forest lands.

Acadian flycatcher (*Empidonax virescens*) prefers moist, deciduous forests with a moderate understory, most commonly near streams. Nests are built on down-hanging branches of deciduous trees, usually over a stream. The flycatcher forages on flying insects 10-40 feet above the ground. The Breeding Bird Survey (BBS) trend data for this region shows a non-significant downward trend in the population. However, the majority of BBS survey routes are along private land on roads. The Region 8 bird surveys completed on the Nantahala and Pisgah National Forests for recent years indicate an increasing population trend for the Acadian Flycatcher.

Portions of the project area contain suitable riparian habitat (Acidic Cove Forest) for this species; these areas are limited to the existing roadbed. Direct impacts from the project to any canopy trees are not expected, as construction/improvement activities will be limited to the existing roadbed and are not expected to disturb any large trees. The proposed new road alignment does not contain suitable riparian habitat for this species. No habitat loss is expected due to the proposed action, therefore no change in the overall increasing population trend for Acadian flycatcher is expected across the Forest.

Rainbow trout (*Oncorhynchus mykiss*), Brown Trout (*Salmo trutta*), Brook Trout (*Salvelinus fontinalis*) and Blacknose Dace (*Rhinichthys atratulus*) may occur either within or downstream of the project area. Changes in the presence and absence of brook trout, brown trout, rainbow trout, and blacknose dace are being used to indicate the effectiveness of management of

coldwater streams across the Nantahala and Pisgah National Forest. Any of these four species are sensitive to subtle changes within water quality. Rainbow trout are the most abundant of the three trout species occurring on the Nantahala and Pisgah National Forests. Even though rainbow trout numbers are higher than brown trout and brook trout forest-wide, all three species have a static population trend. Although blacknose dace populations fluctuate more frequently forest-wide in comparison to the three trout species, the densities of this species have remained relatively stable for the last two decades.

Short-term indirect impacts to individuals could result from increased sedimentation associated with road construction and culvert replacement/installation within the project area. Long-term indirect impacts to individuals could result from incorrect culvert installation/design that does not allow for the passage of aquatic organisms at stream crossings. Short-term and long-term sedimentation and acid runoff can be avoided or minimized through the successful use of BMP's, and required project design criteria included in Chapter 3. It is also possible that long-term indirect impacts associated with the proposed action could be positive, in that the replacement of the blown-out culvert at the Hickory Cove crossing will likely increase stability of the stream channel and banks at that location and may reduce sediment loss at that location during high-flow events. Replacement of other existing, non-functional culverts associated with the proposed action may also prevent similar failures and sediment loss during future high-flow events.

There is a relatively low likelihood of direct impacts to individuals. Negative indirect impacts are possible, but can be avoided or minimized with successful implementation of BMP's and recommendations regarding sediment/erosion control measures and proper treatment/disposition of acidic rock. Positive indirect impacts are also possible, as a major stream crossing in the project area will be stabilized, and non-functional culverts in the project area will be replaced under the proposed action. Due to the low likelihood of direct impacts, and the minimal negative and positive indirect impacts associated with the proposed action, the proposed action is not expected to change the overall forest-wide trend for any of these four species.

Ruffed grouse (*Bonasa umbellus*) utilize a diversity of habitat, varying from early successional vegetation stages to more mature forests with downed wood. Younger mesic to sub-mesic forests with abundant stems, typically 5-15 years of age, provide protection from prey for brood rearing and development plus food throughout the year. Downed woody debris is an important component for ruffed grouse since it relies on it for drumming. The presence and abundance of ruffed grouse is partially dependent on downed woody debris and is analyzed as a MIS for this special habitat across the Nantahala and Pisgah National Forests.

Ruffed grouse are likely to occur within the Laurel Creek area. Special habitats present in the proposed treatment area associated with this species include soft mast-producing species, and downed woody debris. Two soft mast-producing species were present within the proposed treatment area, *Rubus* sp. and *Vitis* sp. A few suitable drumming logs were present in the proposed treatment area. The downed woody debris component within the 0.7 acres to be impacted by the proposed new road alignment may not be fully utilized by ruffed grouse given the lack of nearby younger seral forest. The implementation of the project will result in a permanent decrease in downed woody debris, and a short-term decrease soft mast-producing species within this localized area.

Ruffed grouse populations are considered to be small across the Nantahala and Pisgah National Forests and are declining. Data are collected for the species with annual grouse drumming surveys and harvest data from the NC Wildlife Resources Commission. Due to the limited and localized impacts to soft mast-producing species and downed woody debris, the proposed action is not expected to change the overall population trend for the ruffed grouse on the Forest.

Black bear (*Ursus americanus*) prefers large areas of mixed forest with a thick understory and low levels of human disturbance. During inactive periods, black bears den in hollow logs, an above-ground tree cavity, under a fallen log, or underground, cave-like areas. The black bear is an opportunistic omnivore, feeding on a variety of plants and animals, as well as garbage.

A black bear habitat analysis was completed in 1994 for the Land & Resource Management Plan on the Nantahala and Pisgah National Forests. The objective was to manage for 25 patches, each at least 10,000 acres in size and with less than 0.25 miles per square mile open road density, dispersed forest-wide. Limiting the density of open roads is meant to provide areas free from disturbance of motorized vehicles. Higher open road density increases levels of hunting pressure on black bear and increases the difficulty in enforcing hunting regulations.

The proposed action will result in the loss of 0.7 acres of hard mast-producing habitat within the footprint of the proposed new road alignment. As the proposed action also allows access across the existing and new road alignments within the project area, it will also increase the level of human disturbance within the project area. Since the proposed access is intended to serve a limited number (four) of single-family residences on the LCPOA inholding, traffic levels on this access are expected to be very low. The project is not expected to create significant areas of early successional habitat.

Black bear represents hard mast producing species, and large contiguous areas with low levels of disturbance. The current estimated population trend for black bear is increasing across the Nantahala and Pisgah National Forests. They have increased due to factors other than habitat management, probably due to the benefits of the state black bear sanctuary system. As young bears migrate from these protected areas, they increasingly occupy habitats with little or no hunting pressure, allowing the population to increase further. The proposed project will impact about 0.7 acres of mast producing habitat and will slightly increase the amount of human disturbance within the project area. The impacts associated with the proposed action are not expected to change the forest-wide trend for black bear on the Forest.

Ovenbird (*Seiurus aurocapilla*) nests in older, closed deciduous or mixed forest with deep leaf litter and little understory. Ovenbirds are primarily associated with mature oak-hardwoods with an open understory; however it also nests within cove hardwoods and mature yellow pine-hardwood forest. While the species is considered to be abundant in larger patches and more indicative of interior forest, it can also be located within more fragmented areas of the Nantahala and Pisgah National Forest. The ovenbird was not documented within the project area during field surveys, although adequate habitat was present. The possibility of an ovenbird foraging or nesting in the project area is likely.

Ovenbird populations are declining slightly in some areas of the Nantahala and Pisgah National Forests while slightly increasing in others. The overall population trend forest-wide is a slight decrease. The loss of about 0.7 acre of suitable habitat for this species with implementation of the proposed project is not expected to have a perceptible change on trends for this species or its habitat within the Forest.

Pileated woodpecker (*Dryocopus pileatus*) prefers dense, deciduous forests (in the southeast) with a tall, closed canopy and high basal area. Nests are built in cavities in snags, usually shaded, and typically 16 to 55 feet above the ground. The pileated woodpecker primarily feeds on carpenter ants and beetle larvae by chiseling into trees, stumps, or logs. It will also eat other insects, fruit, and seeds. The pileated woodpecker was chosen as an MIS of large cavity trees and foraging habitat within the older forest community. The BBS trend for the North Carolina pileated woodpecker population indicates a small increase since 1966.

Snags exist throughout the mature forest containing the project area, however few are within close proximity to the existing roadbed or to the footprint of the proposed new road alignment. The proposed action could result in the permanent loss of some snags within the 0.7 acres to be cleared for the new road alignment. Due to the limited extent of this loss compared to the availability of mature forests and snags across the Forest, no change in population trends are anticipated as a result of the proposed action.

3.8.3.2 Effects of Alternatives on Biological Communities and Special Habitats

Alternative A (no action):

Alternative A will not cause changes in trends of biological communities or special habitats on the Forest.

Alternative B:

BIOLOGICAL COMMUNITIES

Rich Cove Forest occurs on moist lower to middle slopes, particularly concave slopes at low to moderate elevations. It can sometimes extend to the top of the ridge on sheltered slopes. It is often characterized by the co-dominance of *Liriodendron tulipifera*, *Tilia americana*, *Acer saccharum*, and *Halesia tetraptera*. *Betula lenta*, *Fagus grandifolia*, *Aesculus flava*, *Acer rubrum*, *Fraxinus americana*, and *Magnolia acuminata* may also be present. *Acer pensylvanicum* and *Ostrya virginiana* are common additions to the understory; the shrub layer is often dominated by *Hydrangea arborescens*. The herb layer in this forest type is typically thick, lush, and is the most diverse of the vegetative communities (Schafale and Weakley 1990). Ginseng is the MIS species associated with rich cove forest.

The proposed new alignment of single-lane road within the project area will eliminate approximately 0.7 acres of forested habitat, containing varying components/features of Rich Cove Forest. Much of the new alignment occurs on the footprint of previous, abandoned logging roads.

Riparian Forests are protected by standards in the Pisgah and Nantahala National Forest Land and Resource Management Plan. These forests, approximately 95,000 acres in extent, currently are static, i.e. they are not expanding or being reduced in extent. As a result there is no reduction in the quantity of habitat and a gradual increase in quality as the forests are aging and developing more characteristics of high-quality riparian forests and only activities that enhance riparian benefits are permitted forest-wide. Acadian flycatcher is the MIS species associated with riparian forest.

No negative impacts to riparian forests are anticipated under the proposed action. Although the current roadbed parallels and crosses several areas of riparian forest community, no additional clearing in these areas will occur. No riparian forest occurs where the proposed new road alignment will be constructed.

There are approximately 5,100 miles of **Coldwater Streams** on the Nantahala and Pisgah National Forests. For cold-water streams, the forest-wide trend is increasing quality, due to improved efforts at erosion control and a reduction in new road construction. Wild brook trout, brown trout, rainbow trout, and blacknose dace are the MIS species associated with coldwater streams.

Implementation of the proposed action will cumulatively impact less than 0.05 mile length of coldwater streams where culverts are replaced or removed. Temporary, negative impacts may occur during culvert replacement/installation. Long-term impacts are not anticipated, as BMP's and project design criteria will likely result in greater stabilization and reduced sediment loss at crossings when compared to the current condition. Neither short-term negative impacts nor long-term positive impacts to coldwater streams are anticipated to change the forest-wide trend for this community.

SPECIAL HABITATS

Six special habitats occur within the activity area: **soft-mast producing species, hard-mast producing species, contiguous areas with low disturbance, large contiguous mature forest, snags and downed woody material**. Four soft-mast producing species were observed within the activity area: *Prunus spp.*, *Smilax spp.*, *Vitis rotundifolia*. and *Rubus spp.* Hard-mast producing species included *Quercus spp.* and *Carya spp.* Downed woody debris on the site included small branches, twigs, and a few large logs. A few small snags were present in the project area. The project area is located on forest lands with low levels of human disturbance. These six special habitats are associated with four MIS species, ruffed grouse, black bear, ovenbird, and pileated woodpecker.

3.8.4 Forest Concern Species

Forest Concern (FC) species are designated by the National Forests of North Carolina, and lie at the periphery of their range or disjunct from their main range. The Nantahala-Pisgah National Forest maintains a list of Forest Concern species on NFS lands; all of these species were originally considered (Section 5.1). The list was filtered by considering only those species listed by the Forest Service as occurring or probably occurring in Clay County, with the exception of terrestrial wildlife. Due to the mobility of terrestrial wildlife, the filtered list also included

species occurring or probably occurring in nearby counties (Cherokee, Graham, Macon, and Swain). A total of 82 species remained after this filter, and included 36 plant species, 37 terrestrial animal species, and 9 aquatic animal species.

The list was then subjected to a second filtering step, eliminating species whose associated natural community type (general habitat), or specialized habitat type *within* a community did not occur within the project area. Examples of natural community types include Rich Cove, Acidic Cove, Montane Oak-Hickory, Northern Hardwood, and High Elevation Red Oak communities. Examples of specialized habitat types include spray cliffs, granitic domes, caves, rock outcrops, talus slopes, bogs, wetlands, spruce-fir forests, etc. Habitat preferences and ranges of these plant and animal species were based on a variety of sources, including the NCNHP database, Forest Service lists, NatureServe© database, personal communication with Forest Service personnel, and other reference materials. Natural community classification followed Schafale and Weakley (1990).

Site visits and pedestrian field surveys of the project area were conducted by Fish and Wildlife Associates, Inc. (FWA) in March 2007, June 2008, June 2009, and March 2010

3.8.4.1 Botanical Forest Concern Species

After removing species that require specialized habitats not present in the project area, the list was further narrowed by eliminating those species with general habitat requirements not found within the proposed project area.

General habitat requirements for 14 of the 36 botanical forest concern species occurring in Clay County occur in the proposed treatment area. Those 14 species are listed in Table 3.8.4.1, including a general habitat description. The NCNHP Virtual Workroom was accessed to determine if any of the 14 botanical species occur within the proposed treatment area. Of these 14 botanical species, none were found or known to occur within the project area, but *Frasera caroliniensis* has been documented within two miles of the project vicinity.

Table 3.8.4.1. Botanical Forest Concern species occurring in Clay County with general habitat requirements within the project area.

| Group | Species | Common Name | Habitat* |
|----------------|-------------------------------------|--------------------|--|
| Vascular Plant | <i>Brachyelytrum septentrionale</i> | Northern shorthusk | Serpentine Forest, Northern Hardwood Forest, Rich Cove Forest |
| Vascular Plant | <i>Calamagrostis porteri</i> | Porter’s reedgrass | Serpentine Woodland, Montane Oak-Hickory Forest |
| Vascular Plant | <i>Carex cherokeeensis</i> | Cherokee sedge | Montane Alluvial Forest, Roadside, Rich Cove Forest |
| Vascular Plant | <i>Carex leptonevia</i> | A wood sedge | Boulderfield Forest, Northern Hardwood Forest, High Elevation Seep, Rich Cove Forest |
| Vascular Plant | <i>Carex oligocarpa</i> | Few-fruited sedge | Rich Cove Forest |
| Vascular Plant | <i>Carex purpurifera</i> | Purple sedge | Rich Cove Forest, Montane Alluvial Forest |

| Group | Species | Common Name | Habitat* |
|----------------|-------------------------------|--------------------------|--|
| Vascular Plant | <i>Carex woodii</i> | Wood's sedge | Northern Hardwood Forest, Rich Cove Forest, Acidic Cove Forest, Mesic Oak-Hickory Forest |
| Vascular Plant | <i>Frasera caroliniensis</i> | Columbo | Rich Cove Forest, Mesic Oak-Hickory Forest |
| Vascular Plant | <i>Helenium breifolium</i> | Littleleaf sneezeweed | Southern Appalachian Bog, Wet Meadow, Seeps, Riverbanks |
| Vascular Plant | <i>Hexalectris spicata</i> | Spiked crested coralroot | Rich Cove Forest, Glade, Mesic Oak-Hickory Forest, Mafic rock |
| Vascular Plant | <i>Liparis loeselii</i> | Yellow widelip orchid | Seep, Roadside |
| Vascular Plant | <i>Pedicularis lanceolata</i> | Swamp Lousewort | Serpentine Woodland, Southern Appalachian Bog, Seep, Swamp, Wet Meadow |
| Vascular Plant | <i>Platanthera peramoena</i> | Purple fringeless orchid | Southern Appalachian Bog, Seep, Marsh |
| Vascular Plant | <i>Smilax hugeri</i> | Huger's carrionflower | Rich Cove Forest, Mesic Oak-Hickory Forest, Mafic Rock |

*Bolded habitat indicates presence in the project area.

There will be no direct, indirect, or cumulative impacts to any botanical forest concern species because none are known to occur, or have been documented, within the project area.

3.8.4.2 Terrestrial Wildlife Forest Concern Species

After filtering by county, 37 Forest Concern species remained for consideration. The list was further narrowed by eliminating those species whose associated natural community type was not present within the project area. Where possible, species whose specialized habitat types (spray cliffs, granitic domes, rock outcrops, talus slopes, spruce-fir forests, etc.) were absent were also eliminated from further consideration. Habitat preferences and ranges of these species were based on a variety of sources, including the NCNHP database, Forest Service lists, NatureServe© database, personal communication with Forest Service personnel, and other reference materials. Natural community classification followed Schafale and Weakley (1990). Four species were not evaluated further in this analysis because the project area did not have the associated natural community type and/or specialized habitat type, or the species is restricted to a well-defined geographical area outside of the project vicinity. The proposed action will therefore have will have no effect or impact on these 4 species. The analysis of potential effects or impacts focused on the 22 remaining species; these species are listed in Table 3.8.4.2 and discussed below.

Table 3.8.4.2. Terrestrial Forest Concern species, habitat, and likelihood of occurrence in the project area.

| Group | Species | Habitat | Likelihood of Occurrence |
|------------------------|--|--|----------------------------------|
| Invertebrate Animal | <i>Appalachina chilhoweensis</i> (queen crater) | under leaf litter and rock piles in rich coves | May occur |
| Invertebrate Animal | <i>Autochton cellus</i> (golden-banded skipper) | moist woods near streams or ponds; nectar -- blackberry, trailing arbutus, hollyhock, and abelia; host -- legumes, mainly hog peanut | May occur |
| Invertebrate Animal | <i>Celastrina nigra</i> (dusky azure) | rich, moist deciduous forests; nectar - wild geranium; host - goat's beard | May occur |
| Invertebrate Animal | <i>Chlosyne gorgone</i> (gorgone checkerspot) | woodland borders and openings; host plants are sunflowers and other tall composites | May occur |
| Invertebrate Animal | <i>Glyphyalinia junaluskana</i> (dark glyph) | moist leaf litter in mixed, mesic woods on mountainsides | May occur |
| Invertebrate Animal | <i>Glyphyalinia pentadelphia</i> (pink glyph) | pockets of moist leaves in rich or acidic cove forests; no actual records | May occur |
| Invertebrate Animal | <i>Haplotrema kendeighi</i> (blue-footed lancetooth) | mountainsides in leaf litter or crawling on the ground in wet weather ; mixed or cove hardwood forests; no actual records | May occur |
| Invertebrate Animal | <i>Helicodiscus fimbriatus</i> (fringed coil) | leaf litter and under rocks on wooded hillsides, crevices in slates; no actual records | May occur |
| Invertebrate Animal | <i>Melanoplus cherokee</i> (Cherokee melanoplus) | woodlands, 1800' - 5100'; no records | May occur |
| Invertebrate Animal | <i>Melanoplus viridipes eurycerus</i> (green-legged Melanoplus) | woodlands and forest edges; no records | May occur |
| Invertebrate Animal | <i>Nesticus species 2</i> | small rocks scattered over n-facing cove forests, southwest-facing talus fields | May occur |
| Invertebrate Animal | <i>Paravitrea lamellidens</i> (lamellate supercoil) | deep moist leaf litter and ravines in acidic cove, rich cove, and montane-oak hickory forests; no actual records | May occur |
| Invertebrate Animal | <i>Paravitrea umbilicaris</i> (open supercoil) | cove forests with rocky slopes | May occur |
| Invertebrate Animal | <i>Patera clarki clarki</i> (dwarf proud globe) | Rich cove forest, high elevation red oak forest, leaf litter on mountainsides; no actual records | May occur |
| Invertebrate Animal | <i>Phyciodes batesii maconensis</i> (tawny crescent) | rocky ridges and woodland openings at higher elevations; host plants - <i>Aster undulatus</i> | Not likely to occur ¹ |
| Invertebrate Animal | <i>Polygonia progné</i> (gray comma) | rich deciduous forests; host plants - mainly gooseberries (<i>Ribes</i>), but also on wild azalea (<i>Rhododendron nudiflorum</i>) | May occur |
| Invertebrate Animal | <i>Zonitoides patuloides</i> (Appalachian gloss) | deep, moist leaf litter on mountainsides or in ravines, beneath bark of logs; no records | May occur |

| Group | Species | Habitat | Likelihood of Occurrence |
|-----------|--|--|----------------------------------|
| Amphibian | <i>Eurycea longicauda longicauda</i> (long-tailed salamander) | streams, seeps, springs in moist woods and floodplains; breeds in streams/ponds | May occur |
| Bird | <i>Dendroica cerulea</i> (cerulean warbler) | mature hardwood forests; steep slopes and coves in mountains | May occur |
| Bird | <i>Sphyrapicus varius appalachiensis</i> (Appalachian yellow-bellied sapsucker) | mature, open hardwoods with scattered dead trees above 3500', breeding season only | May occur |
| Bird | <i>Vermivora pinus</i> (blue-winged warbler) | low elevation (below 3000') brushy fields and thickets, breeding season only | Not likely to occur ¹ |
| Bird | <i>Vireo gilvus</i> (warbling vireo) | open groves of hardwoods along rivers and streams below 3000' | May occur |

¹Species is not likely to occur because potential habitat is not available in the proposed treatment area. This species was not analyzed further.

Forest Concern Land Snails

Environmental Baseline – Seven species of Forest Concern land snails have been recorded on Forest Service lands in one or more of the adjacent counties, but are not known to occur in Clay County. These species are: *Appalachina chilhowensis*, *Glyphyalinia junaluskana*, *Haplotrema kendeighi*, *Helicodiscus fimbriatus*, *Paravitrea lamellidens*, *Paravitrea umbilicaris* and *Zonitoides patuloides*. Preferred habitat for these species varies (Table 3.8.4.2), but typically includes leaf litter in deciduous forests.

Existing Condition

Due to the lack of specific habitat preference information for these species, it is difficult to completely eliminate the possibility of one or more of these species occurring within the project area. However, it is considered unlikely that any of these species are present. Snail surveys have been conducted for other Forest Service projects in similar habitats in Clay County. No rare gastropods were documented during those surveys.

Direct and Indirect Impacts – Due to the low likelihood that this species occurs within or near the proposed treatment area, no direct or indirect impacts as a result of this project are anticipated.

Cumulative Impacts – Due to the lack of direct and indirect impacts, there would be no cumulative impacts as a result of this project.

Golden banded skipper (*Autochton cellus*)

Environmental Baseline –The golden banded skipper has been documented in Cherokee, Graham, Macon, and Swain Counties, but not in Clay County. This species has a high potential to occur in moist woods near streams or ponds. Adults feed on nectar from blackberry, trailing arbutus, hollyhock, and abelia. Hog peanut is the primary host plant for caterpillars (Opler et al. 2006).

Existing Condition

General habitat exists within the proposed treatment area; this habitat includes moist woods and streams. Adult nectar plants and host plants (blackberry and hog-peanut) are also present within the project area.

Direct and Indirect Impacts – Direct impacts to individuals may result from the proposed action, as any individuals present within the project area could be crushed or directly displaced during land clearing activities. Nectar and host plants would be impacted as a result of the proposed action. Due to the tendency of *Rubus sp.* to colonize disturbed areas, it may reestablish itself along portions of roadside within the project area.

Cumulative Impacts – The impacts of past actions such as timber sales could have crushed plants with eggs or caterpillars. These impacts may also result from the proposed action. Blackberry and hog-peanut may recolonize after construction activities, although blackberry is more likely. Due to the small size of the proposed treatment area and the widespread availability of habitat and host/nectar plants across the Forest, cumulative impacts, if any, are expected to be imperceptible.

Dusky azure (*Celastrina nigra*)

Environmental Baseline – The dusky azure has been documented in Clay and Macon Counties. General habitat for this species includes shaded, moist, deciduous woods. Adults are often seen feeding on wild geranium. The caterpillar host plant is goat's beard (Opler et al. 2006).

Existing Condition

General habitat (moist, deciduous woods) does exist within the project area; however, host and nectar plants for this species were not observed within areas to be impacted under the action alternative.

Direct and Indirect Impacts – The dusky azure is not likely to occur in the proposed treatment area, due to the lack of host plants. No direct or indirect impacts are anticipated.

Cumulative Impacts – Due to the lack of direct and indirect impacts, there will be no cumulative impacts as a result of this project.

Gorgone checkerspot (*Chlosyne gorgone*)

Environmental Baseline – This species has been documented in Clay and Macon Counties. General habitat includes woodland openings and borders. This species has a high potential to occur where host plants are present. Host plants include sunflowers, rosinweeds, and other tall composites.

Existing Condition

This species has a high potential to occupy the proposed treatment area; limited openings and borders are present and host plants were observed there.

Direct and Indirect Impacts – Direct impacts to individuals may result from the proposed action, as any individuals present within the project area could be crushed or directly displaced during land clearing activities. Indirect impacts may consist of host plants and general habitat being impacted during land clearing activities.

Cumulative Impacts – The impacts of past actions such as timber sales could have crushed plants with eggs or caterpillars, and could have temporarily impacted habitat. These impacts may also result from the proposed action; however improvement of an existing forest road and construction of new alignment will create/maintain some additional woodland border habitat over the long term. Due to the small size of the proposed treatment area versus the widespread availability of general habitat and host plants across the Forest, cumulative impacts, if any, are expected to be imperceptible.

Pink glyph (*Glyphyalinia pentadelphia*)

Environmental Baseline – This species has been documented in Clay County. General habitat includes Rich Cove and Acidic Cove Forests. Associate species include *Allogona profunda* (broad-banded forest snail), *Halesia sp.* (silverbell), and *Aesculus octandra* (yellow buckeye) (Pilsbry 1946).

Existing Condition

General habitat (Rich Cove and Acidic Cove Forest) occurs within the proposed treatment area.

Available Inventories Information – No targeted snail surveys have been conducted within the project area, although snail surveys have been conducted for other Forest Service projects in Clay County. No rare gastropods were documented during those surveys.

Direct and Indirect Impacts – If present within the project area, direct impacts could occur as individuals could be crushed or directly displaced during land clearing activities. Indirect impacts consist of the permanent loss of approximately 0.7 acres of forested habitat.

Cumulative Impacts – The impacts of past actions such as timber sales could have directly impacted individuals and could have altered or eliminated forested habitat. These impacts may also result from the proposed action. Due to the small size of the project area versus the widespread availability of rich cove habitat across the Forest, cumulative impacts, if any, are expected to be imperceptible.

Cherokee melanoplus (*Melanoplus cherokee*)

Green-legged melanoplus (*Melanoplus viridipes eurycerus*)

Environmental Baseline – Little information is available regarding the distribution, records, and specific habitat requirements of these grasshopper species. General habitat includes woodlands from 1,800 to 5,100 feet in elevation for *Melanoplus cherokee*; general habitat for *Melanoplus viridipes eurycerus* includes woodlands and forest edges.

Existing Condition

The likelihood of occurrence within the project area is unknown due to the lack of information regarding specific habitat requirements for these species. General habitat (woodlands and forest edges) is present within the project area.

Direct and Indirect Impacts – If present, direct impacts to individuals may result from the proposed action, as any individuals present within the project area could be crushed or directly displaced during land clearing activities. Indirect impacts may consist of general habitat being impacted during land clearing activities.

Cumulative Impacts – Past actions such as timber sales could have directly impacted individuals, and could have impacted habitat. These impacts may also result from the proposed action. Due to the small size of the proposed treatment area versus the widespread availability of general habitat across the Forest, cumulative impacts, if any, are expected to be imperceptible.

A *Nesticus* spider (*Nesticus* sp. 2)

Environmental Baseline – This species has only been documented in the Chunky Gal Mountains of Clay County. Only 4 element occurrences exist. Habitat is described as small rocks scattered over north-facing cove forests, and southwest-facing talus fields.

Existing Condition

Habitat (north-facing cove forest) may exist within the project area.

Direct and Indirect Impacts – If present, direct impacts to individuals may result from the proposed action, as any individuals present within the project area could be crushed or directly displaced during land clearing activities. Indirect impacts may consist of the disturbance of small amounts of north-facing cove forest during land clearing activities.

Cumulative Impacts – Past actions such as timber sales could have directly impacted individuals, and could have impacted habitat. These impacts may also result from the proposed action. Due to the small size of the proposed treatment area versus the widespread availability of general habitat across the Forest, cumulative impacts, if any, are expected to be imperceptible.

Dwarf proud globe (*Patera clarki clarki*)

Environmental Baseline – This species has been documented in Clay County and the surrounding counties, but it not known to occur in the vicinity of the project area. General habitat includes Rich Cove, High Elevation Red Oak, and Mesic Mixed Hardwood Forests. This species has a high potential to occur in habitats with the following species present: *Acer pensylvanicum*, *A. saccharum*, *A. rubrum*, and *Aesculus flava* (Pilsbry, 1946).

Existing Condition

The proposed treatment area contains general habitat (Rich Cove, and Mesic Mixed Hardwood Forest) for *Patera clarki clarki*. Associate species were also present within the project area.

Available Inventories Information – No previous surveys have been conducted within the proposed treatment area, although snail surveys have been conducted for other Forest Service projects in Clay County. No rare gastropods were documented during those surveys.

Direct and Indirect Impacts – If present within the project area, direct impacts could occur as individuals could be crushed or directly displaced during land clearing activities. Indirect impacts consist of the permanent loss of approximately 0.7 acres of forested habitat.

Cumulative Impacts – The impacts of past actions such as timber sales could have directly impacted individuals and could have altered or eliminated forested habitat. These impacts may also result from the proposed action. Due to the small size of the project area versus the widespread availability of general habitat across the Forest, cumulative impacts, if any, are expected to be imperceptible.

Gray comma (*Polygona progne*)

Environmental Baseline – This species has been documented in Clay and Swain Counties. General habitat for this species includes rich deciduous or coniferous forest. This species has a high potential to occupy areas along dirt roads, streams, or within clearings. Adults feed on sap, rarely nectar. Host plants for caterpillars include *Ribes sp.* and *Rhododendron nudiflorum* (Opler et al. 2006).

Existing Condition

Habitat for this species is present within the project area. However, no host plants were identified in the area. Adults could use habitats within or near the proposed treatment area. Rich deciduous forest occurs in the proposed treatment area; streams and dirt roads occur near the area. In the absence of host plants, it is unlikely that caterpillars of this species occur within the proposed treatment area.

Direct and Indirect Impacts – If present within the project area, adults could be directly impacted due to crushing or displacement during land clearing activities. Indirect impacts consist of the temporary disturbance of a small amount of edge habitat along the existing roadbed, as well as streamside habitat at stream crossings.

Cumulative Impacts – The impacts of past actions such as timber sales and road improvements could have directly impacted individuals and could have altered or eliminated forested habitat. These impacts may also result from the proposed action. Due to the small size of the proposed treatment area versus the widespread availability of edge, clearing, and roadside habitat through rich deciduous forest across the Forest, cumulative impacts, if any, are expected to be imperceptible.

Long-tailed salamander (*Eurycea longicauda longicauda*)

Environmental Baseline – This species has been documented in Clay, Graham, and Macon Counties. The long-tailed salamander has a high potential to occur along streams, near seepages, or caves. This species will also wander far from water during wet conditions (Conant and Collins 1991, Petranka 1998, and Bartlett and Bartlett 2006).

Existing Condition

The project area contains or crosses habitat (streams, seepages) for this species.

Direct and Indirect Impacts – Direct impacts to individuals may occur during culvert removal/replacement at stream crossings and during other ground-disturbing activities associated with the proposed action. Indirect impacts may also occur as potential habitats for this species will be temporarily impacted during construction activities.

Cumulative Impacts – The impacts of past actions such as timber sales could have crushed individuals. These impacts may also result from the proposed action. Due to the relatively low likelihood that many individuals would be present within the project area during construction activities, cumulative impacts to this species or its habitat are expected to be minimal.

Cerulean warbler (*Dendroica cerulea*)

Environmental Baseline – This species has been documented in Clay, Graham, and Macon Counties. The cerulean warbler has a high potential to occur in mature, deciduous forests, typically with mesic conditions.

Existing Condition

The project area traverses several mature, deciduous forests with mesic conditions. Much of the project area contains habitat for the cerulean warbler. This habitat is located adjacent to the existing roadbed, as well as in the area of the proposed new road alignment.

Direct and Indirect Impacts – Direct impacts to individuals may occur if nests with eggs, hatchlings, or fledglings are present in the area of the new road alignment, as approximately 0.7 acres of currently forested habitat will be disturbed. Indirect impacts would be due to the permanent loss of this 0.7 acres of habitat.

Cumulative Impacts – This project will result in the loss of approximately 0.7 acres of potential habitat in the area of the new road alignment. Due to the small size of the area to be impacted, relative to the availability of mature deciduous habitat across the Forest, cumulative impacts associated with the proposed action are expected to be imperceptible.

Appalachian yellow-bellied sapsucker (*Sphyrapicus varius appalachiensis*)

Environmental Baseline – This species has been documented in Clay and surrounding counties. The Appalachian yellow-bellied sapsucker occurs in deciduous or mixed forest. During the breeding season, it has a high potential to occur in mature, open hardwoods with scattered dead trees, over 3,500 feet in elevation.

Existing Condition

The northern portion of the project area contains mature, hardwood forest above 3,500 feet in elevation. This habitat is largely limited to the area of proposed new road alignment.

Direct and Indirect Impacts – Direct impacts to individuals may occur if nests with eggs, hatchlings, or fledglings are present in the area of the new road alignment, as approximately 0.7 acres of currently forested habitat will be disturbed. Indirect impacts would be due to the permanent loss of this 0.7 acres of habitat.

Cumulative Impacts – Due to the small size of the area to be impacted, relative to the availability of mature hardwoods and snags across the Forest, cumulative impacts associated with the proposed action are expected to be imperceptible.

Warbling vireo (*Vireo gilvus*)

Environmental Baseline – This species has been documented in Macon County, but not Clay County. During the breeding season, it occurs in open deciduous or mixed woodlands, typically along rivers or streams, below 3,000 feet in elevation.

Existing Condition

Habitat for this species is located in the southern portion of the project area, where the existing roadbed is located below 3,000 in elevation and runs along Hickory Cove Creek.

Direct and Indirect Impacts – *Vireo gilvus* is not likely to occur within the portions of the project area where land clearing activities are scheduled to occur. The portion of the project area including habitat for this species will be subject to construction within the footprint of the existing roadbed and will not result in the clearing of additional forested acreage. No direct or indirect impacts are anticipated as a result of the proposed action.

Cumulative Impacts – Due to the small size of the area to be impacted, relative to the availability of mature hardwoods and snags across the Forest, cumulative impacts associated with the proposed action are expected to be imperceptible.

3.8.4.3 Aquatic Forest Concern Species

Nine aquatic Forest Concern Species are known to occur in Nantahala/Pisgah National Forest and Clay County. All nine species are listed below in Table 3.8.4.3 with a general habitat description.

Table 3.8.4.3. Aquatic Forest Concern species known to occur in Clay County on Nantahala/Pisgah National Forest and their likelihood of occurrence in the project area or downstream of project area.

| Group | Species | Habitat | Likelihood of Occurrence |
|-----------|-------------------------------------|---|--------------------------|
| Amphibian | <i>Cryptobranchus alleganiensis</i> | large, clear, fast-flowing streams | Occurs downstream |
| Caddisfly | <i>Micrasema burksi</i> | known from 11 streams in the mountains of NC from Avery County to Clay County | May occur |
| Caddisfly | <i>Rhyacophila amicus</i> | specific information unknown | May occur |
| Dragonfly | <i>Somatochlora elongata</i> | specific information unknown | May occur |
| Fish | <i>Erimystax insignis</i> | primarily French Broad River drainage | May occur |

| Group | Species | Habitat | Likelihood of Occurrence |
|--------|-----------------------------|---|--------------------------|
| Fish | <i>Moxostoma species 1</i> | Little Tennessee and Hiwassee River drainages | May occur downstream |
| Mayfly | <i>Baetopus trishae</i> | Specific information unknown | May occur |
| Mayfly | <i>Habrophleidiodes spp</i> | Specific information unknown | May occur |
| Mussel | <i>Villosa iris</i> | Hiwassee and Little Tennessee River drainages, formerly French Broad River drainage | May occur downstream |

The Forest Concern species listed in Table 3.8.4.3 were included in the effects analysis due to the possibility of their occurrence within the project area or within a reasonable distance downstream.

Direct and Indirect, and Cumulative Impacts –There may be a temporary increase in sedimentation during construction activities, particularly associated with culvert installation/replacement and new road alignment construction. However, these effects should be minimal with proper installation of erosion control measures. Fish would be able to avoid any areas of increased turbidity if it occurs. Individuals of less mobile species, like aquatic insects, could be directly and indirectly impacted if sedimentation occurs. Given the project design criteria, recommendations, and successful BMP implementation, this project would have little effects to the aquatic resources.

If individuals of these Forest Concern species were present, the proposed action could impact individuals but is not likely to cause a trend to federal listing or a loss of viability of these species. This project may impact individuals of the nine Forest Concern aquatic species. Habitats for these species are common across their ranges. There may be effects to some individuals of the species or minor portions of habitat. Cumulative effects, if any, on species viability across the Forest would be negligible.

3.9 Climate Change

Existing Condition, and How Climate Change Affects Analysis Area Resources

The existing condition is an analysis area that is typical of the southern Appalachians, with a range of elevations from approximately 2,800 feet to 3,800 feet. Climate change models are continuing to be developed and refined, but the two principal models found to best simulate future climate-changed conditions for the various regions across the country are the Hadley Centre model and the Canadian Climate Centre model (Climate Change Impacts on the United States 2001). Both models indicate warming in the southern region of the United States. However, the models differ considerably. One predicts little change in precipitation until 2030, followed by much drier conditions over the next 70 years. The other predicts a slight decrease in precipitation during the next 30 years, followed by increased precipitation.

Either of these climate scenarios with their attendant changes could affect forest productivity, forest pest activity, vegetation types, major weather disturbances (droughts, hurricanes), and streamflow. These effects would likely be seen across the entire national forest system in the United States. In the southern Appalachians, it is possible that in the long run, a warmer climate will result in certain species' (cold-adapted ones such as northern hardwoods) ranges moving northward. In turn, species that currently have a more southerly range might start appearing here. In general, concerning both vegetation and wildlife, species that are generalists and can tolerate a wider range of habitat conditions will probably fare better than those with a set of narrow habitat requirements and conditions.

Project Effects on Climate Change

Scope of Analysis

The scope of this analysis for direct, indirect, and cumulative effects on climate change includes the national forest lands affected by the proposed easement. The time frame used in this analysis is up to ten years after completion of the project activities.

Direct and Indirect Effects

Alternative A - Alternative A (No Action) would result in no change to the current trend for carbon storage or release. Forested stands are expected to be less resilient to possible climate change impacts, such as changes in productivity or insect and disease.

Alternative B - The action alternative would not substantially alter the effects of climate change in the project area. The action alternative would remove biomass as a result of road construction and directly affect an area of 0.7 acres through road construction activities permitted by the easement. This would reduce the amount of carbon stored in the area affected by the road prism.

The impacts of the action alternative on global carbon sequestration and atmospheric concentrations of CO₂ are miniscule. However, the forests of the United States significantly reduce atmospheric concentrations of CO₂ resulting from fossil fuel emissions. The forest and wood products of the United States currently sequester approximately 200 teragrams (200 teragrams, or Tg, equals 196,841,306 US tons) of carbon per year (Heath and Smith, 2004). This rate of carbon sequestration offsets approximately 10% of CO₂ emissions from burning fossil fuels (Birdsey et al., 2006). U.S. Forests currently contain 66,600 teragrams of carbon. The long-term reduction in carbon stocks and sequestration rates resulting from the proposed project are imperceptibly small on global and national scales. The currently large carbon sink in US forests is a result of past land use changes, including the re-growth of forests on large areas of the eastern U.S. harvest in the 19th century, and 20th century fire suppression in the western U.S. (Birdsey et al. 2006). The continuation of this large carbon sink is uncertain because some of the processes promoting the current sink are likely to decline and projected increases in disturbance rates such as fire and large-scale insect mortality may release a significant fraction of existing carbon stocks (Pacala et al. 2008; Canadell et al. 2007). Management actions –such as those proposed – that improve the resilience of forest to climate-induced increases in frequency, and

utilize harvested trees for long-lived forest products and renewable energy sources may help sustain the current strength of the carbon sink in US forests (Birdsey et al. 2007).

Cumulative Effects to Climate Change

For the action alternative, the contribution of the proposed project activities to the carbon cycle is extremely small, with direct effects and indirect effects to climate and microclimate on fewer than 5 acres.

When combined, the carbon from this and past projects in the analysis area has a minimal cumulative effect not only at the local level, but at the larger level. When implemented, the rate of carbon release would be minimal for the reasonably foreseeable future.

Chapter 4 – Consultation and Coordination

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Erik Crews – Landscape Architect, National Forests in North Carolina (NFsNC)
Brady N. Dodd – Hydrologist, NFsNC
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Raymond M. Johns II – Lands & Minerals Program Manager (Retired), NFsNC
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Leslie Bilbrey – Project Biologist/Wildlife Specialist, Fish and Wildlife Associates, Inc. (contractor)

5.0 Appendices

5.1 General Guidelines for Road Construction

Single Lane Roads with Turnouts – Five Homes or Less

1. The road should have a minimum width of 13 feet (including shoulders) plus curve widening.
2. Inter-visible passing areas are to be included (maximum distance between passing area shall be 700 feet).
3. Cut slopes should not exceed a maximum of $\frac{3}{4}$ to 1 depending on the type and formation of rock and/or soil.
4. Fill slopes may be placed on the natural repose of the soil. Engineered fills shall be designed based on the material being utilized considering the location and other site factors.
5. Portions of road with grades eight percent or less may be out-sloped to drain utilizing broad based dips.
6. Roads with grades greater than eight percent shall be ditched (minimum one side) with cross drains.
7. Sustained grades shall not exceed 12 % with short pitches (<150 feet) not to exceed 20%.
8. Cross drain culverts shall be a minimum of 24 inches in diameter and of sufficient length to assure disposal of water on natural ground outside fill slope toe.
9. Culverts utilized to carry stream flows must be designed according to standard engineering practices to assure passage of a 50 year flow event.
10. Cleared material may be windrowed at the toe of the fill. It shall be limbed and compacted to form a row that does not extend in height greater than the elevation of the sub-grade.
11. Clearing limits shall be from five feet above the top of the cut to the toe of the fill. If windrow is placed, additional clearing is required to accept the material.
12. Construction season shall be April 1st – September 30th. Seeding activities must be completed by September 30th.
13. No disturbed area outside the travel way may be left without seeding and mulching for more than 15 days.
14. Disturbed or newly constructed slopes within 25 feet of stream courses shall be immediately protected by seeding with 10 lbs/ac of annual ryegrass and 20 lbs/ac of fungus free tall fescue and covered with straw mulch and small limbs the same day as the disturbance (whether completed or not).
15. Silt traps (small retention ponds) must be considered and if warranted, must be constructed and maintained until turf is established.
16. Surfacing shall be included to meet the intended use of the road.
17. An erosion control permit, approved by the state, will be required if the total disturbed area in one acre or larger.

Note: In addition, please ensure the design satisfies the requirements of the Forest Service Handbook (FSH 7709.55-7709.57) available at http://www.fs.fed.us/im/directives/dughtml/fsh_7000.html, and the Standard Specifications for Construction of Roads and Bridges on Federal Highway Projects (FP-03) available at <http://flh.fhwa.dot.gov/resources/pse/specs/fp-03/fp-03usc.pdf> as supplemented by the

National Forests in North Carolina. Other or more stringent requirements (including long term seeding) may be identified in the Environmental Analysis.

In the event of any conflict between any of the preceding printed clauses and the Forest Service Handbook, the handbook direction shall control.

5.2 Biological Evaluation

Biological Evaluation

for the

Laurel Creek Property Owners Association Access Project

Nantahala National Forest
Tusquitee Ranger District
Clay County
North Carolina

PROPOSED ACTION

The Nantahala National Forest is proposing to grant legal access through an easement to a private inholding near the town of Hayesville in Clay County, North Carolina. This inholding is a parcel of privately owned land which is completely surrounded by National Forest land. If the decision is made to grant this access, the landowners will use the easement to reconstruct two Forest Service roads and construct 1,766 feet of new road across the Nantahala National Forest to their privately owned inholding.

1 BOUNDS OF ANALYSIS

1.1 BOTANICAL RESOURCES BOUNDS OF ANALYSIS

Due to the immobility of botanical resources, only species occurring within the project area were considered in the analysis. Only species present would sustain direct impacts as a result of Alternative B; no impacts are anticipated as a result of Alternative A. Any direct effects due to the implementation of Alternative B are expected to be permanent, as the proposed access could be maintained indefinitely.

Existing Condition

The project area includes elevations from 2800 to 3800 feet, and traverses Rich Cove, Acidic Cove, and Montane Oak-Hickory forest types. A variety of plant species occur within the project area, including *Houstonia purpurea*, *Tradescantia sp.*, *Potentilla canadensis*, *Tiarella cordifolia*, *Urtica dioica*, *Impatiens sp.*, *Dichanthelium sp.*, *Oxalis sp.*, *Lysimachia quadrifolia*, *Agrimonia ssp.*, *Maianthemum racemosa*, *Microstegium vimineum*, *Packera aurea*, *Rubus ssp.*, *Hydrangea arborescens*, *Polystichum acrostichoides*, and *Thelypteris noveboracensis*. Other species present in lesser abundance are *Trillium rugelii*, *Thalictrum pubescens*, *Cypripedium acaule*, *Hepatica sp.*, *Diphysastrum digitatum*, *Aster sp.*, *Adiantum pedatum*, *Thelypteris hexagonoptera*, and *Hypoxis hirsuta*.

1.2 TERRESTRIAL WILDLIFE BOUNDS OF ANALYSIS

Without conducting full surveys for terrestrial species, it is difficult to determine the presence or absence of many wildlife species. As a result, analysis of effects or impacts on terrestrial

wildlife is based on 1) whether the species under consideration is known to occur within or near the project area, and 2) presence or absence of suitable habitat within the project area. When applicable, adjacent habitat is also considered when evaluating the potential of wildlife use in the project area.

Existing Condition

Based on observed community types within the project area (see Section 3.1.1), a variety of terrestrial wildlife are likely to utilize habitat in the project area and project vicinity, including birds, mammals, reptiles, amphibians, and terrestrial invertebrates. The project area contains mature deciduous forests, forested riparian areas of headwater streams and higher order streams, as well as rich, moist, forested areas. These particular habitats are associated with several terrestrial TES species; these species, their associated habitats, and their likelihood of occurrence are discussed in Section 3.2.2. During field surveys, evidence and/or sightings of the following common terrestrial wildlife species were documented: *Sus scrofa*, small mammals (unidentified rodent tracks), *Canis latrans*, *Lynx rufus*, *Odocoileus virginianus*, *Procyon lotor*, *Sciurus carolinensis*, *Meleagris gallopavo*, *Bonasa umbellus*, *Helmitheros vermivorus*, *Mniotilta varia*, *Dryocopus pileatus*, *Catharus guttatus*, *Junco hyemalis*, *Eurycea bislineata*, *Desmognathus quadramaculatus*, and *Thamnophis sirtalis*.

1.3 AQUATIC RESOURCES BOUNDS OF ANALYSIS

Species occurring in streams within the project area, as well as those likely to be affected or impacted downstream of the project area were considered in the analysis. Only species present would sustain direct impacts as a result of Alternative B; no impacts are anticipated as a result of Alternative A. Any direct or indirect effects due to the implementation of Alternative B could be temporary and/or permanent, depending on the nature of the impact. In the context of Alternative B, examples of temporary impacts include displacement and habitat alteration during construction of stream crossings; examples of permanent impacts include barriers to aquatic passage and possible chronic sediment loss.

Existing Condition

Laurel Creek and Hickory Cove Creek are both classified by the North Carolina Department of Environment and Natural Resources' Division of Water Quality (DWQ) as waters protected as a water supply, for natural trout propagation and survival of stocked trout, and as Outstanding Resource Waters (ORW). These classifications as well as the stream's designated uses are to be protected. Stream channels in the Laurel Creek drainage are characterized by a B3 stream type as defined by the Rosgen Stream Classification system. Stream channels are stable without excessive scour or deposition. This stream type has a "low" sensitivity to disturbance and to increases in sediment supply (Rosgen 1996).

Thirteen jurisdictional streams (11 perennial and two intermittent) and one small, poorly-developed wetland are located within the project corridor. A portion of these streams were located within some part of the project corridor; however, not all of the streams will be impacted under Alternative B. Culverts are currently present at four perennial stream crossings; all four of these culverts are either plugged or eroding. Seven additional perennial streams are crossed by the existing roadbed crossings. With the exception of Hickory Cove Creek, these perennial streams typically begin on the cut slope of the existing road as a spring. The streams then flow

down the existing roadbed as sheet flow and eventually off of the road into a stream channel or became subsurface. The two intermittent streams have similar channel characteristics as most of the small perennial streams described above (i.e. flowing down existing roadbed).

Project Design criteria to Avoid Sedimentation Impacts

Under Alternative B (proposed action), improvements to the existing road and construction of the new road alignment would be subject to the following requirements to reduce the risk of sediment loss:

1.) Implement National Forests in North Carolina (NFsNC) road Best Management Practices (BMPs) to reduce the risk of sediment moving to adjacent stream channels. These BMPs include features such as: frequent rolling dips to drain the road surface, gravel on the road surface, and the installation of a slash filter windrow along the entire length of road work.

*The implementation of the NFsNC road reconstruction and construction BMPs have proven to be 97 percent effective at controlling sediment from roads (NFsNC 2009 BMP Monitoring).

2.) Culvert replacement/installation will be designed to provide passage for aquatic organisms and reduce the risk of road failure during flood events.

Project Design criteria to Avoid Acid Runoff Impacts

Under Alternative B (proposed action), improvements to the existing road and construction of the new road alignment would be subject to the following requirements to reduce the risk of acid runoff from acid-bearing rock. A majority of the following requirements have been adopted from the December 14, 2007 Memorandum issued by the North Carolina DWQ, *Assessing and Controlling Acid Rock Drainage on Projects Requiring Section 401 Water Quality Certification*.

1.If less than 50 cubic yards of fresh acidic rock material will be removed by excavation or blasting on the entire project, then no further action is required. However, no amount of fresh acidic rock shall be placed in contact with surface waters or groundwater.

2.If more than 50 cubic yards of fresh, un-weathered acidic rock from the project site needs to be removed, then rock samples must be collected from each excavation or blasting location. The samples may be collected from outcrops, exposed surfaces, geotechnical drilling, or drilling from blasting. Outcrop samples should be palm sized. If a drill rig is used, drilling samples should consist of a 2-length of rock core ore 6 to 8 ounces of rock dust. The specific location of each sample shall be recorded.

3.The samples will be tested for Acid Potential and Neutralization Potential and the results reported as Net Neutralization Potential (Neutralization Potential minus Acid Potential). All samples must be analyzed by a testing laboratory appropriately certified by a nationally recognized certifying organization. Areas of acid rock with sample values of Net Neutralization Potential (NNP) between 0 and -10 do not require treatment. If the cumulative total of excavated and/or blasted acid rock for an entire project is less than 1,000 cubic yards and all samples have NNP values between 0 and -10, then no treatment is necessary and no further action is required. The acid rock material shall not be placed in any surface waters or wetlands nor be allowed to come into contact with groundwater.

4.If the cumulative total of excavated or blasted acid rock is greater than 1,000 cubic yards, or if all sample values of NNP are between -10 and -20 for volumes greater than 50 cubic yards, then the acid rock must be placed in a designated waste area located in a dry, stable upland area of the project. This waste area must be designated to ensure that no flowing surface water or any

ground water comes into contact with the acid rock. Any runoff from a fresh cut surface in acid rock must be neutralized.

5. Where more than 50 cubic yards of acid rock are excavated or blasted, and samples have values of NNP greater than -20, the rock shall be placed in a designated waste area as described in requirement #4. It shall also be treated by mixing with crushed limestone aggregate having a calcium carbonate (CaCO₃) equivalent of 90%. For each 1,000 tons of acid rock, the amount of limestone aggregate required equals 1 ton multiplied by the absolute value of the NNP. The acid rock shall be treated by placing four inches of crushed limestone at the base of the acid rock and then adding a four-inch layer of crushed limestone to every three-foot lift of acid rock.

6. If acid material is to be used on the fill portion of a cut and fill road I would recommend this material not be used since it is known that this type of rock is prone to slope failure. If there is no other source of material for the road construction then it is recommended that the fill portion of the road be constructed in compacted lifts treated with lime and limestone or encapsulating the acid material in lime and limestone. Both of these methods neutralize the acid runoff and improve the stability of the road.

1.2 SPECIES EVALUATED AND POTENTIAL EFFECTS OR IMPACTS

The Nantahala-Pisgah National Forest maintains a list of Threatened, Endangered, and Forest Sensitive (TES) species on NFS lands; all of these species were originally considered. The list was first filtered by considering only those species listed by the North Carolina Natural Heritage Program (NCNHP) or the United States Fish and Wildlife Service (USFWS) as occurring or probably occurring in Clay County, with the exception of terrestrial wildlife. Due to the mobility of terrestrial wildlife, the filtered list also included species occurring or probably occurring in adjacent counties (Cherokee, Graham, Macon, and Swain). A total of 52 species remained after this initial step, and included 21 plant species, 30 terrestrial animal species, and 1 aquatic animal species. A list of the 52 species, including a brief habitat description, is provided in Appendix I.

The list was then subjected to a second filtering step, eliminating species whose associated natural community type (general habitat), or specialized habitat type *within* a community did not occur within the project area. Examples of natural community types include Rich Cove, Acidic Cove, Montane Oak-Hickory, Northern Hardwood, and High Elevation Red Oak communities. Examples of specialized habitat types include spray cliffs, granitic domes, caves, rock outcrops, talus slopes, bogs, wetlands, spruce-fir forests, etc. Habitat preferences and ranges of these plant and animal species were based on a variety of sources, including the NCNHP database, Forest Service lists, NatureServe© database, personal communication with Forest Service personnel, and other reference materials. Natural community classification followed Schafale and Weakley (1990).

The NCNHP database was also queried for TES element occurrences at two spatial scales. The first query included TES element occurrences within the project area, whereas the second query included TES element occurrences within two miles of the project area. Results of NCNHP database queries are discussed for each species group in Sections 3.2.1, 3.2.2, and 3.3.3 below.

Site visits and pedestrian field surveys of the project area were conducted by Fish and Wildlife Associates, Inc. (FWA) in March 2007, June 2008, June 2009, and March 2010.

2.1 BOTANICAL THREATENED, ENDANGERED, AND SENSITIVE SPECIES EVALUATED

After filtering by county (as described in Section 3.2 above), 1 Endangered and 20 Forest Sensitive botanical species remained for consideration (see *Table 1*). The list was narrowed further by eliminating those species whose associated natural community type was not present within the project area. Where possible, specialized habitat types (spray cliffs, granitic domes, rock outcrops, talus slopes, spruce-fir forests, etc.) were also used to narrow the list. Habitat preferences and geographic ranges were based on a variety of sources, including the NCNHP database, Forest Service lists, NatureServe© database, personal communication with Forest Service personnel, and other reference materials. As noted in *Table 1*, 10 species were not evaluated further in this analysis due to a lack of habitat within the project area. The analysis evaluates the 11 remaining species; background information and potential effects/impacts to these species are discussed below. Although Southern Nodding Trillium (*Trillium rugelii*) was initially eliminated from consideration because it had not previously been documented in Clay County, this species was observed within the project area during a June 2008 field survey. As a result, an analysis of impacts to this Forest Sensitive species is included below.

The NCNHP database was queried for TES element occurrences at two spatial scales. The first query included TES element occurrences within the project area, whereas the second query included TES element occurrences within two miles of the project area. None of the 10 remaining botanical species are known to occur within the project area; *Megaceros aenigmaticus* and *Monotropsis odorata* have been documented within two miles of the project area.

Botanical field surveys of the project area were conducted by Fish and Wildlife Associates, Inc. (FWA) in March 2007, June 2008, and June 2009.

Table 1. Rare botanical species considered in the analysis.

| Group | Designation | Scientific Name | Common Name | Associated Natural Community Type or Specialized Habitat Type | Analyzed Further/Evaluation Criteria* |
|----------------|-------------|-------------------------------------|---------------------|---|---------------------------------------|
| Vascular plant | Endangered | <i>Sarracenia oreophila</i> | Green Pitcher Plant | Low Elevation Southern Appalachian Bog | No/1 |
| Vascular plant | Sensitive | <i>Carex misera</i> | Miserable Sedge | High Elevation Rocky Summit, Montane Acidic Cliff, High Elevation Granitic Dome | No/1 |
| Liverwort | Sensitive | <i>Drepanolejeunea appalachiana</i> | A Liverwort | Acidic Cove, Montane Oak-Hickory, Serpentine Woodland, Serpentine Forest | Yes |
| Vascular plant | Sensitive | <i>Euphorbia purpurea</i> | Glade Spurge | Northern Hardwood Forest, Rich Cove Forest, Mesic Oak-Hickory | Yes |
| Vascular plant | Sensitive | <i>Helianthus glaucophyllus</i> | Whiteleaf Sunflower | Rich Cove Forest, Northern Hardwood Forest, High Elevation Red Oak Forest, Mesic Oak-Hickory Forest, Roadside | Yes |
| Vascular plant | Sensitive | <i>Juglans cinerea</i> | Butternut | Rich Cove Forest, Mesic Oak-Hickory Forest, Montane Alluvial Forest | Yes |
| Vascular plant | Sensitive | <i>Juncus caesariensis</i> | Rough Rush | Low elevation Southern Appalachian Bog | No/1 |
| Hornwort | Sensitive | <i>Megaceros aenigmaticus</i> | A Hornwort | On rocks in streams | Yes/2 |
| Vascular plant | Sensitive | <i>Monotropsis odorata</i> | Sweet Pinesap | Rich Cove Forest, Mesic Oak-Hickory Forest, Xeric Oak-Hickory Forest, Pine-Oak/Heath Forest | Yes/2 |
| Lichen | Sensitive | <i>Peltigera venosa</i> | An Aquatic Lichen | Bare, moist soil on stream and road banks | Yes |
| Liverwort | Sensitive | <i>Plagiochila caduciloba</i> | A Liverwort | Spray Cliff, Rock Outcrop in Acidic Cove Forest in Gorge | No/1 |
| Liverwort | Sensitive | <i>Plagiochila sharpii</i> | A Liverwort | High Elevation Rocky Summit, Rock Outcrop in Acidic Cove Forest in Gorge | No/1 |
| Liverwort | Sensitive | <i>Plagiochila sullivanii</i> | Sullivant's Leafy | Spray Cliff, Spruce-Fir Forest | No/1 |

| | | | | | |
|----------------|-----------|--|---------------------------|---|------|
| | | var. <i>sullivantii</i> | Liverwort | | |
| Vascular plant | Sensitive | <i>Prenanthes roanensis</i> | Roan Rattlesnakeroot | Northern Hardwood Forest, Grassy Bald, Meadow, High Elevation Roadside, High Elevation Red Oak Forest | No/1 |
| Liverwort | Sensitive | <i>Radula sullivantii</i> | A Liverwort | Spray Cliff, Rock Outcrop in Acidic Cove Forest in Gorge | No/1 |
| Vascular plant | Sensitive | <i>Sceptridium jenmanii</i> | Alabama Grape Fern | Rich Cove Forest | Yes |
| Vascular plant | Sensitive | <i>Thalictrum macrostylum</i> | Small-leaved Meadowrue | Serpentine Woodland, Serpentine Forest | No/1 |
| Vascular plant | Sensitive | <i>Trillium pusillum</i> var. <i>ozarkanum</i> | Alabama Least Trillium | Rich Cove Forest, Mesic Oak-Hickory Forest, associated with mafic rock | Yes |
| Vascular plant | Sensitive | <i>Trillium rugelii</i> | Southern Nodding Trillium | Rich Cove Forest (low elevation) | Yes |
| Vascular plant | Sensitive | <i>Tsuga caroliniana</i> | Carolina Hemlock | Carolina Hemlock Forest, Montane Acidic Cliff, Pine-Oak/Heath, High Elevation Rocky Summit | No/1 |
| Vascular plant | Sensitive | <i>Viola appalachiensis</i> | Appalachian Violet | Serpentine Woodland, Serpentine Forest, Rich Cove Forest, Mesic Oak-Hickory | Yes |

*1 Based on available habitat descriptions for this species, no habitat is present within the project area; no habitat for this species will be impacted by the proposed action.

*2 NCNHP database indicates that this species has been recorded within 2 miles of the project area (however, no records for this species exist within the project area).

A Liverwort (*Drepanolejeunea appalachiana*)

Environmental Baseline – General habitat for this species includes Acidic Cove Forest, Montane Oak-Hickory Forest, and Serpentine Forest. This species is most likely to occur in gorges and near flowing water. In gorges it typically occurs on the bark and twigs of *Kalmia latifolia*, *Rhododendron sp.*, *Ilex opaca*, and less often on a variety of other species. This species has a low potential to occur outside of gorges. When it does occur outside of gorges, it occurs on the bark of *Betula sp.* and *Tsuga canadensis* near the borders of cascading streams (Natureserve 2009).

This species was not observed during FWA’s surveys of the project area. The NCNHP database indicates no records for *Drepanolejeunea appalachiana* in the project area, nor within two miles of the project area. Limited potential habitat was observed within the project area, where *Betula sp.* and *Tsuga canadensis* occurs along streams.

Direct and Indirect Impacts – This species is not present within the project area; no direct impacts are anticipated. Limited potential habitat was observed within the project area. No additional clearing of trees along the existing roadbed is anticipated; some clearing will be necessary along the new alignment, which will eliminate a small amount of potential habitat at stream crossings. Indirect impacts are limited to the loss of a small amount of potential habitat where the new portion of the road alignment will cross streams.

Cumulative Impacts – Cumulative impacts will consist of loss of a limited amount of potential habitat along the project area. Due to the small amount of potential habitat to be impacted, versus the much larger amount of potential habitat across the Forest, no measurable cumulative impacts are anticipated.

Determination of Effect – This project will have no impacts on the viability of this species.

Glade spurge (*Euphorbia purpurea*)

Environmental Baseline – Associated natural community type for glade spurge includes Rich Cove Forest, Northern Hardwood Forest, and Mesic Oak-Hickory Forest. Glade spurge has a high potential to occupy the following habitats: saturated (but not flooded) areas, including seeps and wetlands (Natureserve, 2009). It also occurs in rich, moist, forests on bottomlands or slopes, near rock outcrops, especially over calcareous or mafic rock (Weakley, 2008).

This species was not observed during FWA’s surveys of the project area. The NCNHP database indicates no records for this species in the project area, nor within two miles of the project area. Potential habitat for this species appears to be present at a few places within the project area, where headwater seepage habitats are present in rich, forested areas.

Whiteleaf sunflower (*Helianthus glaucophyllus*)

Environmental Baseline – Associated natural community type for whiteleaf sunflower includes Rich Cove Forest, Northern Hardwood Forest, High Elevation Red Oak Forest, Mesic Oak-Hickory Forest, and roadsides. This species has a high potential to occur in moist forests or woodland edges at mid-elevations, 3,200 to 4,900 feet. This species has a lower potential to occur at elevations below 3,200 feet (Weakley, 2008).

This species was not observed during FWA’s surveys of the project area. The NCNHP database indicates no records for this species in the project area, nor within two miles of the project area. Potential habitat for this species does exist within the project area, in the form of Rich Cove and Montane Oak-Hickory forests and edges above 3,200 feet in elevation.

Butternut (*Juglans cinerea*)

Environmental Baseline – Associated natural community type for butternut includes Rich Cove Forest, Mesic-Oak Hickory Forest, and Montane Alluvial Forest. This species has a high potential to occur in moist, nutrient-rich forests (Weakley 2008). It also occurs on ravines, lower slopes, bottomlands, floodplains, and banks or terraces of streams (Natureserve 2009).

This species was not observed during FWA’s surveys of the project area. The NCNHP database indicates no records for this species in the project area, nor within two miles of the project area. Potential habitat for this species may exist within the project area, as the proposed access road passes through Rich Cove and Montane Oak-Hickory forest types. However, impacts to these habitats will be limited to the removal of trees on the 1,766 feet of new alignment at the end of the proposed project.

A hornwort (*Megaceros aenigmaticus*)

Environmental Baseline – This hornwort occurs on shaded rocks in small streams, springs, or spray zones of waterfalls. Streams are typically clear, cool streams in mixed hardwood forests.

The NCNHP database and Forest Service records indicate that this species is known to occur in Rockhouse Creek, within two miles of the project vicinity. FWA personnel placed particular emphasis on this species at proposed stream crossing locations during field survey efforts.

Megaceros aenigmaticus was not documented during these surveys.

Direct and Indirect Impacts – Potential habitat for this species exists within the project area; however, this species was not present at proposed crossing locations and will not sustain direct impacts. Indirect impacts may occur in the form of localized habitat loss and/or disturbance where culverts are placed at stream crossings along the existing roadbed and new alignment.

Cumulative Impacts – Cumulative impacts will consist of loss of a limited amount of potential habitat at stream crossings along the project area. Due to the small amount of potential habitat to be impacted, versus the amount of potential habitat across the Forest, no measurable cumulative impacts are anticipated.

Determination of Effect – This project **may impact individuals** but is not likely to cause a trend to federal listing or loss of viability of the species across the Forest.

Sweet pinesap (*Monotropsis odorata*)

Environmental Baseline – Sweet pinesap occurs in dry to mesic upland slopes under oaks and pines. It has a high potential to occur on slopes or bluffs with an abundance of heaths, especially *Rhododendron maximum*.

This species has potential habitat within the project area, particularly under pines in Montane Oak-Hickory Forest. In addition, this species has been documented within two miles of the project vicinity. Because sweet pinesap can best be detected during the flowering period, FWA personnel conducted a targeted survey for sweet pinesap in March 2007. FWA conducted intensive searches by sight and smell in high potential habitats along the project area.

Monotropsis odorata was not documented during these surveys.

An aquatic lichen (*Peltigera venosa*)

Environmental Baseline – *Peltigera venosa* occurs along the banks of streams or roadbanks on bare soils in moist, shaded, small crevices (Brodo et al. 2001).

This species was not documented by surveys conducted by FWA personnel. The NCNHP database indicates no records for this species in the project area, nor within two miles of the project area. Potential habitat for this species does exist within the project area, in the form of moist soil on streambanks and road banks.

Direct and Indirect Impacts – Potential habitat for this species exists within the project area; however, this species is not known to occur within the project area. No direct impacts are anticipated. Indirect impacts may occur in the form of localized habitat loss and/or disturbance where road shoulders are graded and where new culverts are placed at stream crossings along the existing roadbed and new alignment.

Cumulative Impacts – Cumulative impacts will consist of loss or disturbance of a limited amount of potential habitat along the project area. Due to the small amount of potential habitat to be impacted, versus the amount of potential habitat across the Forest, no measurable cumulative impacts are anticipated.

Determination of Effect – This project **may impact individuals** but is not likely to cause a trend to federal listing or loss of viability of the species across the Forest..

Alabama grape fern (*Sceptridium jenmanii*)

Environmental Baseline – Associated natural community type for *Sceptridium jenmanii* is described as rich cove forest, moist to moderately dry forests and disturbed areas (Weakley 2008). More detailed habitat associations for this species are not available.

Given the broad habitat description for this species, as well as the high variability of “disturbed areas”, potential habitat may occur within the project area. However, the NCNHP database indicates no records for this species in the project area, nor within two miles of the project area. This species was not documented in surveys conducted by FWA personnel.

Direct and Indirect Impacts – Although potential habitat for this species occurs in portions of the project area, no direct impacts are anticipated because this species is not currently present. Indirect impacts may occur in the form of a small increase in potential habitat, in the form of disturbed area along road shoulders and along the new road alignment.

Cumulative Impacts – Cumulative impacts may consist of a minor increase in potential habitat (disturbed areas) along the proposed access road. Due to the small increase in potential habitat, versus the amount of this habitat already present across the Forest, no measurable cumulative impacts are anticipated.

Determination of Effect – This project will have no impacts on the viability of this species.

Alabama least trillium (*Trillium pusillum* var. *ozarkanum*)

Environmental Baseline – Alabama least trillium occurs in dry to dry-mesic slopes. In North Carolina, it has high potential to occur under *Quercus coccinea* and *Kalmia latifolia* (Weakley 2008). In Missouri and Arkansas, where it is more common, it occurs in thin, acidic soils under a partially open canopy (Natureserve 2009).

Associated natural community type for this species was present in the project area, although individual associate species listed above were not observed. The NCNHP database indicates no records for this species in the project area, nor within two miles of the project area. This species was not documented in surveys conducted by FWA personnel.

Southern Nodding trillium (*Trillium rugelii*)

Environmental Baseline – *Trillium rugelii* has been documented within 20 North Carolina counties, 13 of which occur within the western North Carolina Mountains (Buchanan & Finnegan 2008; David Danley, Pisgah National Forest botanist, personal communication; Gary Kauffman, National Forests in NC forest botanical specialist, personal communication). The species primarily occurs at lower elevations in the mountains, from 1200-3000 feet above sea level. *Trillium rugelii* requires a fairly rich, moist microhabitat most often found in rich coves and bottomlands with a closed canopy. Twenty *Trillium rugelii* populations have been documented within the Nantahala or Pisgah National Forests. These populations vary in abundance from 20-50 individuals covering less than 1 acre to more than ten thousand

individuals covering an area greater than 100 acres. No records indicated that this species has been previously documented on public or private land in Clay County; four populations have been documented on NFS lands within Cherokee County.

During the June 2008 field survey of the project area, eight *Trillium rugelii* stems were observed on the east side of the existing roadbed, approximately 150 feet southwest of the crossing of Unnamed Tributary A (see *Figure 2-1*, UNT A). During a June 2009 field survey, an additional (single) *Trillium rugelii* plant was also located on the west side of the existing roadbed, approximately 15 feet from the southern bank of Hickory Cove Creek (see *Figure 2-1*, Hickory Cove Creek).

Direct and Indirect Effects – None of the documented *Trillium rugelii* individuals were rooted in the existing roadbed, but were located on the side of the road. If these two populations are delineated and conspicuously marked prior to road construction activities, direct impacts to these plants can be avoided. Indirect impacts to these plants could consist of compaction of adjacent soil, or increased surface stormwater flow near these plants. If these areas are adequately avoided and protection measures implemented during construction, indirect impacts should also be avoidable.

Cumulative Effects - During the last 10 years, *Trillium rugelii* has been impacted in 2 projects on the Pisgah Ranger District and one project in the Nantahala Ranger District. These projects did not result in the complete loss of the species from the respective project area.

Determination of Effect – If protection and avoidance measures are taken to protect the plants at these two locations, no direct or indirect impacts are anticipated. The proposed project may impact individuals but is not likely to cause a trend to federal listing or a loss of viability of this species.

Appalachian violet (*Viola appalachiensis*)

Environmental Baseline – Associated natural community type for Appalachian violet includes serpentine woodlands or rich cove forest. This species has a high potential to occur on old roadbeds through coves (Weakley 2008).

Habitat for this species was present in the project area, particularly where the existing roadbed passes through rich cove forest. However, the NCNHP database indicates no records for this species in the project area, nor within two miles of the project area. This species was not documented in surveys conducted by FWA personnel.

2.2 TERRESTRIAL WILDLIFE THREATENED, ENDANGERED, AND SENSITIVE SPECIES EVALUATED

After filtering by county (as described in Section 3.2 above), 5 Endangered, 2 Threatened, and 24 Forest Sensitive species remained for consideration (see *Table 2*). The list was further narrowed by eliminating those species whose associated natural community type was not present within the project area. Where possible, species whose specialized habitat types (spray cliffs, granitic domes, rock outcrops, talus slopes, spruce-fir forests, etc.) were absent were also eliminated from further consideration. Habitat preferences and ranges of these species were

based on a variety of sources, including the NCNHP database, Forest Service lists, NatureServe© database, personal communication with Forest Service personnel, and other reference materials. Natural community classification followed Schafale and Weakley (1990). As noted in *Table 2*, 21 species were not evaluated further in this analysis because the project area did not have the associated natural community type and/or specialized habitat type, or the species is restricted to a well-defined geographical area outside of the project vicinity. The proposed action will therefore have no effect or impact on these species. The analysis of potential effects or impacts focused on the 10 remaining species; these species are listed in *Table 2* and discussed below.

The NCNHP database was queried for TES element occurrences at two spatial scales. The first query included TES element occurrences within the project area, whereas the second query included TES element occurrences within two miles of the project area. None of the 13 remaining species are known to occur within the project area. Three TES species have been documented within two miles of the project vicinity: *Corynorhinus rafinesquii*, *Myotis leibii*, and *Sorex palustris punctulatus*. The project area was surveyed for specialized habitat types and evidence of TES species. FWA personnel conducted these field surveys in June 2008 and June 2009.

Table 2. Rare terrestrial wildlife species considered in the analysis.

| Group | Designation* | Scientific Name | Common Name | Associated Natural Community Type or Specialized Habitat Type | Analyzed Further/Evaluation Criteria* |
|-----------|------------------|--|-----------------------------------|--|---------------------------------------|
| Mammal | Endangered | <i>Glaucomys sabrinus coloratus</i> | Carolina Northern Flying Squirrel | Mature spruce-fir and northern hardwoods generally above 4000 feet | No/1 |
| Insect | Endangered | <i>Microhexura montivaga</i> | Spruce-fir Moss Spider | Spruce-fir forests on well-drained moss mats | No/1 |
| Mammal | Endangered | <i>Myotis grisescens</i> | Gray Bat | Caves in summer and winter | No/1 |
| Mammal | Endangered | <i>Myotis sodalis</i> | Indiana Bat | Roosts in caves, hollow trees or under loose bark of trees in riparian areas | Yes |
| Reptile | Threatened (S/A) | <i>Clemmys muhlenbergi</i> | Bog Turtle | Sunlit, marshy meadows, bogs, and wet pastures | No/1 |
| Mollusk | Threatened | <i>Mesodon clarki nantahala</i> | Noonday Globe | Cliffs; cool, wet areas under vegetation and leaf litter | No/1 |
| Insect | Sensitive | <i>Callophrys irus</i> | Frosted elfin | Open woods and borders, usually in dry situations; host plants - lupines (<i>Lupinus</i>) and wild indigos (<i>Baptisia</i>) | Yes |
| Insect | Sensitive | <i>Cicindela ancocisconensis</i> | A tiger beetle | High elevation forests, >4000 feet | No/1 |
| Mammal | Sensitive | <i>Corynorhinus rafinesquii</i> | Rafinesque's Big-eared Bat | Roosts in old buildings, caves, and mines, under loose bark, usually near water | Yes/2 |
| Amphibian | Sensitive | <i>Desmognathus santeetlah</i> | Santeetlah Dusky Salamander | Headwaters, seepage in hardwood, coves and spruce-fir, generally higher than 2220 feet | Yes |
| Insect | Sensitive | <i>Euchlaena milnei</i> | Milne's Euchlaena | No information available, not documented in project vicinity | No |
| Amphibian | Sensitive/FSC | <i>Eurycea junaluska</i> | Junaluska salamander | Streams; wider, base level portions of streams below 2395' | No/1 |
| Bird | Sensitive | <i>Haliaeetus leucocephalus</i> | Bald Eagle | Mature forests near large bodies of water | No/1 |
| Insect | Sensitive | <i>Melanoplus divergens</i> | Divergent Melanoplus | Glades and balds, 1800' - 4717'; no records | No/1 |
| Insect | Sensitive | <i>Melanoplus serrulatus</i> | Serrulate Melanoplus | Valleys and lower slopes | No/1 |
| Mammal | Sensitive | <i>Microtus chrotorrhinus carolinensis</i> | Southern Rock Vole | Rocky areas in spruce-fir, n. hardwoods and grassy balds; above 3200' | Yes |

| | | | | | |
|-----------|-----------|------------------------------------|---------------------------------|---|-------|
| Mammal | Sensitive | <i>Myotis leibii</i> | Eastern Small-footed Bat | Hemlock forests, rock crevices, caves, mines or buildings, above 2000 ft | Yes/2 |
| Insect | Sensitive | <i>Nesticus cooperi</i> | Lost Nantahala Cave spider | Caves and along Nantahala River | No/1 |
| Insect | Sensitive | <i>Nesticus sheari</i> | Cave spider | High elevation, n-facing rocky slopes, apparently endemic to Graham county, NC | No/3 |
| Insect | Sensitive | <i>Nesticus silvanus</i> | Cave spider | Spruce-fir forests | No/1 |
| Mollusk | Sensitive | <i>Pallifera hemphilli</i> | Black mantleslug | High elevation forests, mainly spruce-fir | No/1 |
| Mollusk | Sensitive | <i>Paravitrea placentula</i> | Glossy Supercoil | Under leaf litter on wooded hillsides and ravines | Yes |
| Amphibian | Sensitive | <i>Plethodon aureolus</i> | Tellico Salamander | Mixed forest; hardwood forests with fallen logs, leaf litter and organic soil, known only from Graham and Cherokee Counties in NC | No/3 |
| Amphibian | Sensitive | <i>Plethodon teyahalee</i> | Southern Appalachian Salamander | Moist forests at all elevations | Yes |
| Insect | Sensitive | <i>Scudderia septentrionalis</i> | Northern Bush Katydid | In the treetops of edges of broadleaved forests | Yes |
| Insect | Sensitive | <i>Semiothisa fraserata</i> | Fraser Fir Angle | Spruce-fir forests with fraser fir | No/1 |
| Mammal | Sensitive | <i>Sorex palustris punctulatus</i> | Southern Water Shrew | Streambanks w/rhododendron cover in n. hardwood or spruce-fir forests; known from > 3000', mostly over 4000' | Yes/2 |
| Insect | Sensitive | <i>Speyeria diana</i> | Diana Fritillary | Mature deciduous and pine woodlands near streams; mostly along roadsides incoves below 4000'; nectar - joe-pye-weed, ironweed, butterflyweed; host plants - violets | Yes |
| Bird | Sensitive | <i>Thryomanes bewickii altus</i> | Appalachian Bewick's wren | Woodland borders or openings at high elevations | No/1 |
| Insect | Sensitive | <i>Trechus luculentus unioi</i> | A ground beetle | Beneath rocks and moss in wet ravines and near seeps and springs > 3000' | No/1 |

*1 Associated natural community type and/or specialized habitat type do not occur in the activity area; therefore, these habitats will not be affected. Given no effects to the habitat, the proposal alternatives will not cause changes to forest-wide trends or changes in population trends of species associated with this habitat.

*2 NCNHP database indicates that this species has been recorded within 2 miles of the project area (however, no records for this species exist within the project area).

*3 Project area is outside of the known, localized geographic range for the species.

Indiana bat (*Myotis sodalis*)

Environmental Baseline – In summer, habitat consists of wooded or semiwooded areas, mainly along streams. This species has high potential to occur in hollow trees or under loose bark of living or dead trees standing in sunny openings. This habitat is used by solitary females or small maternity colonies to bear their offspring. Though maternity sites have been reported as occurring mainly in riparian and floodplain forests, recent studies indicate that upland habitats are used by maternity colonies much more extensively than previously reported. In winter, caves are utilized for hibernation. Indiana bats are known to use highly altered and fragmented landscapes. They may respond favorably to habitat disturbance, particularly where forests are even-aged and closed-canopied. A diverse landscape may benefit Indiana bats, provided that adequate areas of mature forest and suitable roost trees remain.

The Indiana bat has not been recorded in Clay County, but is currently known to occur in adjacent Cherokee and Graham Counties during the summer months. The NCNHP database indicates no records for this species in the project area, nor within two miles of the project area.

No mist net surveys were conducted for this project; however, a qualitative assessment for potential roost trees was conducted. Due to the lack of suitable maternity colony trees (large

trees with exfoliating bark located in sunny areas), this species does not have a high potential to utilize trees adjacent to the project corridor for maternity sites.

Direct and Indirect Effects – The potential for direct effects to individuals will be eliminated by felling any trees during the winter months when the bats are hibernating in caves (between October 15 and April 15). This direction is consistent with Terms and Conditions in the Biological Opinion of the U.S. Fish and Wildlife Service for the protection of the Indiana bat on the Nantahala and Pisgah National Forests. No indirect effects due to loss of maternity colony trees are anticipated. No suitable maternity colony trees have been observed within or adjacent to the existing or proposed access road corridors. The Indiana bat may forage in portions of the project area. Construction activities on the existing roadbed are not anticipated to affect current foraging habitat; construction of the new road alignment could create an additional corridor for foraging/travel.

Cumulative Effects – Cumulative effects are not anticipated due to the absence of direct effects to individuals, as well as the lack of indirect negative effects associated with the proposed action.

Determination of Effect – Terms and Conditions in the Biological Opinion of the U.S. Fish and Wildlife Service for the protection of the Indiana bat on the Nantahala and Pisgah National Forests will ensure that no tree felling activities occur during summer months; these terms ensure that no direct effects to individuals occur. Indirect effects are limited to the creation of a small amount of potential foraging/travel corridor habitat. Due to the absence of negative indirect effects, and the small amount of potential foraging habitat created under the proposed action, no cumulative effects to the Indiana bat are anticipated. This project is not likely to adversely affect the Indiana bat (*Myotis sodalis*).

*** The proposed action is to authorize new road construction and use of existing roads for access of a private tract surrounded by NFS lands. This access is intended to serve the tract and the future construction of up to five, single-family residences (primitive cabins). Development and associated impacts to federally protected species within this private tract is considered a *connected action* in the context of the Forest Service authorizing this access across NFS lands. LCPOA and the Asheville Field Office of the USFWS have cooperatively developed a Habitat Protection Plan with the purpose of avoiding impacts to the Indiana bat on the private tract. This Habitat Protection Plan is included in Appendix II of this Biological Evaluation. ***

Frosted elfin (*Callophrys irus*)

Environmental Baseline – This butterfly species is found in open woods and borders in dry situations. This species has not been documented in Clay County, but has been documented in Cherokee County. The NCNHP database does not indicate that this species has been documented within the project area or within 2 miles of the project area.

Direct and Indirect Effects – If individuals are present within the project area during road improvement/construction, direct impacts could occur in the form of crushing or displacement. The likelihood of direct impacts is relatively low, since it is unlikely that this species is present within the project area. The forest within the project area is relatively contiguous, containing

little or no edge habitat; only a very limited portion of the project area contains forest that could be considered “open” or “dry” habitat. Indirect impacts are also very unlikely. No existing suitable habitat will be destroyed, and little or no suitable habitat will be created as a result of the proposed action.

Cumulative Effects – Cumulative impacts are not anticipated because of the low likelihood of direct impacts to individuals, or indirect impacts in the form of habitat loss or gain.

Determination of Effect – Forest-wide this species has probably benefited from past forest management, which created new edge or border habitat. Whereas the proposed action could directly impact individuals in the unlikely event that they are present within the project area during construction, it is not expected to eliminate or measurably create suitable habitat. This project may impact individuals but is not likely to cause a trend to federal listing or a loss of viability of this species.

Rafinesque’s big-eared bat (*Corynorhinus rafinesquii*)

Environmental Baseline – Information on the habitat and life history of this bat is not extensive. In the southern portions of its range, this species has a high potential to utilize abandoned buildings or caves for summer roosting and maternity colonies. This species has a lower potential to utilize hollow trees. This species appears to prefer more open and often lighted areas for day roosts.

This species has not been documented in Clay County, but has been documented in adjacent Cherokee and Graham Counties. The NCNHP database does indicate that this species has been documented within 2 miles of the project area, but has not been documented within the project area.

Due to the lack of caves or buildings, this species is not likely to utilize the project area for roosting or maternity colonies. The species may use the project area for foraging, however.

Direct and Indirect Effects – No direct impacts are anticipated; possible indirect impacts are limited to the creation of a small amount of potential foraging/travel corridor associated with construction of the new road alignment.

Cumulative Effects – Due to the absence of direct impacts, negative indirect impacts, and the small amount of potential foraging habitat created under the proposed action, no cumulative impacts to the Indiana bat are anticipated.

Determination of Effect – This project will have no impacts on the viability of this species.

Santeetlah dusky salamander (*Desmognathus santeetlah*)

Environmental Baseline – This species occurs in headwaters or seepage areas in hardwood or spruce-fir forests in higher elevations. It has a high potential to occur in the Unicoi Mountains, Great Smoky Mountains National Park, and Great Balsam Mountains, where it has been documented (Petranka 1998). It has a high potential to occur in headwaters or seepage areas in

hardwood or spruce-fir forests in higher elevations, usually over 2,220 feet in elevation. Eggs are laid under moss growing on rocks or logs, typically within few feet of open water.

This species has been documented in Graham and Swain Counties, but not in Clay County. The NCNHP database indicates no records for this species within the project area, nor within two miles of the project area. Potential habitat for this species is present in the project area; however, it is not likely to occur in the project area based on current knowledge of its limits of geographic distribution.

Direct and Indirect Effects – *Desmognathus santeetlah* is not likely to occur in the project area, due to the limitations of its range. No direct or indirect impacts are anticipated.

Cumulative Effects – Due to the lack of direct and indirect impacts, there will be no cumulative impacts as a result of this project.

Determination of Effect – This project will have no impacts on the viability of this species.

Southern rock vole (*Microtus chrotorrhinus carolinensis*)

Environmental Baseline – This species occurs as scattered populations in patches of suitable habitat in the Appalachian Mountains. Associated natural community type requirements are cool, damp, coniferous, and mixed forests at higher elevations in the Appalachians. This species has a high potential to occur in ferns/mossy debris near flowing water in coniferous forests. It has a lower potential to occur in deciduous forest/spruce clearcuts (mainly recent cuts), forest ecotones, grassy balds near forest, and talus slopes associated with road banks.

This species has been documented in Swain County, but not in Clay County. Possible habitat for this species is present within the project area in the form of rocky drainages in deciduous forest; however, optimal habitat listed above is not present. This species is not highly likely to occur within the project area.

Direct and Indirect Effects – *Microtus chrotorrhinus carolinensis* is not highly likely to occur in the project area, due to the lack of optimal habitat. No direct impacts are anticipated. Indirect impacts to the marginal habitat located within the project area are limited to clearing of the new road alignment, and construction activities associated with the existing roadbed.

Cumulative Effects – No direct impacts are anticipated; indirect impacts to the marginal habitat located within the project area are very limited. Due to the limited extent of indirect impacts to marginal habitat versus the availability of marginal and optimal habitat across the Forest, any cumulative impacts to this species are expected to be imperceptible.

Determination of Effect – This project will have no impacts on the viability of this species.

Eastern small-footed bat (*Myotis leibii*)

Environmental Baseline – *Myotis leibii* roosts in hollow trees and rocky crevices during the summer months, but has also been documented in buildings, caves, mines, and expansion joints in concrete bridges. During the winter, it typically hibernates in caves and mines. This species

does not have a high potential to occur because no suitable roosting habitat was observed within the project area. *Myotis leibii* may use the project area for foraging.

The Eastern small-footed bat has been recorded in Clay County, several adjacent counties, and is considered to be widespread but generally uncommon in western North Carolina. The NCNHP database indicates that this species has been documented within two miles of the project area, but has not been documented within the project area.

No mist net surveys were conducted for this project; however, a qualitative assessment for potential roost/maternity sites was conducted. No rock outcrops with crevices, buildings, caves, mines, or concrete bridges are located within the project area; optimal roost habitat was not observed along the existing roadway or new road alignment.

Direct and Indirect Effects – The prohibition on felling trees during the summer months (see *Effects* discussion for *Myotis sodalis* above), will ensure that no direct impacts to *Myotis leibii* will occur. This species may forage in portions of the project area. Construction activities on the existing roadbed are not anticipated to affect current foraging habitat; construction of the new road alignment could create an additional corridor for foraging/travel.

Cumulative Effects – Terms and Conditions in the Biological Opinion of the U.S. Fish and Wildlife Service for the protection of the Indiana bat on the Nantahala and Pisgah National Forests will ensure that no tree felling activities occur during summer months; these terms will also ensure that no direct impacts to *Myotis leibii* individuals occur. Indirect impacts are limited to the creation of a small amount of potential foraging/travel corridor. Due to the absence of negative indirect impacts, and the small amount of potential foraging habitat created under the proposed action, no cumulative impacts to the Eastern small-footed bat are anticipated.

Determination of Effect – This project will have no impacts on the viability of this species.

Glossy supercoil (*Paravitrea placentula*)

Environmental Baseline – Associated natural community type for this species includes Acidic Cove, Rich Cove, High Elevation Red Oak, and Montane Oak-Hickory Forests. Associated species included *Betula alleghaniensis* and *Tsuga canadensis* (Pilsbry, 1946).

The NCNHP database indicates that this species has not been documented within two miles of the project area. Although associate species are present, this species has not been documented in Clay County. Among the adjacent counties this species has only been documented in Swain County. Associated natural community types and associated tree species are present within the project area. However, due to the limited mobility of gastropods, limited distribution outside the project area, and obscure record, this species is not likely to occur within the project area.

Direct and Indirect Effects – *Paravitrea placentula* is not likely to occur in the project area. No direct or indirect impacts are anticipated.

Cumulative Effects – Due to the lack of direct and indirect impacts, there will be no cumulative impacts as a result of this project.

Determination of Effect – This project will have no impacts on the viability of this species.

Southern Appalachian salamander (*Plethodon teyahalee*)

Environmental Baseline - This species occurs in forests made up of birch, beech, hemlock, witch hazel, mountain laurel, and rhododendron. Adults have been found up to 5,000 feet in elevation. The highest densities of this species were in mature, mesic, hardwood forests (Petranka 1998); however the species has been recorded in a wide variety of forest types and elevations within the Nantahala National Forest.

The geographic range of this species covers much of the southwestern tip of North Carolina, including the project vicinity. Based on the presence of many of the associate botanical species listed above, this species may occur within the project area.

Direct and Indirect Effects – Direct impacts to *Plethodon teyahalee* may result during road construction activities. Individuals within the project area could be subject to crushing or displacement during construction. Due to the limited extent of new road alignment included in the proposed action, indirect impacts in the form of habitat loss are expected to be minimal.

Cumulative Effects – Due to the limited extent of direct and indirect impacts to this species, versus the distribution of this species and availability of optimal habitat across the Forest, any cumulative impacts to this species are expected to be imperceptible.

Determination of Effect – Potential direct impacts to *Plethodon teyahalee* individuals could occur during construction; indirect impacts to habitat are expected to be imperceptible. This project may impact individuals but is not likely to cause a trend to federal listing or a loss of viability of this species.

Northern bush katydid (*Scudderia septentrionalis*)

Environmental Baseline – This species is known to utilize treetops at the edges of broadleaved forest. No information regarding the geographic distribution of this species was available via NCNHP database queries, as NCNHP does not track this species.

If individuals are present within the project area during road improvement/construction, direct impacts could occur in the form of crushing or displacement. The likelihood of direct impacts is relatively low, since it is unlikely that this species is present within the project area. The forest within the project area is relatively contiguous, containing little or no edge habitat; it is unclear whether the narrow corridor and canopy gap associated with the access road would provide suitable habitat for this species. Indirect impacts are also very unlikely. Little or no existing suitable habitat will be destroyed or created as a result of the proposed action.

Cumulative Effects – Cumulative impacts are not anticipated because of the low likelihood of direct impacts to individuals, or indirect impacts in the form of habitat loss or gain.

Determination of Effect – Forest-wide this species may have benefited from past forest management, which created new edge or border habitat. The proposed action could directly

impact individuals (if present) during construction; the proposed action is not expected to eliminate or measurably create suitable habitat. This project may impact individuals but is not likely to cause a trend to federal listing or a loss of viability of this species.

Southern water shrew (*Sorex palustris punctulatus*)

Environmental Baseline – *Sorex palustris punctulatus* occurs near swift, rocky streams with *Rhododendron* cover. This species may occur in the project area; it has been documented along Fires Creek within two miles of the project area. This species has been documented in several locations from Macon and Cherokee Counties.

Direct and Indirect Effects – If the species is present within the project area, direct impacts to *Sorex palustris punctulatus* could result during road construction activities, particularly at stream crossings. These direct impacts are considered to be unlikely. Little or no existing riparian vegetation will be cleared during road construction or culvert replacement. Due to the relatively small amount of activity occurring near streams, any indirect impacts in the form of riparian habitat loss are expected to be imperceptible.

Short-term indirect impacts to individuals could result from increased sedimentation associated with road construction and culvert replacement/installation within the project area. Similarly, short-term indirect impacts to individuals could also result from acid runoff during road construction if fresh, un-weathered acidic rock is exposed and is not appropriately treated or disposed of. Short-term and long-term sedimentation and acid run off will be avoided or minimized through the successful use of BMP's, design criteria, and requirements listed in Section 3.1.3 of this BE.

It is also possible that long-term indirect impacts associated with the proposed action could be positive, in that the replacement of the dislodged culvert at the Hickory Cove crossing will likely increase stability of the stream channel and banks at that location and may reduce sediment loss at that location during high-flow events. Replacement of other existing, non-functional (plugged) culverts associated with the proposed action may also prevent similar failures and sediment loss during future high-flow events.

Cumulative Effects – Due to the limited extent of potential direct and indirect impacts to this species, versus the availability of suitable habitat across the Forest, no cumulative impacts to this species are expected as a result of this project.

Determination of Effect – Potential direct impacts to individuals of this species could occur during construction, but are unlikely. Indirect impacts to riparian habitat are expected to be imperceptible; indirect impacts to aquatic habitat will be avoided or minimized through the successful use of BMP's design criteria, and requirements listed in Section 3.1.3 of this BE. This project may impact individuals but is not likely to cause a trend to federal listing or a loss of viability of this species.

Diana fritillary (*Speyeria diana*)

Environmental Baseline – The species is found in moist forests in the southwestern mountains at all elevations and has been observed in various habitats. The adults nectar on joe-pye-weed,

ironweed, and butterflyweed; violets are important for the larvae which feed on the foliage. This species occurs in different forest types, but seems to prefer roadsides through cove forests.

The proposed treatment area contains mesic deciduous forests; however, does not support an abundance of violets. It is thought to be fairly common across Graham, Swain, Cherokee, Clay and Macon counties. The NCNHP database does not indicate that this species has been documented within the project area or within 2 miles of the project area.

Direct and Indirect Effects – If individual adults or larvae are present within the project area during construction, direct impacts to *Speyeria diana* could occur in the form of crushing or displacement. The likelihood of direct impacts is relatively low, since the project area does not appear to support an abundance of violets, and this species is not known to occur within the project area. Indirect impacts are limited to the creation of a small amount of habitat in the form of additional permanent edge habitat along the new road alignment.

Cumulative Effects – Cumulative impacts are not anticipated because of the low likelihood of direct impacts to individuals, as well as the possible favorable indirect impacts associated with a small amount of additional permanent edge habitat.

Determination of Effect – Forest-wide this species has probably benefited from past forest management, which created new forest roadside habitat. The proposed action will not eliminate current roadside habitat. A small amount of additional permanent edge habitat along the new road alignment will be created, which could provide new habitat for this species. This project may impact individuals but is not likely to cause a trend to federal listing or a loss of viability of this species.

2.3 AQUATIC THREATENED, ENDANGERED, AND SENSITIVE SPECIES EVALUATED

After filtering by county (as described in Section 3.2 above), one Forest Sensitive species (*Cambarus parrishi*) remained for consideration (see *Table 3*). The NCNHP database also indicates that this species has been recorded within two miles of the project area (in Rockhouse Branch), but is not known to occur within the project area. The analysis evaluates this species; background information and potential impacts to this species are discussed below.

Table 3. Rare aquatic species considered in the analysis.

| Group | Designation | Scientific Name | Common Name | Associated Natural Community Type or Specialized Habitat Type | Analyzed Further/Evaluation Criteria* |
|----------|-------------|--------------------------|------------------------------|--|---------------------------------------|
| Crayfish | Sensitive | <i>Cambarus parrishi</i> | Hiwassee Headwaters Crayfish | Hiwassee River headwaters, Rockhouse Creek; swift, clear headwater streams | Yes* |

* NCNHP database indicates that this species has been recorded within 2 miles of the project area (however, no records for this species exist within the project area).

Hiwassee headwaters crayfish (*Cambarus parrishi*)

Environmental Baseline – This species has only been documented in headwaters of the Hiwassee River. It has a high potential to occur in streams with swift, clear, flowing water over sand and rocks (Natureserve 2008). The streams within in the project area are headwaters of the Hiwassee River, and appear to contain suitable habitat for this species.

Available Inventories Information – No previous surveys have been conducted within the project area. However, this species has been documented within two miles of the project area in Rockhouse Creek. Hickory Cove Creek and Laurel Creek are tributaries of Rockhouse Creek, and join Rockhouse Creek downstream of the project area.

Direct and Indirect Effects – *Cambarus parrishi* may occur in the project area due to close proximity of known occurrences in nearby streams, and due to apparently suitable habitat in Laurel Creek and Hickory Cove Creek within the project area. Direct impacts to individuals could occur in the short term, as individuals could be crushed or displaced during culvert replacement/installation at the crossing of Hickory Cove creek. This appears to be the only stream crossing involved in the proposed action that includes a stream of sufficient size to support *Cambarus parrishi*. Given the relatively short time period of direct stream disturbance associated with this culvert installation, and the relatively limited footprint of the anticipated culvert, direct impacts to individuals may occur, but are probably unlikely.

Short-term indirect impacts to individuals could result from increased sedimentation associated with road construction and culvert replacement/installation within the project area. Similarly, short-term indirect impacts to individuals could also result from acid runoff during road construction if fresh, un-weathered acidic rock is exposed and is not appropriately treated or disposed of. Short-term and long-term sedimentation and acid run off will be avoided or minimized through the successful use of BMP's, design criteria, and requirements listed in Section 3.1.3 of this BE.

It is also possible that long-term indirect impacts associated with the proposed action could be positive, in that the replacement of the dislodged culvert at the Hickory Cove crossing will likely increase stability of the stream channel and banks at that location and may reduce sediment loss at that location during high-flow events. Replacement of other existing, non-functional (plugged) culverts associated with the proposed action may also prevent similar failures and sediment loss during future high-flow events.

Cumulative Effects – There is a relatively low likelihood of direct impacts to individuals. Negative indirect impacts are possible, but can be avoided or minimized with successful implementation of BMP's and requirements regarding sediment/erosion control measures and proper treatment/disposition of acidic rock. Positive indirect impacts are also possible, as a major stream crossing in the project area will be stabilized, and non-functional culverts in the project area will be replaced under the proposed action. Due to the low likelihood of direct impacts, and the minimal negative and positive indirect impacts associated with the proposed action, no net cumulative impacts to this species are anticipated.

Determination of Effect – The proposed action may directly and indirectly impact individuals during construction activities, particularly during the installation/replacement of culverts at stream crossings. The proposed action may impact individuals but is not likely to cause a trend to federal listing or a loss of viability of this species because required project design criteria should avoid chronic sedimentation and acid runoff impacts to habitat for this species.

2.4 Determination of Effect

Table 2.4. Summary of Determination of Effect or Impact for Threatened, Endangered, and Forest Sensitive species evaluated in the effects analysis.

| Group | Designation | Scientific Name | Common Name | Determination of Effect or Impact |
|-------------------------------------|-------------|--|---------------------------------|--|
| <i>BOTANICAL SPECIES</i> | | | | |
| Liverwort | Sensitive | <i>Drepanolejeunea appalachiana</i> | A Liverwort | No impacts |
| Vascular plant | Sensitive | <i>Euphorbia purpurea</i> | Glade Spurge | No impacts |
| Vascular plant | Sensitive | <i>Helianthus glaucophyllus</i> | Whiteleaf Sunflower | No impacts |
| Vascular plant | Sensitive | <i>Juglans cinerea</i> | Butternut | No impacts |
| Hornwort | Sensitive | <i>Megaceros aenigmaticus</i> | A Hornwort | No impacts |
| Vascular plant | Sensitive | <i>Monotropis odorata</i> | Sweet Pinesap | No impacts |
| Lichen | Sensitive | <i>Peltigera venosa</i> | An Aquatic Lichen | No impacts |
| Vascular plant | Sensitive | <i>Sceptridium jenmanii</i> | Alabama Grape Fern | No impacts |
| Vascular plant | Sensitive | <i>Trillium pusillum</i> var. <i>ozarkanum</i> | Alabama Least Trillium | No impacts |
| Vascular plant | Sensitive | <i>Trillium rugelii</i> | Southern Nodding Trillium | May impact individuals but not likely to cause a trend to federal listing or a loss of viability |
| Vascular plant | Sensitive | <i>Viola appalachiensis</i> | Appalachian Violet | No impacts |
| <i>TERRESTRIAL WILDLIFE SPECIES</i> | | | | |
| Mammal | Endangered | <i>Myotis sodalis</i> | Indiana Bat | Not likely to adversely affect |
| Insect | Sensitive | <i>Callophrys irus</i> | Frosted Elf | May impact individuals but not likely to cause a trend to federal listing or a loss of viability |
| Mammal | Sensitive | <i>Corynorhinus rafinesquii</i> | Rafinesque's Big-eared Bat | No impacts |
| Amphibian | Sensitive | <i>Desmognathus santeetlah</i> | Santeetlah Dusky Salamander | No impacts |
| Mammal | Sensitive | <i>Microtus chrotorrhinus carolinensis</i> | Southern Rock Vole | No impacts |
| Mammal | Sensitive | <i>Myotis leibii</i> | Eastern Small-footed Bat | No impacts |
| Mollusk | Sensitive | <i>Paravitrea placentula</i> | Glossy Supercoil | No impacts |
| Amphibian | Sensitive | <i>Plethodon teyahalee</i> | Southern Appalachian Salamander | May impact individuals but not likely to cause a trend to federal listing or a loss of viability |
| Insect | Sensitive | <i>Scudderia septentrionalis</i> | Northern Bush Katydid | May impact individuals but not likely to cause a trend to federal listing or a loss of viability |
| Mammal | Sensitive | <i>Sorex palustris punctulatus</i> | Southern Water Shrew | May impact individuals but not likely to cause a trend to federal listing or a loss of viability |
| Insect | Sensitive | <i>Speyeria diana</i> | Diana Fritillary | May impact individuals but not likely to cause a trend to federal listing or a loss of viability |
| <i>AQUATIC SPECIES</i> | | | | |
| Crayfish | Sensitive | <i>Cambarus parrishi</i> | Hiwassee Headwaters Crayfish | May impact individuals but not likely to cause a trend to federal listing or a loss of viability |

Threatened, Endangered, and Sensitive Species Recorded in Clay County (and surrounding counties for terrestrial wildlife)

2.5 Forest Concern Species

Forest Concern (FC) species are designated by the National Forests of North Carolina, and lie at the periphery of their range or disjunct from their main range. The Nantahala-Pisgah National Forest maintains a list of Forest Concern species on NFS lands; all of these species were originally considered. The list was filtered by considering only those species listed by the Forest Service as occurring or probably occurring in Clay County, with the exception of terrestrial wildlife. Due to the mobility of terrestrial wildlife, the filtered list also included species occurring or probably occurring in nearby counties (Cherokee, Graham, Macon, and Swain). A total of 82 species remained after this filter, and included 36 plant species, 37 terrestrial animal species, and 9 aquatic animal species.

The list was then subjected to a second filtering step, eliminating species whose associated natural community type (general habitat), or specialized habitat type *within* a community did not occur within the project area. Examples of natural community types include Rich Cove, Acidic Cove, Montane Oak-Hickory, Northern Hardwood, and High Elevation Red Oak communities. Examples of specialized habitat types include spray cliffs, granitic domes, caves, rock outcrops, talus slopes, bogs, wetlands, spruce-fir forests, etc. Habitat preferences and ranges of these plant and animal species were based on a variety of sources, including the NCNHP database, Forest Service lists, NatureServe© database, personal communication with Forest Service personnel, and other reference materials. Natural community classification followed Schafale and Weakley (1990).

Site visits and pedestrian field surveys of the project area were conducted by Fish and Wildlife Associates, Inc. (FWA) in March 2007, June 2008, June 2009, and March 2010

2.5.1 Botanical Forest Concern Species

After removing species that require specialized habitats not present in the project area, the list was further narrowed by eliminating those species with general habitat requirements not found within the proposed project area.

General habitat requirements for 14 of the 36 botanical forest concern species occurring in Clay County occur in the proposed treatment area. Those 14 species are listed in **Table 8-5**, including a general habitat description. The NCNHP Virtual Workroom was accessed to determine if any of the 14 botanical species occur within the proposed treatment area. Of these 14 botanical species, none were found or known to occur within the project area, but *Frasera caroliniensis* has been documented within two miles of the project vicinity.

Table 2.5.1. Botanical Forest Concern species occurring in Clay County with general habitat requirements within the project area.

| Group | Species | Common Name | Habitat* |
|----------------|-------------------------------------|--------------------|---|
| Vascular Plant | <i>Brachyelytrum septentrionale</i> | Northern shorthusk | Serpentine Forest, Northern Hardwood Forest, Rich Cove Forest |
| Vascular Plant | <i>Calamagrostis porteri</i> | Porter's reedgrass | Serpetine Woodland, Montane Oak-Hickory Forest |

| Group | Species | Common Name | Habitat* |
|----------------|-------------------------------|--------------------------|--|
| Vascular Plant | <i>Carex cherokeensis</i> | Cherokee sedge | Montane Alluvial Forest, Roadside, Rich Cove Forest |
| Vascular Plant | <i>Carex leptonevia</i> | A wood sedge | Boulderfield Forest, Northern Hardwood Forest, High Elevation Seep, Rich Cove Forest |
| Vascular Plant | <i>Carex oligocarpa</i> | Few-fruited sedge | Rich Cove Forest |
| Vascular Plant | <i>Carex purpurifera</i> | Purple sedge | Rich Cove Forest, Montane Alluvial Forest |
| Vascular Plant | <i>Carex woodii</i> | Wood's sedge | Northern Hardwood Forest, Rich Cove Forest, Acidic Cove Forest, Mesic Oak-Hickory Forest |
| Vascular Plant | <i>Frasera caroliniensis</i> | Columbo | Rich Cove Forest, Mesic Oak-Hickory Forest |
| Vascular Plant | <i>Helenium breifolium</i> | Littleleaf sneezeweed | Southern Appalachian Bog, Wet Meadow, Seeps, Riverbanks |
| Vascular Plant | <i>Hexalectris spicata</i> | Spiked crested coralroot | Rich Cove Forest, Glade, Mesic Oak-Hickory Forest, Mafic rock |
| Vascular Plant | <i>Liparis loeselii</i> | Yellow widelip orchid | Seep, Roadside |
| Vascular Plant | <i>Pedicularis lanceolata</i> | Swamp Lousewort | Serpentine Woodland, Southern Appalachian Bog, Seep, Swamp, Wet Meadow |
| Vascular Plant | <i>Platanthera peramoena</i> | Purple fringeless orchid | Southern Appalachian Bog, Seep, Marsh |
| Vascular Plant | <i>Smilax hugeri</i> | Huger's carrionflower | Rich Cove Forest, Mesic Oak-Hickory Forest, Mafic Rock |

*Bolded habitat indicates presence in the project area.

There will be no direct, indirect, or cumulative impacts to any botanical forest concern species because none are known to occur, or have been documented, within the project area.

2.5.2 Terrestrial Wildlife Forest Concern Species

After filtering by county, 37 Forest Concern species remained for consideration. The list was further narrowed by eliminating those species whose associated natural community type was not present within the project area. Where possible, species whose specialized habitat types (spray cliffs, granitic domes, rock outcrops, talus slopes, spruce-fir forests, etc.) were absent were also eliminated from further consideration. Habitat preferences and ranges of these species were based on a variety of sources, including the NCNHP database, Forest Service lists, NatureServe© database, personal communication with Forest Service personnel, and other reference materials. Natural community classification followed Schafale and Weakley (1990). Four species were not evaluated further in this analysis because the project area did not have the associated natural community type and/or specialized habitat type, or the species is restricted to a well-defined geographical area outside of the project vicinity. The proposed action will therefore have will have no effect or impact on these 4 species. The analysis of potential effects or impacts focused on the 22 remaining species; these species are listed in Table 3.8.4.2 and discussed below.

Table 2.5.2. Terrestrial Forest Concern species, habitat, and likelihood of occurrence in the project area.

| Group | Species | Habitat | Likelihood of Occurrence |
|------------------------|--|--|----------------------------------|
| Invertebrate Animal | <i>Appalachina chilhoweensis</i> (queen crater) | under leaf litter and rock piles in rich coves | May occur |
| Invertebrate Animal | <i>Autochton cellus</i> (golden-banded skipper) | moist woods near streams or ponds; nectar -- blackberry, trailing arbutus, hollyhock, and abelia; host -- legumes, mainly hog peanut | May occur |
| Invertebrate Animal | <i>Celastrina nigra</i> (dusky azure) | rich, moist deciduous forests; nectar - wild geranium; host - goat's beard | May occur |
| Invertebrate Animal | <i>Chlosyne gorgone</i> (gorgone checkerspot) | woodland borders and openings; host plants are sunflowers and other tall composites | May occur |
| Invertebrate Animal | <i>Glyphyalinia junaluskana</i> (dark glyph) | moist leaf litter in mixed, mesic woods on mountainsides | May occur |
| Invertebrate Animal | <i>Glyphyalinia pentadelphina</i> (pink glyph) | pockets of moist leaves in rich or acidic cove forests; no actual records | May occur |
| Invertebrate Animal | <i>Haplotrema kendeighi</i> (blue-footed lancetooth) | mountainsides in leaf litter or crawling on the ground in wet weather ; mixed or cove hardwood forests; no actual records | May occur |
| Invertebrate Animal | <i>Helicodiscus fimbriatus</i> (fringed coil) | leaf litter and under rocks on wooded hillsides, crevices in slates; no actual records | May occur |
| Invertebrate Animal | <i>Melanoplus cherokee</i> (Cherokee melanoplus) | woodlands, 1800' - 5100'; no records | May occur |
| Invertebrate Animal | <i>Melanoplus viridipes eurycerus</i> (green-legged Melanoplus) | woodlands and forest edges; no records | May occur |
| Invertebrate Animal | <i>Nesticus species 2</i> | small rocks scattered over n-facing cove forests, southwest-facing talus fields | May occur |
| Invertebrate Animal | <i>Paravitrea lamellidens</i> (lamellate supercoil) | deep moist leaf litter and ravines in acidic cove, rich cove, and montane-oak hickory forests; no actual records | May occur |
| Invertebrate Animal | <i>Paravitrea umbilicaris</i> (open supercoil) | cove forests with rocky slopes | May occur |
| Invertebrate Animal | <i>Patera clarki clarki</i> (dwarf proud globe) | Rich cove forest, high elevation red oak forest, leaf litter on mountainsides; no actual records | May occur |
| Invertebrate Animal | <i>Phyciodes batesii maconensis</i> (tawny crescent) | rocky ridges and woodland openings at higher elevations; host plants - <i>Aster undulatus</i> | Not likely to occur ¹ |
| Invertebrate Animal | <i>Polygonia progné</i> (gray comma) | rich deciduous forests; host plants - mainly gooseberries (<i>Ribes</i>), but also on wild azalea (<i>Rhododendron nudiflorum</i>) | May occur |
| Invertebrate Animal | <i>Zonitoides patuloides</i> (Appalachian gloss) | deep, moist leaf litter on mountainsides or in ravines, beneath bark of logs; no records | May occur |

| Group | Species | Habitat | Likelihood of Occurrence |
|-----------|--|--|----------------------------------|
| Amphibian | <i>Eurycea longicauda longicauda</i> (long-tailed salamander) | streams, seeps, springs in moist woods and floodplains; breeds in streams/ponds | May occur |
| Bird | <i>Dendroica cerulea</i> (cerulean warbler) | mature hardwood forests; steep slopes and coves in mountains | May occur |
| Bird | <i>Sphyrapicus varius appalachiensis</i> (Appalachian yellow-bellied sapsucker) | mature, open hardwoods with scattered dead trees above 3500', breeding season only | May occur |
| Bird | <i>Vermivora pinus</i> (blue-winged warbler) | low elevation (below 3000') brushy fields and thickets, breeding season only | Not likely to occur ¹ |
| Bird | <i>Vireo gilvus</i> (warbling vireo) | open groves of hardwoods along rivers and streams below 3000' | May occur |

¹Species is not likely to occur because potential habitat is not available in the proposed treatment area. This species was not analyzed further.

Forest Concern Land Snails

Environmental Baseline – Seven species of Forest Concern land snails have been recorded on Forest Service lands in one or more of the adjacent counties, but are not known to occur in Clay County. These species are: *Appalachina chilhowensis*, *Glyphyalinia junaluskana*, *Haplotrema kendeighi*, *Helicodiscus fimbriatus*, *Paravitrea lamellidens*, *Paravitrea umbilicaris* and *Zonitoides patuloides*. Preferred habitat for these species varies (see **Table 8-6**, above), but typically includes leaf litter in deciduous forests.

Existing Condition

Due to the lack of specific habitat preference information for these species, it is difficult to completely eliminate the possibility of one or more of these species occurring within the project area. However, it is considered unlikely that any of these species are present. Snail surveys have been conducted for other Forest Service projects in similar habitats in Clay County. No rare gastropods were documented during those surveys.

Direct and Indirect Impacts – Due to the low likelihood that this species occurs within or near the proposed treatment area, no direct or indirect impacts as a result of this project are anticipated.

Cumulative Impacts – Due to the lack of direct and indirect impacts, there would be no cumulative impacts as a result of this project.

Golden banded skipper (*Autochton cellus*)

Environmental Baseline –The golden banded skipper has been documented in Cherokee, Graham, Macon, and Swain Counties, but not in Clay County. This species has a high potential to occur in moist woods near streams or ponds. Adults feed on nectar from blackberry, trailing arbutus, hollyhock, and abelia. Hog peanut is the primary host plant for caterpillars (Opler et al. 2006).

Existing Condition

General habitat exists within the proposed treatment area; this habitat includes moist woods and streams. Adult nectar plants and host plants (blackberry and hog-peanut) are also present within the project area.

Direct and Indirect Impacts – Direct impacts to individuals may result from the proposed action, as any individuals present within the project area could be crushed or directly displaced during land clearing activities. Nectar and host plants would be impacted as a result of the proposed action. Due to the tendency of *Rubus sp.* to colonize disturbed areas, it may reestablish itself along portions of roadside within the project area.

Cumulative Impacts – The impacts of past actions such as timber sales could have crushed plants with eggs or caterpillars. These impacts may also result from the proposed action. Blackberry and hog-peanut may recolonize after construction activities, although blackberry is more likely. Due to the small size of the proposed treatment area and the widespread availability of habitat and host/nectar plants across the Forest, cumulative impacts, if any, are expected to be imperceptible.

Dusky azure (*Celastrina nigra*)

Environmental Baseline – The dusky azure has been documented in Clay and Macon Counties. General habitat for this species includes shaded, moist, deciduous woods. Adults are often seen feeding on wild geranium. The caterpillar host plant is goat's beard (Opler et al. 2006).

Existing Condition

General habitat (moist, deciduous woods) does exist within the project area; however, host and nectar plants for this species were not observed within areas to be impacted under the action alternative.

Direct and Indirect Impacts – The dusky azure is not likely to occur in the proposed treatment area, due to the lack of host plants. No direct or indirect impacts are anticipated.

Cumulative Impacts – Due to the lack of direct and indirect impacts, there will be no cumulative impacts as a result of this project.

Gorgone checkerspot (*Chlosyne gorgone*)

Environmental Baseline – This species has been documented in Clay and Macon Counties. General habitat includes woodland openings and borders. This species has a high potential to occur where host plants are present. Host plants include sunflowers, rosinweeds, and other tall composites.

Existing Condition

This species has a high potential to occupy the proposed treatment area; limited openings and borders are present and host plants were observed there.

Direct and Indirect Impacts – Direct impacts to individuals may result from the proposed action, as any individuals present within the project area could be crushed or directly displaced during land clearing activities. Indirect impacts may consist of host plants and general habitat being impacted during land clearing activities.

Cumulative Impacts – The impacts of past actions such as timber sales could have crushed plants with eggs or caterpillars, and could have temporarily impacted habitat. These impacts may also result from the proposed action; however improvement of an existing forest road and construction of new alignment will create/maintain some additional woodland border habitat over the long term. Due to the small size of the proposed treatment area versus the widespread availability of general habitat and host plants across the Forest, cumulative impacts, if any, are expected to be imperceptible.

Pink glyph (*Glyphyalinia pentadelphia*)

Environmental Baseline – This species has been documented in Clay County. General habitat includes Rich Cove and Acidic Cove Forests. Associate species include *Allogona profunda* (broad-banded forest snail), *Halesia sp.* (silverbell), and *Aesculus octandra* (yellow buckeye) (Pilsbry 1946).

Existing Condition

General habitat (Rich Cove and Acidic Cove Forest) occurs within the proposed treatment area.

Available Inventories Information – No targeted snail surveys have been conducted within the project area, although snail surveys have been conducted for other Forest Service projects in Clay County. No rare gastropods were documented during those surveys.

Direct and Indirect Impacts – If present within the project area, direct impacts could occur as individuals could be crushed or directly displaced during land clearing activities. Indirect impacts consist of the permanent loss of approximately 0.7 acres of forested habitat.

Cumulative Impacts – The impacts of past actions such as timber sales could have directly impacted individuals and could have altered or eliminated forested habitat. These impacts may also result from the proposed action. Due to the small size of the project area versus the widespread availability of rich cove habitat across the Forest, cumulative impacts, if any, are expected to be imperceptible.

Cherokee melanoplus (*Melanoplus cherokee*)

Green-legged melanoplus (*Melanoplus viridipes eurycerus*)

Environmental Baseline – Little information is available regarding the distribution, records, and specific habitat requirements of these grasshopper species. General habitat includes woodlands from 1,800 to 5,100 feet in elevation for *Melanoplus cherokee*; general habitat for *Melanoplus viridipes eurycerus* includes woodlands and forest edges.

Existing Condition

The likelihood of occurrence within the project area is unknown due to the lack of information regarding specific habitat requirements for these species. General habitat (woodlands and forest edges) is present within the project area.

Direct and Indirect Impacts – If present, direct impacts to individuals may result from the proposed action, as any individuals present within the project area could be crushed or directly displaced during land clearing activities. Indirect impacts may consist of general habitat being impacted during land clearing activities.

Cumulative Impacts – Past actions such as timber sales could have directly impacted individuals, and could have impacted habitat. These impacts may also result from the proposed action. Due to the small size of the proposed treatment area versus the widespread availability of general habitat across the Forest, cumulative impacts, if any, are expected to be imperceptible.

A *Nesticus* spider (*Nesticus* sp. 2)

Environmental Baseline – This species has only been documented in the Chunky Gal Mountains of Clay County. Only 4 element occurrences exist. Habitat is described as small rocks scattered over north-facing cove forests, and southwest-facing talus fields.

Existing Condition

Habitat (north-facing cove forest) may exist within the project area.

Direct and Indirect Impacts – If present, direct impacts to individuals may result from the proposed action, as any individuals present within the project area could be crushed or directly displaced during land clearing activities. Indirect impacts may consist of the disturbance of small amounts of north-facing cove forest during land clearing activities.

Cumulative Impacts – Past actions such as timber sales could have directly impacted individuals, and could have impacted habitat. These impacts may also result from the proposed action. Due to the small size of the proposed treatment area versus the widespread availability of general habitat across the Forest, cumulative impacts, if any, are expected to be imperceptible.

Dwarf proud globe (*Patera clarki clarki*)

Environmental Baseline – This species has been documented in Clay County and the surrounding counties, but it not known to occur in the vicinity of the project area. General habitat includes Rich Cove, High Elevation Red Oak, and Mesic Mixed Hardwood Forests. This species has a high potential to occur in habitats with the following species present: *Acer pensylvanicum*, *A. saccharum*, *A. rubrum*, and *Aesculus flava* (Pilsbry, 1946).

Existing Condition

The proposed treatment area contains general habitat (Rich Cove, and Mesic Mixed Hardwood Forest) for *Patera clarki clarki*. Associate species were also present within the project area.

Available Inventories Information – No previous surveys have been conducted within the proposed treatment area, although snail surveys have been conducted for other Forest Service projects in Clay County. No rare gastropods were documented during those surveys.

Direct and Indirect Impacts – If present within the project area, direct impacts could occur as individuals could be crushed or directly displaced during land clearing activities. Indirect impacts consist of the permanent loss of approximately 0.7 acres of forested habitat.

Cumulative Impacts – The impacts of past actions such as timber sales could have directly impacted individuals and could have altered or eliminated forested habitat. These impacts may also result from the proposed action. Due to the small size of the project area versus the widespread availability of general habitat across the Forest, cumulative impacts, if any, are expected to be imperceptible.

Gray comma (*Polygona progne*)

Environmental Baseline – This species has been documented in Clay and Swain Counties. General habitat for this species includes rich deciduous or coniferous forest. This species has a high potential to occupy areas along dirt roads, streams, or within clearings. Adults feed on sap, rarely nectar. Host plants for caterpillars include *Ribes sp.* and *Rhododendron nudiflorum* (Opler et al. 2006).

Existing Condition

Habitat for this species is present within the project area. However, no host plants were identified in the area. Adults could use habitats within or near the proposed treatment area. Rich deciduous forest occurs in the proposed treatment area; streams and dirt roads occur near the area. In the absence of host plants, it is unlikely that caterpillars of this species occur within the proposed treatment area.

Direct and Indirect Impacts – If present within the project area, adults could be directly impacted due to crushing or displacement during land clearing activities. Indirect impacts consist of the temporary disturbance of a small amount of edge habitat along the existing roadbed, as well as streamside habitat at stream crossings.

Cumulative Impacts – The impacts of past actions such as timber sales and road improvements could have directly impacted individuals and could have altered or eliminated forested habitat. These impacts may also result from the proposed action. Due to the small size of the proposed treatment area versus the widespread availability of edge, clearing, and roadside habitat through rich deciduous forest across the Forest, cumulative impacts, if any, are expected to be imperceptible.

Long-tailed salamander (*Eurycea longicauda longicauda*)

Environmental Baseline – This species has been documented in Clay, Graham, and Macon Counties. The long-tailed salamander has a high potential to occur along streams, near seepages, or caves. This species will also wander far from water during wet conditions (Conant and Collins 1991, Petranka 1998, and Bartlett and Bartlett 2006).

Existing Condition

The project area contains or crosses habitat (streams, seepages) for this species.

Direct and Indirect Impacts – Direct impacts to individuals may occur during culvert removal/replacement at stream crossings and during other ground-disturbing activities associated with the proposed action. Indirect impacts may also occur as potential habitats for this species will be temporarily impacted during construction activities.

Cumulative Impacts – The impacts of past actions such as timber sales could have crushed individuals. These impacts may also result from the proposed action. Due to the relatively low likelihood that many individuals would be present within the project area during construction activities, cumulative impacts to this species or its habitat are expected to be minimal.

Cerulean warbler (*Dendroica cerulea*)

Environmental Baseline – This species has been documented in Clay, Graham, and Macon Counties. The cerulean warbler has a high potential to occur in mature, deciduous forests, typically with mesic conditions.

Existing Condition

The project area traverses several mature, deciduous forests with mesic conditions. Much of the project area contains habitat for the cerulean warbler. This habitat is located adjacent to the existing roadbed, as well as in the area of the proposed new road alignment.

Direct and Indirect Impacts – Direct impacts to individuals may occur if nests with eggs, hatchlings, or fledglings are present in the area of the new road alignment, as approximately 0.7 acres of currently forested habitat will be disturbed. Indirect impacts would be due to the permanent loss of this 0.7 acres of habitat.

Cumulative Impacts – This project will result in the loss of approximately 0.7 acres of potential habitat in the area of the new road alignment. Due to the small size of the area to be impacted, relative to the availability of mature deciduous habitat across the Forest, cumulative impacts associated with the proposed action are expected to be imperceptible.

Appalachian yellow-bellied sapsucker (*Sphyrapicus varius appalachiensis*)

Environmental Baseline – This species has been documented in Clay and surrounding counties. The Appalachian yellow-bellied sapsucker occurs in deciduous or mixed forest. During the breeding season, it has a high potential to occur in mature, open hardwoods with scattered dead trees, over 3,500 feet in elevation.

Existing Condition

The northern portion of the project area contains mature, hardwood forest above 3,500 feet in elevation. This habitat is largely limited to the area of proposed new road alignment.

Direct and Indirect Impacts – Direct impacts to individuals may occur if nests with eggs, hatchlings, or fledglings are present in the area of the new road alignment, as approximately 0.7 acres of currently forested habitat will be disturbed. Indirect impacts would be due to the permanent loss of this 0.7 acres of habitat.

Cumulative Impacts – Due to the small size of the area to be impacted, relative to the availability of mature hardwoods and snags across the Forest, cumulative impacts associated with the proposed action are expected to be imperceptible.

Warbling vireo (*Vireo gilvus*)

Environmental Baseline – This species has been documented in Macon County, but not Clay County. During the breeding season, it occurs in open deciduous or mixed woodlands, typically along rivers or streams, below 3,000 feet in elevation.

Existing Condition

Habitat for this species is located in the southern portion of the project area, where the existing roadbed is located below 3,000 in elevation and runs along Hickory Cove Creek.

Direct and Indirect Impacts – *Vireo gilvus* is not likely to occur within the portions of the project area where land clearing activities are scheduled to occur. The portion of the project area including habitat for this species will be subject to construction within the footprint of the existing roadbed and will not result in the clearing of additional forested acreage. No direct or indirect impacts are anticipated as a result of the proposed action.

Cumulative Impacts – Due to the small size of the area to be impacted, relative to the availability of mature hardwoods and snags across the Forest, cumulative impacts associated with the proposed action are expected to be imperceptible.

2.5.3 Aquatic Forest Concern Species

Nine aquatic Forest Concern Species are known to occur in Nantahala/Pisgah National Forest and Clay County. All nine species are listed below in Table 3.8.4.3 with a general habitat description.

Table 2.5.3. Aquatic Forest Concern species known to occur in Clay County on Nantahala/Pisgah National Forest and their likelihood of occurrence in the project area or downstream of project area.

| Group | Species | Habitat | Likelihood of Occurrence |
|-----------|-------------------------------------|---|--------------------------|
| Amphibian | <i>Cryptobranchus alleganiensis</i> | large, clear, fast-flowing streams | Occurs downstream |
| Caddisfly | <i>Micrasema burksi</i> | known from 11 streams in the mountains of NC from Avery County to Clay County | May occur |
| Caddisfly | <i>Rhyacophila amicus</i> | specific information unknown | May occur |
| Dragonfly | <i>Somatochlora elongata</i> | specific information unknown | May occur |
| Fish | <i>Erimystax insignis</i> | primarily French Broad River drainage | May occur |

| Group | Species | Habitat | Likelihood of Occurrence |
|--------|-----------------------------|---|--------------------------|
| Fish | <i>Moxostoma species 1</i> | Little Tennessee and Hiwassee River drainages | May occur downstream |
| Mayfly | <i>Baetopus trishae</i> | Specific information unknown | May occur |
| Mayfly | <i>Habrophleidiodes spp</i> | Specific information unknown | May occur |
| Mussel | <i>Villosa iris</i> | Hiwassee and Little Tennessee River drainages, formerly French Broad River drainage | May occur downstream |

The Forest Concern species listed in Table 3.8.4.3 were included in the effects analysis due to the possibility of their occurrence within the project area or within a reasonable distance downstream.

Direct and Indirect, and Cumulative Impacts –There may be a temporary increase in sedimentation during construction activities, particularly associated with culvert installation/replacement and new road alignment construction. However, these effects should be minimal with proper installation of erosion control measures. Fish would be able to avoid any areas of increased turbidity if it occurs. Individuals of less mobile species, like aquatic insects, could be directly and indirectly impacted if sedimentation occurs. Given the project design criteria, recommendations, and successful BMP implementation, this project would have little effects to the aquatic resources.

If individuals of these Forest Concern species were present, the proposed action could impact individuals but is not likely to cause a trend to federal listing or a loss of viability of these species. This project may impact individuals of the nine Forest Concern aquatic species. Habitats for these species are common across their ranges. There may be effects to some individuals of the species or minor portions of habitat. Cumulative effects, if any, on species viability across the Forest would be negligible.

| Group | Designation | Scientific Name | Common Name | Habitat |
|-------------------|-------------|-------------------------------------|---------------------|---|
| Botanical Species | | | | |
| Vascular plant | Endangered | <i>Sarracenia oreophila</i> | Green Pitcher Plant | low elevation Southern Appalachian Bog |
| Vascular plant | Sensitive | <i>Carex misera</i> | Miserable Sedge | High Elevation Rocky Summit, Montane Acidic Cliff, High Elevation Granitic Dome |
| Liverwort | Sensitive | <i>Drepanolejeunea appalachiana</i> | A Liverwort | Acidic Cove, Montane Oak-Hickory, Serpentine Woodland, Serpentine Forest |
| Vascular plant | Sensitive | <i>Euphorbia purpurea</i> | Glade Spurge | Northern Hardwood Forest, Rich Cove Forest, Mesic oak-hickory |
| Vascular plant | Sensitive | <i>Helianthus glaucophyllus</i> | Whiteleaf Sunflower | Rich Cove Forest, Northern Hardwood Forest, High Elevation Red Oak Forest, Mesic Oak-Hickory Forest, Roadside |
| Vascular plant | Sensitive | <i>Juglans cinerea</i> | Butternut | Rich Cove Forest, Mesic Oak-Hickory, Montane Alluvial Forest |
| Vascular plant | Sensitive | <i>Juncus caesariensis</i> | Rough Rush | low elevation Southern Appalachian Bog |
| Hornwort | Sensitive | <i>Megaceros aenigmaticus</i> | A Hornwort | stream |
| Vascular plant | Sensitive | <i>Monotropsis odorata</i> | Sweet Pinesap | Rich Cove Forest, Mesic Oak-Hickory, Xeric Oak-Hickory, Pine-Oak/Heath Forest |
| Lichen | Sensitive | <i>Peltigera venosa</i> | An Aquatic Lichen | Stream |
| Liverwort | Sensitive | <i>Plagiochila caduciloba</i> | A Liverwort | Spray Cliff, Streamside, Rock Outcrop in Acidic Cove Forest in Gorge |

| Group | Designation | Scientific Name | Common Name | Habitat |
|---------------------|-------------|--|-----------------------------------|--|
| Liverwort | Sensitive | <i>Plagiochila sharpii</i> | A Liverwort | High Elevation Rocky Summit, Rock Outcrop in Acidic Cove Forest in Gorge |
| Liverwort | Sensitive | <i>Plagiochila sullivantii</i> var. <i>sullivantii</i> | Sullivant's Leafy Liverwort | Spray Cliff, Spruce-Fir Forest |
| Vascular plant | Sensitive | <i>Prenanthes roanensis</i> | Roan Rattlesnakeroot | Northern Hardwood Forest, Grassy Bald, Meadow, Roadside, High Elevation Red Oak Forest |
| Liverwort | Sensitive | <i>Radula sullivantii</i> | A Liverwort | Spray Cliff, Rock Outcrop in Acidic Cove Forest in Gorge |
| Vascular plant | Sensitive | <i>Sceptridium jenmanii</i> | Alabama Grape Fern | Rich Cove Forest |
| Vascular plant | Sensitive | <i>Thalictrum macrostylum</i> | Small-Leaved Meadowrue | Serpentine Woodland, Serpentine Forest, moist woods? |
| Vascular plant | Sensitive | <i>Trillium pusillum</i> var. <i>ozarkanum</i> | Alabama Least Trillium | Rich Cove Forest, Mesic Oak-Hickory, mafic rock |
| Vascular plant | Sensitive | <i>Tsuga caroliniana</i> | Carolina Hemlock | Carolina Hemlock Forest, Montane Acidic Cliff, Pine-Oak/Heath, High Elevation Rocky Summit |
| Vascular plant | Sensitive | <i>Viola appalachiensis</i> | Appalachian Violet | Serpentine Woodland, Serpentine Forest, Rich Cove Forest, Mesic Oak-Hickory |
| Terrestrial Species | | | | |
| Mammal | Endangered | <i>Glaucomys sabrinus coloratus</i> | Carolina Northern Flying Squirrel | mature spruce-fir and northern hardwoods generally above 4,000 feet |
| Insect | Endangered | <i>Microhexura montivaga</i> | Spruce-Fir Moss Spider | on rocks in spruce-fir forests |

| Group | Designation | Scientific Name | Common Name | Habitat |
|-----------|------------------|---|-----------------------------|---|
| Mammal | Endangered | <i>Myotis grisescens</i> | Gray Bat | roosts in caves |
| Mammal | Endangered | <i>Myotis sodalis</i> | Indiana Bat | roosts in caves, hollow trees or under loose bark of trees in riparian areas |
| Reptile | Threatened (S/A) | <i>Glyptemys muhlenbergi</i> | Bog Turtle | sunlit, marshy meadows, bogs, and wet pastures |
| Mollusk | Threatened | <i>Patera clarki nantahala</i> | Noonday Globe | cliffs; cool, wet areas under vegetation and leaf litter |
| Insect | Sensitive | <i>Callophrys irus</i> | Frosted Elfin | open woods and borders, usually in dry situations; host plants - lupines(Lupinus) and wild indigos (Baptisia) |
| Insect | Sensitive | <i>Cicindela ancocisconensis</i> | A Tiger Beetle | high elevation forests, >4,000 feet |
| Mammal | Sensitive | <i>Corynorhinus rafinesquii rafinesquii</i> | Rafinesque's Big-Eared Bat | roosts in old buildings, caves, and mines, under loose bark, usually near water |
| Amphibian | Sensitive | <i>Desmognathus santeetlah</i> | Santeetlah Dusky Salamander | headwaters, seepage in hardwood, coves and spruce-fir, generally higher than 2220 feet |
| Insect | Sensitive | <i>Euchlaena milnei</i> | Milne's Euchlaena | unknown |
| Amphibian | Sensitive | <i>Eurycea junaluska</i> | Junaluska Salamander | Streams; wider, base level portions of streams below 2395' |
| Bird | Sensitive | <i>Haliaeetus leucocephalus</i> | Bald Eagle | mature forests near large bodies of water |
| Insect | Sensitive | <i>Melanoplus divergens</i> | Divergent Melanoplus | glades and balds, 1800' - 4717'; no records |

| Group | Designation | Scientific Name | Common Name | Habitat |
|-----------|-------------|--|---------------------------------|---|
| Insect | Sensitive | <i>Melanoplus serrulatus</i> | Serrulate Melanoplus | valleys and lower slopes |
| Mammal | Sensitive | <i>Microtus chrotorrhinus carolinensis</i> | Southern Rock Vole | rocky areas in spruce-fir, n. hardwoods and grassy balds; above 3200' |
| Mammal | Sensitive | <i>Myotis leibii</i> | Eastern Small-Footed Bat | hemlock forests, rock crevices, caves, mines or buildings, above 2000 ft |
| Insect | Sensitive | <i>Nesticus cooperi</i> | Lost Nantahala Cave Spider | caves |
| Insect | Sensitive | <i>Nesticus sheari</i> | Cave Spider | high elevation, n-facing rocky slopes, also rich cove forest at all aspects; no records |
| Insect | Sensitive | <i>Nesticus silvanus</i> | Cave Spider | high elevation, n-facing rocky slopes, also rich cove forest at all aspects; no records |
| Mollusk | Sensitive | <i>Pallifera hemphilli</i> | Black Mantleslug | high elevation forests, mainly spruce-fir |
| Mollusk | Sensitive | <i>Paravitrea placentula</i> | Glossy Supercoil | under leaf litter on wooded hillsides and ravines |
| Amphibian | Sensitive | <i>Plethodon aureolus</i> | Tellico Salamander | mixed forest, hardwood forests with fallen logs, leaf litter and organic soil |
| Amphibian | Sensitive | <i>Plethodon teyahalee</i> | Southern Appalachian Salamander | moist forests at all elevations |
| Insect | Sensitive | <i>Scudderia septentrionalis</i> | Northern Bush Katydid | in the treetops of edges of broadleaved forests |
| Insect | Sensitive | <i>Semiothisa fraserata</i> | Fraser Fir Angle | spruce-fir forests with fraser fir |

| Group | Designation | Scientific Name | Common Name | Habitat |
|-----------------|-------------|------------------------------------|------------------------------|---|
| Mammal | Sensitive | <i>Sorex palustris punctulatus</i> | Southern Water Shrew | streambanks 12-15' wide w/rhododendron cover in n. hardwood or spruce-fir forests; known from > 3000', mostly over 4000' |
| Insect | Sensitive | <i>Speyeria diana</i> | Diana Fritillary | mature deciduous and pine woodlands near streams; mostly along roadsides incoves below 4000'; nectar - joe-pye-weed, ironweed, butterflyweed; host plants - violets |
| Bird | Sensitive | <i>Thryomanes bewickii altus</i> | Appalachian Bewick's Wren | woodland borders or openings at high elevations |
| Insect | Sensitive | <i>Trechus luculentus unicoi</i> | A Ground Beetle | beneath rocks and moss in wet ravines and near seeps and springs > 3000' |
| Aquatic Species | | | | |
| Crayfish | Sensitive | <i>Cambarus parrishi</i> | Hiwassee Headwaters Crayfish | headwaters of the Hiwasee River |

Appendix II

**Indiana Bat (*Myotis sodalis*) Habitat Protection Plan
Laurel Creek Property Owners Association**

This protection plan applies certain principles of land use relative to the current scientific understanding of the Indiana bat (*Myotis sodalis*). The Indiana bat is not currently known to occur in Clay County, but has been recently documented in adjacent Cherokee, Graham, Swain, and Haywood Counties (NCNHP Element Occurrences database, accessed 15 February 2011). In summer, habitat consists of wooded or semiwooded areas, mainly along streams. This species has high potential to occur in hollow trees or under loose bark of living or dead trees standing in sunny openings. This habitat is used by solitary females or small maternity colonies to bear their offspring. Though maternity sites have been reported as occurring mainly in riparian and floodplain forests, recent studies indicate that upland habitats are used by maternity colonies much more extensively than previously reported. Recent studies in the southern Appalachians indicate that maternity colony trees are often large conifers with exfoliating bark located in sunny canopy gaps. In winter, caves are utilized for hibernation. Indiana bats are known to use highly altered and fragmented landscapes. They may respond favorably to habitat disturbance, particularly where forests are even-aged and closed-canopied. A diverse landscape may benefit Indiana bats, provided that adequate areas of mature forest and suitable roost trees remain.

The LCPOA tract contains elements of potential habitat for this species in the form of mature deciduous forest including forested riparian areas. Forest management and/or development plans will be designed such that Indiana bats are not harmed. To ensure this, the following measure will be implemented:

No suitable roost trees will be felled during the period between April 15 and October 15. This measure will eliminate the threat of direct effect (take) to individual bats. Under this measure, potential habitat within the LCPOA tract could be lost through felling of trees during the winter months. The cumulative effect of this habitat loss would be imperceptible, compared to the availability of potential habitat in areas surrounding the LCPOA tract, and is not likely to adversely affect this species.

Other activities may be possible with a concurrence letter from the U.S. Fish and Wildlife Service. These exceptions will be considered on a case-by-case basis as the need arises.

Current development plans within the LCPOA tract include:

Building of up to 5 single family residences (primitive cabins) on the LCPOA tract.

**Addendum to the Biological Evaluation for
Laurel Creek Property Owners Association
Access Across National Forest System Lands
Clay County, North Carolina**

This addendum includes effects analyses for forest concern species for the proposed project area. This document does not affect any determinations of effects for federally threatened, endangered, proposed, or sensitive species; therefore, the original Fish and Wildlife Concurrence on the BE remains valid.

FOREST CONCERN SPECIES

Forest Concern (FC) species are designated by the National Forests of North Carolina, and lie at the periphery of their range or disjunct from their main range. The Nantahala-Pisgah National Forest maintains a list of Forest Concern species on NFS lands; all of these species were originally considered (see Appendix A). The list was filtered by considering only those species listed by the Forest Service as occurring or probably occurring in Clay County, with the exception of terrestrial wildlife. Due to the mobility of terrestrial wildlife, the filtered list also included species occurring or probably occurring in nearby counties (Cherokee, Graham, Macon, and Swain). A total of 82 species remained after this filter, and included 36 plant species, 37 terrestrial animal species, and 9 aquatic animal species.

The list was then subjected to a second filtering step, eliminating species whose associated natural community type (general habitat), or specialized habitat type *within* a community did not occur within the project area. Examples of natural community types include Rich Cove, Acidic Cove, Montane Oak-Hickory, Northern Hardwood, and High Elevation Red Oak communities. Examples of specialized habitat types include spray cliffs, granitic domes, caves, rock outcrops, talus slopes, bogs, wetlands, spruce-fir forests, etc. Habitat preferences and ranges of these plant and animal species were based on a variety of sources, including the NCNHP database, Forest Service lists, NatureServe© database, personal communication with Forest Service personnel, and other reference materials. Natural community classification followed Schafale and Weakley (1990).

Site visits and pedestrian field surveys of the project area were conducted by Fish and Wildlife Associates, Inc. (FWA) in March 2007, June 2008, June 2009, and March 2010.

BOTANICAL FOREST CONCERN SPECIES

After removing species that require specialized habitats (as described above), the list was further narrowed by eliminating those species with general habitat requirements not found within the proposed treatment areas.

General habitat requirements for 14 of the 36 botanical forest concern species occurring in Clay County occur in the proposed treatment area. Those 14 species are listed in *Table 1*, including a general habitat description. The NCNHP Virtual Workroom was accessed to determine if any of the 14 botanical species occur within the proposed treatment area. Of these 14 botanical species, none were found or known to occur within the project area, but *Frasera caroliniensis* has been documented within two miles of the project vicinity.

Table 1. Botanical Forest Concern species occurring in Clay County with general habitat requirements within the project area.

| Group | Species | Common Name | Habitat* |
|----------------|-------------------------------------|--------------------------|--|
| Vascular Plant | <i>Brachyelytrum septentrionale</i> | Northern shorthusk | Serpentine Forest, Northern Hardwood Forest, Rich Cove Forest |
| Vascular Plant | <i>Calamagrostis porteri</i> | Porter's reedgrass | Serpentine Woodland, Montane Oak-Hickory Forest |
| Vascular Plant | <i>Carex cherokeensis</i> | Cherokee sedge | Montane Alluvial Forest, Roadside, Rich Cove Forest |
| Vascular Plant | <i>Carex leptonevia</i> | A wood sedge | Boulderfield Forest, Northern Hardwood Forest, High Elevation Seep, Rich Cove Forest |
| Vascular Plant | <i>Carex oligocarpa</i> | Few-fruited sedge | Rich Cove Forest |
| Vascular Plant | <i>Carex purpurifera</i> | Purple sedge | Rich Cove Forest, Montane Alluvial Forest |
| Vascular Plant | <i>Carex woodii</i> | Wood's sedge | Northern Hardwood Forest, Rich Cove Forest, Acidic Cove Forest, Mesic Oak-Hickory Forest |
| Vascular Plant | <i>Frasera caroliniensis</i> | Columbo | Rich Cove Forest, Mesic Oak-Hickory Forest |
| Vascular Plant | <i>Helenium breifolium</i> | Littleleaf sneezeweed | Southern Appalachian Bog, Wet Meadow, Seeps, Riverbanks |
| Vascular Plant | <i>Hexalectris spicata</i> | Spiked crested coralroot | Rich Cove Forest, Glade, Mesic Oak-Hickory Forest, Mafic rock |
| Vascular Plant | <i>Liparis loeselii</i> | Yellow widelip orchid | Seep, Roadside |
| Vascular Plant | <i>Pedicularis lanceolata</i> | Swamp Lousewort | Serpentine Woodland, Southern Appalachian Bog, Seep, Swamp, Wet Meadow |
| Vascular Plant | <i>Platanthera peramoena</i> | Purple fringeless orchid | Southern Appalachian Bog, Seep, Marsh |
| Vascular Plant | <i>Smilax hugeri</i> | Huger's carrionflower | Rich Cove Forest, Mesic Oak-Hickory Forest, Mafic Rock |

***Bolded habitat indicates presence in the project area.**

There will be no direct, indirect, or cumulative impacts to any botanical forest concern species because none are known to occur, or have been documented, within the project area.

TERRESTRIAL WILDLIFE FOREST CONCERN SPECIES

After filtering by county (as described), 37 Forest Concern species remained for consideration (see **Table 2**). The list was further narrowed by eliminating those species whose associated natural community type was not present within the project area. Where possible, species whose specialized habitat types (spray cliffs, granitic domes, rock outcrops, talus slopes, spruce-fir forests, etc.) were absent were also eliminated from further consideration. Habitat preferences and ranges of these species were based on a variety of sources, including the NCNHP database, Forest Service lists, NatureServe© database, personal communication with Forest Service personnel, and other reference materials. Natural community classification followed Schafale and Weakley (1990). As noted in **Table 9-6**, 4 species were not evaluated further in this analysis because the project area did not have the associated natural community type and/or specialized

habitat type, or the species is restricted to a well-defined geographical area outside of the project vicinity. The proposed action will therefore have will have no effect or impact on these 4 species. The analysis of potential effects or impacts focused on the 22 remaining species; these species are listed in Table 9-6 and discussed below.

Table 2. Terrestrial Forest Concern species, habitat, and likelihood of occurrence in the project area.

| Group | Species | Habitat | Likelihood of Occurrence |
|------------------------|--|---|-------------------------------------|
| Invertebrate Animal | <i>Appalachina chilhoweensis</i> (queen crater) | under leaf litter and rock piles in rich coves | May occur |
| Invertebrate Animal | <i>Autochton cellus</i> (golden-banded skipper) | moist woods near streams or ponds; nectar -- blackberry, trailing arbutus, hollyhock, and abelia; host -- legumes, mainly hog peanut | May occur |
| Invertebrate Animal | <i>Celastrina nigra</i> (dusky azure) | rich, moist deciduous forests; nectar - wild geranium; host - goat's beard | May occur |
| Invertebrate Animal | <i>Chlosyne gorgone</i> (gorgone checkerspot) | woodland borders and openings; host plants are sunflowers and other tall composites | May occur |
| Invertebrate Animal | <i>Glyphyalinia junaluskana</i> (dark glyph) | moist leaf litter in mixed, mesic woods on mountainsides | May occur |
| Invertebrate Animal | <i>Glyphyalinia pentadelphia</i> (pink glyph) | pockets of moist leaves in rich or acidic cove forests; no actual records | May occur |
| Invertebrate Animal | <i>Haplotrema kendeighi</i> (blue-footed lancetooth) | mountainsides in leaf litter or crawling on the ground in wet weather ; mixed or cove hardwood forests; no actual records | May occur |
| Invertebrate Animal | <i>Helicodiscus fimbriatus</i> (fringed coil) | leaf litter and under rocks on wooded hillsides, crevices in slates; no actual records | May occur |
| Invertebrate Animal | <i>Melanoplus cherokee</i> (Cherokee melanoplus) | woodlands, 1800' - 5100'; no records | May occur |
| Invertebrate Animal | <i>Melanoplus viridipes</i> <i>eurycerus</i> (green-legged Melanoplus) | woodlands and forest edges; no records | May occur |
| Invertebrate Animal | <i>Nesticus species 2</i> | small rocks scattered over n-facing cove forests, southwest-facing talus fields | May occur |
| Invertebrate Animal | <i>Paravitrea lamellidens</i> (lamellate supercoil) | deep moist leaf litter and ravines in acidic cove, rich cove, and montane-oak hickory forests; no actual records | May occur |
| Invertebrate Animal | <i>Paravitrea umbilicaris</i> (open supercoil) | cove forests with rocky slopes | May occur |
| Invertebrate Animal | <i>Patera clarki clarki</i> (dwarf proud globe) | Rich cove forest, high elevation red oak forest, leaf litter on mountainsides; no actual records | May occur |
| Invertebrate Animal | <i>Phyciodes batesii</i> <i>maconensis</i> (tawny crescent) | rocky ridges and woodland openings at higher elevations; host plants - <i>Aster</i> <i>undulatus</i> | Not likely to occur ¹ |

| Group | Species | Habitat | Likelihood of Occurrence |
|---------------------|--|--|----------------------------------|
| Invertebrate Animal | <i>Polygonia progne</i> (gray comma) | rich deciduous forests; host plants - mainly gooseberries (<i>Ribes</i>), but also on wild azalea (<i>Rhododendron nudiflorum</i>) | May occur |
| Invertebrate Animal | <i>Zonitoides patuloides</i> (Appalachian gloss) | deep, moist leaf litter on mountainsides or in ravines, beneath bark of logs; no records | May occur |
| Amphibian | <i>Eurycea longicauda longicauda</i> (long-tailed salamander) | streams, seeps, springs in moist woods and floodplains; breeds in streams/ponds | May occur |
| Bird | <i>Dendroica cerulea</i> (cerulean warbler) | mature hardwood forests; steep slopes and coves in mountains | May occur |
| Bird | <i>Sphyrapicus varius appalachiensis</i> (Appalachian yellow-bellied sapsucker) | mature, open hardwoods with scattered dead trees above 3500', breeding season only | May occur |
| Bird | <i>Vermivora pinus</i> (blue-winged warbler) | low elevation (below 3000') brushy fields and thickets, breeding season only | Not likely to occur ¹ |
| Bird | <i>Vireo gilvus</i> (warbling vireo) | open groves of hardwoods along rivers and streams below 3000' | May occur |

¹Species is not likely to occur because potential habitat is not available in the proposed treatment area. This species was not analyzed further.

FOREST CONCERN LAND SNAILS

Environmental Baseline – Seven species of Forest Concern land snails have been recorded on Forest Service lands in one or more of the adjacent counties, but are not known to occur in Clay County. These species are: *Appalachina chilhoweensis*, *Glyphyalinia junaluskana*, *Haplotrema kendeighi*, *Helicodiscus fimbriatus*, *Paravitrea lamellidens*, *Paravitrea umbilicaris* and *Zonitoides patuloides*. Preferred habitat for these species varies (see **Table 2**, above), but typically includes leaf litter in deciduous forests.

Existing Condition

Due to the lack of specific habitat preference information for these species, it is difficult to completely eliminate the possibility of one or more of these species occurring within the project area. However, it is considered unlikely that any of these species are present. Snail surveys have been conducted for other Forest Service projects in similar habitats in Clay County. No rare gastropods were documented during those surveys.

Direct and Indirect Impacts – Due to the low likelihood that this species occurs within or near the proposed treatment area, no direct or indirect impacts as a result of this project are anticipated.

Cumulative Impacts – Due to the lack of direct and indirect impacts, there will be no cumulative impacts as a result of this project.

GOLDEN BANDED SKIPPER (*Autochton cellus*)

Environmental Baseline –The golden banded skipper has been documented in Cherokee, Graham, Macon, and Swain Counties, but not in Clay County. This species has a high potential to occur in moist woods near streams or ponds. Adults feed on nectar from blackberry, trailing

arbutus, hollyhock, and abelia. Hog peanut is the primary host plant for caterpillars (Opler et al. 2006).

Existing Condition

General habitat exists within the proposed treatment area; this habitat includes moist woods and streams. Adult nectar plants and host plants (blackberry and hog-peanut) are also present within the project area.

Direct and Indirect Impacts – Direct impacts to individuals may result from the proposed action, as any individuals present within the project area could be crushed or directly displaced during land clearing activities. Nectar and host plants will be impacted as a result of the proposed action. Due to the tendency of *Rubus sp.* to colonize disturbed areas, it may reestablish itself along portions of roadside within the project area.

Cumulative Impacts – The impacts of past actions such as timber sales could have crushed plants with eggs or caterpillars. These impacts may also result from the proposed action. Blackberry and hog-peanut may recolonize after construction activities, although blackberry is more likely. Due to the small size of the proposed treatment area and the widespread availability of habitat and host/nectar plants across the Forest, cumulative impacts, if any, are expected to be imperceptible.

DUSKY AZURE (*Celastrina nigra*)

Environmental Baseline – The dusky azure has been documented in Clay and Macon Counties. General habitat for this species includes shaded, moist, deciduous woods. Adults are often seen feeding on wild geranium. The caterpillar host plant is goat's beard (Opler et al. 2006).

Existing Condition

General habitat (moist, deciduous woods) does exist within the project area; however, host and nectar plants for this species were not observed within areas to be impacted under the action alternative.

Direct and Indirect Impacts – The dusky azure is not likely to occur in the proposed treatment area, due to the lack of host plants. No direct or indirect impacts are anticipated.

Cumulative Impacts – Due to the lack of direct and indirect impacts, there will be no cumulative impacts as a result of this project.

GORGONE CHECKERSPOT (*Chlosyne gorgone*)

Environmental Baseline – This species has been documented in Clay and Macon Counties. General habitat includes woodland openings and borders. This species has a high potential to occur where host plants are present. Host plants include sunflowers, rosinweeds, and other tall composites.

Existing Condition

This species has a high potential to occupy the proposed treatment area; limited openings and borders are present and host plants were observed there.

Direct and Indirect Impacts – Direct impacts to individuals may result from the proposed action, as any individuals present within the project area could be crushed or directly displaced during land clearing activities. Indirect impacts may consist of host plants and general habitat being impacted during land clearing activities.

Cumulative Impacts – The impacts of past actions such as timber sales could have crushed plants with eggs or caterpillars, and could have temporarily impacted habitat. These impacts may also

result from the proposed action; however improvement of an existing forest road and construction of new alignment will create/maintain some additional woodland border habitat over the long term. Due to the small size of the proposed treatment area versus the widespread availability of general habitat and host plants across the Forest, cumulative impacts, if any, are expected to be imperceptible.

PINK GLYPH (*Glyphyalinia pentadelphia*)

Environmental Baseline – This species has been documented in Clay County. General habitat includes Rich Cove and Acidic Cove Forests. Associate species include *Allogona profunda* (broad-banded forest snail), *Halesia sp.* (silverbell), and *Aesculus octandra* (yellow buckeye) (Pilsbry 1946).

Existing Condition

General habitat (Rich Cove and Acidic Cove Forest) occurs within the proposed treatment area.

Available Inventories Information – No targeted snail surveys have been conducted within the project area, although snail surveys have been conducted for other Forest Service projects in Clay County. No rare gastropods were documented during those surveys.

Direct and Indirect Impacts – If present within the project area, direct impacts could occur as individuals could be crushed or directly displaced during land clearing activities. Indirect impacts consist of the permanent loss of approximately 0.7 acres of forested habitat.

Cumulative Impacts – The impacts of past actions such as timber sales could have directly impacted individuals and could have altered or eliminated forested habitat. These impacts may also result from the proposed action. Due to the small size of the project area versus the widespread availability of rich cove habitat across the Forest, cumulative impacts, if any, are expected to be imperceptible.

CHEROKEE MELANOPLUS (*Melanoplus cherokee*)

GREEN-LEGGED MELANOPLUS (*Melanoplus viridipes eurycerus*)

Environmental Baseline – Little information is available regarding the distribution, records, and specific habitat requirements of these grasshopper species. General habitat includes woodlands from 1,800 to 5,100 feet in elevation for *Melanoplus cherokee*; general habitat for *Melanoplus viridipes eurycerus* includes woodlands and forest edges.

Existing Condition

The likelihood of occurrence within the project area is unknown due to the lack of information regarding specific habitat requirements for these species. General habitat (woodlands and forest edges) is present within the project area.

Direct and Indirect Impacts – If present, direct impacts to individuals may result from the proposed action, as any individuals present within the project area could be crushed or directly displaced during land clearing activities. Indirect impacts may consist of general habitat being impacted during land clearing activities.

Cumulative Impacts – Past actions such as timber sales could have directly impacted individuals, and could have impacted habitat. These impacts may also result from the proposed action. Due to the small size of the proposed treatment area versus the widespread availability of general habitat across the Forest, cumulative impacts, if any, are expected to be imperceptible.

A NESTICUS SPIDER (*Nesticus sp. 2*)

Environmental Baseline – This species has only been documented in the Chunky Gal Mountains of Clay County. Only 4 element occurrences exist. Habitat is described as small rocks scattered over north-facing cove forests, and southwest-facing talus fields.

Existing Condition

Habitat (north-facing cove forest) may exist within the project area.

Direct and Indirect Impacts – If present, direct impacts to individuals may result from the proposed action, as any individuals present within the project area could be crushed or directly displaced during land clearing activities. Indirect impacts may consist of the disturbance of small amounts of north-facing cove forest during land clearing activities.

Cumulative Impacts – Past actions such as timber sales could have directly impacted individuals, and could have impacted habitat. These impacts may also result from the proposed action. Due to the small size of the proposed treatment area versus the widespread availability of general habitat across the Forest, cumulative impacts, if any, are expected to be imperceptible.

DWARF PROUD GLOBE (*Patera clarki clarki*)

Environmental Baseline – This species has been documented in Clay County and the surrounding counties, but it not known to occur in the vicinity of the project area. General habitat includes Rich Cove, High Elevation Red Oak, and Mesic Mixed Hardwood Forests. This species has a high potential to occur in habitats with the following species present: *Acer pensylvanicum*, *A. saccharum*, *A. rubrum*, and *Aesculus flava* (Pilsbry, 1946).

Existing Condition

The proposed treatment area contains general habitat (Rich Cove, and Mesic Mixed Hardwood Forest) for *Patera clarki clarki*. Associate species were also present within the project area.

Available Inventories Information – No previous surveys have been conducted within the proposed treatment area, although snail surveys have been conducted for other Forest Service projects in Clay County. No rare gastropods were documented during those surveys.

Direct and Indirect Impacts – If present within the project area, direct impacts could occur as individuals could be crushed or directly displaced during land clearing activities. Indirect impacts consist of the permanent loss of approximately 0.7 acres of forested habitat.

Cumulative Impacts – The impacts of past actions such as timber sales could have directly impacted individuals and could have altered or eliminated forested habitat. These impacts may also result from the proposed action. Due to the small size of the project area versus the widespread availability of general habitat across the Forest, cumulative impacts, if any, are expected to be imperceptible.

GRAY COMMA (*Polygonia progne*)

Environmental Baseline – This species has been documented in Clay and Swain Counties. General habitat for this species includes rich deciduous or coniferous forest. This species has a high potential to occupy areas along dirt roads, streams, or within clearings. Adults feed on sap, rarely nectar. Host plants for caterpillars include *Ribes sp.* and *Rhododendron nudiflorum* (Opler et al. 2006).

Existing Condition

Habitat for this species is present within the project area. However, no host plants were identified in the area. Adults could use habitats within or near the proposed treatment area. Rich deciduous forest occurs in the proposed treatment area; streams and dirt roads occur near the

area. In the absence of host plants, it is unlikely that caterpillars of this species occur within the proposed treatment area.

Direct and Indirect Impacts – If present within the project area, adults could be directly impacted due to crushing or displacement during land clearing activities. Indirect impacts consist of the temporary disturbance of a small amount of edge habitat along the existing roadbed, as well as streamside habitat at stream crossings.

Cumulative Impacts – The impacts of past actions such as timber sales and road improvements could have directly impacted individuals and could have altered or eliminated forested habitat. These impacts may also result from the proposed action. Due to the small size of the proposed treatment area versus the widespread availability of edge, clearing, and roadside habitat through rich deciduous forest across the Forest, cumulative impacts, if any, are expected to be imperceptible.

LONG-TAILED SALAMANDER (*Eurycea longicauda longicauda*)

Environmental Baseline – This species has been documented in Clay, Graham, and Macon Counties. The long-tailed salamander has a high potential to occur along streams, near seepages, or caves. This species will also wander far from water during wet conditions (Conant and Collins 1991, Petranka 1998, and Bartlett and Bartlett 2006).

Existing Condition

The project area contains or crosses habitat (streams, seepages) for this species.

Direct and Indirect Impacts – Direct impacts to individuals may occur during culvert removal/replacement at stream crossings and during other ground-disturbing activities associated with the proposed action. Indirect impacts may also occur as potential habitats for this species will be temporarily impacted during construction activities.

Cumulative Impacts – The impacts of past actions such as timber sales could have crushed individuals. These impacts may also result from the proposed action. Due to the relatively low likelihood that many individuals would be present within the project area during construction activities, cumulative impacts to this species or its habitat are expected to be minimal.

CERULEAN WARBLER (*Dendroica cerulea*)

Environmental Baseline – This species has been documented in Clay, Graham, and Macon Counties. The cerulean warbler has a high potential to occur in mature, deciduous forests, typically with mesic conditions.

Existing Condition

The project area traverses several mature, deciduous forests with mesic conditions. Much of the project area contains habitat for the cerulean warbler. This habitat is located adjacent to the existing roadbed, as well as in the area of the proposed new road alignment.

Direct and Indirect Impacts – Direct impacts to individuals may occur if nests with eggs, hatchlings, or fledglings are present in the area of the new road alignment, as approximately 0.7 acres of currently forested habitat will be disturbed. Indirect impacts would be due to the permanent loss of this 0.7 acres of habitat.

Cumulative Impacts – This project will result in the loss of approximately 0.7 acres of potential habitat in the area of the new road alignment. Due to the small size of the area to be impacted, relative to the availability of mature deciduous habitat across the Forest, cumulative impacts associated with the proposed action are expected to be imperceptible.

APPALACHIAN YELLOW-BELLIED SAPSUCKER (*Sphyrapicus varius appalachiensis*)

Environmental Baseline – This species has been documented in Clay and surrounding counties. The Appalachian yellow-bellied sapsucker occurs in deciduous or mixed forest. During the breeding season, it has a high potential to occur in mature, open hardwoods with scattered dead trees, over 3,500 feet in elevation.

Existing Condition

The northern portion of the project area contains mature, hardwood forest above 3,500 feet in elevation. This habitat is largely limited to the area of proposed new road alignment.

Direct and Indirect Impacts – Direct impacts to individuals may occur if nests with eggs, hatchlings, or fledglings are present in the area of the new road alignment, as approximately 0.7 acres of currently forested habitat will be disturbed. Indirect impacts would be due to the permanent loss of this 0.7 acres of habitat.

Cumulative Impacts – Due to the small size of the area to be impacted, relative to the availability of mature hardwoods and snags across the Forest, cumulative impacts associated with the proposed action are expected to be imperceptible.

WARBLING VIREO (*Vireo gilvus*)

Environmental Baseline – This species has been documented in Macon County, but not Clay County. During the breeding season, it occurs in open deciduous or mixed woodlands, typically along rivers or streams, below 3,000 feet in elevation.

Existing Condition

Habitat for this species is located in the southern portion of the project area, where the existing roadbed is located below 3,000 in elevation and runs along Hickory Cove Creek.

Direct and Indirect Impacts – *Vireo gilvus* is not likely to occur within the portions of the project area where land clearing activities are scheduled to occur. The portion of the project area including habitat for this species will be subject to construction within the footprint of the existing roadbed and will not result in the clearing of additional forested acreage. No direct or indirect impacts are anticipated as a result of the proposed action.

Cumulative Impacts – Due to the small size of the area to be impacted, relative to the availability of mature hardwoods and snags across the Forest, cumulative impacts associated with the proposed action are expected to be imperceptible.

AQUATIC FOREST CONCERN SPECIES

Nine aquatic Forest Concern Species are known to occur in Nantahala/Pisgah National Forest and Clay County. All nine species are listed below in **Table 3** with a general habitat description.

Table 3. Aquatic Forest Concern species known to occur in Clay County on Nantahala/Pisgah National Forest and their likelihood of occurrence in the project area or downstream of project area.

| Group | Species | Habitat | Likelihood of Occurrence |
|-----------|-------------------------------------|---|--------------------------|
| Amphibian | <i>Cryptobranchus alleganiensis</i> | large, clear, fast-flowing streams | Occurs downstream |
| Caddisfly | <i>Micrasema burksi</i> | known from 11 streams in the mountains of NC from Avery County to Clay County | May occur |
| Caddisfly | <i>Rhyacophila amicus</i> | specific information unknown | May occur |
| Dragonfly | <i>Somatochlora elongata</i> | specific information unknown | May occur |
| Fish | <i>Erimystax insignis</i> | primarily French Broad River drainage | May occur |
| Fish | <i>Moxostoma species 1</i> | Little Tennessee and Hiwassee River drainages | May occur downstream |
| Mayfly | <i>Baetopus trishae</i> | Specific information unknown | May occur |
| Mayfly | <i>Habrophleidiodes spp</i> | Specific information unknown | May occur |
| Mussel | <i>Villosa iris</i> | Hiwassee and Little Tennessee River drainages, formerly French Broad River drainage | May occur downstream |

The Forest Concern species listed above in *Table 3* were included in the effects analysis due to the possibility of their occurrence within the project area or within a reasonable distance downstream.

Direct and Indirect, and Cumulative Impacts –There may be a temporary increase in sedimentation during construction activities, particularly associated with culvert installation/replacement and new road alignment construction. However, these effects should be minimal with proper installation of erosion control measures. Individuals of the fishes would be able to avoid any areas of increased turbidity if it occurs. Individuals of less mobile species, like aquatic insects, could be directly and indirectly impacted if sedimentation occurs. Given the project design criteria, recommendations, and successful BMP implementation, this project will have little effects to the aquatic resources.

If individuals of these Forest Concern species were present, the proposed action could impact individuals but is not likely to cause a trend to federal listing or a loss of viability of these species. This project may impact individuals of the nine Forest Concern aquatic species. Habitats for these species are common across their ranges. There may be effects to some individuals of the species or minor portions of habitat. Cumulative effects, if any, on species viability across the Forest will be negligible.

This addendum finalizes the BE, including the April 21, 2011 document submitted to USFWS for concurrence, for this project.

/s/ Jason Farmer

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October 17, 2011

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Appendix A

Forest Concern Species that occur in Clay County,
(or surrounding counties for terrestrial wildlife)

| Group | Designation | Scientific Name | Common Name | Habitat |
|--------------------------|--------------|---|-----------------------------|--|
| Botanical Species | | | | |
| Vascular Plant | Locally Rare | <i>Brachyelytrum aristosum</i> | Northern Shorthusk | Serpentine Forest, Northern Hardwood Forest, Rich Cove Forest |
| Vascular Plant | Locally Rare | <i>Calamagrostis porteri</i> | Porter's Reedgrass | Serpentine Woodland, Montane Oak-Hickory Forest |
| Vascular Plant | Locally Rare | <i>Campanula aparinoides</i> | Marsh Bellflower | Southern Appalachian Bog, Wet Meadow |
| Vascular Plant | Locally Rare | <i>Carex cherokeeensis</i> | Cherokee Sedge | Montane Alluvial Forest, Roadside, Rich Cove Forest |
| Vascular Plant | Locally Rare | <i>Carex leptonevia</i> | A Wood Sedge | Boulderfield Forest, Northern Hardwood Forest, High Elevation Seep, Rich Cove Forest |
| Vascular Plant | Locally Rare | <i>Carex oligocarpa</i> | Few-Fruited Sedge | Rich Cove Forest |
| Vascular Plant | Locally Rare | <i>Carex purpurifera</i> | Purple Sedge | Rich Cove Forest, Montane Alluvial Forest |
| Vascular Plant | Locally Rare | <i>Carex woodii</i> | Wood's Sedge | Northern Hardwood Forest, Rich Cove Forest, Acidic Cove Forest, Mesic Oak-Hickory |
| Vascular Plant | Locally Rare | <i>Crocantemum propinquum</i> | Creeping Sunrose | Glade, Southern Appalachian Fen, Montane Acidic Cliff |
| Vascular Plant | Locally Rare | <i>Cypripedium parviflorum var. parviflorum</i> | Small Yellow Lady's-Slipper | High Elevation Red Oak Forest |
| Vascular Plant | Locally Rare | <i>Deschampsia cespitosa ssp. glauca</i> | Tufted Hairgrass | Serpentine Woodland, Serpentine Forest |
| Vascular Plant | Locally Rare | <i>Elymus trachycaulus ssp. trachycaulus</i> | Slender Wheatgrass | Serpentine Woodland |
| Vascular Plant | Locally Rare | <i>Frasera caroliniensis</i> | Columbo | Rich Cove Forest, Mesic Oak-Hickory Forest |
| Vascular Plant | Locally Rare | <i>Gentianopsis crinita</i> | Fringed Gentian | Serpentine Woodland, Glade |
| Vascular Plant | Locally Rare | <i>Hackelia virginiana</i> | Virginia Stickseed | Woods and thickets, circumneutral soils |
| Vascular Plant | Locally Rare | <i>Helenium brevifolium</i> | Littleleaf Sneezeweed | Southern Appalachian Bog, Wet Meadow, Seeps, Riverbanks |

| Group | Designation | Scientific Name | Common Name | Habitat |
|-------------------|--------------|--|---------------------------------|--|
| Vascular Plant | Locally Rare | <i>Hexalectris spicata</i> | Crested Coralroot | Rich Cove Forest, Glade, Mesic Oak-Hickory, mafic rock |
| Vascular Plant | Locally Rare | <i>Houstonia longifolia</i> var. <i>glabra</i> | Granite Dome Bluet | High Elevation Granitic Dome |
| Vascular Plant | Locally Rare | <i>Liparis loeselii</i> | Fen Orchid | Seep, Roadside |
| Nonvascular Plant | Locally Rare | <i>Macrocoma sullivantii</i> | Macrocoma Moss | Montane Cedar Hardwood Forest, Pine-Oak/Heath Forest |
| Vascular Plant | Locally Rare | <i>Muhlenbergia glomerata</i> | Bristly Muhly | Serpentine Woodland, Southern Appalachian Fen, Montane Mafic Cliff |
| Vascular Plant | Locally Rare | <i>Oenothera perennis</i> | Perennial Sundrops | Southern Appalachian Bog, Roadside |
| Vascular Plant | Locally Rare | <i>Packera plattensis</i> | Prairie Ragwort | Serpentine Woodland, Serpentine Forest, Montane Mafic Cliff, Montane Calcareous Cliff |
| Vascular Plant | Locally Rare | <i>Parnassia grandifolia</i> | Large-Leaved Grass-Of-Parnassus | Seep, Fen, Serpentine Woodland, Roadside, mafic rock |
| Vascular Plant | Locally Rare | <i>Pedicularis lanceolata</i> | Swamp Lousewort | Serpentine Woodland, Southern Appalachian Bog, Seep, Swamp, Wet Meadow |
| Vascular Plant | Locally Rare | <i>Platanthera flava</i> var. <i>herbiola</i> | Northern Green Orchid | Southern Appalachian Bog, Swamp Forest-Bog Complex |
| Vascular Plant | Locally Rare | <i>Platanthera grandiflora</i> | Large Purple-Fringed Orchid | High Elevation Seep, Grassy Bald, Roadside, Northern Hardwood Forest, Southern Appalachian Bog |
| Vascular Plant | Locally Rare | <i>Platanthera peramoena</i> | Purple Fringeless Orchid | Southern Appalachian Bog, Seep, Marsh |
| Vascular Plant | Locally Rare | <i>Poa saltuensis</i> | A Bluegrass | Serpentine Woodland, Serpentine Forest |
| Vascular Plant | Locally Rare | <i>Ranunculus fascicularis</i> | Early Buttercup | Roadside, Serpentine Woodland |
| Nonvascular Plant | Locally Rare | <i>Scopelophila ligulata</i> | Copper Moss | Copper-rich Soils, Roadsides |
| Vascular Plant | Locally | <i>Smilax hugeri</i> | Huger's Carrion- | Rich Cove Forest, Mesic Oak- |

| Group | Designation | Scientific Name | Common Name | Habitat |
|----------------------------|--------------|--------------------------------------|----------------------------------|---|
| | Rare | | Flower | Hickory, mafic rock |
| Vascular Plant | Locally Rare | <i>Solidago uliginosa</i> | Bog Goldenrod | High Elevation Seep, Southern Appalachian Bog |
| Vascular Plant | Locally Rare | <i>Spiranthes lacera var. lacera</i> | Northern Slender Ladies-Tresses | Balds |
| Vascular Plant | Locally Rare | <i>Sporobolus heterolepis</i> | Prairie Dropseed | Serpentine Woodland |
| Vascular Plant | Locally Rare | <i>Symphotrichum rhiannon</i> | Rhiannon's Aster | Serpentine Barren |
| Terrestrial Species | | | | |
| Bird | Locally rare | <i>Aegolius acadicus pop. 1</i> | Northern Saw-Whet Owl-So. Appal. | spruce-fir forests or mixed hardwood/spruce forests for nesting; over 5000' |
| Amphibian | Locally rare | <i>Ambystoma talpoideum</i> | Mole Salamander | Floodplains, bottomlands; breeds in fish-free semipermanent woodland ponds; forages in adjacent woodlands |
| Amphibian | Locally rare | <i>Aneides aeneus</i> | Green Salamander | shady, moist, granite-gneiss rock outcrops with abundant connecting crevices |
| Mollusk | Locally rare | <i>Appalachina chilhoweensis</i> | Queen Crater | under leaf litter and rock piles in deciduous forests; no actual records |
| Invertebrate Animal | Locally rare | <i>Autochton cellus</i> | Golden Banded Skipper | moist woods near streams or ponds; nectar -- blackberry, trailing arbutus, hollyhock and abelia; host -- legumes, mainly hog peanut |
| Bird | Locally rare | <i>Catharus guttatus</i> | Hermit Thrush | spruce-fir forest for nesting |
| Invertebrate Animal | Locally rare | <i>Celastrina nigra</i> | Dusky Azure | rich, moist deciduous forests; nectar - wild geranium; host - goat's beard |
| Invertebrate Animal | Locally Rare | <i>Chlosyne gorgone</i> | Gorgone Checkerspot | dry, sand hill pine oak woodland |
| Bird | Locally rare | <i>Dendroica cerulea</i> | Cerulean Warbler | mature hardwood forests; steep slopes and coves in mountains |

| Group | Designation | Scientific Name | Common Name | Habitat |
|---------------------|--------------|---------------------------------------|--------------------------------|--|
| Bird | Locally rare | <i>Dendroica magnolia</i> | Magnolia Warbler | spruce-fir forests, especially in immature stands, breeding season only |
| Invertebrate Animal | Locally rare | <i>Eulonchus marialicia</i> | Mary Alice's Small-Headed Fly | high elevation, nectaring on rubus |
| Invertebrate Animal | Locally rare | <i>Euphydryas phaeton</i> | Baltimore Checkerspot | wet meadows, herbaceous wetlands |
| Amphibian | Locally rare | <i>Eurycea longicauda longicauda</i> | Long-Tailed Salamander | streams, seeps, springs in moist woods and floodplains; breeds in streams/ponds |
| Mollusk | Locally rare | <i>Glyphyalinia junaluskana</i> | Dark Glyph | moist leaf litter in deciduous woods on mountainsides |
| Mollusk | Locally rare | <i>Glyphyalinia pentadelphia</i> | Pink Glyph | pockets of moist leaves in upland woods; no actual records |
| Mollusk | Locally rare | <i>Haplotrema kendeighi</i> | Blue-Footed Lancetooth | mountainsides in leaf litter or crawling on the ground in wet weather; mixed or cove hardwood forests; no actual records |
| Mollusk | Locally rare | <i>Helicodiscus bonamicus</i> | Spiral Coil | leaf litter on wooded hillsides |
| Mollusk | Locally rare | <i>Helicodiscus fimbriatus</i> | Fringed Coil | leaf litter and under rocks on wooded hillsides, crevices in slates; no actual records |
| Invertebrate Animal | Locally rare | <i>Hepialus sciophanes</i> | A Ghost Moth | spruce-fir forest |
| Mollusk | Locally rare | <i>Inflectarius ferrissi</i> | Smokey Mountain Covert | moss covered boulderfields; spruce-fir forest; under rock ledges and boulders with seepages |
| Invertebrate Animal | Locally rare | <i>Itame subcessaria</i> | Barred Itame | high elevation forests with gooseberry |
| Mollusk | Locally rare | <i>Melanoplus cherokee</i> | Cherokee Melanoplus | woodlands, 1800' - 5100'; no records |
| Invertebrate Animal | Locally rare | <i>Melanoplus viridipes eurycerus</i> | Green-Legged Melanoplus | woodlands and forest edges; no records |
| Invertebrate Animal | Locally rare | <i>Nesticus species 2</i> | An Undescribed Nesticus Spider | small rocks scattered over n-facing cove forests, southwest- |

| Group | Designation | Scientific Name | Common Name | Habitat |
|---------------------|--------------|--|----------------------------|--|
| | | | | facing talus fields |
| Invertebrate Animal | Locally rare | <i>Papilio cresphontes</i> | Giant Swallowtail | primarily coastal in maritime forests or thickets; host plants - prickly ash (<i>Zanthoxylum</i>), hoptree (<i>Ptelea</i>) |
| Mollusk | Locally rare | <i>Paravitrea lacteodens</i> | Ramp Cove Supercoil | leaf litter in mesic coves |
| Mollusk | Locally rare | <i>Paravitrea lamellidens</i> | Lamellate Supercoil | deep moist leaf litter on wooded hillsides and ravines; no actual records |
| Mollusk | Locally rare | <i>Paravitrea umbilicaris</i> | Open Supercoil | deep, moist leaf litter on wooded hillsides |
| Mollusk | Locally rare | <i>Patera clarki clarki</i> | Dwarf Proud Globe | Rich cove forest, high elevation red oak forest, leaf litter on mountainsides; no actual records |
| Invertebrate Animal | Locally rare | <i>Phyciodes batesii maconensis</i> | Tawny Crescent | dry hillsides, upland pastures; host plants - <i>Aster undulatus</i> , <i>Andropogon</i> sp. |
| Invertebrate Animal | Locally rare | <i>Polygonia progne</i> | Gray Comma | rich deciduous forests; host plants - mainly gooseberries (<i>Ribes</i>), but also on wild azalea (<i>Rhododendron nudiflorum</i>) |
| Mammal | Locally rare | <i>Sorex dispar</i> | Rock Shrew | high elevation forests with talus or rocky slopes, also man-made talus; > 3500' |
| Bird | Locally rare | <i>Sphyrapicus varius appalachiensis</i> | Appalachian Yellow-Bellied | mature, open hwd. with scattered dead trees above 3500', breeding season only |
| Reptile | Locally Rare | <i>Sternotherus minor</i> | Loggerhead Musk Turtle | streams and rivers in the Mississippi drainage |
| Bird | Locally rare | <i>Vermivora pinus</i> | Blue-Winged Warbler | low elevation (below 3000') brushy fields and thickets, breeding season only |
| Bird | Locally rare | <i>Vireo gilvus</i> | Warbling Vireo | open groves of hardwoods along rivers and streams below 3000' |
| Mollusk | Locally rare | <i>Zonitoides patuloides</i> | Appalachian Gloss | deep, moist leaf litter on mountainsides or in ravines, |

| Group | Designation | Scientific Name | Common Name | Habitat |
|------------------------|--------------|-------------------------------------|--------------------|---|
| | | | | beneath bark of logs; no records |
| Aquatic Species | | | | |
| Mayfly | Locally rare | <i>Baetopus trishae</i> | A Mayfly | no habitat data available |
| Amphibian | Locally rare | <i>Cryptobranchus alleganiensis</i> | Hellbender | large, clear, fast-flowing streams |
| Fish | Locally rare | <i>Erimystax insignis</i> | Blotched Chub | French Broad River drainage |
| Mayfly | Locally rare | <i>Habrophleidiodes spp</i> | A Mayfly | no habitat data available |
| Caddisfly | Locally rare | <i>Micrasema burksi</i> | A Caddisfly | no habitat data available |
| Fish | Locally rare | <i>Moxostoma species 1</i> | Sicklefin Redhorse | Little Tennessee and Hiwassee drainages |
| Caddisfly | Locally rare | <i>Rhyacophila amicus</i> | A Caddisfly | no habitat data available |
| Dragonfly | Locally rare | <i>Somatochlora elongata</i> | Ski-Tailed Emerald | no habitat data available |
| Mussel | Locally rare | <i>Villosa iris</i> | Rainbow | Little Tennessee and Hiwassee drainages |

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Attachment 1a: Endangered, threatened and sensitive aquatic species, Nantahala National Forest.

| USFS Status | Type | Species | Habitat/Distribution |
|-----------------------------------|------------|-------------------------------------|---|
| <i>Endangered/ Threatened</i> | Bivalve | <i>Alasmidonta raveneliana</i> | Little Tennessee River drainage and Tuckaseegee River; Nolichucky River |
| | Bivalve | <i>Pegias fabula</i> | Lower Little Tennessee River; historic record from Valley River, Cherokee Co. |
| | Fish | <i>Erimonax monachus</i> | Little TN River; French Broad River system |
| <i>Sensitive</i> | Bivalve | <i>Fusconaia barnesiana</i> | Lower Little TN River and Hiwassee River |
| | Bivalve | <i>Lasmigona holstonia</i> | Valley River, Historic Record, Cherokee Co. |
| | Crustacean | <i>Cambarus georgiae</i> | Streams in Little TN River, Macon Co. |
| | Crustacean | <i>Cambarus parrishi</i> | Streams in Hiwassee River drainage |
| | Crustacean | <i>Cambarus reburus</i> | Tributary to Horsepasture River, Transylvania Co.; upper French Broad River |
| | Crustacean | <i>Cambarus chaugaensis</i> | Streams in Savannah River drainage, Jackson, Macon, and Transylvania Co.; SC and GA |
| | Dragonfly | <i>Macromia margarita</i> | Rivers, Macon, Swain, Transylvania Co.; Caldwell Co. |
| | Fish | <i>Etheostoma vulneratum</i> | Large streams and rivers, Little TN River system, Jackson, Macon, Swain Co.; Cheoah River, Graham |
| | Fish | <i>Percina squamata</i> | Higher gradient upland rivers, Tennessee River system, Cherokee, Jackson, Macon, Swain Co. |
| <i>Forest Concern</i> | Amphibian | <i>Cryptobranchus alleganiensis</i> | Rivers and large streams, TN and Savannah River systems |
| | Bivalve | <i>Alasmidonta viridis</i> | Little Tennessee River, Swain Co. |
| | Bivalve | <i>Elliptio dilatata</i> | Little TN and Hiwassee Rivers, Cherokee Co.; New River |
| | Bivalve | <i>Fusconaia subrotunda</i> | Cherokee and Clay Counties |
| | Bivalve | <i>Lampsilis fasciola</i> | Little TN, French Broad and Pigeon Rivers, historic records |

| USFS Status | Type | Species | Habitat/Distribution |
|-------------|------------|--------------------------------------|---|
| | Bivalve | <i>Pleurobema oviforme</i> | Little TN and Hiwassee drainages, Cherokee Co. |
| | Bivalve | <i>Villosa vanuxemensis</i> | Hiwassee River system, Cherokee Co.; French Broad River system |
| | Bivalve | <i>Villosa iris</i> | Little TN and Hiwassee Rivers, Martin and Brasstown Crks; French Broad R. |
| | Bivalve | <i>Villosa trabilis</i> | Hiwassee River |
| | Caddisfly | <i>Agapetus jocassee</i> | Lake Jocassee catchment, Transylvania Co.; Cherokee and Graham Counties |
| | Caddisfly | <i>Agapetus tomus</i> | Cherokee County |
| | Caddisfly | <i>Beraea gorteba</i> | Specifics unknown |
| | Caddisfly | <i>Brachycentrus etowahensis</i> | Cherokee County |
| | Caddisfly | <i>Ceraclea sp. 3</i> | Jackson County |
| | Caddisfly | <i>Goerita flinti</i> | Swain County |
| | Caddisfly | <i>Homoplecta monticola</i> | Jackson and Macon Counties |
| | Caddisfly | <i>Hydropsyche carolina</i> | Jackson and Macon Counties |
| | Caddisfly | <i>Hydroptila coveetensis</i> | Macon County |
| | Caddisfly | <i>Oropsyche howellae</i> | Jackson and Macon Counties |
| | Caddisfly | <i>Polycentropus colei</i> | Swain County |
| | Caddisfly | <i>Rhyacophila accola</i> | Oconaluftee River, Swain County |
| | Caddisfly | <i>Rhyacophila amicis</i> | Clay, Jackson, Macon, and Swain Counties |
| | Caddisfly | <i>Rhyacophila celadon</i> | Swain County |
| | Caddisfly | <i>Rhyacophila montana</i> | Jackson and Swain Counties |
| | Crustacean | <i>Cambarus acanthura</i> | Cherokee and Clay Counties |
| | Crustacean | <i>Cambarus nodosus</i> | Cherokee and Clay Counties |
| | Crustacean | <i>Cambarus tuckasegee</i> | Jackson and Macon Counties |
| | Crustacean | <i>Orconectes sp. 3</i> | Graham County |
| | Crustacean | <i>Skistodiaptomus carolinensis</i> | Lake Ravenel, Macon Co. |
| | Dragonfly | <i>Ladona julia</i> | Jackson County |
| | Fish | <i>Clinostomus funduloides sp. 1</i> | Little TN River drainage, Jackson and Macon Co. |
| | Fish | <i>Erimystax insignis</i> | Hiwassee River, Cherokee Co. |

| USFS Status | Type | Species | Habitat/Distribution |
|-------------|-----------|-------------------------------|--|
| | Fish | <i>Etheostoma inscriptum</i> | Large streams in Savannah River system |
| | Fish | <i>Luxilus chrysocephalus</i> | Reported in Little TN River system, Macon Co.; Cane River system |
| | Fish | <i>Micropterus coosae</i> | Savannah River system, Transylvania and Jackson Counties |
| | Fish | <i>Moxostoma breviceps</i> | Macon and Swain Counties |
| | Fish | <i>Moxostoma sp. 2</i> | Little TN and Hiwassee River drainages |
| | Fish | <i>Notropis micropteryx</i> | Cherokee, Clay, Jackson, Macon, and Swain Counties |
| | Fish | <i>Notropis lutipinnis</i> | Savannah and Little TN River systems, Jackson and Transylvania Co.; Broad River system |
| | Fish | <i>Noturus flavus</i> | Warmwater streams and rivers, Little TN River drainage, Swain Co.; Nolichucky and French Broad River systems |
| | Fish | <i>Percina caprodes</i> | Streams, rivers reservoirs in TN River system; New River drainage |
| | Fish | <i>Stizostedion canadense</i> | Large streams, rivers, reservoirs in Hiwassee River system, Cherokee Co.; French Broad River system |
| | Gastropod | <i>Elimia christyi</i> | Cherokee County |
| | Mayfly | <i>Ameletus sp. 1</i> | Jackson County, Panthertown Valley |
| | Mayfly | <i>Ametus tertius</i> | Jackson County, Panthertown Valley |
| | Mayfly | <i>Attenella margarita</i> | Swain County |
| | Mayfly | <i>Baetopus trishae</i> | Specifics unknown |
| | Mayfly | <i>Barbaetis benfieldi</i> | Jackson County |
| | Mayfly | <i>Plauditus cestus</i> | Specifics unknown |
| | Mayfly | <i>Seratella spiculosa</i> | Mountain streams |
| | Stonefly | <i>Haploperla parkeri</i> | Macon County |
| | Stonefly | <i>Megaleuctra williamsae</i> | UT Cullasaga River, Macon Co.; Mull Crk, Jackson Co.; Cove Crk, Haywood Co. |
| | Stonefly | <i>Pteronarcy comstocki</i> | Specifics unknown |
| | Stonefly | <i>Rasvena terna</i> | Specifics unknown |
| | Stonefly | <i>Tallaperla elisa</i> | Swain County |
| | Stonefly | <i>Zapada chila</i> | Small streams, Beech Flat Prong, Swain Co.; Ashe Co. |

Attachment 2: Endangered, threatened and sensitive plant species, Pisgah and Nantahala National Forests.

| USFS Status | Species | Habitat/Distribution |
|-------------|---|---|
| Endangered | <i>Geum radiatum</i> | High Elevation Rocky Summit |
| Endangered | <i>Gymnoderma lineare</i> | High Elevation Rocky Summit, Moist Rock Outcrop in Acidic Cove |
| Endangered | <i>Houstonia montana</i> | Grassy Bald, High Elevation Rocky Summit |
| Endangered | <i>Sagittaria fasciculata</i> | Southern Appalachian Bog, Streamside, Swamp Forest-Bog Complex |
| Endangered | <i>Sarracenia jonesii</i> | Southern Appalachian Bog |
| Endangered | <i>Sarracenia oreophila</i> | low elevation Southern Appalachian Bog |
| Endangered | <i>Sisyrinchium dichotomum</i> | Montane Oak Woodland, Mafic Rock, Roadsides |
| Threatened | <i>Helonias bullata</i> | Southern Appalachian Bog, Swamp Forest-Bog Complex |
| Threatened | <i>Hexastylis naniflora</i> | Rich Deciduous Woodland Bluffs |
| Threatened | <i>Hudsonia montana</i> | High Elevation Rocky Summit, Pine-Oak/Heath Forest |
| Threatened | <i>Isotria medeoloides</i> | White Pine Forest, Mesic Oak-Hickory |
| Threatened | <i>Liatria helleri</i> | High Elevation Rocky Summit, Montane Acidic Cliff |
| Threatened | <i>Solidago spithamaea</i> | High Elevation Rocky Summit |
| Threatened | <i>Spiraea virginiana</i> | Riverside Scour Zone |
| Sensitive | <i>Aconitum reclinatum</i> | Northern Hardwood Cove Forest, Boulderfield Forest, High Elevation Seep, Rich Cove Forest |
| Sensitive | <i>Acrobolbus ciliatus</i> | Spruce-Fir Forest, Spray Cliff |
| Sensitive | <i>Allium cuthbertii</i> | Low Elevation Granitic Dome |
| Sensitive | <i>Aneura maxima</i> | Spray Cliff |
| Sensitive | <i>Anzia americana</i> | Gorge, Acidic Cove |
| Sensitive | <i>Aspiromitus appalachianus</i> | Stream |
| Sensitive | <i>Asplenium x ebenoides</i> | Montane Calcareous Cliff |
| Sensitive | <i>Bazzania nudicaulis</i> | Spruce-Fir Forest |
| Sensitive | <i>Berberis canadensis</i> | Rich Cove Forest, Glade, Mafic Rock |
| Sensitive | <i>Boechera patens</i> | Montane Mafic Cliff, Montane Calcareous Cliff |
| Sensitive | <i>Brachydontium trichodes</i> | Spruce-Fir Forest |
| Sensitive | <i>Bryocrumia vivicolor</i> | Spray Cliff, Moist Montane Acidic Cliff, Gorge |
| Sensitive | <i>Buckleya distichophylla</i> | Hemlock Hardwood Forest, Acidic Cove Forest, Montane Acidic Cliff, Mesic Oak-Hickory |
| Sensitive | <i>Buxbaumia minakatae</i> | Rotting Logs |
| Sensitive | <i>Calamagrostis cainii</i> | High Elevation Rocky Summit |
| Sensitive | <i>Campylopus paradoxus</i> | High Elevation Rocky Summit |
| Sensitive | <i>Cardamine clematitidis</i> | Boulderfield, Northern Hardwood Forest, Spruce-Fir Forest, High Elevation Seep |
| Sensitive | <i>Carex biltmoreana</i> | High Elevation Granitic Dome, Montane Cedar-Hardwood Forest, Montane Acidic Cliff |
| Sensitive | <i>Carex communis</i> var. <i>amplisquama</i> | Rich Cove Forest, Mafic Rock |
| Sensitive | <i>Carex misera</i> | High Elevation Rocky Summit, Montane Acidic Cliff, High Elevation Granitic Dome |
| Sensitive | <i>Carex radfordii</i> | Rich Cove Forest, Escarpment Gorge |

| USFS Status | Species | Habitat/Distribution |
|-------------|---|---|
| Sensitive | <i>Carex roanensis</i> | Rich Cove Forest, Montane Oak-Hickory |
| Sensitive | <i>Cephalozia macrostachya</i> <i>ssp. australis</i> | Rock Outcrop in Acidic Cove Forest in Gorge |
| Sensitive | <i>Cephaloziella massalongi</i> | High Elevation Rocky Summit |
| Sensitive | <i>Cheilolejeunea evansii</i> | Acidic Cove, Oak-White Pine Forest, Escarpement Gorge |
| Sensitive | <i>Chelone cuthbertii</i> | Southern Appalachian Bog |
| Sensitive | <i>Cleistes bifaria</i> | Pine-Oak/Heath Forest, Pine-Oak Woodland, Shortleaf Pine |
| Sensitive | <i>Coreopsis latifolia</i> | Rich Cove Forest, Northern Hardwood Cove Forest |
| Sensitive | <i>Danthonia epilis</i> | High Elevation Granitic Dome, Seep |
| Sensitive | <i>Delphinium exaltatum</i> | Rich Cove Forest, Grassy Bald, Glade, Montane Oak-Hickory, Mafic Rock |
| Sensitive | <i>Desmodium ochroleucum</i> | Openings in Oak Woodlands |
| Sensitive | <i>Diervilla rivularis</i> | Streamside, Acidic Cove Forest |
| Sensitive | <i>Diplophyllum apiculatum</i> var. <i>taxifolioides</i> | Bog, Wet Soils |
| Sensitive | <i>Diplophyllum obtusatum</i> | Spruce-Fir Forest |
| Sensitive | <i>Ditrichum ambiguum</i> | Acidic Cove Forest, High Elevation Red Oak Forest |
| Sensitive | <i>Drepanolejeunea</i> <i>appalachiana</i> | Acidic Cove, Montane Oak-Hickory Forest |
| Sensitive | <i>Entodon concinnus</i> | Moist Montane Calcareous Cliff |
| Sensitive | <i>Epebe americana</i> | High Elevation Rocky Summit |
| Sensitive | <i>Euphorbia purpurea</i> | Northern Hardwood Forest, Rich Cove Forest, Mesic Oak-Hickory Forest |
| Sensitive | <i>Eurybia avita</i> | Low Elevation Granitic Outcrop |
| Sensitive | <i>Fissidens appalachensis</i> | High Elevation Streams |
| Sensitive | <i>Fothergilla major</i> | Pine-Oak/Heath Forest, Montane Oak Woodland, Roadside |
| Sensitive | <i>Frullania appalachiana</i> | Spruce-Fir Forest |
| Sensitive | <i>Frullania oakesiana</i> | Spruce-Fir Forest |
| Sensitive | <i>Gentiana austromontana</i> | Grassy Bald, High Elevation Red Oak Forest, Northern Hardwood Forest |
| Sensitive | <i>Geum geniculatum</i> | Boulderfield Forest, High Elevation Seep |
| Sensitive | <i>Geum lobatum</i> | Acidic Cove Forest, Mesic Oak-Hickory, Gorge |
| Sensitive | <i>Glyceria nubigena</i> | Northern Hardwood Forest, Boulderfield, High Elevation Seep, Spruce-Fir Forest |
| Sensitive | <i>Hasteola suaveolens</i> | Montane Alluvial Forest |
| Sensitive | <i>Helianthus glaucophyllus</i> | Rich Cove Forest, Northern Hardwood Forest, High Elevation Red Oak Forest, Mesic Oak-Hickory Forest, Roadside |
| Sensitive | <i>Heuchera longiflora</i> | Rock Outcrops in Rich Cove Forest, Mafic Rock |
| Sensitive | <i>Hexastylis contracta</i> | Acidic Cove Forest |
| Sensitive | <i>Hexastylis rhombiformis</i> | Acidic Cove Forest, Hemlock Hardwood Forest, Montane Alluvial Forest |
| Sensitive | <i>Homaliadelphus sharpii</i> | Dry Montane Calcareous Cliff |
| Sensitive | <i>Hygrohypnum closteri</i> | Stream |
| Sensitive | <i>Hymenophyllum tayloriae</i> | Spray Cliff, Grotto, Gorge |

| USFS Status | Species | Habitat/Distribution |
|-------------|---|---|
| Sensitive | <i>Hypericum graveolens</i> | High Elevation Seep, Wet Meadow, Grassy Bald |
| Sensitive | <i>Hypericum mitchellianum</i> | High Elevation Seep, Wet Meadow, Grassy Bald |
| Sensitive | <i>Hypotrachyna virginica</i> | High Elevation Forest |
| Sensitive | <i>Ilex collina</i> | Northern Hardwood Forest, Boulderfield Forest, Southern Appalachian Bog, Swamp Forest Bog Complex |
| Sensitive | <i>Juglans cinerea</i> | Rich Cove Forest, Mesic Oak-Hickory, Montane Alluvial Forest |
| Sensitive | <i>Juncus caesariensis</i> | Southern Appalachian Bogs at Low Elevation |
| Sensitive | <i>Lejeunea blomquistii</i> | Spray Cliff |
| Sensitive | <i>Leptodontium excelsum</i> | Spruce-Fir Forest |
| Sensitive | <i>Leptohymerium sharpii</i> | Spruce-Fir Forest |
| Sensitive | <i>Liatrix turgida</i> | High Elevation Granitic Dome, Montane Oak Woodland |
| Sensitive | <i>Lilium grayi</i> | Northern Hardwood Forest, High Elevation Seep, Grassy Bald, Wet Meadow |
| Sensitive | <i>Lophocolea appalachiana</i> | Spray Cliff |
| Sensitive | <i>Lysimachia fraseri</i> | Mesic Oak-Hickory Forest, Montane Oak Forest, Rich Cove Forest, Acidic Cove Forest, Roadside |
| Sensitive | <i>Malaxis bayardii</i> | Xeric Upland Forests |
| Sensitive | <i>Mannia californica</i> | Dry Montane Acidic Cliff |
| Sensitive | <i>Marshallia grandiflora</i> | Southern Appalachian Bog |
| Sensitive | <i>Marshallia trinervia</i> | Habitat unknown |
| Sensitive | <i>Marsupella emarginata</i> var. <i>latiloba</i> | Spray Cliff |
| Sensitive | <i>Megaceros aenigmaticus</i> | Stream |
| Sensitive | <i>Metzgeria furcata</i> var. <i>setigera</i> | Spruce-Fir Forest, Acidic Cove Forest in Gorge |
| Sensitive | <i>Metzgeria temperata</i> | High Elevation Forest |
| Sensitive | <i>Metzgeria uncigera</i> | Acidic Cove Forest |
| Sensitive | <i>Micranthes caroliniana</i> | Northern Hardwood Forest, Montane Acidic Cliff, High Elevation Rocky Summit |
| Sensitive | <i>Micropolypodium nimbatum</i> | Spray Cliff |
| Sensitive | <i>Monotropsis odorata</i> | Rich Cove Forest, Mesic Oak-Hickory, Xeric Oak-Hickory, Pine-Oak/Heath Forest |
| Sensitive | <i>Nardia lescurii</i> | Acidic Cove Forest adjacent to streams |
| Sensitive | <i>Packera millefolium</i> | Montane Acidic Cliff, Montane Cedar-Hardwood Woodland, High Elevation Granitic Dome |
| Sensitive | <i>Pellia appalachiana</i> | rock outcrop near spray Cliff |
| Sensitive | <i>Peltigera venosa</i> | Stream |
| Sensitive | <i>Penstemon smallii</i> | Montane Acidic Cliff |
| Sensitive | <i>Philonotis cernua</i> | Spray Cliff, Moist Montane Acidic Cliff, Gorge |
| Sensitive | <i>Physcia pseudospeciosa</i> | High Elevation Granitic Dome |
| Sensitive | <i>Plagiochasma intermedium</i> | Streamside Limestone Rock |
| Sensitive | <i>Plagiochasma wrightii</i> | Streamside Limestone Rock |
| Sensitive | <i>Plagiochila austinii</i> | Moist Montane Acidic Cliff |
| Sensitive | <i>Plagiochila caduciloba</i> | Spray Cliff, Streamside, Rock Outcrop in Acidic Cove Forest in Gorge |
| Sensitive | <i>Plagiochila echinata</i> | Spray Cliff, Streamside, Rock Outcrop in Acidic Cove |

| USFS Status | Species | Habitat/Distribution |
|-------------|---|---|
| | | Forest in Gorge |
| Sensitive | <i>Plagiochila sharpii</i> | High Elevation Rocky Summit, Rock Outcrop in Acidic Cove Forest in Gorge |
| Sensitive | <i>Plagiochila sullivantii</i> var. <i>spinigera</i> | Spray Cliff |
| Sensitive | <i>Plagiochila sullivantii</i> var. <i>sullivantii</i> | Spray Cliff, Spruce-Fir Forest |
| Sensitive | <i>Plagiochila virginica</i> var. <i>caroliniana</i> | Spray Cliff, Rock Outcrop in Acidic Cove Forest in Gorge |
| Sensitive | <i>Plagiochila virginica</i> var. <i>virginica</i> | On Limestone, Wet Rock Outcrop |
| Sensitive | <i>Plagiomnium carolinianum</i> | Rock Outcrop in Acidic Cove Forest in Gorge, Streambank |
| Sensitive | <i>Platanthera integrilabia</i> | High Elevation Seep, Southern Appalachian Bog |
| Sensitive | <i>Platyhypnidium pringlei</i> | Spray Cliff, Rock Outcrop in Acidic Cove Forest in Gorge |
| Sensitive | <i>Poa paludigena</i> | Southern Appalachian Bog |
| Sensitive | <i>Polytrichum appalachianum</i> | Rocky Summits, Mid- to High Elevation |
| Sensitive | <i>Porella japonica</i> ssp. <i>appalachiana</i> | Spray Cliff |
| Sensitive | <i>Porella wataugensis</i> | Rock Outcrop in Acidic Cove Forest in Gorge |
| Sensitive | <i>Porpidia diversa</i> | High Elevation Rocky Summit |
| Sensitive | <i>Porpidia herteliana</i> | High Elevation Rocky Summit |
| Sensitive | <i>Prenanthes roanensis</i> | Northern Hardwood Forest, Grassy Bald, Meadow, Roadside, High Elevation Red Oak Forest |
| Sensitive | <i>Pycnanthemum beadleii</i> | rock outcrops, Oak woodlands |
| Sensitive | <i>Pycnanthemum torrei</i> | Xeric Oak-Hickory, Glade |
| Sensitive | <i>Radula sullivantii</i> | Spray Cliff, Rock Outcrop in Acidic Cove Forest in Gorge |
| Sensitive | <i>Radula voluta</i> | Spray Cliff |
| Sensitive | <i>Rhachithecium perpusillum</i> | Hardwood Trees |
| Sensitive | <i>Rhododendron vaseyi</i> | Northern Hardwood Forest, High Elevation Seep, Southern Appalachian Bog, Meadow, Roadside |
| Sensitive | <i>Riccardia jugata</i> | Rotten Logs in Acidic Cove Forest in Gorge |
| Sensitive | <i>Robinia hartwegii</i> | High Elevation Granitic Dome |
| Sensitive | <i>Robinia viscosa</i> var. <i>viscosa</i> | High Elevation Granitic Dome, Woodlands |
| Sensitive | <i>Rudbeckia triloba</i> var. <i>pinnatifida</i> | Rich Cove Forest, Montane Mafic Cliff, Mafic Rock |
| Sensitive | <i>Rugelia nudicaulis</i> | Spruce-Fir Forest |
| Sensitive | <i>Sabatia capitata</i> | Glade, Pine-Oak Woodlands |
| Sensitive | <i>Sceptridium jenmanii</i> | Rich Cove Forest |
| Sensitive | <i>Schlotheimia lancifolia</i> | Oak-Hickory Forest, Acidic Cove Forest, Hemlock Hardwood Forest, Serpentine Rocks |
| Sensitive | <i>Scopelophila cataractae</i> | Copper-rich Soils, Roadsides |
| Sensitive | <i>Scutellaria ovata</i> ssp. <i>rugosa</i> var. <i>1</i> | Boulderfield Forest, Rocky Forest |
| Sensitive | <i>Scutellaria saxatilis</i> | Northern Hardwood Forest, Boulderfield Forest, Rich |

| USFS Status | Species | Habitat/Distribution |
|-------------|--|--|
| | | Cove Forest |
| Sensitive | <i>Shortia galacifolia</i> var. <i>brevistyla</i> | Acidic Cove Forest, Streambank, Gorge |
| Sensitive | <i>Shortia galacifolia</i> var. <i>galacifolia</i> | Acidic Cove Forest, Streambank, Gorge |
| Sensitive | <i>Silene ovata</i> | Rich Cove Forest, Mesic Oak-Hickory, Roadside, Mafic Rock |
| Sensitive | <i>Solidago simulans</i> | High Elevation Granitic Dome |
| Sensitive | <i>Sphagnum flavicomans</i> | Seeps on Rock or Spray Cliffs |
| Sensitive | <i>Sphenolobopsis pearsonii</i> | Fraser-Fir Forest |
| Sensitive | <i>Splachnum pennsylvanicum</i> | Southern Appalachian Bog |
| Sensitive | <i>Stachys clingmanii</i> | Northern Hardwood Forest, Boulderfield Forest |
| Sensitive | <i>Sticta limbata</i> | High Elevation Forest |
| Sensitive | <i>Taxiphyllum alternans</i> | Spray Cliff, Mafic Rock |
| Sensitive | <i>Thalictrum macrostylum</i> | Serpentine Woodland, Serpentine Forest, Moist Woodlands |
| Sensitive | <i>Thaspium pinnatifidum</i> | Rich Cove Forest, Mesic Oak-Hickory, Roadside, Mafic Rock |
| Sensitive | <i>Thermopsis fraxinifolia</i> | Xeric Oak-Hickory Forest, Montane Oak Woodland, Pine-Oak/Heath |
| Sensitive | <i>Tortula ammonsiana</i> | Moist Montane Mafic Cliff |
| Sensitive | <i>Trillium pusillum</i> var. <i>ozarkanum</i> | Rich Cove Forest, Mesic Oak-Hickory, Mafic Rock |
| Sensitive | <i>Trillium rugelii</i> | Rich Cove Forest at Low Elevation |
| Sensitive | <i>Trillium simile</i> | Rich Cove Forest |
| Sensitive | <i>Tsuga caroliniana</i> | Carolina Hemlock Forest, Montane Acidic Cliff, Pine-Oak/Heath, High Elevation Rocky Summit |
| Sensitive | <i>Viola appalachiensis</i> | Serpentine Woodland, Serpentine Forest, Rich Cove Forest, Mesic Oak-Hickory |
| Sensitive | <i>Xanthoparmelia monticola</i> | High Elevation Rocky Summit |

5.3 Indiana Bat Habitat Protection Plan

Indiana Bat (*Myotis sodalis*) Habitat Protection Plan Laurel Creek Property Owners Association

This protection plan applies certain principles of land use relative to the current scientific understanding of the Indiana bat (*Myotis sodalis*). The Indiana bat is not currently known to occur in Clay County, but has been recently documented in adjacent Cherokee, Graham, Swain, and Haywood Counties (NCNHP Element Occurrences database, accessed 15 February 2011). In summer, habitat consists of wooded or semiwooded areas, mainly along streams. This species has high potential to occur in hollow trees or under loose bark of living or dead trees standing in sunny openings. This habitat is used by solitary females or small maternity colonies to bear their offspring. Though maternity sites have been reported as occurring mainly in riparian and floodplain forests, recent studies indicate that upland habitats are used by maternity colonies much more extensively than previously reported. Recent studies in the southern Appalachians indicate that maternity colony trees are often large conifers with exfoliating bark located in sunny canopy gaps. In winter, caves are utilized for hibernation. Indiana bats are known to use highly altered and fragmented landscapes. They may respond favorably to habitat disturbance, particularly where forests are even-aged and closed-canopied. A diverse landscape may benefit Indiana bats, provided that adequate areas of mature forest and suitable roost trees remain.

The LCPOA tract contains elements of potential habitat for this species in the form of mature deciduous forest including forested riparian areas. Forest management and/or development plans will be designed such that Indiana bats are not harmed. To ensure this, the following measure will be implemented:

No suitable roost trees will be felled during the period between April 15 and October 15. This measure will eliminate the threat of direct effect (take) to individual bats. Under this measure, potential habitat within the LCPOA tract could be lost through felling of trees during the winter months. The cumulative effect of this habitat loss would be imperceptible, compared to the availability of potential habitat in areas surrounding the LCPOA tract, and is not likely to adversely affect this species.

Other activities may be possible with a concurrence letter from the U.S. Fish and Wildlife Service. These exceptions will be considered on a case-by-case basis as the need arises.

Current development plans within the LCPOA tract include:

Building of up to 5 single family residences (primitive cabins) on the LCPOA tract.