United States
Department of
Agriculture

Forest
Service

March 2016

Environmental Assessment

Laurel Creek Property Owners Association Access Across National Forest System Lands

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

For Information Contact: **Tusquitee Ranger District**
123 Woodland Drive
Murphy, NC 2828906
(828) 837-5152
www.fs.usda.gov/nfsnc

In accordance with Federal civil rights law and U.S. Department of Agriculture (USDA) civil rights regulations and policies, the USDA, its Agencies, offices, and employees, and institutions participating in or administering USDA programs are prohibited from discriminating based on race, color, national origin, religion, sex, gender identity (including gender expression), sexual orientation, disability, age, marital status, family/parental status, income derived from a public assistance program, political beliefs, or reprisal or retaliation for prior civil rights activity, in any program or activity conducted or funded by USDA (not all bases apply to all programs). Remedies and complaint filing deadlines vary by program or incident.

Persons with disabilities who require alternative means of communication for program information (e.g., Braille, large print, audiotape, American Sign Language, etc.) should contact the responsible Agency or USDA's TARGET Center at (202) 720-2600 (voice and TTY) or contact USDA through the Federal Relay Service at (800) 877-8339.

To file a program discrimination complaint, complete the USDA Program Discrimination Complaint Form, AD-3027, found online at http://www.ascr.usda.gov/complaint_filing_cust.html and at any USDA office or write a letter addressed to USDA and provide in the letter all of the information requested in the form. To request a copy of the complaint form, call (866) 632-9992. Submit your completed form or letter to USDA by: (1) mail: U.S. Department of Agriculture, Office of the Assistant Secretary for Civil Rights, 1400 Independence Avenue, SW, Washington, D.C. 20250-9410; (2) fax: (202) 690-7442; or (3) email: program.intake@usda.gov .

USDA is an equal opportunity provider, employer, and lender..

Table of Contents

Summary

Proposed Action:

The National Forests in North Carolina is evaluating a request to grant legal access to a private inholding near the town of Hayesville in Clay County, North Carolina. This property is a parcel of privately owned land which is completely surrounded by National Forest System lands. The Forest Service considered in detail a no action alternative and three action alternatives. The Forest Service also considered alternative methods and routes of access, although not in detail, for reasons disclosed in this Environmental Analysis. If an action alternative is selected, the Forest Service would grant a special use authorization to the Laurel Creek Property Owners Association providing the association access across National Forest System lands to their property at the headwaters of Laurel Creek for their stated purpose of ingress and egress to their property to construct, use, and enjoy four primitive cabins.

Location of Action:

Fires Creek and Valley River watersheds, Clay County and Cherokee County, North Carolina.

National Forests in North Carolina, Nantahala National Forest, Tusquitee Ranger District, Clay County and Cherokee County, NC

Type of Statement:

Environmental Assessment

Responsible Official:

Hurston A. Nicholas, Forest Supervisor

Lead Agency:

USDA Forest Service

Contact Person:

Steverson Moffat, 123 Woodland Drive, Murphy, NC 28906. (828) 837-5152

Chapter 1 – Purpose and Need for the Action

1.1 Introduction and Document Structure

The Forest Service has prepared this Environmental Assessment (EA) in compliance with the National Environmental Policy Act (NEPA) and other relevant federal and state laws and regulations. This EA discloses the direct, indirect, and cumulative environmental impacts that would result from the proposed action and alternatives. This document is based upon the best available science, including peer-reviewed scientific literature, state and federal agency reports and management input, discussions with scientists and other professionals, and ground-based observations. The EA is organized into five parts:

- *Chapter 1*: The section includes background information on the history of the project proposal and the purpose of and need for the project. This section also details how the Forest Service informed the public of the proposal and how the public responded.
- *Chapter 2*: This section provides a more detailed description of the agency's proposed action - - grant a special use authorization to the Laurel Creek Property Owners Association providing the association access across National Forest System lands - - as well as alternative methods for achieving the stated purpose. Maps, tables, and discussion compare the attributes of the alternatives that were considered. These alternatives were developed based on key issues raised by the public and other agencies. This discussion also includes design criteria proposed to mitigate impacts to resources.
- *Chapter 3*: This section describes the affected environment and the environmental consequences of implementing the proposed action and other alternative(s). This analysis is organized by resource area. Within each section, the affected environment is described first, followed by the effects of the No Action Alternative. No Action provides a baseline for evaluation and comparison of the other alternative(s) that follow.
- *Chapter 4*: This section provides a list of preparers and agency representatives consulted during the development of the environmental assessment.
- *Appendices*: The appendices provide more detailed information to support the analyses presented in the environmental assessment.

Additional documentation, including more detailed analyses of project-area resources, may be found in the project planning record located at the Tusquitee Ranger District office in Murphy, North Carolina.

1.2 Background

Prior to the passage of the Weeks Act in 1911, a law that granted the federal government the authority to acquire lands primarily in in the eastern United States to be preserved and maintained as national forests, all of the land in Clay County, North Carolina that now comprises the Nantahala National Forest was held by private individuals and companies. The federal government began obtaining the tracts that would become the Tusquitee Ranger District, Nantahala National Forest in 1917 through direct purchase, through legal proceedings such as condemnations (often executed in an effort to resolve title disputes), and through legal agreements with state and county governments to resolve outstanding tax delinquencies. Parcels were obtained as they became available within the jurisdictional boundaries of the Nantahala

National Forest as established by Congress. Management activities after federal acquisition included fire suppression, reforestation, and silvicultural treatments to promote timber production and wildlife habitat.

The phase of major land acquisition for the Nantahala National Forest ended in the late 1930s and early 1940s. A number of parcels of private land within the jurisdictional boundary of the Nantahala National Forest remained in private ownership and were surrounded by Forest Service lands. These inclusions of private land are called inholdings.

The inholding that is the focal point of this EA is a 50 acre parcel that was never acquired by the federal government. It is located at the headwaters of Laurel Creek at the rim of the Valley River Mountains along the border of Clay County and Cherokee County. (Figures 1.2.1 and 1.2.2) The surrounding national forest land was acquired on August 10, 1937 through condemnation proceedings to resolve overlapping title claims and involved approximately 17,886 acres in Clay and Cherokee Counties. The survey for this acquisition was completed in August 1935, showing the 50 acre tract in the ownership of Will Bumgarner and Eugenia Bumgarner (Figure 1.2.3).

The Bumgarner's estate transferred the property to George G. Westfeld on October 3, 1935. The land eventually became the shared property of multiple members of the Westfeld family. The Forest Service enquired about purchasing the property in the 1970s and 1980s, with the last attempt occurring in the early 2000s. The owners were unwilling to sell the property each time. The tract was acquired by the Laurel Creek Property Owners Association (LCPOA) partnership in 2006. In 2008 the partnership approached the Forest Service and made a formal request via an Application for Transportation and Utility Systems and Facilities on Federal Lands (Standard Form 299) to receive road access to their property.

1.3 Purpose and Need for the Project

The purpose and need for the project are to respond to the LCPOA's application for access across National Forest System lands. The Forest Service is required to respond to a formal request for transportation and utility systems and facilities on federal lands (36 CFR §251, Subpart D).

Title 36 of the Code of Federal Regulations (CFR), Chapter II, Subpart D - Access to Non-Federal Lands, establishes the procedures the Forest Service follows in evaluating proposals for access and defines the criteria, terms and conditions for the use of the access. As the executive branch agency responsible for managing the national forests, the Forest Service has the discretion to determine the location, design, type, and extent of the access to be granted across National Forest System lands.

In this EA, the Forest Service has:

- Considered methods of access (vehicular and non-vehicular);
- Proposed and analyzed the location of potential access routes; and
- Disclosed the effects to the environment associated with each alternative.

The work is consistent with NEPA and with the Land and Resource Management Plan for the Nantahala and Pisgah National Forests (Chapter 3 of this EA).

Figure 1.2.1. Tusquitee Mountains, Valley River Mountains, and Fires Creek Watershed, North Carolina

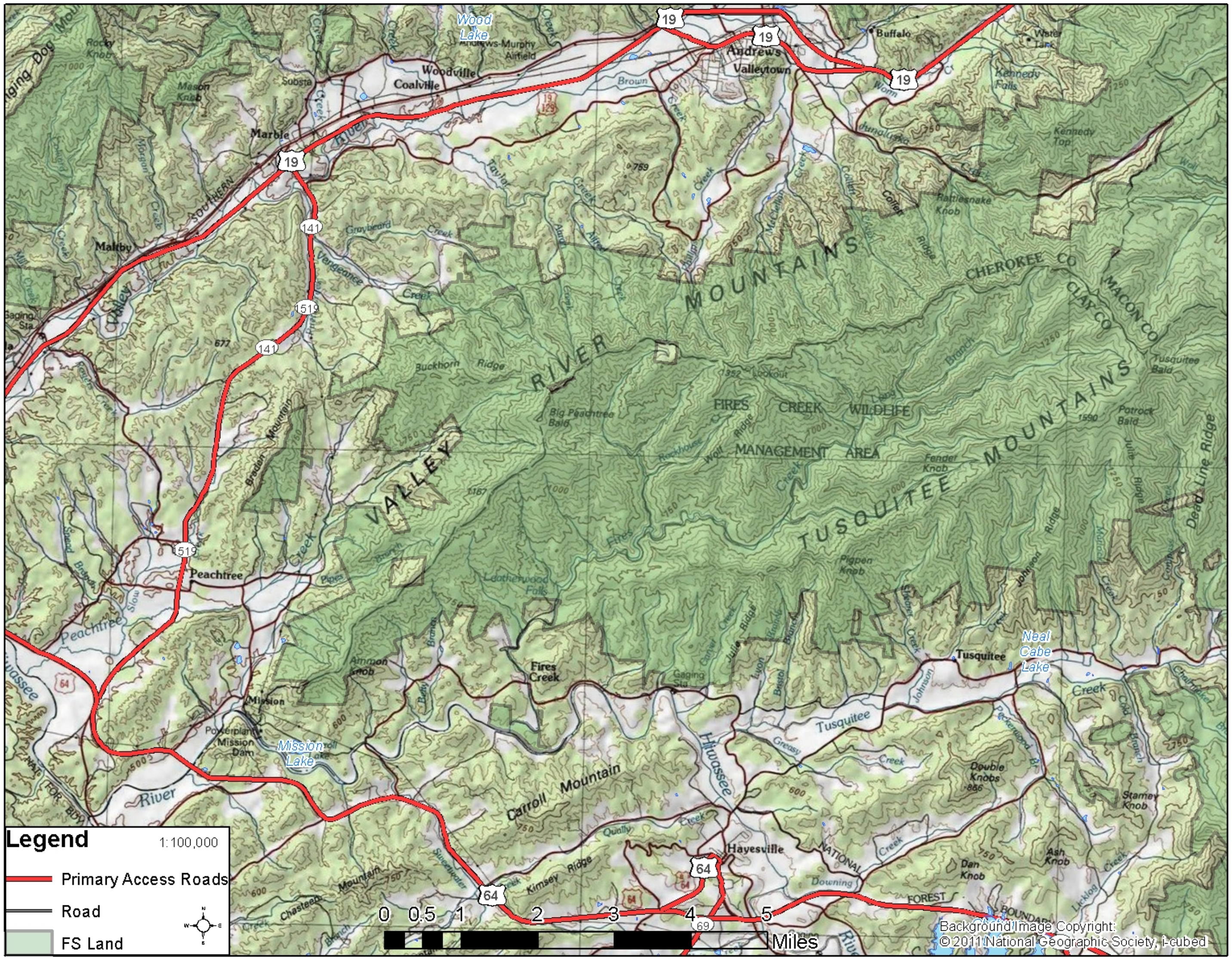


Figure 1.2.2. Location of the Laurel Creek Property Owners Association's Inholding

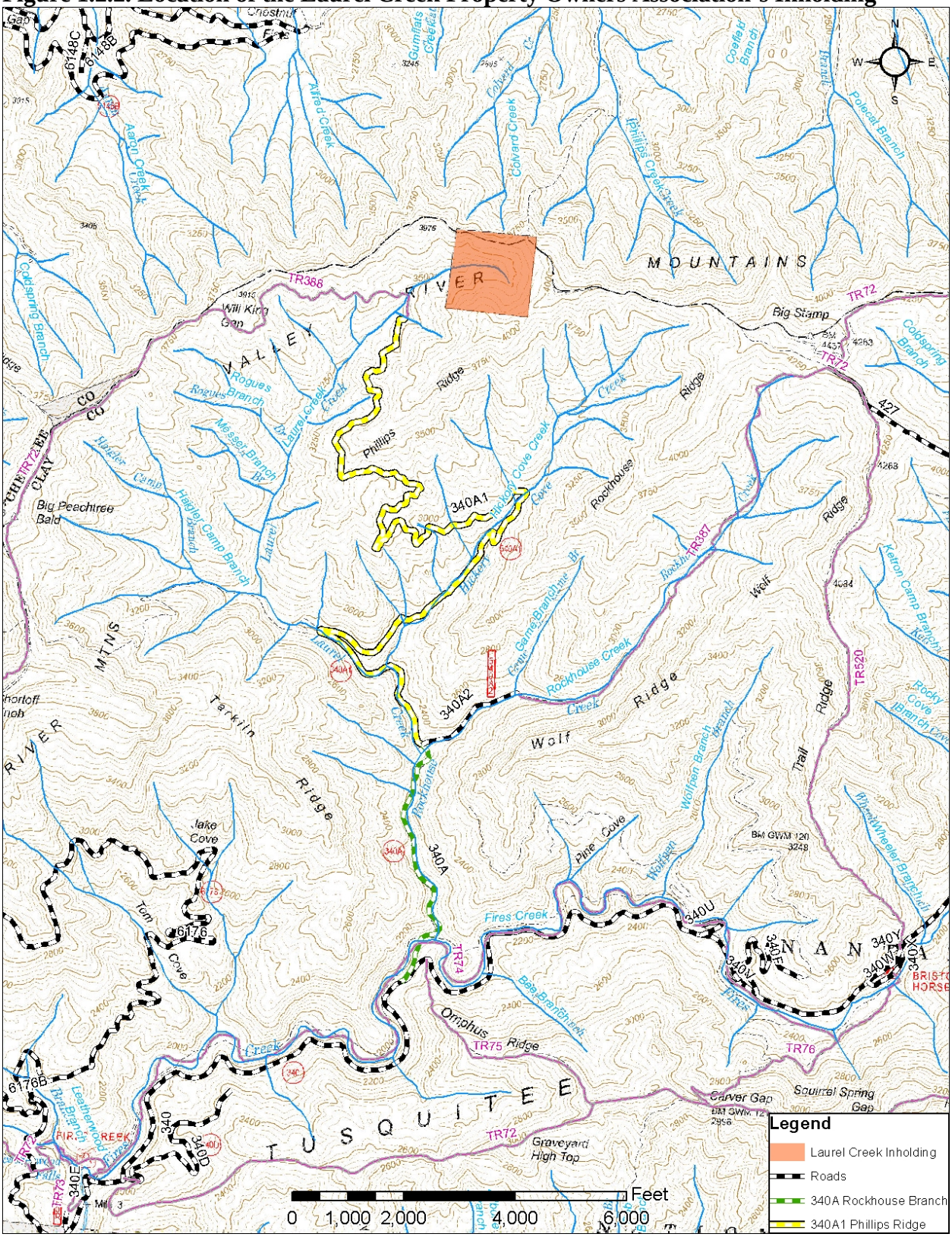
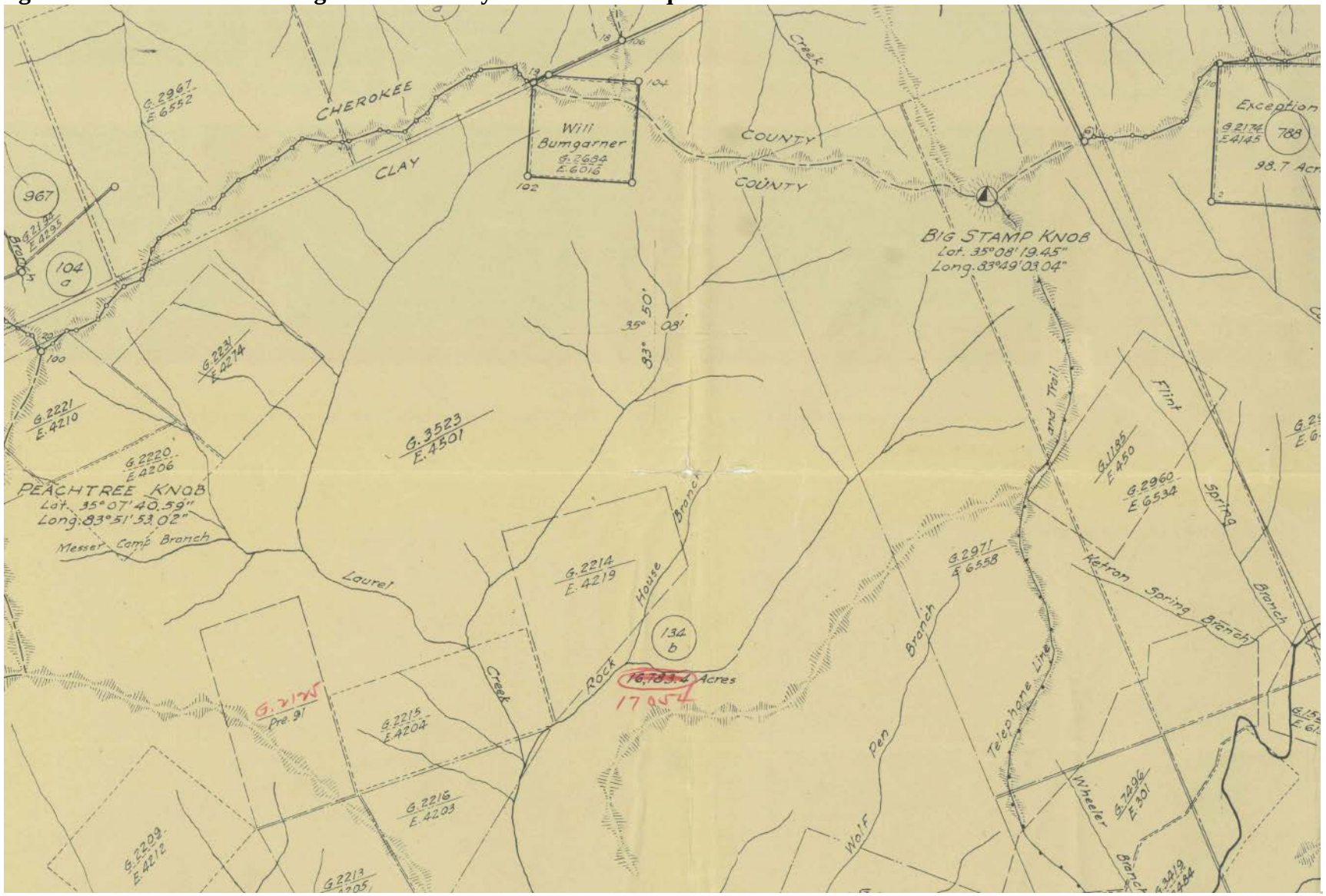


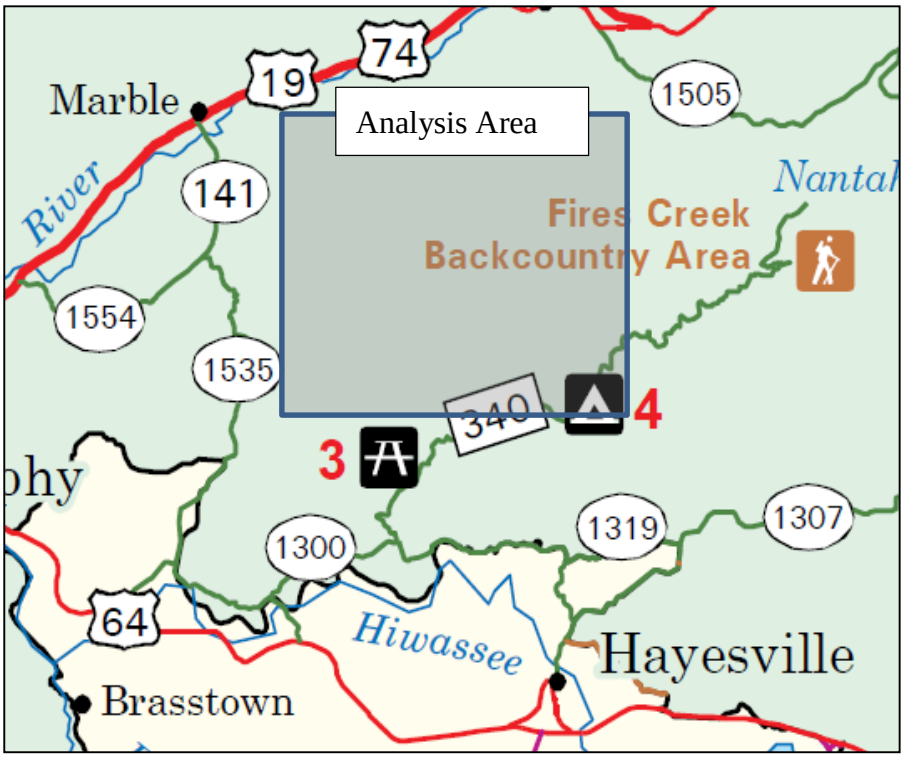
Figure 1.2.3. Section of the August 1935 Survey for the 1937 Acquisition



1.4 Where Actions Would Occur

If approved, a special use authorization and any road construction and reconstruction work would be limited to the public lands managed by the Nantahala National Forest. The analysis area is located in a portion of the Fires Creek watershed and Valley River watershed north of Hayesville, North Carolina (Figure 1.4.1) that includes all proposed access routes from the south, east, and north.

Figure 1.4.1. Analysis Area



Elevations in the analysis area 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 communities 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 picnicking, swimming, hunting, fishing, hiking, backpacking, camping, horseback riding, and 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 Areas 2C, 3B, and 4C. Management Area (MA) 2C emphasizes pleasant scenery for people who experience the forest by driving through it (Forest Plan at III-63), MA 3B emphasizes a sustainable supply of timber, but with few open roads and limited disturbance associated with motor vehicles (Forest Plan at III-71), and MA 4C emphasizes visually pleasing scenery and habitats for wildlife requiring older forests (Forest Plan at III-77). If authorized, the requested special use authorization and any subsequent activities to construct new road and/or reconstruct existing roads are permissible and consistent with the uses allowed in the MAs.

1.5 What the Decision Will Address

The decision will conform to the Code of Federal Regulations, the National Environmental Policy Act and all other pertinent statutes, and the Land and Resource Management Plan for the Nantahala and Pisgah National Forests and will protect the public's long-term interest in the management of the areas surrounding the inholding. The decision will address the following:

- Whether access beyond existing means will be granted.
- If granted, then the method of access that would be provided by the Forest Service (foot, horse, and/or bicycle using existing trails, or vehicular access using existing roads and new road construction).
- If granted, then the route of access across National Forest System lands that would be provided by the Forest Service.
- If access by road is granted allowing passenger vehicles to reach the property, then the Forest Service would define the standards and limitations for road construction, road reconstruction, and road use, along with design criteria to reduce environmental impacts.

Depending on the alternative, this proposal and decision may require amendments to the Land and Resource Management Plan for the Nantahala and Pisgah National Forests. The Responsible Official for this decision is the Forest Supervisor for the National Forests in North Carolina (NFsNC).

1.6 Scoping and Public Involvement

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 the LCPOA's request for access. Since July 2008, the project has been listed in the NFsNC Quarterly Schedule of Proposed Actions (SOPA), and project updates have been published each quarter of the calendar year.

In November 2011, District Ranger Lauren Stull released an Environmental Analysis to the public for a 30 day notice and comment period. Sixty two persons, organizations, and agencies commented on the EA. These comments were reviewed by the Forest Service's Interdisciplinary Team (ID Team) which produced the EA. The ID Team concluded that sufficient issues were raised to warrant revision of the EA. These included revisions to Section 1.9 (Federal Regulations – Access to Non-Federal Lands); consideration of additional alternatives; and expanded recreational and scenery analyses in Chapter 3. The ID Team further determined that the revisions were substantial enough to require that the revised EA be released to the public for a second 30 day notice and comment period.

In December 2012, the revised EA was released to the public for a 30 day notice and comment period. Forty three persons, organizations, and agencies commented on the EA. The Forest Service conducted content analysis on and responded to public comments prior to National Forests in North Carolina Forest Supervisor Kristin Bail's June 2013 decision to grant access to the LCPOA. This decision was appealed on grounds that the Forest Service did not analyze in detail alternative access routes, particularly approaches from the north and east, and that the Forest Service had prematurely and improperly dismissed alternative routes from the north, east, and west. After review by the Regional Forester, the decision was remanded in August 2013.

The LCPOA exercised their right to continue their application because a final determination on their application for access did not result from the June 2013 decision and subsequent appeal. Accordingly, this new EA has been prepared to analyze the LCPOA's application for access and to provide background and information necessary for the Forest Supervisor for the National Forests in North Carolina to make a decision on the LCPOA's application for access.

This EA responds to points made in the appeal of the June 2013 decision by (1) analyzing in detail potential access routes from the north and east; (2) analyzing a potential access route from the south; and (3) comparing the three with an alternative that would not grant access. This EA also considered additional routes from the north, east, and west, but these were not analyzed in detail for reasons disclosed in Chapter 2. Detailed analysis of approaches from the north, east, and south included reviews of recreation, scenery, water quality, hydrology, geology, soils, air quality, cultural and historic resources, and biological resources. Additionally, a new and detailed engineering study was conducted to refine and to specify road corridor locations from the north, east, and south.

This engineering study utilized LIDAR data produced in April of 2007 to generate topographic surfaces in AutoCad, a widely used computer modeling program. Forest Service engineering staff created horizontal and vertical road corridor alignments and identified the optimal road corridor locations that were the most technologically feasible given the topography. AutoCad was then used to apply typical road sections along the corridor to generate proposed surfaces. This LIDAR and AutoCad approach differed from the engineering processes utilized for the June 2013 EA, which did not utilize computer mapping and design programs. The LIDAR and AutoCad approach provided more precision and detail in the analysis and the process produced road corridors that differ in length, location, and potential environmental impacts from those presented in the 2013 EA, but which are more technologically feasible than those produced earlier.

1.7 Issue Identification

The ID Team reviewed the comments received during the initial public scoping period and during the November 2011 and December 2012 - January 2013 notice and comment periods and the 2013 appeals and separated the issues into two groups: those key to the decision to be made and those considered to be concerns. Key issues are those directly or indirectly caused by implementing the proposed action and are used to develop alternatives, design criteria, or environmental effects analysis topics.

The key 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 1.9** 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 **Sections 3.2, 3.7, and 3.8** of this EA.

- Scenery 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 3.3 and 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.

1.8 Other Concerns

Other concerns are not considered key issues under the National Environmental Policy Act 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 concerns were determined to be non-key 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.

  In Management Area 4C, visually pleasing scenery and habitats for wildlife requiring older forests is emphasized. The land is not suitable for timber production to meet visual quality objectives or lands are not cost efficient for timber production. The Forest Plan directs managers to limit access for motorized vehicles and establishes criteria for open road density per square mile. No new open roads would result from this action and no

forest management activities on national forest lands are proposed. Accordingly, selecting an action alternative would be consistent with the Forest Plan for Management Area 4C, provided that the selected alternative meets visual quality objectives for MA 4C (see **Section 3.2** for scenery analysis).

- Wilderness designation of the Fires Creek watershed.

  Wilderness designation is beyond the scope of the proposal. The analysis area is not within an inventoried roadless area or a wilderness study area.

- Concerns regarding who is responsible for costs incurred from road reconstruction, construction, and maintenance.

  If an action alternative is selected, the landowner would incur all costs of road reconstruction, construction, and maintenance for the full length of any access granted to the LCPOA.

- Public requests for the Forest Service to place restrictions on what the landowners 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.

  While open roads may be associated with these threats, there would be no increase in open roads if an action alternative is selected.

1.9 Federal Regulations - Access to Non-Federal Lands

Sections 251.110 through 251.114 of Title 36 of the Code of Federal Regulations (CFR) establish the procedures that the Forest Service and landowners must follow when landowners apply for access across National Forest System lands. In this section of the EA, the pertinent language from the CFR is presented in italics, followed by Forest Service analysis and discussion.

1.9.1 Scope, Application, and Definitions 36 CFR §251.110

Section 251.110 establishes the scope and procedures by which landowners may apply for access across National Forest System lands. Within 36 CFR §251.110, paragraphs c, d, and g are most pertinent to the analysis and discussion that follow:

- *(c) Subject to the terms and conditions contained in this part and in parts 212 and 293 of this chapter, as appropriate, landowners shall be authorized such access as the authorized officer deems to be adequate to secure them the reasonable use and enjoyment of their land.*
- *(d) In those cases where a landowner's ingress or egress across National Forest System lands would require surface disturbance or would require the use of*

Government-owned roads, trails, or transportation facilities not authorized for general public use, the landowner must apply for and receive a special-use or road-use authorization documenting the occupancy and use authorized on National Forest System lands or facilities and identifying the landowner's rights, privileges, responsibilities, and obligations.

- *(g) Where there is existing access or a right of access to a property over non-National Forest land or over public roads that is adequate or that can be made adequate, there is no obligation to grant additional access through National Forest System lands.*

Adequate Access and Reasonable Use and Enjoyment – 36 CFR §251.110 Paragraph C

Section 251.111 defines adequate access: *Adequate access means 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 National Forest System lands and resources.* The LCPOA applied for a method of access that would accommodate passenger vehicles. The Forest Service considered all methods of access, including foot, horse, bicycle, and passenger vehicles, and that discussion is presented in Chapter 2 of this EA.

In their application for access the LCPOA cited an objective of building up to four primitive cabins on the inholding for the use and enjoyment of LCPOA members. If the Forest Service determines that the method of access would not extend to accommodating motorized vehicles, the landowners could continue to access their property by driving to the end of the publicly accessible Forest Service Road (FSR) 340A (Rockhouse Branch Road) and parking near the existing gate at FSR 340A1 (Phillips Ridge Road, which is closed to public access year-round). They would then walk or ride horses up FSR 340A1 approximately 3.5 miles to its end point. The owners would then have to walk approximately half a mile through the forest to access the inholding.

Special Use Authorization – 36 CFR §251.110 Paragraph D

Given the remote location of the property, any method of access that would accommodate motorized vehicles would require surface disturbance to establish one or more new road segments and to improve existing Forest Service roads that are not authorized for general public use. Several routes were proposed that would accommodate passenger vehicles. Those routes are presented and analyzed in Chapter 2 of this EA. Granting motorized access would require the Forest Service to issue a special use authorization to the LCPOA.

Existing Access – 36 CFR §251.110 Paragraph G

Forest Service research of existing rights of access determined that there were no historical rights or currently existing rights of access over public roads or across non-National Forest System land. The findings of this research are presented in the following three subsections of this EA.

Deeded Access Rights – Federal Tract

The United States of America acquired USA Tract N-134b consisting of 800 acres from F. P. Cover & Sons, Incorporated 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 acquisition 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 (Figure 1.2.3, page 6). 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 Forest Service reviewed the chain of title to determine 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. The deed issued from W.T. (Will) Bumgarner and wife, Eugenia Bumgarner to George G. Westfeld on October 3, 1935 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 Forest Service also reviewed the chain of deeds from 1935 to the current landowners and found that there were no outstanding or reserved access rights conveyed in those 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.

1.9.2 Similarly Situated Non-Federal Land 36 CFR §251.114

Paragraph a of 36 CFR Section 251.114 establishes the criteria, terms, and conditions for the authorizing official, in this case the Forest Supervisor for the NFsNC, to follow when considering an application to access non-federal lands:

> *(a) In issuing a special-use authorization for access to non-Federal lands, the authorized officer shall authorize only those access facilities or modes of access that are needed for the reasonable use and enjoyment of the land and that minimize the impacts on the Federal resources. The authorizing officer shall determine what constitutes reasonable use and enjoyment of the lands based on contemporaneous uses made of similarly situated lands in the area and any other relevant criteria.*

In 2010, the Forest Service identified parcels of similarly situated non-Federal land in Cherokee, Clay, Graham and the western portion of Macon counties in North Carolina. Selected tracts were surrounded by National Forest System lands and were not subdivided more than five times or extensively developed. Tracts inconsistent with these criteria were dropped from consideration to ensure that similar road construction standards could be applied per the NFsNC Access Guidelines (see Section 1.9.3 of this EA). Small tracts with a single owner smaller than five acres were also excluded from analysis as they are not similar to the LCPOA property.

In the four-county area, 73 private tracts were considered, with 39 tracts identified as being similar to the applicants' land. These are shown in Figures 1.9.2.1 - 1.9.2.4, pages 15 and 16. Analysis conducted in 2010 and revisited in 2013 determined that the average tract size is approximately 46.5 acres and the majority of the tracts are owned by a single owner. The type of access was then identified using United States Geological Survey maps, aerial photography and county geographic information system and/or tax information.

Data are presented in Table 1.9.2.1 on page 17. Of the 39 properties identified as similarly situated:

- Twenty six (67%) have vehicular access by State, Forest Service, and/or private roads and 13 (33%) have non-motorized access.
- Of the 26 similarly situated properties with motorized access, 14 have access by public roads and twelve have vehicular access by Forest Service and/or private roads.
- Of the 13 with non-motorized access, eight have no designated access route and five have access by trails with an average walk of one half mile.

1.9.3 Access Guidelines and Use Restrictions

In addition to meeting the requirements of CFR 36, Chapter II, Subpart D, if access is granted the Forest Service and the landowners must comply with National Forest in North Carolina access guidelines as well as local ordinances defining land use restrictions for private subdivisions in Clay County, North Carolina. Both are discussed in the following two subsections.

Clay County Land Use Restrictions

Clay County, North Carolina issued land-use ordinances for subdevelopments that became effective on July 1, 1996 and which 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" (Clay County Ordinances for Subdevelopments Section 4.4.2.B).

Accordingly, there are no restrictions being placed on interior roads by Clay County as four primitive cabins (single-family residences) are being proposed for construction and would be served by a spur roadway. It should be noted that these ordinances apply only to privately owned land within Clay County and do not govern National Forest System lands.

Figure 1.9.2.1. Access Analysis - Similarly Situated Properties, Cherokee County, NC

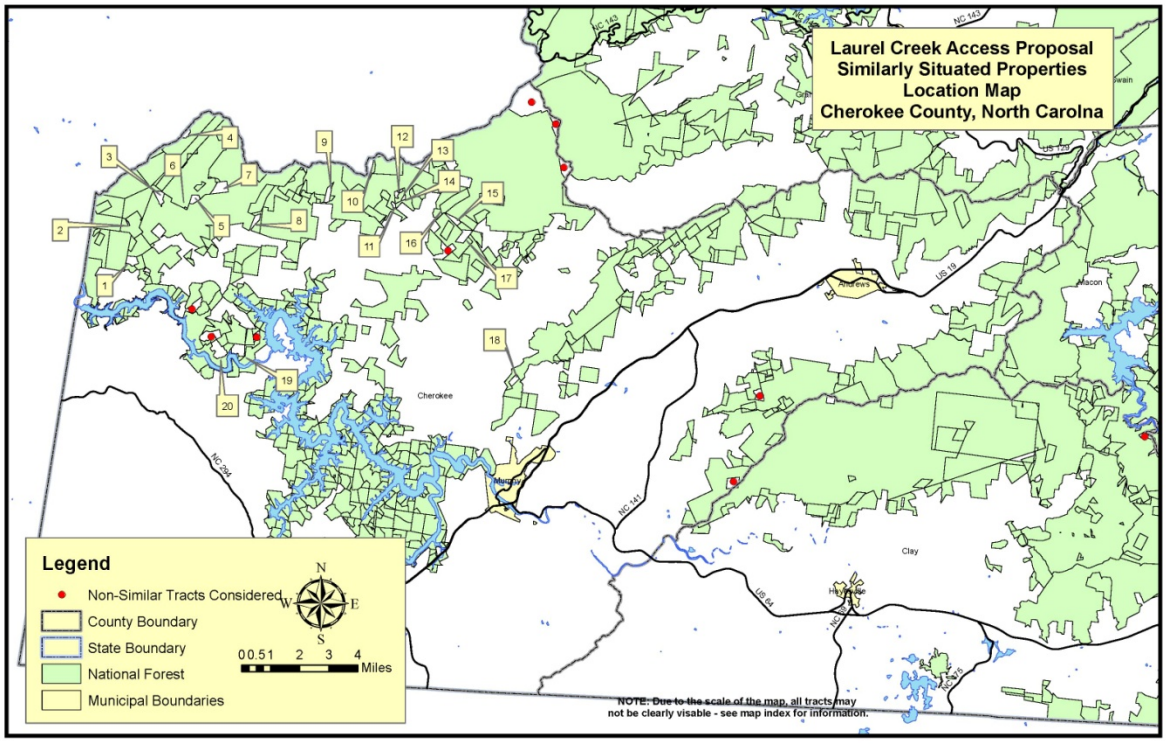


Figure 1.9.2.2. Access Analysis - Similarly Situated Properties, Clay County, NC

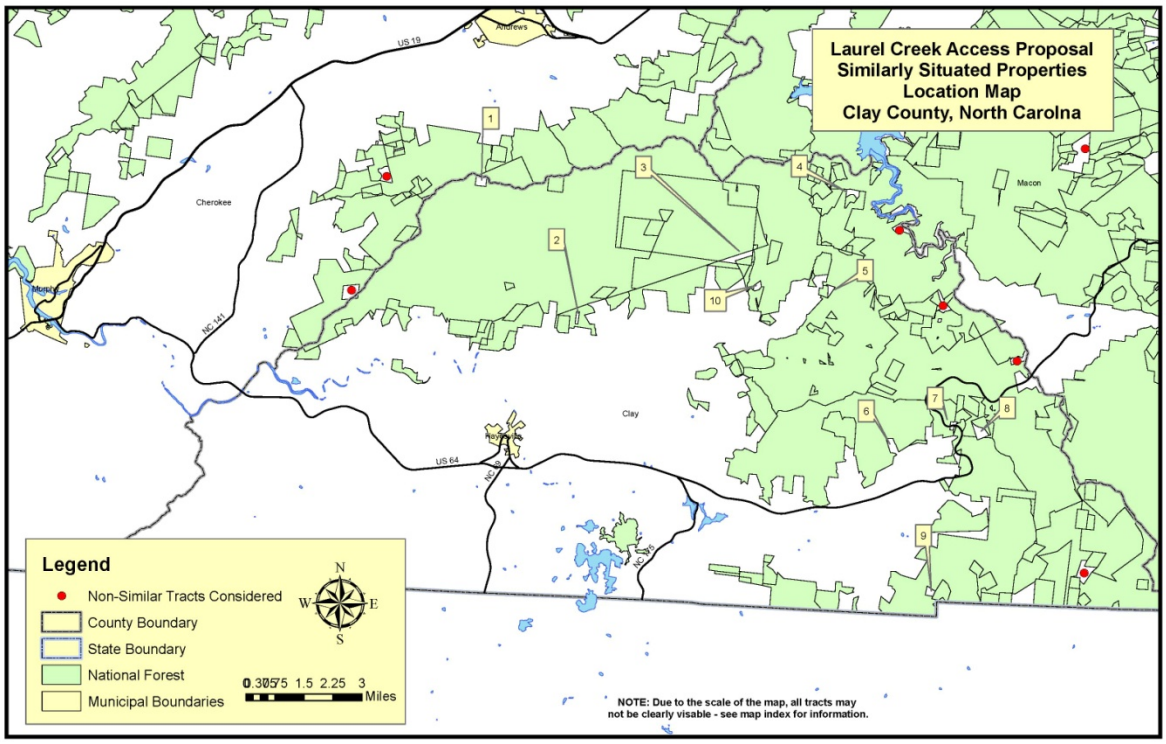


Figure 1.9.2.3. Access Analysis - Similarly Situated Properties, Graham County, NC

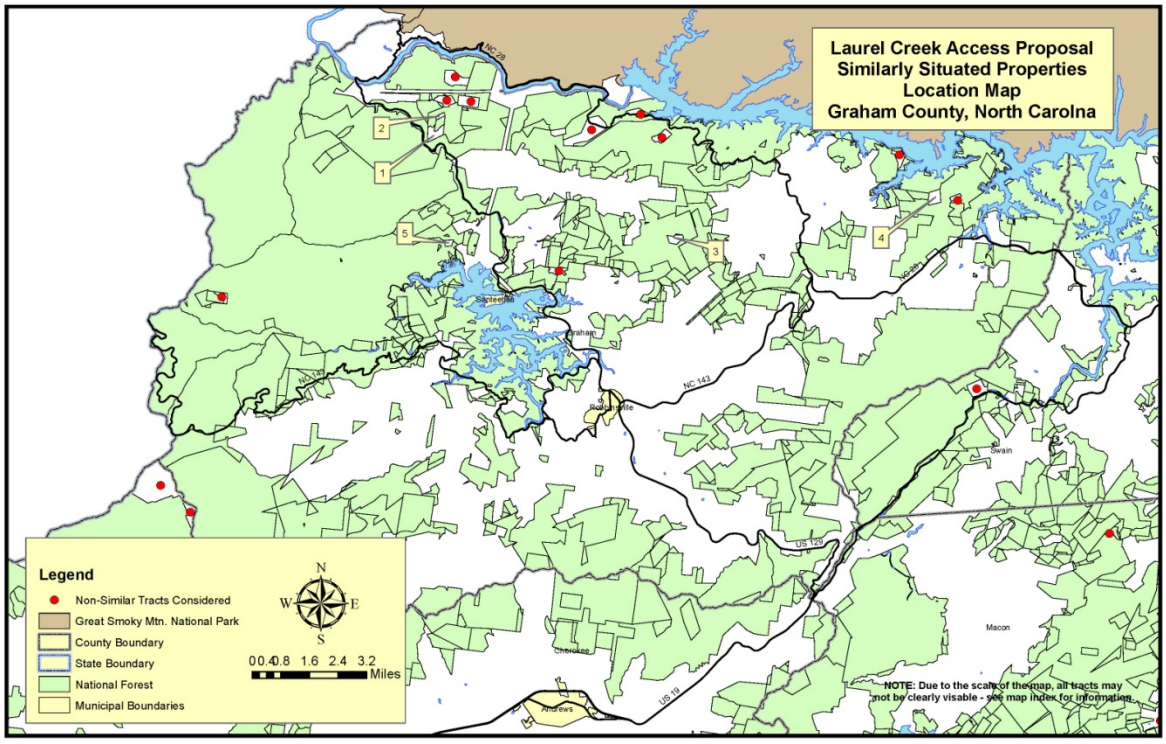


Figure 1.9.2.4. Access Analysis - Similarly Situated Properties, Macon County, NC

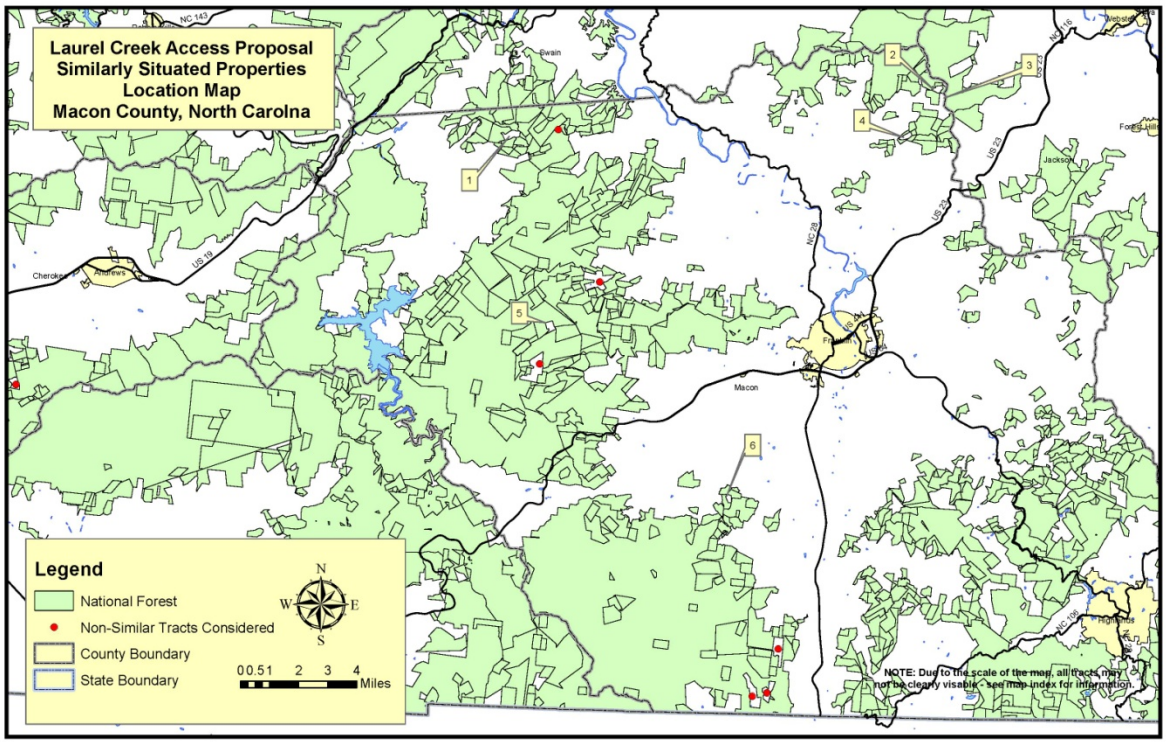


Table 1.9.2.1 Access Analysis – Similarly Situated Properties in Cherokee, Clay, Graham, and Macon Counties, North Carolina

Tract Number	County	Acres	Developed?	Type of Access	Subdivided	Number of 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	Trail	No	1
5	Cherokee	37.5	Yes	SR 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	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 Road	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 Road	Yes	5
20	Cherokee	141.22	Yes	FS 333a/Pvt Road	No	1
1†	Clay	49.33	No	Trail	Yes	4
2	Clay	15.3	No	None	No	1
3	Clay	54	No	None	No	1
4	Clay	35.17	No	SR 1307	Yes	4
5	Clay	22.5	No	No ROW	No	1
6	Clay	8.11	No	US 64 E	No	1
7	Clay	53.2	No	Trail	No	1
8	Clay	33.66	No	None	No	1
9	Clay	22	No	Trail	No	1
1	Graham	91.57	Partially	SR 1249	Yes	4
2	Graham	17.45	Partially	SR 1250	Yes	4
3	Graham	50	No	FS 438	No	1
4	Graham	80	No	Trail	No	1
5	Graham	28	No	None	No	1
1	Macon	87.65	Yes	FS 7030/Pvt Road	Yes	3
2	Macon	10.5	No	None	No	1
3	Macon	20	No	None	No	1
4	Macon	35	No	Unknown	No	1
5	Macon	54.31	Yes	FS 69/Pvt Road	Yes	3
6	Macon	26.96	Yes	SR 1128	Yes	5

†Tract number one in Clay County is the LCPOA property. It was not among those analyzed to show contemporaneous uses of similarly situated properties but is included in this table for reference purposes.

National Forests in North Carolina – Access Guidelines

On February 13, 2003, the NFsNC revised the guidelines for the construction of roads that access private property. These guidelines addressed the level and type of roads needed to serve single family residences, subdivisions and commercial establishments on National Forest System 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 Local Roads (Average Daily Traffic <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.

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 LCPOA. The *General Guidelines for Road Construction – Single Lane Road with Turnouts – Five Homes or Less* establish 17 guidelines for road construction, including:

- A minimum width of 13 feet, inter-visible passing areas;
- Sustained grades not exceeding a 12% grade;
- Short pitches (less than 150 feet) not to exceed a 20% grade.

If vehicular access is granted, the NFsNC *General Guidelines for Road Construction – Single Lane Road with Turnouts – Five Homes or Less* would be used in conjunction with specific design criteria to ensure the protection of National Forest System lands and resources (Appendix 1).

A separate set of NFsNC guidelines apply for roads accessing more than five homes and commercial buildings, including higher occupancy structures such as condominiums. If vehicular access is granted to the LCPOA and if the LCPOA builds the four primitive cabins as proposed in the application for access, and if in the future the LCPOA wishes to exceed five homes or wishes to increase the housing capacity of any existing structures, the LCPOA would have to apply for a new special use authorization under the NFsNC *General Guidelines for Roads Accessing More than Five Homes and Commercial Buildings*. This application would require a new Environmental Analysis and new decision by the Forest Service.

1.9.4 Scope and Limitations of the LCPOA's Access Application

The Forest Service performed this environmental analysis to identify and disclose the effects that would occur if access is granted to the LCPOA. The Forest Service would not construct the access; if a special use authorization is granted it would permit the landowners to construct access to their property in compliance with Forest Service standards and other Federal and State environmental statutes.

The LCPOA would be responsible for all costs associated with upgrading existing Forest Service roads to Forest Service standards for passenger vehicles (referred to henceforth as "road reconstruction" in this document). Road reconstruction includes (but is not limited to): regrading road surfaces, adding new gravel aggregate, repairing and/or replacing culverts (as necessary), removing encroaching vegetation, clearing inslope ditches, and related treatments. If access is

granted, the LCPOA would be responsible for maintaining existing Forest Service roads to Forest Service standards for passenger vehicles for the duration of the special use authorization. In areas where Forest Service roads make up a portion of an access route, the Forest Service would share partial responsibility for road maintenance, but only at levels commensurate with agency use.

The LCPOA would be responsible for all costs associated with constructing new road segments to Forest Service standards for passenger vehicles. If access is granted, wherever the LCPOA would have to establish a new road prism and new cut and fill slopes to access their property, the standards in the NFsNC *General Guidelines for Road Construction – Single Lane Road with Turnouts – Five Homes or Less* (Appendix 1) would be implemented as written to protect National Forest System lands and resources. If access is granted, the LCPOA would be responsible for maintaining new road segments to Forest Service standards for passenger vehicles for the duration of the access.

The special use authorization would not include utilities. If access is granted and if the LCPOA wishes to have electrical service at the property in the future, the LCPOA would have to apply for a utilities access and special use authorization from the Forest Service and go through a separate Environmental Analysis for the utilities application. The special use authorization would not extend to hauling logs. If the LCPOA wishes to conduct timber harvesting activities at the property in the future, the LCPOA would have to apply for a haul permit to transport logs across Forest Service roads. The special use authorization would not allow the LCPOA to engage in commercial activities at the property. If the LCPOA wishes to engage in commercial activities in the future, the LCPOA would have to apply for a separate special use authorization and go through a separate environmental analysis and comply with the NFsNC *General Guidelines for Road Construction – Roads Accessing More than Five Homes and Commercial Buildings.*

The Forest Service would grant the special use authorization conditional upon the LCPOA's compliance with all applicable Federal and State laws, such as but not limited to, the North Carolina Sediment Control Act, the Clean Water Act, and the Endangered Species Act. The special use authorization would also be conditional on the LCPOA's receiving (1) all necessary permits and waivers by the North Carolina Department of Environmental Quality and (2) all necessary permits and waivers by the United States Army Corps of Engineers.

Pursuant to Forest Service Handbook (FSH) 7715.4, a Project Level Travel Analysis Plan (TAP) was prepared for this project. Recommended changes to the transportation system from the TAP were incorporated into the analysis.

Chapter 2 – Alternatives

2.1 Introduction

Four alternatives were identified for detailed analysis, Alternative A, Alternative B (proposed action), Alternative C, and Alternative D. Four additional alternatives were proposed for analysis in response to the comments received during the November 2011 and December 2012 notice and comment period. The four additional alternatives were evaluated by the ID Team but were not analyzed in detail (Section 2.5).

2.2 Alternatives Considered in Detail

2.2.1 Alternative A – No Access

The Forest Service would not grant additional access beyond the existing foot and horseback routes currently available to the landowners as described in Section 1.9.1 of this EA, consistent with 36 CFR, §251.110, paragraph c: "*…landowners shall be authorized such access as the authorized officer deems to be adequate to secure them the reasonable use and enjoyment of their land.*" Alternative A also provides a baseline for estimating the effects of proposed action alternatives.

2.2.2 Alternatives B, C, and D: Special Use Authorization for Access by Passenger Vehicles

The Forest Service would grant a special use authorization to the Laurel Creek Property Owners Association providing the LCPOA with passenger vehicle access across National Forest System lands to their property at the headwaters of Laurel Creek for their stated purpose of ingress and egress to construct, use, and enjoy four primitive cabins. A special use authorization would be granted consistent with the guidelines and use restrictions as described in Section 1.9.3 on pages 14 and 18 of this EA and with the design criteria presented in Section 2.3.

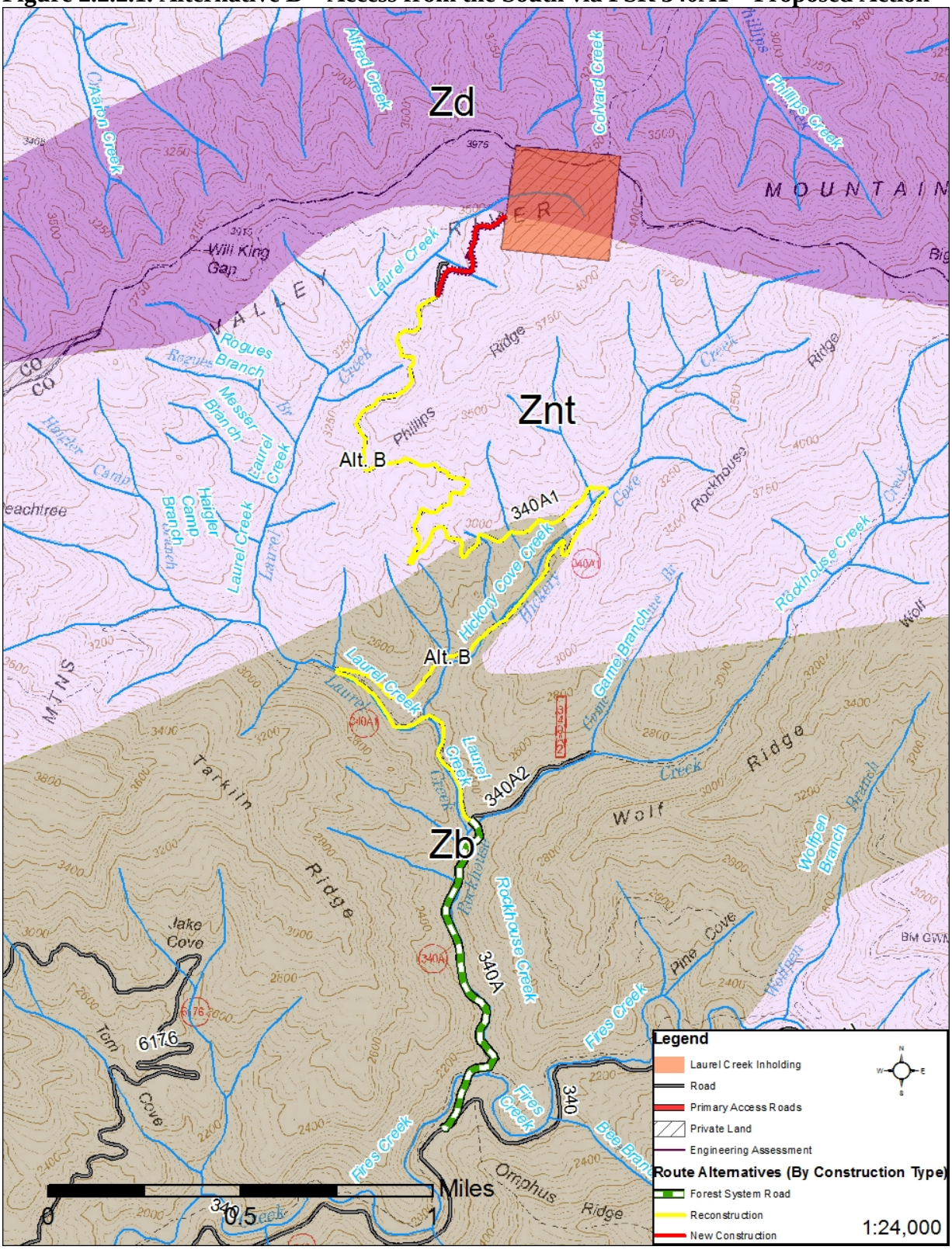
2.2.2.1 Alternative B – Access via FSR 340A1 – Proposed Action

This alternative would grant access through a special use authorization beginning at the point where Rockhouse Branch Road (Forest Service Road (FSR) 340A) leaves Fires Creek Road (FSR 340) (Figure 2.2.2.1 on page 21). Rockhouse Branch Road is currently open to public vehicular access, and would remain open to public vehicular access under this proposal. From the gate at the end of FSR 340A, a special use authorization would continue on Phillips Ridge Road (FSR 340A1) approximately 3.5 miles to its end point. Phillips Ridge Road is currently closed to public vehicular access by the locked gate, and would remain closed to public vehicular access under this proposal. The LCPOA would reconstruct approximately 3.5 miles of FSR 340A1 under this proposal. A new road segment approximately 0.34 miles in length would be constructed along the upper northwestern slope of Phillips Ridge near the terminal point of FSR 340A1 to access the private property. This road segment would maintain a steep uphill gradient for its entire length. While FSR 340A1 and the one third mile section of new road would be closed to vehicular use by the general public, they would be open to use by hikers and horseback riders to the boundary between National Forest System lands and the LCPOA property. The special use authorization would allow for permanent, year-round vehicular access.

2.2.2.2 Alternative C – Access from the East via FSR 427

This alternative would grant access through a special use authorization that would utilize State Road 1344, Fires Creek Road (FSR 340) and FSR 340C, with the special use authorization beginning at Big Stamp Road (FSR 427) and extending the length of Big Stamp Road to the LCPOA property (Figure 2.2.2.2 on page 23). Fires Creek Road (FSR 340) is currently closed at its junction with FSR 340B due to a road slide, but is normally open to public vehicular access, and would remain open to public vehicular access under this proposal when repair work is completed.

Figure 2.2.2.1. Alternative B – Access from the South via FSR 340A1 – Proposed Action



Znt is the U.S. Geologic Survey code for The Nantahala Formation, a sulfidic rock layer that is discussed in Section 3.4 of this document. Zb is The Brasstown Formation, Zd is The Dean Formation.

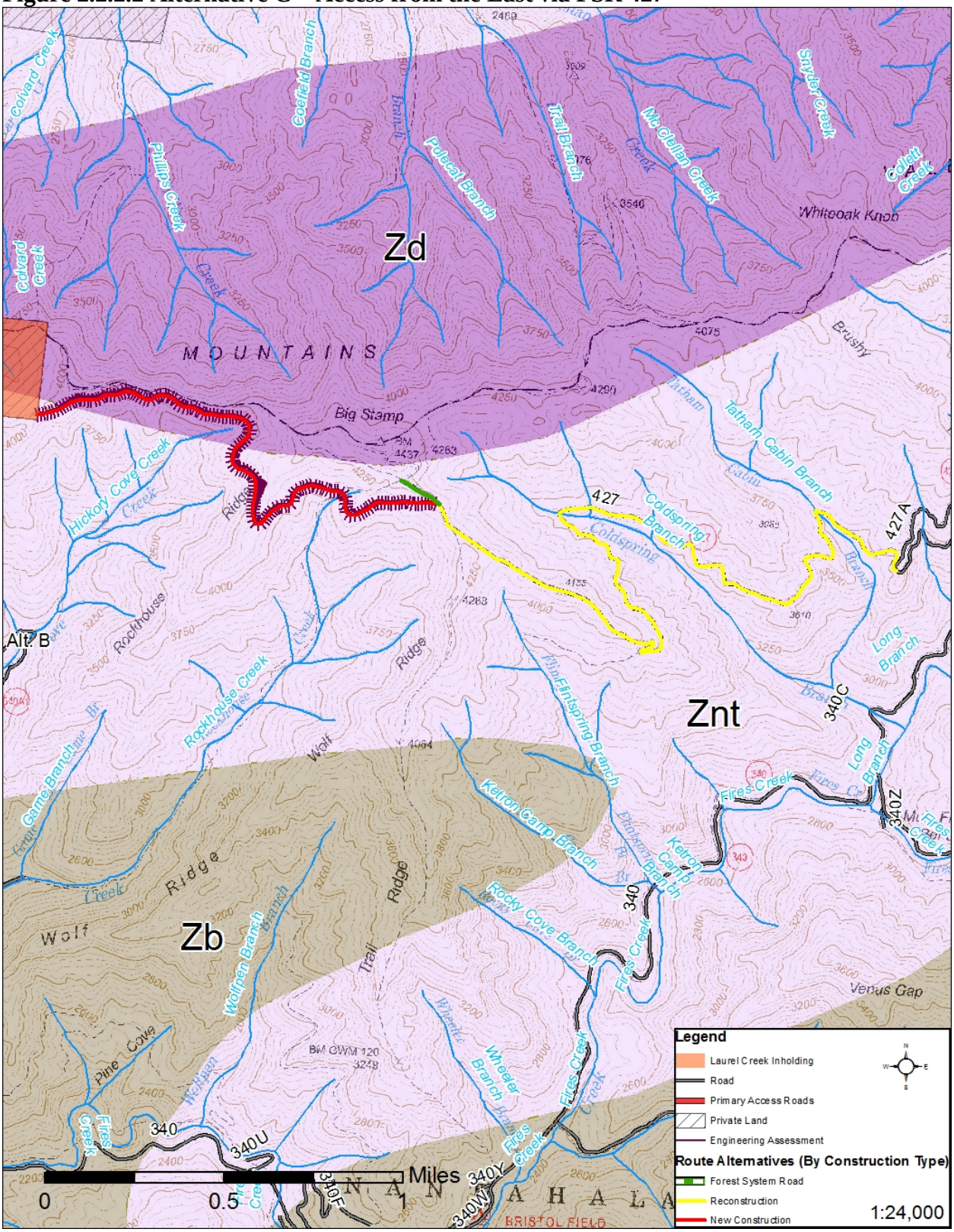
Fires Creek Road (FSR 340) becomes FSR 340C at the confluence of Long Branch and Fires Creek, and follows Long Branch to the north-northwest. Forest Service Road 340C, currently closed due to the road slide, is normally open to the public and would remain open to the public under this alternative when repair work is completed. Under this proposal, the Forest Service would grant LCPOA a special use authorization beginning at the Forest Service gate at FSR 427.

The route would use approximately 3.6 miles of FSR 427 to its intersection with the Rim Trail, Future Rim Trail Bypass (see Section 3.1) and Rockhouse Creek Trail below Big Stamp, and the LCPOA would reconstruct the entire length of FSR 427 under this proposal. A new road segment approximately 1.6 miles in length would be constructed to access the inholding from the end of FSR 427. The new construction would cross the Rockhouse Creek Trail, travel southwest at the 3,900 foot elevation contour of Rockhouse Ridge, follow the contour around Rockhouse Ridge and travel northwest, approaching within 100 feet of the Future Rim Trail Bypass, parallel the Future Rim Trail Bypass for approximately half a mile, and then follow the 3,900 foot elevation contour to the southeast corner of the private property. While FSR 427 and the section of new road would be closed to vehicular use by the general public, they would be open to use by hikers and horseback riders to the boundary between National Forest System lands and the LCPOA property. The special use authorization would allow for permanent, year-round vehicular access to the tract of private land by the landowners.

2.2.2.3 Alternative D – Access from the North via FSR 6148A

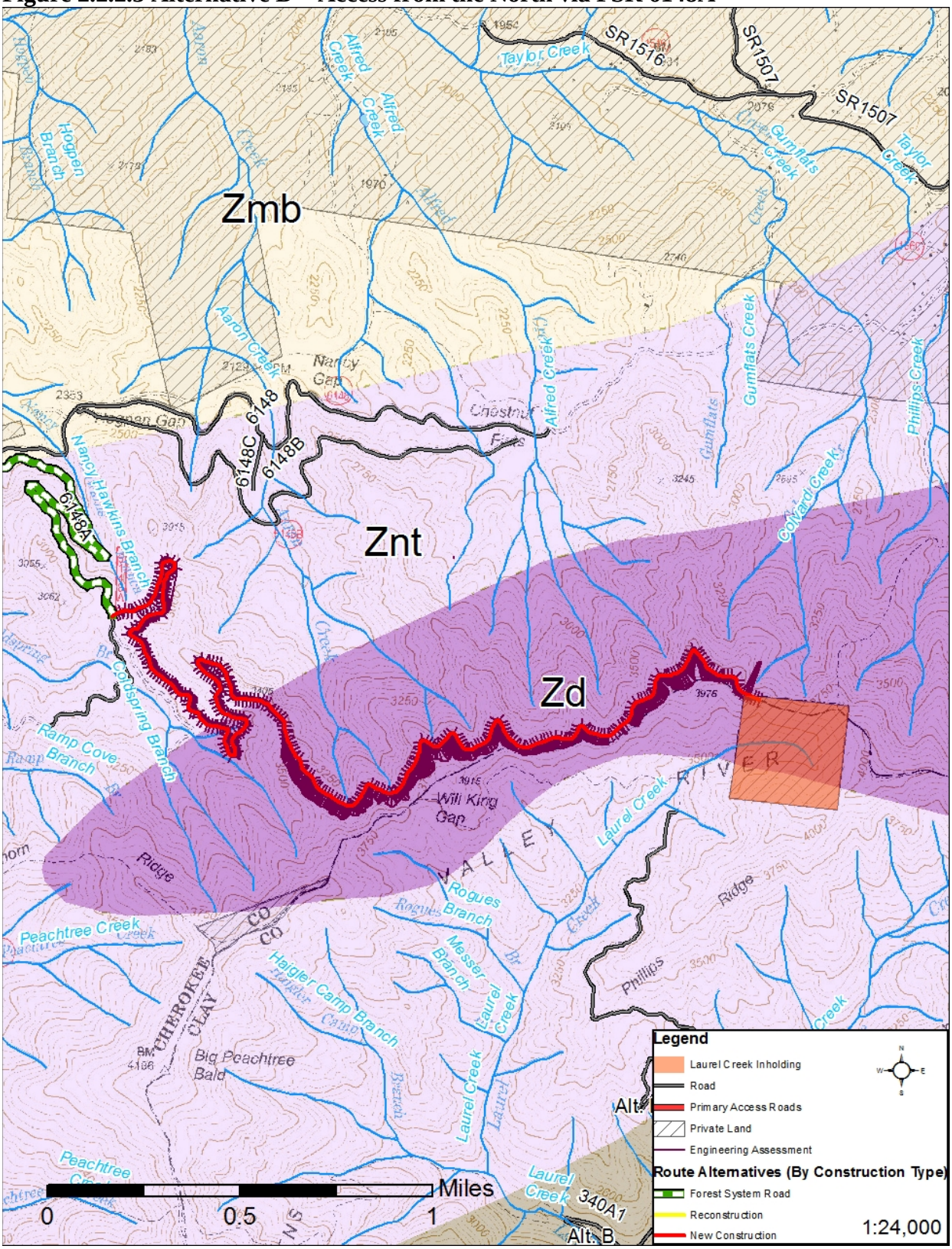
This alternative route would grant access through a special use authorization that would utilize State Highway 141, State Road 1520, Derreberry Road (FSR 6148) and FSR 6148A in Cherokee County (Figure 2.2.2.3 on page 24). Derreberry Road (FSR 6148) is open seasonally (April 1 – December 31) and would remain open seasonally under this proposal. Forest Service Road 6148A is currently closed to public vehicular access and would remain closed under this proposal. The special use authorization would begin at the gate that accesses FSR 6148A and continue to a point approximately 1.3 miles from the gate at FSR 6148A. From that point, a new road segment approximately 3.5 miles in length would be constructed to Forest Service standards for passenger vehicles to access the inholding. The new road segment would approach Will King Gap on an unnamed ridge east of Nancy Hawkins Branch and then turn east above the headwaters of Aaron Creek, Alfred Creek, and Colvard Creek to access the inholding from its northwest corner at the rim of the Valley River Mountains. While 6148A and the new road segment would be closed to vehicular use by the general public, they would be open to use by hikers and horseback riders to the boundary between National Forest System lands and the LCPOA property. The special use authorization would allow for permanent, year-round vehicular access to the tract of private land by the landowners.

Figure 2.2.2.2 Alternative C – Access from the East via FSR 427



Znt is the U.S. Geologic Survey code for The Nantahala Formation, a sulfidic rock layer that is discussed in Section 3.4 of this document. Zb is The Brasstown Formation, Zd is The Dean Formation.

Figure 2.2.2.3 Alternative D – Access from the North via FSR 6148A



Znt is the survey code for The Nantahala Formation, a sulfidic rock layer that is discussed in Section 3.4 of this document. Zb is The Brasstown Formation, Zd is The Dean Formation, Zmb is The Mineral Bluff Formation.

2.3 Design Criteria

If Alternative B, C, or D is selected, the following design criteria would be applied for activities related to road construction and reconstruction to protect National Forest System lands and resources while providing appropriate and safe access. The criteria that would be used for the design of the roadways presented in these alternatives are as follows:

2.3.1 New Road Construction Alternatives B, C, and D

If a special use authorization is granted, wherever the LCPOA would have to establish a new road prism and new cut and fill slopes to access their property, the standards in the NFsNC *General Guidelines* (Appendix 1) would be applied. For any of these alternatives, the LCPOA would have to obtain the required permits, including North Carolina Department of Environment and Natural Resource NPDES Permit, NC Division of Water Quality 401 water quality certification and the US Army Corps of Engineers 404 Permit, as a precondition to the Forest Service granting a special use authorization.

2.3.2 Road Reconstruction for Alternatives B and C

If a special use authorization is granted, reconstruction and reconditioning of portions of Forest Service roads would be required. Reconstruction and reconditioning activities include any work that is required to restore the road to a state where it meets the criteria set forth *in NFsNC General Guidelines*. Some of these guidelines may be modified for reconstruction activities to reduce soil disturbance, to reduce the risk of acid runoff in areas where the access crosses the Nantahala Formation, and to reduce the risk of sedimentation into nearby waters. In areas agreed upon with the NFsNC, where cut and fill slopes are stable and where road widths are currently less than 12 feet but are wide enough to accommodate emergency response vehicles and construction materials, the LCPOA would not be required to engage in reconstruction activities that would result in ground disturbance solely to achieve the minimum design standards in the NFsNC *General Guidelines* because doing so would result in unnecessary soil disturbance.

2.3.3 Water Quality Protection for Alternatives B, C, and D

During road reconstruction and construction, the following Best Management Practices (BMPs) would be implemented to stabilize the road prism and reduce the risk of sediment movement:

- Limiting road grade to a maximum of 12% and limiting fill slopes to a maximum of 2H:1V and cut slopes to a maximum of 1H:1V (H = horizontal, V = vertical);
- The construction of outsloped roadway for portions of road with grades up to 8% and the construction of rolling dips at frequencies appropriate for the road grades;
- The construction of crowned and ditched roadway where the grade exceeds 8% and the installation of relief culverts at spacings appropriate for the ditch grade;
- The design of culverts with capacity to carry the 50 year storm flow and have a minimum width of bankfull width where live water is crossed;
- The surfacing of the roadway using appropriate grade and depth of stone;
- The use of silt fences, mulch, and other measures to reduce sedimentation;
- Seeding exposed soil with native plants; and
- The installation of a slash filter wind row 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).

2.3.3.1 BMPs Specific to Alternative B

For Alternative B, the three existing stream crossings and the eroded crossing at Hickory Cove Creek would be replaced 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. The existing plugged culverts would be replaced with crossings designed to pass the 50 year storm flow for those drainages. The LCPOA would be required to obtain all necessary state and federal permits prior to receiving a special use authorization from the Forest Service.

2.3.3.2 BMPs Specific to Alternative C

For Alternative C, the four estimated stream crossings affected by new road construction would be accomplished 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. Existing culverts on Forest Service roads that are plugged or are not properly sized would be replaced with crossings designed to pass the 50 year storm flow for those drainages. The LCPOA would be required to obtain all necessary state and federal permits prior to receiving a special use authorization from the Forest Service.

2.3.3.3 BMPs Specific to Alternative D

For Alternative D, the fifteen estimated stream crossings affected by new road construction would be accomplished 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. Existing culverts on Forest Service roads that are plugged or are not properly sized would be replaced with crossings designed to pass the 50 year storm flow for those drainages. The LCPOA would be required to obtain all necessary state and federal permits prior to receiving a special use authorization from the Forest Service.

2.3.4 Design Measures for Acidic Rock - Alternatives B, C, and D

Some portions of existing and potential road corridors are located in areas that are in the Nantahala Geologic Formation. Under the action alternatives, improvements to existing roads and construction of new road segments 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 Division of Water Quality, *Assessing and Controlling Acid Rock Drainage on Projects Requiring Section 401 Water Quality Certification*. Should conditions require the LCPOA to excavate acidic rock and establish waste areas, material would have to be removed from NFS lands for treatment.

1. If less than 50 cubic yards of fresh acidic rock material would be removed by excavation or blasting on the entire project, then no further action would be 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, unweathered 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 two-lengths of rock core or six to eight ounces of rock dust. The specific location of each sample shall be recorded.

3. The samples would 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 by applying limestone to road surfaces and drainage ditches when there is a risk of acidified stormwater entering ephemeral streams.

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 ($CaC0_3$) 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. Acid material is not to be used on the fill portion of a cut and fill road since 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 by encapsulating the acid material in lime and limestone. Both of these methods neutralize the acid runoff and improve the stability of the road.

2.4 Comparison of Alternatives

Table 2.4.1 on pages 28 and 29 summarizes Alternatives A, B, C, and D with respect to a number of variables. More complete examinations of potential effects to lands, waters, biological, and cultural resources are presented in Chapter 3.

Table 2.4.1. Comparison of Road Access Alternatives – LCPOA Access Across National Forest System Lands, Part 1

Variable	Alternative A	Alternative B	Alternative C	Alternative D
Miles of Road				
Total Miles	3.50, 3.6, 1.3*	3.84	5.2	4.8
Miles Existing System Road	3.50, 3.6, 1.3*	3.50	3.6	1.3
Miles Reconstruction	NA	3.50	3.6	0
Miles New Construction	NA	0.34	1.6	3.5
Number of Stream Crossings				
Total Stream Crossings	12, 4, 0*	13	8	15
Existing Stream Crossings	12, 4, 0*	12	4	0
Reconstruction Stream Crossings	NA	12	2	0
New Construction Stream Crossings	NA	1	4	15
Miles in Nantahala Formation				
Total Miles Nantahala Formation	1.86, 3, 1.3*	2.20	3.71	2.11
Existing System Road Miles Nantahala Formation	1.86, 3, 1.3*	1.86	3	1.3
Reconstruction Miles Nantahala Formation	NA	1.86	3	0
New Construction Miles Nantahala Formation	NA	0.34	0.71	0.81
Miles Within 100' of Water				
Total Miles within 100' of Water	1.36, 0.34, 0.12*	1.44	0.34	0.12
System Miles w/in 100' of Water	1.36, 0.34, 0.12*	1.36	0.34	0.12
Reconstruction w/in 100' of Water	NA	1.36	0	0
New Construction w/in 100' of Water	NA	0.08	0	0
Miles Within 30' of Water				
Total Miles within 30' of Water	0.35, 0.056, 0.01*	0.35	0.056	0.01
System Miles w/in 30' of Water	0.35, 0.056, 0.01*	0.35	0.056	0.01
Reconstruction w/in 30' of Water	NA	0.35	0	0
New Construction w/in 30' of Water	NA	0	0	0

*Figures represent variables associated with existing roads (FSRs 340A1, 427, and 6148A) that would remain in the analysis area if the no action alternative is selected.

Table 2.4.1. Comparison of Road Access Alternatives – LCPOA Access Across National Forest System Lands, Part 2

Variable	Alternative A	Alternative B	Alternative C	Alternative D
Average grade of proposed new road construction	NA	9.3%	3.1%	5.4%
Maximum grade of proposed new road construction	NA	12%	12%	11%
Average sideslopes of areas proposed for new road construction	NA	48%	68%	82%
Maximum sideslopes of areas proposed for new road construction	NA	60%	78%	115%
Cubic yards of excavation of areas proposed for new construction	0	8,000	80,000	294,000
Maximum height of cut bank of areas proposed for new construction	0	25 feet	65 feet	80 feet
Average height of cut bank areas proposed for new construction	0	18 feet	17 feet	52 feet
Acres disturbed by areas proposed for new road construction	0	2	9	45

2.5 Alternatives Considered but not Analyzed in Detail

The Forest Service considered an additional four alternative access routes to the LCPOA inholding by passenger vehicle. Forest Service engineers proposed other approaches that could access the property from the north (Alternative 1), west (Alternatives 2a and 2b), and east (Alternative 3). Maps of these alternatives are presented in figures 2.5.1, 2.5.2, and 2.5.3.

The ID Team examined the characteristics of Alternatives 1, 2a, 2b, and 3 and discussed the advantages and liabilities of each alternative. These four alternative routes were not carried forward for detailed analysis because two are technologically unfeasible to implement (Alternatives 2a and 2b) and because two are duplications of alternatives considered in detail (Alt. 1 - similar to Alt. D, and Alt. 3 - similar to Alt. C) (40 CFR 1502.14).

Members of the public proposed that the Forest Service provide access on existing routes by Off-highway vehicles (OHVs). The Forest Service did not consider granting access via an OHV trail because OHV use is illegal on all Forest Service roads on the Tusquitee Ranger District.

2.5.1 Alternative 1 –FSR 6148A and Will King Gap

Alternative 1 would provide a special use authorization from State Highway 141, State Road 1520, and FSRs 6148 and 6148A in Cherokee County (Figure 2.5.1 on page 31). Access would begin at a point approximately 1.3 miles from the gate at FSR 6148A. This route would require approximately 1.46 miles of new road construction to Will King Gap. The proposed route would then access the LCPOA property by crossing the ridgetop at Will King Gap and reconstructing a 0.87 mile section of the old logging road prism currently occupied by Phillips Ridge Trail to a point where a 0.27 mile segment of new road would be constructed to reach the private property. This route was not considered in detail because it is a duplication of Alternative D.

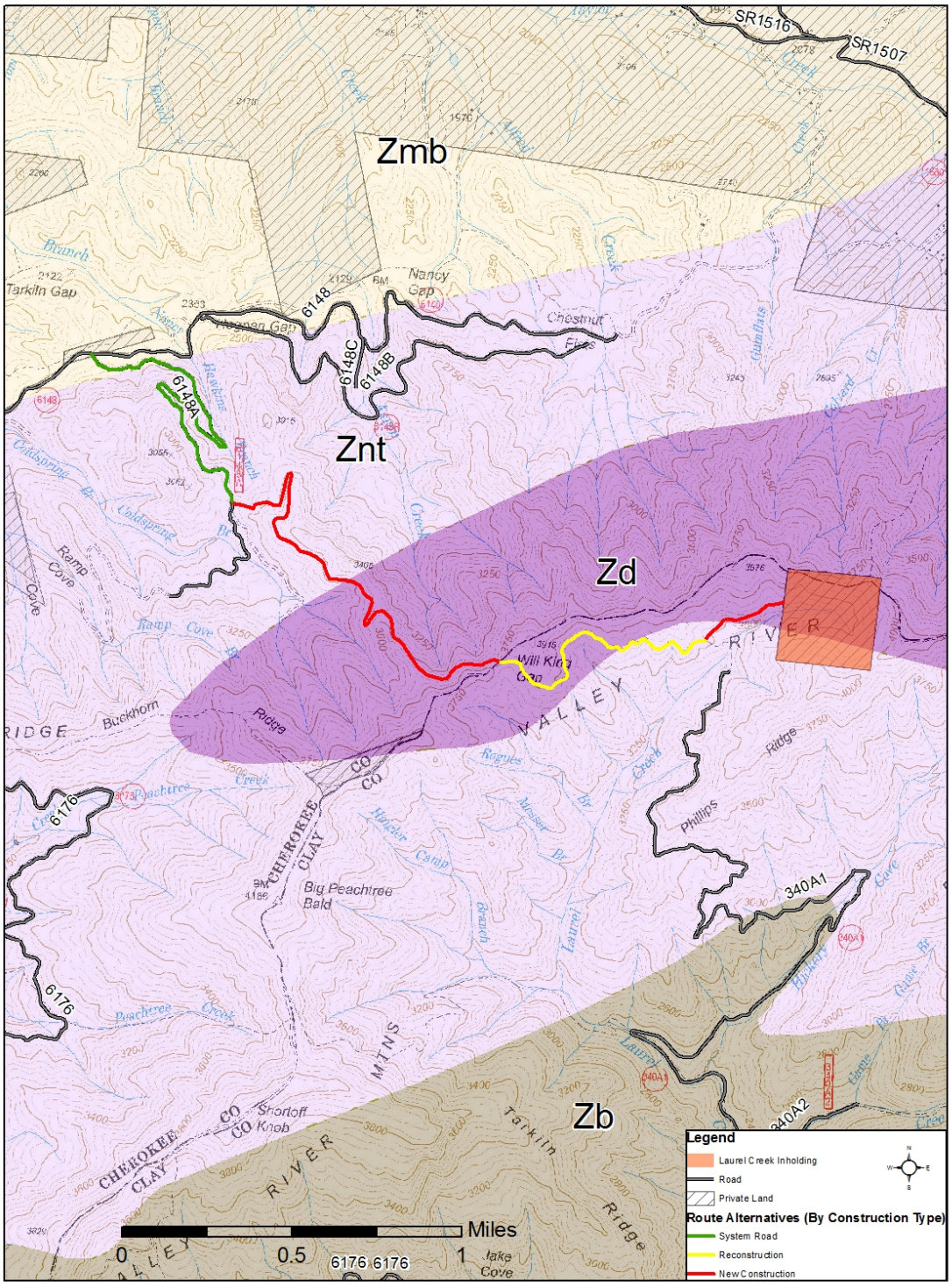
2.5.2 Alternatives 2a and 2b – Access from the West

Alternatives 2a and 2b would provide access from State Road 1344 and Leatherwood Road - FSR 6176 (Figure 2.5.2 on page 32). Access would begin at a point approximately 12 miles from State Road 1344. Approximately 1.2 miles of new road would be constructed to access Buckhorn Ridge. An old logging road would be reconstructed to the ridgetop at the county line. The road would then access the property by (2a) new road construction for approximately 1.65 miles on the ridgetop to the property or (2b) through new road construction on the ridgetop for approximately 0.65 miles and then along a 0.87 mile section of the Phillips Ridge Trail to a point where a 0.27 mile segment of new road would be constructed to reach the private property. These alternatives would require 1.65 miles (2a) and 0.65 (2b) miles of blasting and grading to level the ridgetop, actions determined to be technologically unfeasible by FS engineers.

2.5.3 Alternative 3 – FSR 427 and Big Stamp

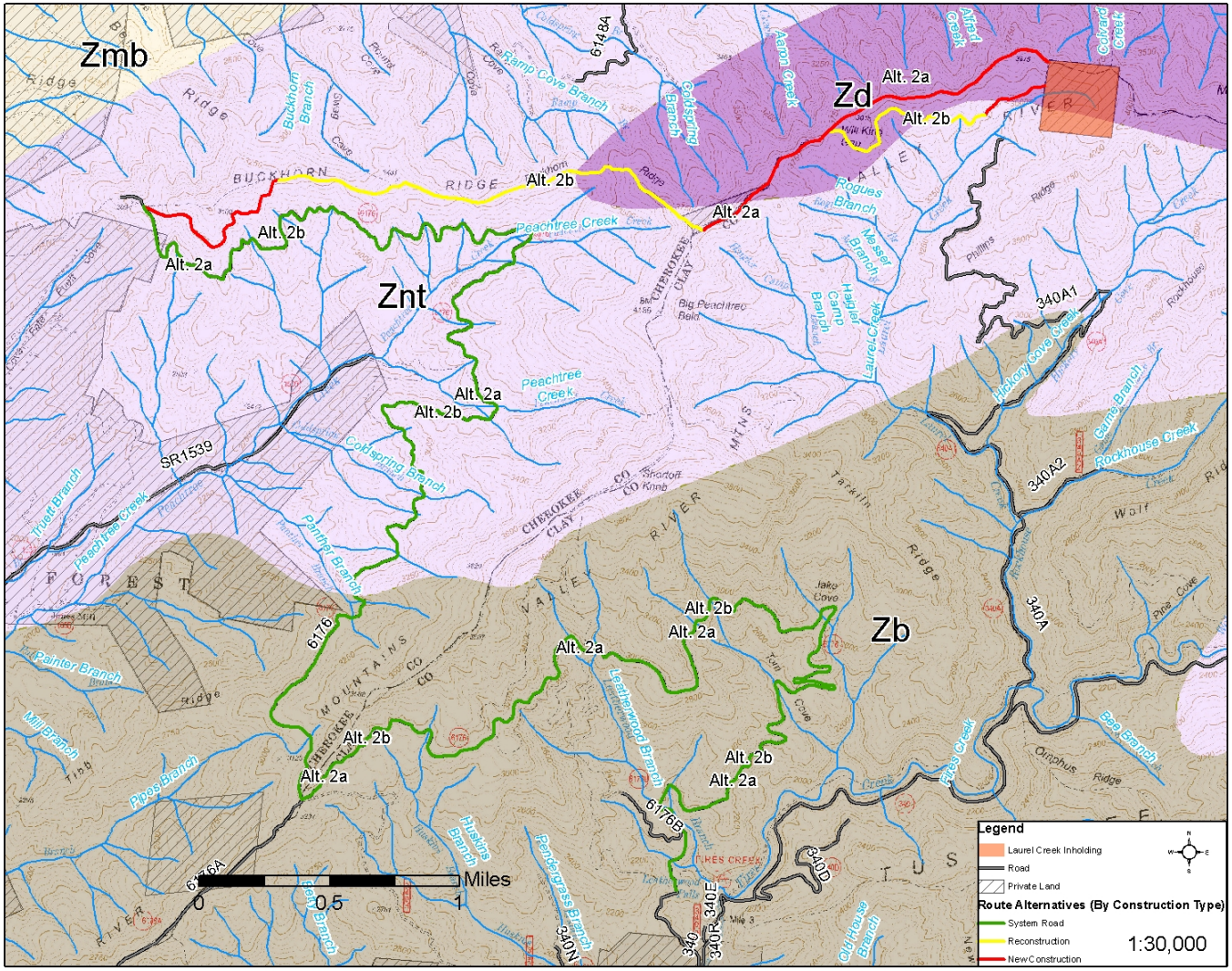
Alternative 3 would provide access from State Road 1344, Fires Creek Road (FSR 340), and FSR 340C (Figure 2.5.3 on page 33). Access would begin at the Forest Service gate at FSR 427a, and the route would use approximately 3.6 miles of FSR 427 to its intersection with the Rim Trail, and Rockhouse Creek Trail below Big Stamp. A new road segment approximately 1.23 miles in length would be constructed to access the inholding from the end of FSR 427. This route was not considered in detail because it is a duplication of Alternative C.

Figure 2.5.1. Alternative 1 – FSR 6148A and Will King Gap



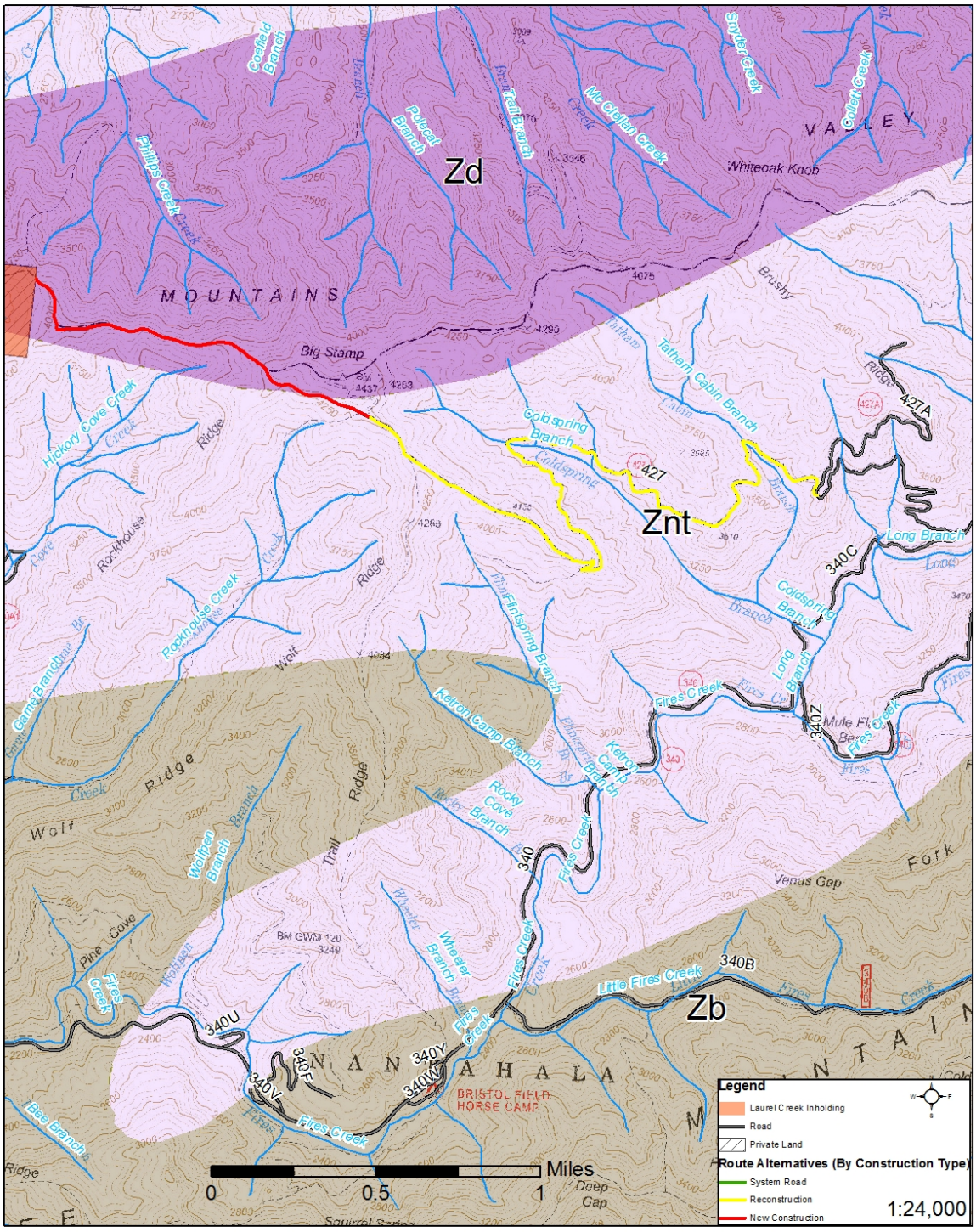
Znt is the U.S. Geologic Survey code for the Nantahala Formation, a sulfidic rock layer that is discussed in Section 3.4 of this document. Zb is the Brasstown Formation, Zd is the Dean Formation, Zmb is the Mineral Bluff Formation.

Figure 2.5.2. Alternatives 2a and 2b – Access from the West



Znt is the U.S. Geologic Survey code for the Nantahala Formation, a sulfidic rock layer that is discussed in Section 3.4 of this document. Zb is the Brasstown Formation, Zd is the Dean Formation, Zmb is the Mineral Bluff Formation.

Figure 2.5.3. Alternative 3 – FSR 427 and Big Stamp



Znt is the U.S. Geologic Survey code for the Nantahala Formation, a sulfidic rock layer that is discussed in Section 3.4 of this document. Zb is the Brasstown Formation, Zd is the Dean Formation.

Chapter 3 – Affected Environment and Environmental Consequences

This section forms the scientific and analytic basis for comparison of alternatives based on their effects to recreation, scenery, water quality, hydrology, geology, soils, air quality, cultural and historical resources, and biological resources. The environmental effects described here include both beneficial and detrimental effects. Environmental effects include appropriate ecological, aesthetic, historical, cultural, economic, social, and human health-related effects, which directly, indirectly, or cumulatively result from the proposed action. The environmental effects discussion will focus on the issues identified for this project (refer to "What the Decision Will Address", Section 1.5). Environmental effects are analyzed using references from scientific literature and reports, which are incorporated as an integral part of this environmental assessment. This section of the EA is based upon the best available science, including peer-reviewed scientific literature, State and Federal agency reports and management input, discussions with scientists and other professionals, and ground-based observations.

3.1 Recreational Analysis

3.1.1 Existing Condition

The Fires Creek area is a recreation destination popular with picnickers, swimmers, hikers, horseback riders, mountain bikers, hunters, and anglers. The analysis 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 are used for recreation in the immediate area of Alternatives B and C. 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 at Will King Gap, the Rim Trail is open to horseback riders and hikers to the west but is closed to through travel across the LCPOA property to the east. From FSR 340A1, the Rockhouse Creek Trail (TR387) ascends Rockhouse Creek and connects with the Rim Trail at Big Stamp. From Big Stamp the Rim Trail is open to horseback riders and hikers to the east, but is closed to through travel to the west across the LCPOA property (Figure 1.2.2, page 5 and Figure 3.1, page 37). The Rim Trail (TR72) is the only non-dispersed recreational resource in the vicinity of Alternative D.

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

In contrast, very little recreational activity occurs on the north slopes of the Valley River Mountains below Will King Gap in the vicinity of Alternative D. The terrain is steep, rugged and largely inaccessible to foot traffic and there are no trails for walking, biking, hiking, and horseback riding. Derreberry Road (FSR 6148) is utilized by hunters and other forest users to access the lower slopes of the Valley River Mountains along Nancy Hawkins Branch, Aaron Creek, Alfred Creek, and Colvard Creek.

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 (two double and five single sites), a primitive toilet facility, and horse support facilities. 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 ten picnic units and provides hiking access to the Leatherwood Loop Trail (TR73) and the Rim Trail and gets heavy use in summer for swimming. These facilities are not accessed by Rockhouse Branch Road, by Phillips Ridge Road, or by FSR 6148.

Lands in the analysis area are managed for a Roaded Natural 2 (RN2) Recreation Opportunity Spectrum (ROS), LRMP p.III-83 (See Table 3.1.1.1, page 36). 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 page 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 non-motorized forms of recreation are possible, but non-motorized opportunities dominate.

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

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

3.1.1.1 The Rim Trail

The Rim Trail is a 25 mile foot and horse path that traverses the rim of the Tusquitee Mountains and Valley River Mountains that form the Fires Creek watershed. Its origins are unknown, but sections of the trail predate its acquisition by the Forest Service in 1937. 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 closed the Rim Trail to through travel between Big Stamp and Will King Gap and temporarily 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.

Table 3.1.1.1. Modified ROS Management Objectives by Management Area

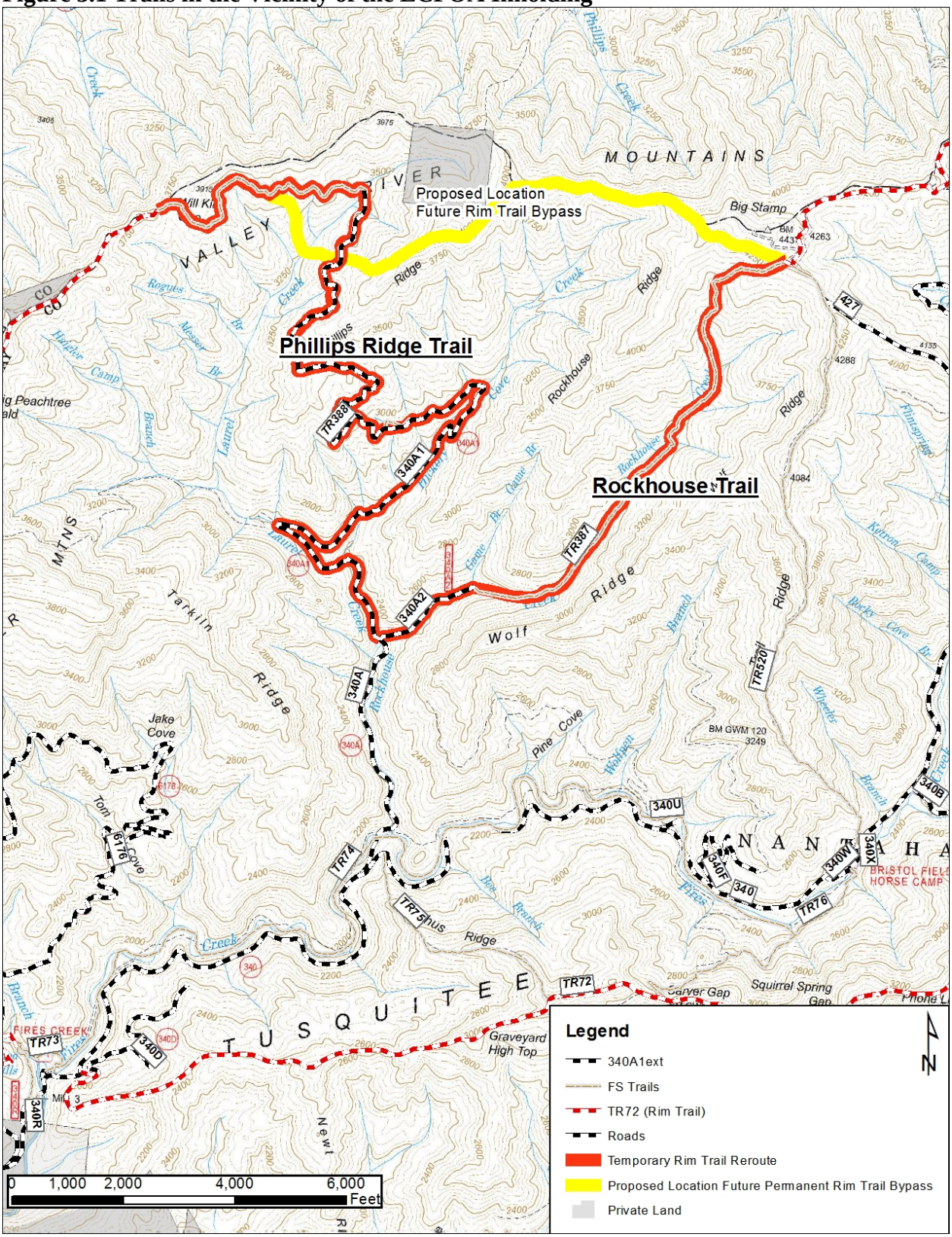
Table G-5, p. G-7 LRMP - Modified Recreation Opportunity Spectrum Management Objectives by Management Area			
Management Area	4C		
ROS	Roaded Natural 2 (RN2)		
Acceptable Environmental Modifications			
• **Type**	Roads	Structures	Resource Management
• **Degree**	Evident to Dominant	Evident-Subordinate	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 wildlife, 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		

The temporary reroute takes Rim Trail hikers moving east to west down the Rockhouse Creek Trail, up FSR 340A1 to the Phillips Ridge Trail, and then up Phillips Ridge Trail where it rejoins the Rim Trail to avoid trespass across the inholding (Figure 3.1). The reroute adds approximately 2.5 additional miles to the trip between Big Stamp and Will King Gap and requires hikers to drop from 4,280 feet in elevation near Big Stamp to 2,300 feet at Laurel Creek and then back up to 3,750 feet to Will King Gap, a loss 1,980 feet and a gain of 1,450 feet in elevation, respectively.

Under a separate action that is not part of this decision, the Forest Service is developing a proposal to construct a permanent Rim Trail Bypass. This trail section would bring hikers approximately 1.1 miles west from Big Stamp towards the LCPOA property along the ridgetop between Big Stamp and the LCPOA property and then follow the 4,000 foot contour through the forest along Phillips Ridge to the south of the inholding, cross the existing Phillips Ridge Road, cross Laurel Creek, tie in with the existing Phillips Ridge Trail, and rejoin the Rim Trail at Will King Gap. This future bypass would be shorter than the current temporary reroute, would restore an important stretch of ridgetop to public access, and would reduce the amount of elevation loss and gain in bypassing the LCPOA property relative to the temporary reroute.

Section 2.3 referenced this section of the EA for the Forest Service's rationale for the detailed examination of current and future impacts to the Rim Trail, temporary Rim Trail Reroute, and proposed Rim Trail Bypass. Because the Forest Service anticipates using portions of the ridgetop between Big Stamp and the LCPOA property for the future Rim Trail Bypass, the analysis in Section 2.3 and 3.1 was expanded to include impacts to the ridgetop trail segment between Big

Figure 3.1 Trails in the Vicinity of the LCPOA Inholding



Stamp and the LCPOA inholding as the location of the future bypass (Figure 3.1). As the Rim Trail is of high importance to people who seek backcountry experiences in the Fires Creek watershed, the Forest Service concluded that more detailed analysis was warranted to identify and disclose impacts to recreation resources in the analysis area.

3.1.1.2 Effects to Trails near the LCPOA Inholding

Alternative A: The experience of hikers using trails in the vicinity of the LCPOA inholding would not change from current conditions.

Alternative B: Under Alternative B, FSR 340A1 (Phillips Ridge Road) would have a fresh layer of gravel aggregate added to its surface and encroaching vegetation would be trimmed and/or removed. Hikers using FSR 340A1 currently have the experience of traveling on an old woods road that is partially reclaimed by the forest for its entire length. Under Alternative B hikers using FSR 340A1 would have the experience of traveling on a freshly graded and graveled road for its entire length. When the future permanent Rim Trail Bypass is completed, hikers using the Rim Trail would not utilize FSR 340A1 at all, but would cross an existing segment of FSR 340A1 as is the case where the Rim Trail currently crosses Leatherwood Road above the Fires Creek Picnic Area.

Alternative C: Under Alternative C, FSR 427, currently a native surface road, and the junction of the Rim Trail and Rockhouse Creek Trail below Big Stamp, also currently native surface, would be graded and graveled. Members of the public currently using the Rim Trail and the Rockhouse Creek Trail have the experience of traveling on trails to and across an old woods road. Under Alternative C, members of the public would encounter freshly graveled and graded road surfaces in the area. A gate would be installed at the point where new road construction would begin at the FSR 427 junction with the Rim Trail and Rockhouse Creek Trail and the new road would be visible to hikers on the trails near the junction. As the old Rim Trail is closed along the ridgetop to the west from Big Stamp, there would be no effects to the old Rim Trail from Alternative C. When the future permanent Rim Trail Bypass is completed, the new road segment proposed under Alternative C would be visible to hikers from sections of the bypass trail.

Alternative D: Approximately 10% of this access road would be visible from the Rim Trail at the junction of Will King Gap and the Phillips Ridge Trail and would also be visible to hikers using the Rim Trail for approximately one third to one half mile west of Will King Gap.

3.1.1.3 Cumulative Effects to Trails Near the LCPOA Inholding

Alternative A: The cumulative effects to trails under Alternative A include the effects presented in Section 3.1.1.2 in combination with other past actions and reasonably foreseeable future projects. Past actions include trail building, road construction, timber extraction, campground development, prescribed burning, and wildfires. Some effects of these past actions have dissipated over time (timber extraction and prescribed burning, for example), others, such as trail building and campground development, have improved opportunities for hiking, and others, such as prescribed burning, are of short duration. The only other past, present or reasonably foreseeable future actions affecting trails under Alternative A are the continuation of the

Tusquitee Ranger District prescribed burning program, the future permanent Rim Trail Bypass, and whatever actions may occur on the inholding in the absence of vehicular access. The bypass trail would be longer than hikers experienced previously when crossing the LCPOA property on the Rim Trail prior to its closure between Big Stamp and Will King Gap, but shorter than the current temporary reroute. The permanent Rim Trail Bypass would include sections of the old Rim Trail from Big Stamp moving west towards the LCPOA inholding, but would not alter the trails beyond their current condition. Use of the Rockhouse Creek Trail would likely decline when the permanent Rim Trail Bypass takes the place of the temporary Rim Trail Reroute. Use of the Phillips Ridge Trail would likely increase as hikers use the Rim Trail Bypass to travel to and from Will King Gap from Big Stamp. The type and extent of land use on the inholding (beyond the scope of this decision) under Alternative A would be affected by the lack of vehicular access.

Alternative B: Cumulative effects under Alternative B to trails in the analysis area would be similar to those under Alternative A described above. The extent of land clearing on the inholding (beyond the scope of this decision) is expected to be limited to approximately one acre to comply with the Habitat Conservation Plan for the Indiana bat (Appendix 3) and the Forest Service does not anticipate land use on the inholding to be visible from current and future trails.

Alternative C: Cumulative effects under Alternative C to trails in the analysis area would be similar to those under Alternative A described above. The only other past, present or reasonably foreseeable future actions affecting trails near the proposed location for Alternative C is the permanent Rim Trail Bypass. The permanent Rim Trail Bypass would include a section of the old Rim Trail from Big Stamp moving west towards the LCPOA inholding, but would not alter the existing trail system beyond its current condition. Use of the Rockhouse Creek Trail would decline when the permanent Rim Trail Bypass takes the place of the temporary Rim Trail Reroute. Use of the Phillips Ridge Trail would likely increase and use of the Rockhouse Creek Trail would likely decrease as hikers use the Rim Trail Bypass to travel to and from Will King Gap from Big Stamp. Long-term effects would be consistent with the Forest Plan and ROS.

Alternative D: Cumulative effects under Alternative D to trails in the analysis area would be similar to those under Alternative A described above. The only other past, present or reasonably foreseeable future actions affecting trails near the proposed location for Alternative D is the permanent Rim Trail Bypass. The permanent Rim Trail Bypass would occupy a section of the Phillips Ridge Trail, but would not alter the trail system beyond its current condition. Hiking use of the Phillips Ridge Road would likely decline when the permanent Rim Trail Bypass takes the place of the temporary Rim Trail Reroute. Use of the Phillips Ridge Trail would likely increase as hikers use the Rim Trail Bypass to travel to and from Will King Gap from Big Stamp. Long-term effects would be consistent with the Forest Plan and ROS

3.1.2 Effects to Recreation

Alternative A: Recreation would not be affected beyond current conditions.

Alternative B: The lack of a destination, the dead-end aspect of the road, and because FSR 340A would remain closed to public vehicular access under Alternative B, only a modest increase in traffic is expected on FSR 340A under Alternative B. The Roaded Natural character of the hiking experience would not change as open road density in the watershed would not

increase. The road prism of FSR 340A1would be more pronounced after reconstruction activities proposed under Alternative B, with freshly graveled surfaces replacing existing native surfaces. Small increases in recreation opportunity are expected along FSR 340A1 as improvements to the road would make horseback riding easier. Hikers are likely to avoid using FSR 340A1 for a period of time after reconstruction activities. The Forest Service does not anticipate substantive positive or substantive negative impacts to hunting, fishing, camping, and other recreation opportunities in the rest of the analysis area as a consequence of Alternative B.

Alternative C: Because it is a closed road, the only increase in vehicular traffic on FSR 427 would be directly related to access of the LCPOA inholding. The Roaded Natural character of the hiking experience would not change as open road density in the area would not increase. Small increases in recreation opportunity are expected along FSR 427 as improvements to the road would make for easier foot, horse, and bike travel. The Forest Service does not anticipate substantive positive or substantive negative impacts to hunting, fishing, camping, and other recreation opportunities in the rest of the analysis area as a consequence of Alternative C.

Alternative D: The only increase in vehicular traffic on FSR 6148 and 6148A would be directly related to access of the LCPOA inholding. The current management objective of FSR 6148 and 6148A would not change under Alternative D. The Roaded Natural character of the hiking experience would not change as open road density would not increase. Under Alternative D, small increases in recreation opportunity are expected along FSR 6148A and the new LCPOA access road would provide new opportunities for foot, horse, and bike travel into a previously unroaded area of the forest. The Forest Service does not anticipate substantive positive or substantive negative impacts to hunting, fishing, camping, and other recreation opportunities in the rest of the analysis area as a consequence of Alternative D.

3.1.3 Cumulative Effects to Recreation:

Alternative A, Alternative B, Alternative C, and Alternative D: The cumulative effects of Alternatives A, B, C, and D to recreation in the analysis area include the effects presented in Section 3.1.2 in combination with other past actions and reasonably foreseeable future projects in the analysis area. Past actions include trail building, road construction, timber extraction, campground development, prescribed burning, and wildfires. Some effects of these past actions have dissipated over time (timber extraction and prescribed burning, for example); trail building and campground development have improved recreation opportunities; and others, such as prescribed burning, have short duration effects to recreation. Presently, the temporary Rim Trail Reroute affects hikers wanting to complete a hike between Will King Gap and Big Stamp (refer to Section 3.1.1.1). The future permanent Rim Trail Bypass, and if Alternative B, C, or D is selected, any cabin construction activities completed by the LCPOA are the only reasonably foreseeable future actions affecting recreation in the area and are not anticipated to result in a violation of any state, federal or local thresholds related to recreation resources.

3.2 Scenery Analysis

3.2.1 Existing Condition

Lands within the analysis area are identified as MAs 2C, 3B and 4C. Management direction for MA2 C is summarized on page III-63 of the Nantahala and Pisgah National Foreests Land and

Resource Management Plan (LRMP), MA 3B is summarized on page III-71, and MA 4C is summarized on page III-77. MA 2C "emphasizes pleasant scenery for people who experience the forest by driving through it"; MA 3B emphasizes a "sustainable supply of timber, but with few open roads and limited disturbance (to wildlife) associated with motorized vehicles"; MA 4C emphasizes "visually pleasing scenery and habitats for wildlife requiring older forests".

Scenery management standards for MA 2C are to meet "Retention (R) VQO in all distance zones and sensitivity levels, except for Partial Retention (PR) VQO in Sensitivity Level 3", LRMP page III-64. Scenery management standards for MA 3B are to meet Modification Visual Quality Objective (VQO) in all distance zones and sensitivity levels, LRMP page III-72. Proposed activities in MA 4C are to meet "Retention (R) VQO in all distance zones and sensitivity levels, except for Partial Retention (PR) VQO in Sensitivity Level 3", LRMP page III-80. Retention, Partial Retention, and Modification VQOs are identified in the Forest Service Visual Management System Handbook (VMS), and the LRMP on page G-1-2. Sensitivity Level (SL) and Distance Zone (DZ) are also VMS terminologies found in the LRMP on page G-2.

Relevant VMS terminology:

- **Retention VQO:** To the average viewer, management activities are not visually evident. Activities only repeat form, line, color, and texture found in the characteristic landscape. Meet within one growing season.
- **Partial Retention VQO:** To the average viewer, management activities remain visually subordinate within the characteristic landscape. Activities may repeat form, line, color, and texture common to the characteristic landscape. Meet within two growing seasons.
- **Modification VQO:** To the average viewer, management activities may visually dominate the original characteristic landscape. However, activities must borrow from naturally established form, line, color or texture. Meet within three growing seasons.
- **Sensitivity Level 1**: 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.
- **Sensitivity Level 2:** 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.
- **Sensitivity Level 3:** Secondary travel route, use area, or water body where 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 foreground up to 5 miles away.
- **Background (BG) DZ:** from middleground to horizon.

The area is also managed for a Roaded Natural 2 (RN2) Recreation Opportunity Spectrum (ROS), LRMP page III-83. The desired RN2 ROS setting described on LRMP page 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

The scenery analysis considered viewpoints from all use areas, open Forest Service roads, Forest Service trails, State roads, and US highways to identify locations that could be affected by actions proposed under Alternatives B, C, and D. The viewing distance, sensitivity of viewing location, duration of view, and frequency of visible activities are all taken into account. The following is a list of viewpoints considered:

- U.S. Highway 19/74/129 (Nantahala Scenic Byway)
- Alt 19/129 (Old Hwy 19)
- State Roads 1515, 1516, 1507, 1509, 1510 & 1618
- The town of Andrews
- Rim Trail (TR72)
- Phillips Ridge Trail (TR388)
- Rockhouse Creek Trail (TR387)
- Trail Ridge Trail (TR520)
- Cover Trail (TR74)

Alternatives B, C, and D, would provide the LCPOA with vehicular access to their property, enabling the owners to clear land and to build structures on the inholding. Beyond the terms and conditions for granting access, the Forest Service has no regulatory authority over what the LCPOA does on the inholding. There could be impacts to scenery from land clearing and construction activities depending upon the size and location of the structures, but these actions are not subject to Forest Service VQOs. However, land clearing activities are expected to be limited as governed by the Indiana Bat Habitat Protection Plan developed by the LCPOA to comply with the Endangered Species Act (Appendix 3).

3.2.3 Effects to Scenery

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

Alternative B: Under Alternative B the LCPOA would reconstruct most of FSR 340A1 and construct a new road segment connecting to their property. All proposed activities must meet R VQO as seen from the Rim Trail and the Phillips Ridge Trail.

Road construction, reconstruction, and resurfacing proposed under Alternative B would be visible to hikers and horseback riders on FSR 340A1 (temporary Rim Trail). When the future permanent Rim Trail Bypass is completed, Rim Trail hikers would not utilize FSR 340A1 at all, but would cross an existing segment of the road. Just as FSR 340A1 is visible currently from the Phillips Ridge Trail, it would also be visible from the future bypass trail at the newly established intersection. However, the extension from FSR 340A1 to the LCPOA property would not be visible from the proposed Rim Trail bypass route.

Proposed road improvement activities would not create a notable change to the existing scenic character as seen from the viewpoints analyzed. The scenic character would be very similar to that at the current intersection of Phillips Ridge Trail and FSR 340A1. Therefore, assigned VQOs would be met under Alternative B.

Alternative C: Under Alternative C, the LCPOA would reconstruct FSR 427 from its junction with FSR 427A and would construct a new road segment to connect FSR 427 to their property. Road reconstruction and construction proposed under Alternative C would occur at the Rim Trail and Rockhouse Creek Trail junction below Big Stamp. All proposed activities must meet R VQO as seen from Rim Trail, Rockhouse Creek Trail and Trail Ridge Trail.

Reconstruction of FSR 427 near the Trail Ridge Trail – Rim Trail – Rockhouse Creek Trail intersection would create no notable changes in scenic character. However, the new road construction proposed from FSR 427 to the LCOPA property would introduce an entirely new road prism into the landscape as visible from the Rim Trail, Rockhouse Creek Trail, and the proposed Rim Trail Bypass. Unlike Alternative B, these activities would create a change in scenic character because trails in these locations do not currently intersect a system road. Therefore, the assigned VQOs for the existing trails would not be met under Alternative C and would require an amendment to the Forest Plan to be implemented.

Alternative D: Under Alternative D, the LCPOA would construct a new road segment to connect FSR 6148A to their property. Activities in MA 3B are required to meet M VQO, and those in MA 4C must meet R VQO. Road construction proposed under Alternative D would occur along the face of the Valley River Mountains, and would include a segment approximately two miles in length requiring 80 foot cut banks when constructed to Forest Service standards. This two mile segment of highly visible new road construction would lie entirely within MA 4C.

Proposed new road construction would be visible from U.S. Highway 19/74/129, which is designated by the State of North Carolina as the Nantahala Scenic Byway. This designation increases viewer concern to Sensitivity Level 1. New road construction activities on the steep slopes of Valley River Mountains would create a change in scenic character as viewed from the Nantahala Scenic Byway and other nearby State roads in the Andrews area, and would not meet VQOs without an amendment to the Forest Plan.

3.2.4 Cumulative Effects to Scenery

Alternative A (no action): In the absence of direct and indirect effects, no cumulative effects to scenery would occur under Alternative A.

Alternatives B, C, and D: The cumulative effects of Alternatives B, C, and D include the effects presented in Section 3.2.3, in combination with other past actions and reasonably foreseeable future projects in the analysis area. Past actions which have affected scenery in the analysis area include road construction, trail construction, timber extraction, prescribed burning, and wildfires. Other activities which may impact scenery in conjunction with Alternatives B, C, or D would include development of the LCOPA property itself, construction of the future Rim Trail Bypass, and scenery impacts associated with the existing Vengeance Creek Mine.

Specific home locations, size, exterior colors, and clearing limits for any future development at the LCPOA property are unknown. Therefore, their potential visibility or degree of cumulative scenic impact cannot be determined. Potential scenery impacts from construction of the future Rim Trail Bypass would be negligible, since it would be a narrow native surface trail. The existing Vengeance Creek Mine is visible from the Nantahala Scenic Byway. Until mine

reclamation is complete, new road construction proposed in Alternative D would be visible in conjunction with these existing scenic impacts. Other ongoing or reasonably foreseeable future projects in the analysis area are not anticipated to result in a violation of any state, federal or local thresholds for scenery.

3.3 Water Quality and Hydrologic Analysis

Alternatives B, C, and D, would provide the LCPOA with vehicular access to their property, enabling the owners to clear land and to build structures on the inholding. Beyond the terms and conditions for granting access, the Forest Service has no regulatory authority over what the LCPOA does on the inholding. There could be impacts to water quality from land clearing and construction activities depending upon the size and location of the structures, but these actions are not within the jurisdictional authority of the Forest Service. However, land clearing activities are expected to be limited as governed by the Indiana Bat Habitat Protection Plan developed by the LCPOA to comply with the Endangered Species Act (Appendix 3).

3.3.1 Existing Condition – Alternative B

The area proposed for access is drained by Rockhouse Creek, Hickory Cove Creek, Laurel Creek and their smaller tributaries. Road reconstruction activities on FSR 340A1 would be in proximity to Hickory Cove Creek and Laurel Creek. Hickory Cove Creek is classified as Water Supply IV (WS-IV), waters that are a source of water supply for drinking and which are generally located in moderately to highly developed watersheds; Trout (Tr), a supplemental classification intended to protect freshwaters for natural trout propagation and survival of stocked trout; and Outstanding Resource Waters (ORW), a supplemental classification intended to protect unique and special waters having excellent water quality and being of exceptional state or national, ecological or recreational significance. All ORW waters are also High Quality Waters (HQW) by supplemental classification. Laurel Creek is also classified as WS-IV; Tr, and ORW.

The ORW designation prohibits the establishment of new discharges or expansions of existing discharges. Where developments require an Erosion and Sedimentation Control Plan, specific storm water requirements for ORW waters shall be implemented (15A NCAC 02B .0225). When required, these storm water control provisions include utilizing vegetated conveyances to transport storm water and maintaining a 30 foot vegetated buffer (15A NCAC 02H .1007).

Road reconstruction occurred on a portion of FSR 340A1 following the 2004 hurricanes. This work included installation of broad-based dips and gravel on the road surface. Portions of FSR 340A1 are currently native surface. Although stable, the road experiences washing during high rainfall events and would benefit from grading. 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 uppermost Hickory Cove Creek crossing, leaving at least three stream crossings in poor condition further out FSR 340A1. 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.

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).

Figure 3.3.1. Hickory Cove Creek Crossing Blow Out.

3.3.2 Existing Condition – Alternative C

The area proposed for access and new road construction in Alternative C is drained by Hickory Cove Creek, Rockhouse Creek, Flintspring Branch, Coldspring Branch, Long Branch and their smaller tributaries. Road reconstruction activities on FSR 427 would be in proximity to Rockhouse Creek, Flintspring Branch, Coldspring Branch, and Long Branch. Rockhouse Creek is classified as Water Supply IV (WS-IV), waters that are a source of water supply for drinking and which are generally located in moderately to highly developed watersheds; Trout (Tr), a supplemental classification intended to protect freshwaters for natural trout propagation and survival of stocked trout; and Outstanding Resource Waters (ORW), a supplemental classification intended to protect unique and special waters having excellent water quality and being of exceptional state or national, ecological or recreational significance. All ORW waters are also High Quality Waters (HQW) by supplemental classification. Flintspring Branch classified as Class C (protected for secondary recreation, fishing, aquatic life including propagation and survival, and wildlife), Tr, and ORW, and Coldspring Branch and Long Branch are Class C, ORW.

The ORW designation prohibits the establishment of new discharges or expansions of existing discharges. Where developments require an Erosion and Sedimentation Control Plan, specific storm water requirements for ORW waters shall be implemented (15A NCAC 02B .0225). When required, these storm water control provisions include utilizing vegetated conveyances to transport storm water and maintaining a 30 foot vegetated buffer (15A NCAC 02H .1007).

Stream channels in the drainages potentially affected by Alternative C 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).

Big Stamp Road (FSR 427) is currently a native surface road from its intersection with FSR 427A to Big Stamp. Although stable, the road experiences washing during high rainfall events and would benefit from grading. Culverts, although properly sized to pass the calculated 50 year flood, are not sized to the bankfull channel width and were not installed with aquatic organism passage in mind. As a result, passage is restricted by a perched outlet and excessive velocities through the pipes.

3.3.3 Existing Condition – Alternative D

The area proposed for access in Alternative D is drained by Colvard Creek, Alfred Creek, Aaron Creek, Nancy Hawkins Branch and their smaller tributaries. Road reconstruction activities are not planned on the existing FSR 6148A road. Colvard Creek, Alfred Creek and Nancy Hawkins Creek are classified as Class C only, and Aaron Creek is Class C and Tr. Outstanding Resource Waters (ORW) are not designated in the drainage.

Stream channels in the drainages potentially affected by Alternative D 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).

Forest Service Road 6148A is currently a native surface road from its intersection with FSR 6148. Although stable, the road experiences washing during high rainfall events and would benefit from grading. Culverts are properly sized to pass the calculated 50 year flood and to the bankfull channel width. However, they were not installed with aquatic organism passage in mind. As a result, passage is restricted by a perched outlet and excessive velocities through the pipes.

3.3.4 Effects to Water Quality

Alternative A: Water quality would be affected by a variety of natural factors (examples include type and extent of vegetative cover; precipitation events influencing baseflow, peakflow, and stormflow; leaching; and background levels of sedimentation consistent with forested environments), and human-induced factors (examples include airborne pollutants; vehicular traffic; and road maintenance). Currently, erosion and sedimentation from the existing road

network is minimal, except 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: Some road reconstruction activities on FSR 340A1 would have no direct impacts since cut banks and fill slopes are currently stable and since work in those areas would largely be limited to installing new gravel aggregate over the existing road surface per the design criteria in Chapter 2. Where road widening activities and new road construction are necessary, the actions proposed for this project may temporarily increase sedimentation within the watersheds where stream crossings occur. These effects would be minimized, however, by applying project design features (e.g. out slope drainage, brush barriers, broad-based dips, seeding, sediment traps) to control storm water runoff from road surfaces. Due to the erosion control techniques designed into the project, sedimentation from these roads would be unmeasurable at the confluence of these tributaries with Rockhouse Creek. Swift (1985) recorded sediment deposition below road fills ranging from 75 feet to 150 feet. Although deposition of greater distances can occur on grassed road fills with brush barriers, sediments from this type of road construction are typically filtered effectively within 20 feet below the fill slope (Swift, 1986). Erosion from road surface runoff would be filtered before reaching any perennial water sources.

Sedimentation from the culvert installation proposed for the uppermost crossing of Hickory Cove Creek and the replacement of the existing plugged, poorly designed, and/or poorly placed culverts may reduce the quality of the habitat for the coldwater streams community within the streams by partially filling pools within the first 75 feet below the crossing (Farmer, personal observation). These effects may persist until the next bankfull flow event (the flow event which occurs approximately every 2.5 years).

Proposed road reconstruction would reduce the risk of failure of existing crossings, where culverts are currently non-functional, or where the current crossing consists of a ford. New road construction would include the installation of properly sized, functional culverts at stream and wet weather conveyance crossings. With the implementation of Best Management Practices for Nonpoint-Source Water Pollution (BMPs) and design criteria presented in Chapter 2, the proposed road work would not adversely impact water quality.

Alternative C: The potential effects of Alternative C on water quality would occur in the same drainages as Alternative B. The 3.0 miles of road reconstruction under Alternative C (1.14 more miles of road reconstruction than Alternative B) and the 0.71 miles of new road construction (0.37 more miles than Alternative B) would all occur within the Nantahala Formation. Although project design features have been included to reduce the effects of acid rock exposure, the disturbance caused by longer road segments increases the risk of acidic exposure to all stream channels and ephemeral storm channels. This alternative would require eight culvert installations or replacements in analysis area streams and resulting in fewer locations of contributing road runoff to the stream network than Alternative B.

Alternative D: The potential effects of Alternative D on water quality would occur within the Valley River watershed. This alternative proposes the greatest amount of new road construction within the Nantahala Formation (0.81 miles) and thus has the greatest potential to adversely

impact water quality of all the alternatives. This alternative would require 15 culvert installations in analysis area streams (more than Alternatives B and C), and would require disturbance of large amounts of soil during cut-slope construction. These large cuts and fills may be less stable and more prone to failure and could result in increased sedimentation to analysis area streams.

3.3.5 Cumulative Effects to Water Quality

Alternative A: The cumulative effects of Alternative A include the effects presented in Section 3.3.4 in combination with other past actions and reasonably foreseeable future projects in the analysis area. Past events include road building and timber harvest, activities which initially may have impacted water quality but which have not resulted in violations of the Clean Water Act (CWA). With the exception of the bypass trail presented in Section 3.1.1.3, there are no other past, present, or reasonably foreseeable future actions that may affect water quality in the area, and cumulative effects under Alternative A would be limited to the construction of the permanent bypass trail, actions not anticipate to result in a violation of the CWA.

Alternatives B, C, and D: The cumulative effects of Alternatives B, C, and D include the effects presented in Section 3.3.4 in combination with other past actions and reasonably foreseeable future projects in the analysis area. Past events include road building and timber harvest, activities which initially may have impacted water quality but which have not resulted in violations of the CWA. With the exception of the bypass trail presented in Section 3.1.1.3, and the land clearing and construction activities that could result on the private property if access is granted (opening paragraph, Section 3.3), the cumulative effects of Alternatives B, C, D together with the construction of the permanent bypass trail are also not anticipated to result in a violation of the CWA.

3.3.6 Anticipated Impacts and Permits Required Under Alternatives B, C, and D

Field surveys of aquatic resources along the proposed Alternative B project corridor were conducted on October 21, 2009. A review of aquatic resources along the Alternative C and Alternative D corridors was conducted in December 2013 and March 2014. The purpose of the reviews was to document the location of Waters of the United States within the proposed access corridors and to determine the potential impacts to waters in the corridors.

Alternative B: Thirteen jurisdictional streams (eleven perennial and two intermittent) and one wetland are located within the access corridor under Alternative B. Portions of these streams are located within some part of the project corridor; however, not all of the streams would be affected under Alternative B.

If Alternative B is selected, the LCPOA would be required to submit an application for Jurisdictional Determination and application for a Section 404 Permit to the US Army Corps of Engineers (USACE). This permit would cover potential impacts to jurisdictional features in the road corridor, as well as design criteria required by USACE to reduce impacts to streams from road reconstruction and construction. Obtaining this permit is a precondition of the Forest Service granting access.

Alternative C: Eight jurisdictional streams (six perennial and two intermittent) are located within the access corridor under Alternative C. Portions of these streams are located within some part of the project corridor; however, not all of the streams would be affected under Alternative C.

If Alternative C is selected, the LCPOA would be required to submit an application for Jurisdictional Determination and application for a Section 404 Permit to USACE. This permit would cover potential impacts to jurisdictional features in the road corridor, as well as design criteria required by USACE to reduce impacts to streams from road reconstruction and construction. Obtaining this permit is a precondition of the Forest Service granting access

Alternative D: Fifteen jurisdictional streams (twelve perennial and three intermittent) are located within the access corridor under Alternative D. Portions of these streams are located within some part of the project corridor; however, not all of the streams would be affected under Alternative D.

If Alternative D is selected, the LCPOA would be required to submit an application for Jurisdictional Determination and application for a Section 404 Permit to USACE. This permit would cover potential impacts to jurisdictional features in the road corridor, as well as design criteria required by USACE to reduce impacts to streams from road reconstruction and construction. Obtaining this permit is a precondition of the Forest Service granting access.

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 on March 6, 2012, and on research of available geologic reports, maps, and additional site visits in 2012, 2013, and 2014. The purpose of these site visits was to evaluate the acid producing Nantahala Formation and its possible occurrence along the proposed road access to the private property.

3.4.2 Geologic Setting

The analysis 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).

Portions of all of the access routes proposed under Alternatives B, C, and D are located in 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 ago.

The Nantahala Formation consists of medium to dark gray graphitic and sulfidic phyllite, schist, and metasiltstone interbedded with subordinate to subequal amounts of quartzose metasandstone (Figure 3.4.1, page 51). 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 metasiltstone and subordinate quartzose metasandstone. Graphitic phyllite becomes more silty down section where it grades to graphite-bearing micaceous metasiltstone. The basal 1500 meters consists principally of graphitic metasiltstone interlayered with quartzose metasandstone and graphitic phyllite (Ausburn and Others, 1998).

The graphitic phyllite is permeated by finely disseminated iron-sulfide minerals producing a characteristic dark gray to black color. Graphitic micaceous metasiltstone contains fine-grained quartz and plagioclase in a dominantly muscovite groundmass. Graphite occurs mostly as dense, finely disseminated clots interstitial to clastic grains. Small garner and biotite porphryroblasts occur in graphitic phyllites near the base of the formation (Ausburn and others, 1998).

White quartzose metasandstone commonly occurs interbedded with the graphitic metasiltstone producing a distinctive “zebra-striped” appearance (Figure 3.4.2, page 51). 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 occasionallyobserved 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).

3.4.3 Evaluation of Geologic Hazards and Risks

The Nantahala Formation is one of many geologic 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 expose substantial areas 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 markedly 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.

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

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

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

Alternative B: Road reconstruction and new construction activities on the 2.21 miles that are on the Nantahala Formation 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 existing road prism of FSR 340A1, but reconstruction activities could fracture native sulfidic rocks, expose fresh surfaces to weathering, and result in acid runoff. The 0.34 miles of new road construction proposed in the Nantahala Formation under Alternative B is projected to result in approximately 8,000 cubic yards of excavation and approximately two acres of disturbance.

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. Maximum cut bank heights for new road construction proposed under Alternative B are estimated to be approximately 25 feet, with average cut bank heights of 18 feet for the 0.34 mile corridor. The potential for slope movement increases when these rocks are exposed in cut slopes and used in embankments (Wooten, 2006).

On March 6, 2012, the geologist that served the Forest Service's Southern Region made a site visit to the proposed route and concluded that the rock surfaces exposed during the initial construction of Phillips Ridge Road have weathered and are no longer leaching sulfidic compounds. The geologist recommended that if access is granted along Phillips Ridge Road, that design criteria for road reconstruction be incorporated to minimize soil disturbance in the Nantahala Formation. The design criteria are described in Section 2.2 of the EA.

Alternative C: Road reconstruction and new construction activities on the 3.71 miles that are on the Nantahala Formation 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 existing road prism of FSR 427, but reconstruction activities could fracture native sulfidic rocks, expose fresh surfaces to weathering, and result in acid runoff. The 1.6 miles of new road construction (0.71 miles of new construction proposed in the Nantahala Formation) under Alternative C is projected to result in approximately 80,000 cubic yards of excavation and approximately nine acres of disturbance.

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. Maximum cut bank heights for new road construction proposed under Alternative C are estimated to be approximately 65 feet, with average cut bank heights of 17 feet for the 1.6 mile corridor. The potential for slope movement increases when these rocks are exposed in cut slopes and used in embankments (Wooten, 2006).

Site visits in 2012, 2013, and 2014 indicate that the rock surfaces exposed during the initial construction of FSR 427 have weathered and are no longer leaching sulfidic compounds. If access is granted along FSR 427, design criteria for road reconstruction would be incorporated to

minimize soil disturbance in the Nantahala Formation. The design criteria are described in Section 2.2 of the EA.

Alternative D: Road reconstruction and new road construction activities on the 2.11 miles that are on the Nantahala Formation 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 existing road prism of 6148A. The 3.5 miles of new road (0.81 miles of new construction proposed in the Nantahala Formation) under Alternative D is projected to result in approximately 294,000 cubic yards of excavation and approximately 45 acres of disturbance.

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. Maximum cut bank heights for new road construction proposed under Alternative D are estimated to be approximately 80 feet, with average cut bank heights of 52 feet for the 3.5 mile corridor. 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: 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: 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 minimize the amount of soil disturbance during road reconstruction activities, minimum road width standards and slope requirements for cut banks and fill slopes would be modified by the Forest Service per Chapter 2 of this EA. In cases where soil disturbance is unavoidable, as with some reconstruction work and with the 1/3 mile of new road construction to connect the inholding to FSR 340A1, the landowners would implement the design criteria for acidic rock as detailed in Chapter 2 to reduce the risk of acid runoff.

Engineering analysis estimates that 8,000 cubic yards of soil would be excavated to produce the new road segment under Alternative B, resulting in two acres of disturbance, with maximum cut bank heights of 25 feet and average cut bank heights of 18 feet for 0.34 miles of new road construction in the Nantahala Formation. This work has the risk of producing acid runoff, which could affect streams and water quality in Laurel Creek.

Alternative C: 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 minimize the amount of soil disturbance during road reconstruction activities, minimum road width standards and slope requirements for cut banks and fill slopes would be modified by the Forest Service per Chapter 2 of this EA. In cases where soil disturbance is unavoidable, as with some reconstruction work and with the 0.71 miles of new road construction to connect the inholding to FSR 427, the landowners would implement the design criteria for acidic rock as detailed in Chapter 2 to reduce the risk of acid runoff.

Engineering analysis estimates that 80,000 cubic yards of soil would be excavated to produce the new road segment under Alternative C, resulting in nine acres of disturbance, with maximum cut bank heights of 65 feet and average cut bank heights of 17 feet for 0.71 miles of new road construction in the Nantahala Formation. This work has the risk of producing acid runoff, which could affect streams and water quality in Rockhouse Creek.

Alternative D: No road reconstruction would occur under Alternative D. The LCPOA would implement the design criteria for acidic rock as detailed in Chapter 2 to reduce the risk of acid runoff for the 0.81 miles of new road construction that would occur in the Nantahala Formation to connect the inholding to FSR 6148A.

Engineering analysis estimates that 294,000 cubic yards of soil would be excavated to produce the new road segment under Alternative D, resulting in 45 acres of disturbance, with maximum cut bank heights of 80 feet and average cut bank heights of 52 feet for 0.81 miles of new road construction in the Nantahala Formation. This work has the risk of producing acid runoff, which could affect streams and water quality in Aaron Creek and Alfred Creek.

3.4.5 Cumulative Effects

Alternatives A, B, C, and D: The cumulative effects of Alternatives A, B, C, and D include the effects presented in Section 3.4.4 in combination with other past actions and reasonably foreseeable future projects in the analysis area. Past events include road building and timber extraction, activities which initially exposed fresh rock surfaces in the Nantahala Formation. These exposed surfaces have weathered over time and are no longer producing negative effects. Any future clearing and construction activities by LCPOA on their inholding and construction of the Rim Trail Bypass by the Forest Service are the only past, present, or reasonably foreseeable future human actions anticipated to have an impact on geologic strata in the analysis area.

3.5 Soils

3.5.1 Existing Condition

Information regarding soil types in the analysis area was obtained from the USDA Natural Resources Conservation Service. The soils in the proposed treatment area include the Spivey-Santeetlah complex, Soco-Stecoah complex, Sylco-Cataska complex, Cheoah channery loam, and Junaluska-Tsali complex. None of the soils is classified as Prime Farmland. Each soil type is discussed briefly in the following section. All soils in the proposed treatment area have an Erosion Hazard Rating of *Severe*. This rating indicates that substantial erosion can occur. Roads will require frequent maintenance and 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 segments.

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 segments.

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 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 segments.

Cheoah channery loam, 50 to 95 percent slopes (ChF) – This soil series 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 segments.

Junaluska-Tsali complex, 30 to 50 percent slopes (JtE) – This soil series 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 Effects

Alternative A: Alternative A would not have direct, indirect, or cumulative effects on soils.

Alternatives B: Alternative B would have direct impacts to soils during road construction and reconstruction activities. Because all the soils on the proposed Alternative B access corridor are prone to erosion, sedimentation and erosion could occur. Design criteria, including the *Guidelines*, recommendations, and BMPs discussed elsewhere in Chapter 2 would be utilized to control or minimize indirect impacts to soils outside of the proposed treatment area. BMPs would also control sediment and erosion during construction activities. Alternative B would result in 0.34 miles of new road construction with cut bank heights reaching 25 feet, conditions conducive to soil erosion.

Alternative C: Alternative C would have direct impacts to soils during road construction and reconstruction activities. Because all the soils on the proposed Alternative C road corridor are prone to erosion, sedimentation and erosion could occur. Design criteria, including the *Guidelines*, recommendations, and BMPs discussed elsewhere in Chapter 2 would be utilized to control or minimize indirect impacts to soils outside of the proposed treatment area. BMPs

would also control sediment and erosion during construction activities. Implementing Alternative C would result in 1.6 miles of new road construction with cut bank heights reaching 65 feet, conditions conducive to soil erosion.

Alternative D: Alternative D would have direct impacts to soils during road construction and reconstruction activities. Because all the soils on the proposed Alternative D road corridor are prone to erosion, sedimentation and erosion could occur. Design criteria, including the *Guidelines*, recommendations, and BMPs discussed elsewhere in Chapter 2 would be utilized to control or minimize indirect impacts to soils outside of the proposed treatment area. BMPs would also control sediment and erosion during construction activities. Implementing Alternative D would result in 3.5 miles of new road construction with cut bank heights reaching 80 feet, conditions conducive to soil erosion.

3.5.3 Cumulative Effects

Alternative A: The cumulative effects of Alternative A include the effects presented in Section 3.5.2 in combination with other past actions and reasonably foreseeable future projects in the analysis area. Past actions include road building and timber harvest, activities which may have impacted soils in the analysis area but which have stabilized or recovered over time. Roads in the analysis area would continue to need maintenance depending on the management objective associated with them. Roads in the analysis area are prone to erosion and, in rare cases, roadslides, and so would require maintenance and monitoring if Alternative A is selected.

Alternatives B, C, and D: The cumulative effects of Alternatives B, C, and D include the effects presented in Section 3.5.2 in combination with other past actions and reasonably foreseeable future projects in the analysis area. Past actions include road building and timber harvest, activities which may have impacted soils in the analysis area but which have stabilized or recovered over time. In the absence of other projects requiring heavy equipment (such as timber harvest) or road building projects in the area, cumulative effects to soils due to Alternatives B, C, and D are expected to be minimal. Land clearing and cabin construction by the LCPOA on their inholding and construction of the Rim Trail Bypass by the Forest Service are the only past, present, or reasonably foreseeable future actions affecting soils in the area. These effects are not anticipated to result in a violation of any state, federal or local thresholds.

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 Effects

Alternative A: Alternative A would not have direct, indirect, or cumulative effects on air quality.

Alternatives B, C, and D: Short term, temporary impacts to air quality would result under Alternatives B, C, and D during construction activities. Longer term, dust and particulates from vehicular traffic on the reconstructed road segments could be generated, particularly in dry weather. As traffic volumes are expected to be low, these impacts would not result in measurable impacts to air quality.

3.6.3 Cumulative Effects

Alternatives A, B, C, and D: The cumulative effects of Alternatives A, B, C, and D include the effects presented in Section 3.6.2 in combination with other past actions and reasonably foreseeable future projects in the analysis area. Past actions include road building and timber harvest, prescribed burning, and wildlfires, events which impacted air quality in the analysis area when activities were occurring, but which have stabilized or recovered over time, or, as with fires, have short duration effects to air quality. The only other past, present or reasonably foreseeable future actions affecting air quality under Alternatives A, B, C, and D are the continued implementation of the Tusquitee Ranger District's prescribed fire program, any land clearing and construction on the inholding, and the construction of the permanent Rim Trail Bypass. Effects from these additional unconnected future actions are not anticipated to result in a violation of any state, federal or local thresholds.

3.7 Cultural and Historic Resources

3.7.1 Existing Condition and Survey Results

Heritage resource inventories were completed for these proposed actions in 2009 and 2014. Four previous cultural resource surveys (FS 1989, FS 1990a, FS 1990b, and FS 2005) also have been conducted in proximity to and are included within portions of this project. A total of five archeological sites have been recorded within the area of potential effect (APE). Of these sites, two are assessed as Eligible for listing on the National Register of Historic Places (NRHP). These sites would be protected and avoided by all project activities. Reports for the project have been sent to the NC State Historic Preservation Officer (SHPO) and Eastern Band of Cherokee Indians (EBCI) Tribal Historic Preservation Officer (THPO) for comment in compliance with Section 106 of the National Historic Preservation Act of 1966, and 36CFR800, as amended 1991.

The analysis area is within the aboriginal territory of the Cherokee People. Given the importance of the APE to the Cherokee People, the Forest Service has consulted with the EBCI THPO throughout the duration of this project, including a joint site visit to the APE to establish existing conditions, to identify areas of historic significance to the EBCI, and to identify areas with a high probability of supporting cultural and/or historic resources.

Alternative B: Blue Ridge Archaeological Consultants (BRAC) conducted an archaeological survey of the Alternative B corridor, including the portion proposed for new construction in

February 2009. This area was examined again by Forest Service archaeologists on May 19, 2014. BRAC identified four archaeological resources within the APE for Alternative B. Each of these four archaeological resources was characterized as including prehistoric lithic and/or historic period Native American ceramic components. Two of the sites, and an isolated artifact find, included only lithic artifact materials – none of which were diagnostic for a specific cultural/temporal component, but an Archaic-period association is perhaps likely for each. One archaeological site demonstrated the presence of intact cultural deposits, was found eligible for listing in the National Register of Historic Places (NRHP), and requires preservation.

Alternative C: This area was examined by Forest Service archaeologists and by a member of the THPO staff on three separate visits in April and May of 2014. One known archaeological site was revisited. This known site demonstrates the presence of intact cultural deposits, is potentially eligible for listing in the NRHP, and requires continued preservation. Other areas within the APE for Alternative C have a high probability of supporting additional NRHP eligible sites. The EBCI THPO has substantive concerns about Alternative C and the impacts that this route would have on areas that are important to Tribal history and culture. The THPO has expressed strong opposition to Alternative C.

Alternative D: This area was examined by Forest Service archaeologists in May of 2014. Areas within the APE for Alternative D have a high probability of supporting archaeological sites potentially eligible for listing in the NRHP, but none are known to occur. Despite there being no known NRHP-eligible archaeological sites along this route, the EBCI THPO has expressed substantial concerns about Alternative D and the impacts that this route would have on areas associated with Tribal history and culture. The Valley River valley is important to EBCI history and traditions, and the THPO stressed their opposition to the negative visual effects to its scenic character and to the potential disturbance of areas important to Tribal history that would be created by the implementation of Alternative D.

3.7.2 Effects

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

Alternative B: The current route of FSR 340A1 and the proposed road improvements under Alternative B pass directly through two archaeological sites and in proximity to the isolated find. These were evaluated as ineligible for nomination to the NRHP. The Forest Service has received concurrence from the North Carolina State Historic Preservation Office (SHPO) and the EBCI THPO.

One archaeological site was determined to be eligible for nomination to the NRHP; BRAC recommended that any adverse effect to this site should be avoided if Alternative B is selected. Per these recommendations, if access is authorized, the Forest Service archaeologists and engineers would work closely with the LCPOA to ensure that no direct or indirect impacts would occur by avoiding this site.

Alternative C: The current route FSR 427 passes directly through a site which is classified as potentially eligible for nomination to the NRHP. The proposed road improvements under Alternative C would impact several known, but as yet unrecorded, archaeological sites that are

thought to be potentially eligible for inclusion on the NRHP. The EBCI THPO has substantial concerns about Alternative C and the impacts that this route would have on areas that are important to Tribal history and culture.

Alternative D: The current route of the existing FSR 6148 and FSR 6148A as well as the proposed new road construction under Alternative D do not pass through any archaeological sites that are determined to be eligible or potentially eligible for nomination to the NRHP. The Valley River valley is important to EBCI history and traditions, and the THPO stressed their opposition to the negative visual effects to its scenic character and to the potential disturbance of areas important to Tribal history that would be created by the implementation of Alternative D.

3.7.3 Cumulative Effects

Alternative A: The cumulative effects of Alternative A include the effects presented in Section 3.7.2 in combination with other past actions and reasonably foreseeable future projects in the analysis area. Three archaeological sites were impacted as a result of the initial construction of FSR 340A1. No past, present, or reasonably foreseeable future action would occur that would produce cumulative effects under Alternative A. In the absence of direct or indirect impacts to this site, no cumulative effects to eligible archaeological resources are anticipated under Alternative A.

Alternatives B, C, and D: The cumulative effects of Alternatives B, C, and D include the effects presented in Section 3.7.2 in combination with other past actions and reasonably foreseeable future projects in the analysis area. Past actions include road building and timber harvest. The only other past, present or reasonably foreseeable future actions that may potentially affect cultural and historic resources under Alternatives B, C, and D are the continued implementation of the Tusquitee Ranger District's prescribed fire program, the construction of the permanent Rim Trail Bypass, and any future actions on the LCPOA inholding. These additional future actions are not anticipated to result in a violation of any state, federal or local thresholds for cultural and historic resources. In the absence of direct or indirect impacts, no cumulative effects to eligible archaeological resources are anticipated under Alternatives B, C, and D.

3.8 Biological Resources

The analysis in this document tiers to the Final Environmental Impact Statement (FEIS) for the Land and Resource Management Plan for the Nantahala and Pisgah National Forests (Forest Plan) and to the FEIS for Vegetation Management in the Appalachian Mountains.

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

The following tables (3.8.1.1 – 3.8.1.5 on pages 60 – 63) support the analysis that follows for biological communities, special habitats, and management indicator species (MIS). All MIS potentially affected by project activities were initially considered (Table 3.8.1.1, Table 3.8.1.2 and Table 3.8.1.3). 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 special habitats for these MIS

species occurred within the analysis area (Tables 3.8.1.4 and 3.8.1.5). Discussion for all environmental consequences to biological resources will be discussed by discipline: aquatic communities and resources, botanical communities and resources, and terrestrial wildlife communities and resources.

Table 3.8.1.1 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 years)	Hard Mast- Producing Species	
pileated woodpecker	Increase	Old Forest Communities	Snags and Dens (>22 diameter)	Down Woody Debris – All Sizes
ovenbird	Decrease	Large Contiguous Forest Areas		
rufous-sided (Eastern) towhee	Decrease	Early-successional (0-10 years)	Early-successional (11-20 years)	
pine warbler	Stable	Yellow pine mid-successional forests		
ruffed grouse	Stable	Early successional (0-10 years)	Early successional (11-20 years)	Down 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		

Estimate describes current population trend for the species on the NFsNC.

****Associated Biological Community or Special Habitat Component*** describes the forest community and the habitat mostly closely associated with the MIS.

Table 3.8.1.2. Biological communities and associated MIS (Amendment 17, 2005).

Biological Community	Management Indicator Species (MIS)	Analyzed Further/Evaluation Criteria*
		Alts B, C, and D
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 would not be affected. Given no effects to the community, the alternatives would not cause changes to forest-wide trends or changes in population trends of species associated with this community.**

Table 3.8.1.3. Special habitats and associated MIS (using Forest Plan EIS, Table III-9).

Special Habitats	Management Indicator Species (MIS)	Analyzed Further/Evaluation Criteria*
		Alts B, C, and D
Old Forest Communities (100+ years old)	black bear	Yes
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 would not be affected. Given no effects to the habitat, the alternatives would not cause changes to forest-wide trends or changes in population trends of associated species.**

Table 3.8.1.4. Estimated change in biological communities.

Biological Community	Alternative A	Alternative B	Alternative C	Alternative D
Fir dominated communities at high elevations	None affected.	None affected.	None affected.	None affected.
Northern hardwood forests	None affected.	None affected.	None affected.	None affected.
Carolina hemlock forests	None affected.	None affected.	None affected.	None affected.
Rich Cove forests; mesic mixed mesophytic communities	None affected.	No new road construction is proposed where Rich Cove Forest occurs. Road reconstruction would affect ± 0.15 acres of Rich Cove Forest.	New road construction would affect ± 0.32 acres of Rich Cove Forest. No Rich Cove forest occurs in areas affected by road reconstruction.	New road construction would affect ± 1.45 acres of Rich Cove Forest.
Xeric yellow pine forests	None affected.	None affected.	None affected.	None affected.
Reservoirs	None affected.	None affected.	None affected.	None affected.
Riparian forests	None affected.	Analysis area includes riparian forests adjacent to the existing roadbed; no additional impacts to riparian forest are anticipated.	Analysis area includes riparian forests adjacent to portions of FSR 427; no additional impacts to riparian forest are anticipated.	Analysis area includes riparian forests adjacent to portions of FSR 6148A; no additional impacts to riparian forest are anticipated.
Coldwater streams	None affected.	Short term: limited areas at stream crossings would be impacted by culvert installation/ replacement. Long term: Successful implementation of BMPs, project design criteria, and increased stabilization at stream crossings would ensure that long-term negative impacts to these communities do not occur.	Short term: limited areas at stream crossings would be impacted by culvert installation/replacement. Long term: Successful implementation of BMPs, project design criteria, and increased stabilization at stream crossings would ensure that long-term negative impacts to these communities do not occur.	Short term: limited areas at stream crossings would be impacted by culvert installation. Long term: Successful implementation of BMPs, project design criteria, and increased stabilization at stream crossings would ensure that long-term negative impacts to these communities do not occur.
Warmwater streams	None affected.	None affected.	None affected.	None affected.

Table 3.8.1.5. Estimated change in special habitats.

Special Habitats	Alternative A	Alternative B	Alternative C	Alternative D
Old forest communities (100+ years old)	None affected.	None affected.	New road construction would affect ± 1.31 acres of Old forest communities.	New road construction would affect ± 0.73 acres of Old forest communities.
Early successional communities (0-10 yr)	None affected.	None affected.	None affected.	None affected.
Early successional communities (11-20 yr)	None affected.	None affected.	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.	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.	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 two acres would be permanently impacted in the area of new road construction.	Approximately nine acres would be permanently impacted in the area of new road construction.	Approximately 45 acres would be permanently impacted in the area of new road construction.
Contiguous areas with low disturbance	None affected.	The amount of disturbance in the analysis area would temporarily increase during construction activities.	The amount of disturbance in the analysis area would temporarily increase during construction activities.	The amount of disturbance in the analysis area would temporarily increase during construction activities.
Large contiguous mature forest	None affected.	Approximately two acres would be permanently impacted in the area of new road construction.	Approximately nine acres would be permanently impacted in the area of new road construction.	Approximately 45 acres would be permanently impacted in the area of new road construction.
Permanent grass/forb openings	None affected.	None affected.	None affected.	None affected.
Snags	None affected.	Approximately two acres would be permanently impacted in the area of new road construction.	Approximately nine acres would be permanently impacted in the area of new road construction.	Approximately 45 acres would be permanently impacted in the area of new road construction.
Downed woody material	None affected.	Approximately two acres would be permanently impacted in the area of new road construction.	Approximately nine acres would be permanently impacted in the area of new road construction.	Approximately 45 acres would be permanently impacted in the area of new road construction.

3.8.1.1 Aquatic Communities, Special Habitats and MIS

Boundaries of Aquatic Communities and MIS

This assessment addresses analysis area waters and analysis area waters associated with the Laurel Creek Property Owners Association Access Across National Forest System Lands project. These waters are defined as those in the area of potential direct and indirect effects on aquatic habitat and populations, and do not necessarily overlap with the effects to botanical and wildlife resources. In addition to analysis area waters, the analysis area encompasses waters downstream that potentially could be impacted by project activities when considered within the watershed context. The aquatic analysis areas consist of the following watersheds: Laurel Creek from its headwaters downstream to the confluence with Rockhouse Creek and Rockhouse Creek to the confluence with Fires Creek.

Existing Conditions for Aquatic Communities and MIS

Existing Condition – Alternative B

The area proposed for access is drained by Rockhouse Creek, Hickory Cove Creek, Laurel Creek and their smaller tributaries. Road reconstruction activities on FSR 340A1 would be in proximity to Hickory Cove Creek and Laurel Creek. Hickory Cove Creek is classified as Water Supply IV (WS-IV), waters that are a source of water supply for drinking and which are generally located in moderately to highly developed watersheds; Trout (Tr), a supplemental classification intended to protect freshwaters for natural trout propagation and survival of stocked trout; and Outstanding Resource Waters (ORW), a supplemental classification intended to protect unique and special waters having excellent water quality and being of exceptional state or national, ecological or recreational significance. All ORW waters are also High Quality Waters (HQW) by supplemental classification. Laurel Creek is also classified as WS-IV; Tr, and ORW.

The ORW designation prohibits the establishment of new discharges or expansions of existing discharges. Where developments require an Erosion and Sedimentation Control Plan, specific storm water requirements for ORW waters shall be implemented (15A NCAC 02B .0225). When required, these storm water control provisions include utilizing vegetated conveyances to transport storm water and maintaining a 30 foot vegetated buffer (15A NCAC 02H .1007).

Road reconstruction occurred on a portion of FSR 340A1 following the 2004 hurricanes. This work included installation of broad-based dips and gravel on the road surface. This section of road is currently stable. 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 by excessive water velocities through the pipes.

Reconstruction ended at the uppermost Hickory Cove Creek crossing, leaving at least three stream crossings in poor condition further out FSR 340A1. 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, page 45), while the other two crossings were plugged or partly plugged by debris and channel substrate.

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).

The analysis area has had roads constructed parallel to Rockhouse Creek, Laurel Creek, and crossing approximately seven small unnamed tributaries. The construction dates of these roads are unknown; however, road surfaces and cut-fill slopes are well vegetated. If acid bearing rock was exposed during the construction of these roads, the material has likely stabilized over time and is not leaching into analysis area streams. The presence of rainbow trout within Rockhouse Creek and Laurel Creek below barriers would indicate that water quality is suitable for aquatic organisms. Furthermore, the forest sensitive species *Cambarus parrishi* has also been found near the confluence of Rockhouse Creek and Laurel Creek, indicating that water quality is not a limiting factor in this watershed.

Portions of FSR 340A1 are currently native surface. Although stable, the road experiences washing during high rainfall events and would benefit from grading. 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.

Existing Condition – Alternative C

The area proposed for access and new road construction in Alternative C is drained by Hickory Cove Creek, Rockhouse Creek, Flintspring Branch, Coldspring Branch, Long Branch and their smaller tributaries. Road reconstruction activities on FSR 427 would be in proximity to Rockhouse Creek, Flintspring Branch, Coldspring Branch, and Long Branch. Rockhouse Creek is classified as Water Supply IV (WS-IV), waters that are a source of water supply for drinking and which are generally located in moderately to highly developed watersheds; Trout (Tr), a supplemental classification intended to protect freshwaters for natural trout propagation and survival of stocked trout; and Outstanding Resource Waters (ORW), a supplemental classification intended to protect unique and special waters having excellent water quality and being of exceptional state or national, ecological or recreational significance. All ORW waters are also High Quality Waters (HQW) by supplemental classification. Flintspring Branch classified as Class C (protected for secondary recreation, fishing, aquatic life including propagation and survival, and wildlife), Tr, and ORW, and Coldspring Branch and Long Branch are Class C, ORW.

The ORW designation prohibits the establishment of new discharges or expansions of existing discharges. Where developments require an Erosion and Sedimentation Control Plan, specific storm water requirements for ORW waters shall be implemented (15A NCAC 02B .0225). When required, these storm water control provisions include utilizing vegetated conveyances to transport storm water and maintaining a 30 foot vegetated buffer (15A NCAC 02H .1007).

Stream channels in the drainages potentially affected by Alternative C 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).

Big Stamp Road (FSR 427) is currently a native surface road from its intersection with FSR 427A to Big Stamp. Although stable, the road experiences washing during high rainfall events and would benefit from grading. Culverts, although properly sized to pass the calculated 50 year flood, are not sized to the bankfull channel width and were not installed with aquatic organism passage in mind. As a result, passage is restricted by a perched outlet and by excessive water velocities through the pipes.

Existing Condition – Alternative D

The area proposed for access in Alternative D is drained by Colvard Creek, Alfred Creek, Aaron Creek, Nancy Hawkins Branch and their smaller tributaries. Road reconstruction activities are not planned on the existing FSR 6148A road. Colvard Creek, Alfred Creek and Nancy Hawkins Creek are classified as Class C only, and Aaron Creek is Class C and Tr. Outstanding Resource Waters (ORW) are not designated in the drainage.

Stream channels in the drainages potentially affected by Alternative D 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).

Forest Service Road 6148A is currently a native surface road from its intersection with FSR 6148. Although stable, the road experiences washing during high rainfall events and would benefit from grading. Culverts are properly sized to pass the calculated 50 year flood and to the bankfull channel width. However, some were not installed with aquatic organism passage in mind. As a result, passage is restricted by a perched outlet and by excessive water velocities through the pipes.

Aquatic Communities and MIS Evaluated

The aquatic analysis area contains one biological community, coldwater streams (Table 3.8.1.2, page 62). No special habitat components are associated with any aquatic resources in the analysis area, and therefore will not be analyzed further (Table 3.8.1.3, page 62). Only aquatic MIS potentially affected by the proposed project are fully evaluated.

Effects of Alternatives on Communities – Coldwater Streams

MIS associated with the coldwater streams community includes **rainbow trout** (*Oncorhynchus mykiss),* **brown trout** *(Salmo trutta),* **brook trout** (*Salvelinus fontinalis*) and **blacknose dace** (*Rhinichthys atratulus).*

Direct and Indirect Effects: **Alternative A** would involve no ground disturbing activities and would result in no effects to aquatic communities and MIS.

Alternative B, Alternative C, and Alternative D: In general, the duration of the effect of sedimentation depends upon stream type (stream energy available to move particles) and storm runoff magnitude and frequency. The effect could move downstream although it would dissipate the further removed it is from the source. Higher gradient stream channels may have these sediments scoured (i.e. flushed from the substrate and deposited in low velocity areas) and the effect would be dissipated throughout the stream channel.

A small quantity of sediments may enter unnamed tributaries of main stem creeks during culvert and road construction/reconstruction activities; however, these effects would not be measurable approximately 75 feet below the stream crossings (Farmer, personal observation). The effects of the culvert installations would be minor because any disturbed soil would be seeded and mulched within one working day of completion of construction; therefore, very little sediment is expected to enter the streams. Effects from the culvert installations would be immeasurable at the confluence with Fires Creek because the effects of the culvert installations would dissipate prior to reaching Fires Creek.

Sedimentation from the culvert installations may reduce the quality of the habitat for the coldwater streams community within the streams by partially filling pools within the first 75 feet below the crossing (Farmer, personal observation). These effects may persist until the next bankfull flow event (the flow event which occurs approximately every 2.5 years). Constructing the fish passage structures as presented in the design criteria under Chapter 2 (replacing culverts with bottomless arches or bridges as necessary) would produce similar short-term sedimentation effects but would restore fish passage to these waters.

The road construction and reconstruction proposed for this project may temporarily increase sedimentation within the watersheds where stream crossings occur; however, these effects would be minimized by application of project design features (e.g. out slope drainage, brush barriers, water bars, seeding, sediment traps) to control storm water runoff from road surfaces. Due to the erosion control techniques designed into the project, sedimentation from these roads would be immeasurable at the confluence of these tributaries with Fires Creek. Swift (1985) recorded sediment deposition below road fills ranging from 75 feet to 150 feet. Although deposition of greater distances can occur on grassed road fills with brush barriers, sediments from this type of road construction are typically filtered effectively within 20 feet below the fill slope (Swift, 1986). Erosion from road surface runoff would be filtered before reaching any perennial water sources.

The proposed activities within the aquatic analysis area would impact approximately 75 feet of stream below each crossing but these impacts would not change the forest-wide a trend for this habitat type because the small amount of sediment entering analysis area streams would be scoured from the channel during the next bankfull flow event.

Cumulative Effects: **Alternative A:** In the absence of direct and indirect effects, there would be no cumulative effects under Alternative A.

Alternative B: The cumulative effects of Alternative B include the direct and indirect effects to aquatic communities, special habitats, and MIS in combination with other past actions and

reasonably foreseeable future projects in the analysis area. Previous activities that affected streams within the analysis area include timber harvest and road construction. There may have been an increase in stream turbidity during culvert installations for previous timber projects. Specifically, the effects of these actions would have included sedimentation from the ground disturbing activities (road construction, reconstruction, and culvert installations). All of these effects, however, would have exhibited short-term impacts on aquatic resources, and would have dissipated in the time since management activities occurred in the analysis area. As a result, there are no present effects to aquatic resources in the analysis area as a result of past actions. As a result of the length of time since completion of these actions, any effects to the aquatic resources are reflected in the current affected environment. There are no existing effects to the aquatic resources resulting from these activities.

There are no other ongoing activities occurring on federal lands within the project aquatic analysis area. There are no other ongoing activities on private lands affecting the analysis area waters.

There are no other reasonably foreseeable future actions proposed for the aquatic analysis area on federal lands; therefore, there would be no known effects from future actions. The proposed site clearing and cabin construction activities planned for the inholding may affect the analysis area waters in the future.

Alternative C: Cumulative effects upon aquatic communities under Alternative C would be similar to the cumulative effects described for Alternative B.

Alternative D: Cumulative effects upon aquatic communities under Alternative D would be similar to the cumulative effects described for Alternative B.

Effects of Alternatives on Management Indicator Species

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 analysis 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 Forests. 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.

Direct and Indirect Effects: **Alternative A:** would produce no direct or indirect effects to the aquatic MIS because there would be no ground disturbing activities proposed for this alternative. This alternative would meet Forest Plan standards by maintaining the existing wild trout populations.

Alternative B, Alternative C, and Alternative D: Short-term indirect impacts to individuals could result from increased sedimentation associated with road construction and culvert replacement/installation within the analysis area. Short-term and long-term sedimentation and acid runoff can be avoided or minimized through the successful use of BMPs and required project design criteria included in Chapter 2. 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 would likely increase stability of the stream channel and banks at that location and may reduce sediment loss at that location during high-flow events. However, replacement of this culvert, instead of requiring a bridge or bottomless arched culvert may create a passage barrier for the wild rainbow trout within Hickory Cove Creek. 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 low likelihood of direct impacts to individuals. Negative indirect impacts are possible, but can be avoided or minimized with successful implementation of BMPs 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 analysis area would be stabilized, and non-functional culverts in the analysis area would 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.

Effects of Past, Ongoing, and Future Actions: The effects of past, ongoing, and future actions on the aquatic resources have been disclosed in the Biological Communities discussion above and would be the same for the aquatic MIS.

Cumulative Effects: Cumulative effects upon management indicator species under Alternatives B, C, and D would be similar to the cumulative effects disclosed in the Biological Communities discussion on pages 67 and 68.

3.8.1.2 Botanical Communities, Special Habitats and MIS

Boundaries of Botanical Communities and MIS

The botanical analysis area or "boundary of effects" used for this proposal is defined as the total area within two miles of any proposed activity area. The botanical analysis area helps determine which federally proposed, threatened and endangered, Forest Service Region 8 sensitive (PETS), and forest concern (FC) plant species have the highest likelihood of occurring in the proposed activity area. Because plants are rooted species that must be present in proposed activity areas to undergo effects, potential direct and indirect effects were evaluated for PETS and FC plant species that occur within proposed activity areas. In addition, potential direct and indirect effects were only evaluated for MIS botanical species, biological communities, and special habitats that occur within proposed activity areas.

Existing Conditions for Botanical Communities and MIS

The analysis area consists of high to moderate ridges, spur slopes, and ravines, with elevations ranging from 2,200 to 4,000 feet. Forest community types include High Elevation Red Oak Forest, Rich Cove Forest, Acidic Cove Forest, Montane Oak-Hickory Forest, and Mixed Oak Heath. Montane Oak-Hickory occurs on the open slopes and Chestnut Oak Forest occurs on the spur ridges. Acidic Cove Forest predominates in the ravines and sheltered slopes. For a detailed description of forest community types refer to Schafale and Weakley's "Classification of the Natural Communities of North Carolina", third approximation (1990).

Botanical Communities and MIS Evaluated

All Nantahala and Pisgah National Forests management indicator species (MIS) and special habitats that occur within the proposed analysis area were evaluated (Tables 3.8.1.2 and 3.8.1.3, page 62). The effect of proposed activities on biological diversity is assessed by evaluating MIS population trends and their associated biological communities. In addition, the effects of activities on biological diversity is assessed by evaluating the presence and diversity of special habitat components (e.g. old forests and early successional) and their associated MIS (e.g. bear and ruffed grouse) within proposed analysis areas and across the Nantahala and Pisgah National Forests. Biological communities, special habitats, and associated MIS present in the LCPOA activity area include Rich Cove Forest, American ginseng (*Panax quinquefolius*), and forests ≥100 years old.

Effects to Biological Communities by Alternative

Rich Cove Forests

Direct and Indirect Effects: **Alternative A (no action):** This alternative would produce no direct or indirect effects to Rich Cove Forests because there would be no ground disturbing activities.

Alternative B: There is a small portion of marginal Rich Cove Forest that occurs along approximately 0.15 acres of road proposed for reconstruction. Because this is a preexisting Forest Service Road, the community type is not structurally and functionally fully intact. Thus, the effects to this community type would be small to negligible. The road reconstruction may directly affect the remnant Rich Cove Forest by reducing the amount of herbaceous species associated with this community type. In addition, the road reconstruction may indirectly affect herbaceous species associated with Rich Cove Forest by increasing light thereby increasing competition from early successional species.

Alternative C: Approximately 0.32 acres of Rich Cove Forest occurs along the new road construction proposed for Alternative C. The new road construction would directly affect the Rich Cove Forest by the removal of canopy trees and the reduction of herbaceous species. Indirect effects include an increase in early successional species associated with higher light conditions.

Alternative D: The new road construction proposed under Alternative D would directly and indirectly effect approximately 1.45 acres of Rich Cove Forest. The new road construction would directly affect the Rich Cove Forest by the removal of canopy trees and the reduction of herbaceous species. Indirect effects include an increase in early successional species associated with higher light conditions.

Effects of Past, Ongoing and Future Projects: Previous activities within the analysis area include timber harvest and road construction. There would have been impacts to botanical communities from these extractive management activities, but as these impacts occurred without detailed botanical surveys, no data exist to identify trends and impacts. Most of these effects, however, would have exhibited short-term effects on botanical resources, and plant communities would have largely recovered in the time since management activities occurred in the analysis area. As a result, there are most likely few effects to botanical resources in the analysis area as a result of past actions. Given the length of time since completion of these actions, any effects to the botanical resources are reflected in the current affected environment. There are no existing effects to the botanical resources resulting from these activities.

There are no other ongoing activities occurring on federal lands within the project botanical analysis area. There are no other ongoing activities on private lands affecting the analysis area plant communities.

The only other reasonably foreseeable future action proposed for the botanical analysis area on federal lands is the future construction of the proposed permanent Rim Trail Bypass trail. The proposed site clearing and cabin construction activities planned for the inholding may affect analysis area plant communities in the future.

Cumulative Effects: The analysis area contains very small patches of intermediate to marginal examples of Rich Cove Forest. In addition, the proposed Alternative B, Alternative C, and Alternative D, would only affect 0.15, 0.32, and 1.45 acres of intermediate Rich Cove Forest, respectively. Thus, this project would not alter the existing forest-wide trend for Rich Cove Forests across the Nantahala-Pisgah National Forests.

Effects of Alternatives on Special Habitat Components

Forest Communities Greater than 100 Years Old

Direct and Indirect Effects: **Alternative A:** This alternative would not directly or indirectly effect forest communities ≥ 100 years old because there would be no ground disturbing activities.

Alternative B: This alternative would not directly or indirectly effect forest communities ≥ 100 years old because the new road construction proposed under this alternative does not contain any forests communities ≥100 years old.

Alternative C: This alternative would affect approximately 1.31 acres of forest communities ≥100 years old due to the removal of canopy trees during road construction.

Alternative D: This alternative would affect approximately 0.73 acres of forest communities ≥100 years old due to the removal of canopy trees during road construction.

Effects of Past, Ongoing, and Future Actions: The effects of past, ongoing, and future actions on botanical resources have been disclosed in the rich cove forests discussion above and would be the same for forest communities ≥100 years old.

Cumulative Effects: Alternative C and Alternative D contain very small portions of forests communities ≥100 years old. Overall, the trend for forest communities ≥100 years old on the Nantahala and Pisgah National Forests is increasing. For instance, the amount of forested communities ≥100 years increased from 47,591 acres in 1980 to 166, 078 acres in 2000 (USFS, 2001, page 23). The loss of 1.31 acres under Alternative C and 0.73 acres under Alternative D would not appreciably change the forest-wide trend for forest communities ≥100 years old across the Nantahala and Pisgah National Forests.

Effects of Alternatives on Management Indicator Species

American Ginseng (*Panax quinquefolius*)
American ginseng is a slow growing, long lived plant that occurs in rich, moist deciduous forests in well-drained soils (Van der Voort et al. 2003). In the Southern Appalachian region, American ginseng typically occurs in Rich Cove Forests due to the higher base content, soil moisture, and nutrients that occur in this community type. Because ginseng is a long-lived perennial, it does not reach reproductive age until after a lengthy juvenile period, which makes this species more susceptible to overharvesting (Van der Voort et al. 2003). Since ginseng harvesters gather the entire portion of root, vegetative regeneration from remaining fragments rarely occurs (Van der Voort et al. 2003). Harvest pressure has increased because of the increase in the monetary value of American ginseng. As a result, the age structure and reproductive potential of American ginseng populations may be decreasing. In some states, the annual average number of dried wild roots per pound has increased. These results suggest that the size of roots have decreased, which in turn, suggests that the age structure and reproductive potential of ginseng has declined (Van der Voort et al. 2003, Robbins 2000). Across the Nantahala and Pisgah National Forests, population sizes appear smaller than in the past with fewer than 50 individuals per population (Gary Kauffman, personal communication).

Direct and Indirect Effects: **Alternative A (no action):** This alternative would produce no direct or indirect effects to American ginseng because there would be no ground disturbing activities proposed for this alternative.

Alternative B: The small portion of Rich Cove Forest that occurs adjacent to approximately 0.063 miles of road proposed for reconstruction would not directly or indirectly effect American ginseng because there is a very remote probability that this species occurs along the existing road corridor.

Alternative C: Approximately 0.32 acres of Rich Cove Forest occurs along the new road corridor proposed for Alternative C. The proposed new road construction may directly affect

American ginseng via mechanical crushing. Indirectly, American ginseng may be affected by an increase in vegetative competition from early successional plants.

Alternative D: Approximately 1.45 acres of Rich Cove Forest occurs along the proposed new road construction for Alternative D. The new road construction may directly affect American ginseng via mechanical crushing. Indirectly, American ginseng may be affected by an increase in vegetative competition from early successional plants.

Effects of Past, Ongoing, and Future Actions: The effects of past, ongoing, and future actions on the botanical resources have been disclosed in the Biological Communities discussion above and would be the same for American ginseng.

Cumulative Effects: The estimated population trend for American ginseng is gradually decreasing across the Nantahala and Pisgah National Forests primarily due to the commercial harvest of roots, both legal and illegal (USFS, 2001, pg. 818). American ginseng is most commonly associated with Rich Cove Forests, totaling approximately 110,000 acres across the Nantahala and Pisgah National Forests (determined by modeling Rich Cove Forest). The 0.32 acres and 1.45 acres affected by the proposed for new road construction for Alternative C and Alternative D, respectively, would not alter the current trend for American ginseng across the Nantahala and Pisgah National Forests because only marginal Rich Cove Forests occurs and American ginseng was not found in the analysis area during botanical surveys.

3.8.1.3 Terrestrial Wildlife Communities, Special Habitats and MIS

Boundaries of Terrestrial Wildlife Communities and MIS

Only terrestrial wildlife resources within or adjacent to the LCPOA project activity areas were analyzed in detail. This includes the areas above and below the existing Forest Service roads 340A1, 427, 6148A, and the corridors for the segments of new road construction.

Existing Conditions for Terrestrial Communities and MIS

Based on observed community types within the analysis area, a variety of terrestrial wildlife species is likely to utilize habitat in the analysis 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: wild or feral hogs (*Sus spp.)*, small mammals (unidentified rodent tracks), coyote (*Canis latrans)*, bobcat (*Lynx rufus),*white-tailed deer *(Odocoileus virginianus),*racooon *(Procyon lotor),* Eastern gray squirrel *(Sciurus carolinensis),* wild turkey *(Meleagris gallopavo),* ruffed grouse *(Bonasa umbellus),* worm-eating warbler *(Helmitheros vermivorus),* black and white warbler *(Mniotilta varia),* pileated woodpecker *(Dryocopus pileatus),* hermit thrush *(Catharus guttatus),* dark-eyed junco *(Junco hyemalis),* Northern two-lined salamander *(Eurycea bislineata),* blackbelly salamander *(Desmognathus quadramaculatus),* and common garter snake *(Thamnophis sirtalis).*

Terrestrial Wildlife Communities and MIS Evaluated

The terrestrial wildlife analysis area contains one biological community, riparian forests (Table 3.8.1.2, page 62). Special habitat components associated with terrestrial wildlife resources are soft mast-producing species, hard mast-producing species, large contiguous areas with low levels of human disturbance, large contiguous areas of mature deciduous forest, snags, and down woody debris (Table 3.8.1.3, page 62). Terrestrial MIS associated with these special habitats are ruffed grouse, black bear, ovenbird, and pileated woodpecker.

Effects of Alternatives on Management Indicator Species

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 trend data for this region shows a downward trend in the population. However, the majority of Breeding Bird Survey routes are along private land on roads. The Forest Service Southern Region 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 analysis area contain suitable riparian habitat (acidic cove forest) for this species; these areas are limited to the existing roadbeds under all three action alternatives. Direct impacts from the project to any canopy trees are not expected, as road reconstruction and construction activities would be limited to the existing roadbed and are not expected to disturb any large trees. The proposed new road alignments proposed under Alternatives B, C, and D do 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.

***Direct and Indirect Effects*:** No direct or indirect effects would occur under Alternatives A, B, C, or D.

***Effects of Past, Ongoing and Future Projects*:** Past actions, including road building and timber extraction, may have affected habitat for the Acadian flycatcher, but those effects have moderated over time. No future projects in the analysis area would affect Acadian flycatcher habitat.

Cumulative Effects – In the absence of direct and indirect effects, and given that no future projects would affect this species, there would be no cumulative effects under Alternatives A, B, C, and D.

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 five to 15 years of age, provide protection from prey for brood rearing and development and food throughout the year. Down 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 down 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 down 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 down woody debris component within the acres that would be affected by the proposed new road alignments in Alternatives B, C, and D may not be fully utilized by ruffed grouse given the lack of nearby younger seral forest. The implementation of the project would result in the permanent decrease in down woody debris and a short-term decrease soft mast-producing species within the road corridors.

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 North Carolina Wildlife Resources Commission. Due to the limited and localized impacts to soft mast-producing species and down woody debris, the proposed action is not expected to change the overall population trend for the ruffed grouse on the forest.

***Direct and Indirect Effects*:** Alternative A would have no effect. There would be a short term loss of soft mast-producing species under Alternatives B, C, and D, but this habitat is expected to recover within a few growing seasons after project implementation. There would be a loss of two acres of down woody material habitat under Alternative B, nine acres under Alternative C, and 45 acres under Alternative D.

***Effects of Past, Ongoing and Future Projects*:** Past actions, including road building and timber extraction, may have affected habitat for the ruffed grouse, but those effects have moderated over time. No future projects in the analysis area would, increase or diminish the amount of habitat for ruffed grouse in the analysis area on federal lands. Clearing and cabin construction on the inholding may affect ruffed grouse habitat in the future.

Cumulative Effects: Because of the very small habitat affected, the overall abundance ruffed grouse habitat in the analysis area would remain stable.

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 in 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 would result in the loss of two acres (Alternative B), nine acres (Alternative C) and 45 acres (Alternative D) of hard mast-producing habitat within the footprint of the proposed new road alignments. As the proposed action also allows access across the existing and new road alignments within the analysis area, it would also increase the level of human disturbance within the analysis area, particularly during any clearing and construction activities on the inholding. Since the proposed access is intended to serve four primitive cabins on the LCPOA property, traffic levels on this access are expected to be very low over the long term. The project is not expected to create substantial areas of early successional habitat.

Black bear is associated with the hard mast-producing species special habitat type and with large contiguous areas with low levels of disturbance (Table 3.8.1.5, page 64). The current estimated population trend for black bear is increasing across the Nantahala and Pisgah National Forests. Black bear 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 would impact hard mast-producing habitat and would slightly increase the amount of human disturbance within the analysis area between two acres (Alternative B), nine acres (Alternative C), and 45 acres (Alternative D). The impacts associated with the proposed action are not expected to change the forest-wide trend for black bear on the forest.

***Direct and Indirect Effects*:** Alternative A would result in no change in black bear habitat. There would be a loss of two acres of hard mast-producing species habitat under Alternative B, nine acres under Alternative C, and 45 acres under Alternative D. There would be a short-term increase in disturbance in the analysis area during road reconstruction and construction activities under Alternatives B, C, and D, and with residential construction on the inholding.

***Effects of Past, Ongoing and Future Projects*:** Past actions, including road building and timber extraction, affected habitat for black bear, but those effects have moderated over time. Beyond the road reconstruction, construction, and proposed clearing and cabin construction, no future projects in the analysis area would increase or diminish the amount of black bear habitat in the analysis area.

***Cumulative Effects*:** Because of the very small amount of black bear habitat affected, the overall abundance of habitat in the analysis area would remain stable.

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 analysis area during field surveys, although adequate habitat was present. The possibility of an ovenbird foraging or nesting in the analysis 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 two acres (Alternative B), nine acres (Alternative C) and 45 acres (Alternative D) 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.

Direct and Indirect Effects: Alternative A would result in no change in ovenbird habitat. There would be a loss of two acres of large contiguous areas of mature deciduous forest habitat under Alternative B, nine acres under Alternative C, and 45 acres under Alternative D.

***Effects of Past, Ongoing and Future Projects*:** Past actions, including road building and timber extraction, affected habitat for ovenbird, but those effects have moderated over time. Beyond the road reconstruction, construction, and proposed clearing and cabin construction, no future projects in the analysis area would increase or diminish the amount of ovenbird habitat in the analysis area.

***Cumulative Effects*:** Because of the very small amount of ovenbird habitat affected, the overall abundance of habitat in the analysis area would remain stable.

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 Breeding Bird Survey trend for the North Carolina pileated woodpecker population indicates a small increase since 1966.

Snags exist throughout the mature forest in the analysis area, but few are within close proximity to the existing roadbeds or to the footprints of the proposed new road alignments. The proposed action could result in the permanent loss of some snags within the corridors that would be cleared for the new road alignments under Alternatives B, C, and D. 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.

***Direct and Indirect Effects*:** Alternative A would result in no change in pileated woodpecker habitat. There could be a loss of snags if any exist in the two acre corridor of the new road proposed under Alternative B, nine acres under Alternative C, and 45 acres under Alternative D.

***Effects of Past, Ongoing and Future Projects*:** Past actions, including road building and timber extraction, affected habitat for the pileated woodpecker, but those effects have moderated over time. Beyond the road reconstruction, construction, and proposed clearing and cabin construction, no future projects in the analysis area would increase or diminish the amount of pileated woodpecker habitat in the analysis area.

***Cumulative Effects*:** Because of the very small amount of pileated woodpecker habitat affected, the overall abundance of habitat in the analysis area would remain stable.

3.8.1.4 Summary of Effects of Alternatives on Biological Communities and Special Habitats

Alternatives A, B, C, and D: Alternatives A, B, C, and D would not cause changes in trends to biological communities or special habitats on the forest.

Biological Communities

(1) Coldwater Streams: There are approximately 5,100 miles of coldwater streams on the Nantahala and Pisgah National Forests. The forest-wide trend for coldwater streams quality is increasing due to improved efforts at erosion control and a reduction in new road construction.

Implementation of the proposed action would cumulatively impact short segments 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 BMPs and project design criteria would likely result in greater stabilization and reduced sediment loss at crossings when compared to current conditions. Neither short-term negative impacts nor long-term positive impacts to coldwater streams are anticipated that would change the forest-wide trend for this community.

(2) 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 yellow poplar *(Liriodendron tulipifera)*, basswood *(Tilia americana)*, sugar maple *(Acer saccharum)*, and silverbell *(Halesia tetraptera)*. Black birch (also called sweet birch) *(Betula lenta)*, American beech *(Fagus grandifolia)*, buckeye *(Aesculus flava)*, red maple *(Acer rubrum)*, white ash *(Fraxinus americana)*, and cucumber tree *(Magnolia acuminata)* may also be present. Striped maple (also called moosewood) *(Acer pensylvanicum)* and American hophornbeam *(Ostrya virginiana)* are common additions to the understory; the shrub layer is often dominated by hydrangea *(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).

The proposed new alignment of single lane road within the analysis area would eliminate approximately 0.15 acres (Alternative B), 0.32 acres (Alternative C), and 1.45 acres (Alternative D) containing varying components and/or features of Rich Cove Forest.

(3) Riparian Forests are protected by standards in the Nantahala and Pisgah National Forests Land and Resource Management Plan. These forests, approximately 95,000 acres in extent, currently are static and are not expanding or being reduced in extent. As a result there is no reduction in the quantity of habitat and there is 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.

No negative impacts to riparian forests are anticipated under the proposed actions. Although the current roadbeds parallel and cross several areas of riparian forest community, no additional clearing in these areas would occur. No riparian forest occurs where the proposed new road alignments are proposed.

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 **down woody material**. Four soft mast-producing plant families occur within the activity area: cherry (*Prunus spp*.), catbriar (*Smilax spp.),* wild grape (*Vitis rotundifolia)* and blackberry (*Rubus spp*.). Hard mast-producing families include oaks (*Quercus spp*.) and hickories (*Carya spp*.). Down woody debris on the site includes small branches, twigs, and a few large logs. A few small snags are present in the analysis area. The analysis 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.

(1) Soft mast-producing species: *Direct and Indirect Effects* - Soft mast-producing species are primarily associated with forest communities less than 20 years old. Alternative A would result in no change in soft mast-producing species habitat. Under Alternatives B, C, and D, road reconstruction and road construction activities would reduce the number of soft mast-producing species as work is carried out, but long term, the increase in the amount of sunlight reaching road edges may result in an increase in the abundance of soft mast-producing species, depending on the frequency of roadside mowing. The total amount of habitat would be small and would not be contiguous. No large-scale increases or decreases to this habitat type are expected from this project.

Effects of Past, Ongoing and Future Projects **–** Past actions, including road building and timber extraction, affected soft mast-producing species, but those effects have moderated over time. Beyond the road reconstruction, construction, and proposed clearing and cabin construction, no reasonably foreseeable future projects in the analysis area would increase or diminish the amount of soft mast-producing habitat in the analysis area.

Cumulative Effects **–** Because of the very small amount of soft mast-producing species habitat affected, the overall abundance of soft mast-producing species in the analysis area would remain stable, influenced primarily by natural disturbance events such as ice storms, tree mortality, and wind storms. The type and extent of land clearing and landscaping conducted on the LCPOA property could increase the amount of soft mast-producing species.

Forest-wide Trends - Forest-wide, mid successional habitat is decreasing due to the reduction in timber harvesting. The proposed project would have no effect on this downward trend.

(2) Hard mast-producing species: *Direct and Indirect Effects* - Hard mast-producing species are associated with mature forest communities greater than 40 years old. Alternative A would result in no change in hard mast-producing species in the near future. There would be a loss of

two acres of hard mast-producing species habitat under Alternative B, nine acres under Alternative C, and 45 acres under Alternative D.

Effects of Past, Ongoing and Future Projects **–** Past actions, including road building and timber extraction, affected hart mast-producing species in the analysis area, but those effects have moderated over time. Beyond the road reconstruction, construction, and proposed clearing and cabin construction, no reasonably foreseeable future projects in the analysis area would increase or diminish the amount of hard mast-producing habitat in the analysis area.

Cumulative Effects – Because of the very small amount of hard mast-producing species habitat affected, the overall abundance of hard mast-producing species in the analysis area would remain stable, influenced primarily by natural disturbance events such as ice storms, tree mortality, and wind storms.

Forest-wide Trends - The forest-wide trend is increasing due to the aging of young stands. The proposed project would not affect this trend.

(3) Contiguous areas with low disturbance: *Direct and Indirect Effects* – There would be no change to the amount of contiguous areas with low disturbance under Alternative A. There would be a loss of two linear acres under Alternative B, nine linear acres under Alternative C, and 45 linear acres under Alternative D, a loss that would last approximately 20 to 50 years as the forest in disturbed areas recovers over time.

Effects of Past, Ongoing and Future Projects **–** Past actions, including road building and timber extraction, affected contiguous areas with low disturbance in the analysis area, but those effects have moderated over time. Beyond the road reconstruction, construction, and proposed clearing and cabin construction, no reasonably foreseeable future projects in the analysis area would increase or diminish the amount of contiguous areas with low disturbance in the analysis area.

Cumulative Effects - Because of the small amount of disturbance associated with this project, the overall abundance of contiguous areas with low disturbance forest habitat would remain stable in the analysis area.

Forest-wide Trends - The forest-wide trend of contiguous areas with low disturbance is increasing at a slow rate as silvicultural-based management activities decline. The proposed project would not affect this trend.

(4) Large contiguous mature forest: *Direct and Indirect Effects* – There would be no change to the amount of large contiguous mature forest under Alternative A. There would be a loss of two acres under Alternative B, nine acres under Alternative C, and 45 acres under Alternative D.

Effects of Past, Ongoing and Future Projects **–** Past actions, including road building and timber extraction, affected the amount of large contiguous mature forest in the analysis area, but those effects have moderated over time. Beyond the road reconstruction, construction, and proposed clearing and cabin construction, no reasonably foreseeable future projects in the analysis area would increase or diminish the amount of large contiguous mature forest in the analysis area.

Cumulative Effects - Because of the very small amount large continuous mature forest habitat affected, the overall abundance of large contiguous mature forest habitat would remain stable in the analysis area.

Forest-wide Trends - The forest-wide trend is increasing, due to the aging of stands. The proposed project would not affect this trend.

(5) Snags: *Direct and Indirect Effects* – There would be no affects to the number of snags under Alternative A. If snags are present in the corridor proposed for new road construction, there would be some reduction in the amount of snags in the area affected under Alternatives B (two acres), C (nine acres), and D (45 acres).

Effects of Past, Ongoing and Future Projects **–** Past actions, including road building and timber extraction, affected the number of snags in the analysis area, but those effects have moderated over time. Beyond the road reconstruction, construction, and proposed clearing and cabin construction, no reasonably foreseeable future projects in the analysis area would increase or diminish the number of snags in the analysis area.

Cumulative Effects - Because of the very small amount of potential snag habitat affected, the overall amount of snag producing habitat would remain stable in the analysis area.

Forest-wide Trends - The forest-wide trend is increasing, due to the aging of young stands. The proposed project would not affect this trend.

(6) Down woody material: *Direct and Indirect Effects* - Alternative A would result in no change in down woody material in the near future. There would be a short-term decrease in down woody material in the two acres under Alternative B, nine acres under Alternative C, and 45 acres under Alternative D proposed for new road construction in each alternative.

Effects of Past, Ongoing and Future Projects - Past actions, including road building and timber extraction, affected the amount of down woody material in the analysis area, but those effects have moderated over time. Beyond the road reconstruction, construction, and proposed clearing and cabin construction, no reasonably foreseeable future projects in the analysis area would increase or diminish the amount of down woody material in the analysis area.

Cumulative Effects - Because of the very small amount of down woody material habitat affected, the overall abundance of down woody material habitat would remain stable in the analysis area.

Forest-wide Trends - The forest-wide trend is stable. The proposed project would not affect this trend.

3.8.2 Proposed, Endangered, Threatened, and Sensitive Species

The Nantahala and Pisgah National Forests maintain a list of Proposed, Endangered, Threatened and Region 8 Forest Sensitive (PETS) species on National Forest System 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 and or Cherokee Counties, 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 (Graham, Macon, and Swain). A total of 58 species remained after this initial step, and included 27 plant species, 30 terrestrial animal species, and one aquatic animal species. A list of the 58 species, including a brief habitat description, is provided in the full Biological Evaluation in Appendix 2.

The list was then subjected to a second filtering step, eliminating species whose associated natural community type (general habitat), or specialized habitat type did not occur within the analysis 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 PETS element occurrences at two spatial scales. The first query included PETS element occurrences within the analysis area, whereas the second query included PETS element occurrences within two miles of the analysis area. Results of NCNHP database queries are discussed for each species group below.

Site visits and pedestrian field surveys of the analysis area were conducted by Fish and Wildlife Associates, Inc. (FWA) in March 2007, June 2008, June 2009, and March 2010, and by members of the ID Team in May and June of 2014.

See also the Biological Evaluation (BE) in Appendix 2 of this Environmental Assessment.

3.8.2.1 Aquatic Threatened, Endangered, and Sensitive Species Evaluated

After filtering by county, one Forest Sensitive species *(Cambarus parrishi*) remained for consideration (Table 3.8.2.1). The NCNHP database also indicates that this species has been recorded within two miles of the analysis area (in Rockhouse Branch), but is not known to occur within the proposed treatment area. The analysis evaluates this species; background information and potential impacts to this species are discussed below.

Table 3.8.2.1. 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	*Cambarus parrishi*	Hiwassee headwaters crayfish	Hiwassee River headwaters, Rockhouse Creek; swift, clear headwater streams	Yes*

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

Hiwassee headwaters crayfish (*Cambarus parrishi*) - 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 analysis 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 proposed treatment area. However, this species has been documented within two miles of the analysis area in Rockhouse Creek. Hickory Cove Creek and Laurel Creek are tributaries of Rockhouse Creek, and join Rockhouse Creek downstream of the analysis area. The species has been located within Fires Creek, the Hiwassee River, Tusquitee Creek, Big Tuni Creek, Compass Creek, Morgan Creek, and Shooting Creek. The populations within Rockhouse Creek and Fires Creek have been surveyed in 1984 and 2007. Both populations are persisting within these two streams. Additional surveys were deemed unnecessary for this species because available inventory information is adequate to guide project design, support determination of effects, and meet requirements for conservation of the species

Direct and Indirect Effects: *Cambarus parrishi* may occur in tributary streams in the analysis 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 analysis 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 entire range of proposed actions (Alternatives B, C, and D) 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, including crushing of individuals during culvert installation. These effects would only occur during construction and are unlikely to affect the viability of the species across the forest as a whole due to the restricted duration and geographic extent of effects. Installation of a culvert on Hickory Cove Creek, rather than requiring a bridge or arched bottomless culvert may fragment the Hiwassee headwaters crayfish population at this location by limiting passage.

Short-term indirect impacts to individuals could result from increased sedimentation associated with road construction and culvert replacement/installation within the analysis area. The effects of increased turbidity and sedimentation would be highest during culvert installation, which would occur for approximately one 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 sediment downstream of the culvert installation would persist until the next bankfull flow event, which occurs approximately every 2.5 years. Similarly, short-term indirect impacts to individuals could also result from acid runoff during road construction if fresh, unweathered acidic rock is exposed and is not appropriately treated or disposed of. Exposure of acid bearing rock (and failure to properly treat the material with limestone) can result in long-term negative effects to aquatic organisms (Bacon and Maas 1979, Mathews and Morgan 1982, Kucken et al. 1994, Huckabee et al. 1975, and Daniels and Orndorff 2003).

Daniels and Orndorff (2003) noted that lime additions to the surface of road fill material was "minimally effective" at neutralizing acid bearing rock. Furthermore, Daniels and Orndorff (2003) recommend blending agricultural limestone with road fill materials containing acidic rock and/or placing an "engineered cap" over waste areas. Short-term and long-term sedimentation and acid run off would be avoided or minimized through the successful use of BMPs, design criteria, and requirements listed in Chapter 2. The proposed road reconstruction for this project is expected to have minimal effects to the Hiwassee headwaters crayfish because design criteria would be applied where fresh rock is exposed during reconstruction. The 0.34 miles of new road construction in the Nantahala Formation (Alternative B), 0.71 miles (Alternative C), and 0.81 miles (Alternative D) would be accomplished using project design features to reduce acid bearing rock exposure (Chapter 2).

It is also possible that long-term indirect impacts associated with the proposed actions could be positive, in that the replacement of the dislodged culvert at the Hickory Cove crossing (Alternative B) would 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, poorly installed and poorly functioning culverts associated with the proposed actions under Alternatives B, C, and D may also prevent similar failures and sediment loss during future high-flow events.

Cumulative Effects: Previous activities within the analysis area include timber harvest and road construction and maintenance activities consistent with the management levels for Forest Service roads in the analysis area. Portions of Rockhouse Road, Phillips Ridge Road, and Little Fires Creek Road were 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 action alternatives proposed in this EA. These activities were designed to prevent chronic erosion and sedimentation. Therefore, past effects from these actions were minimal and would not produce cumulative impacts with this project. Past 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 ten years ago.

There are no ongoing or reasonably foreseeable future actions occurring or proposed on Federal lands within the analysis area; therefore, there are no ongoing or future effects to analysis area waters anticipated. There are no ongoing activities or reasonably foreseeable future actions on private lands that are known to be, or would affect the aquatic resources in the analysis area.

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 would be avoided or minimized with successful implementation of BMPs 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 analysis area would be stabilized, and non-functional culverts in the analysis area would 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 would avoid chronic sedimentation and acid runoff impacts to habitat for this species.

3.8.2.2 Botanical Threatened, Endangered, and Sensitive Species Evaluated

There is one federally endangered, one federally threatened, and 27 Region 8 sensitive plant species that are known or historically known to occur in Clay and Cherokee County (Biological Evaluation, Appendix 2). Out of these plant species, five Region 8 sensitive plant species are known or historically known to occur in the LCPOA botanical analysis area (Table 3.8.2.2). No federally proposed, endangered, or threatened plant species are known or historically known to occur in the LCPOA botanical analysis area. In addition, no federally proposed, endangered, or threatened plant species were located during botanical field surveys of the analysis area. Only one sensitive plant, Southern nodding trillium (*Trillium rugelii*) was located by Fish and Wildlife Associates, Inc. (FWA) during botanical surveys of the analysis area in June 2008. This species was not located during botanical surveys conducted in May and June of 2014. Because this species closely resembles the common sweet trillium (*Trillium vaseyi*), there may have been an identification error, especially since other botanists (Ed Schwartzman, NC Natural Heritage Program and Mike Schafale, NC Natural Heritage Area) have conducted surveys in the surrounding area and have not found this species. To be thorough, an effects analysis was completed for Southern nodding trillium.

Table 3.8.2.2. Federally Proposed, Endangered, and Threatened, and Region 8 Sensitive Plant Species Known or Historically Known to Occur in the LCPOA Botanical AA.

Group	Designation	*Scientific Name*	Common Name	Associated Natural Community Type or Specialized Habitat Type	Analyzed Further/Evaluation Criteria*
Vascular plant	Sensitive	*Monotropsis odorata*	sweet pinesap	Rich Cove Forest, Mesic Oak-Hickory, Dry Oak-Hickory, Dry-Mesic Oak Forest, Pine-Oak/Heath Forest	No/2
Vascular plant	Sensitive	*Sceptridium jenmanii*	Alabama grape fern	Rich Cove Forest	No/2
Vascular plant	Sensitive	*Scutellaria saxatilis*	rock skullcap	Northern Hardwood Forest, Boulderfield Forest, Rich Cove Forest	No/2
Vascular plant	Sensitive	*Stachys clingmanii*	Clingman's hedge-nettle	Northern Hardwood Forest, Boulderfield Forest	No/2
Vascular plant	Sensitive	*Trillium rugelii*	Southern nodding trillium	Rich Cove Forest, low elevation	Yes

***1** Based on available habitat descriptions for this species, no habitat is present within the analysis area; no habitat for this species would be impacted by the proposed actions.
***2** NCNHP database indicates that this species has been recorded within two miles of the analysis area (however, no records for this species exist *within* the analysis area and the species was not found during botanical field surveys).

Southern nodding trillium (*Trillium rugelii*) - Southern nodding trillium has been documented within 20 North Carolina counties, 13 of which occur within the western North Carolina mountains (Buchannan & Finnegan 2008; David Danley, Pisgah National Forest botanist, personal communication; Gary Kauffman, National Forests in NC botanist, personal communication). The species primarily occurs at lower elevations in the mountains, from 1,200-3,500 feet above sea level. Southern nodding trillium requires a fairly rich, moist microhabitat most often found in rich coves and bottomlands with a closed canopy. Twenty Southern nodding trillium populations have been documented within the Nantahala and Pisgah National Forests. These populations vary in abundance from 20 to 50 individuals covering less than one acre to more than ten thousand individuals covering an area greater than 100 acres. This would be the second population documented on National Forest System lands in Clay County. Four populations have been documented on National Forest System lands within Cherokee County.

During the June 2008 field survey of the analysis area, FWA reported that eight Southern nodding trillium stems were observed on the east side of the existing roadbed of FSR 340A1, approximately 150 feet southwest of the crossing of an unnamed tributary. During a June 2009 field survey, FWA reported that one additional single Southern nodding trillium plant was also located on the west side of the existing FSR 340A1 roadbed, approximately 15 feet from the southern bank of Hickory Cove Creek.

Direct and Indirect Effects: **Alternative A:** There would be no direct or indirect effects to Southern nodding trillium because there would be no disturbance that would affect this species.

Alternative B: Individuals of Southern nodding trillium may have been found along the side of FSR 340A1. If present, individuals may be directly affected and top-killed by road runoff and debris during road reconstruction. Indirect impacts to individuals could consist of compaction of adjacent soil, increased surface stormwater flow, or increased light levels at the forest floor.

Alternative C and D: There would be no direct or indirect effects to Southern nodding trillium because this species was not located in the proposed road corridors.

Cumulative Effects: **Alternative A:** Past actions that may have affected Southern nodding trillium in the analysis area include road building and timber extraction. As botanical surveys were not conducted prior to those past events, the Forest Service cannot determine past effects to Southern nodding trillium. Since Alternative A would produce no direct or indirect effects, there would be no cumulative effects to Southern nodding trillium.

Alternative B: During the last ten years, Southern nodding trillium has been impacted in two 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 analysis area. Past actions that may have affected Southern nodding trillium in the analysis area include road building and timber extraction. As botanical surveys were not conducted prior to those past events, the Forest Service cannot determine past effects to Southern nodding trillium. There are no ongoing or reasonably foreseeable future actions within the LCPOA botanical analysis area that would affect this species.

Alternative C and D: Past actions that may have affected Southern nodding trillium if it was ever present in the analysis area include road building and timber extraction. As botanical surveys were not conducted prior to those past events, the Forest Service cannot determine if past effects occurred to Southern nodding trillium. Since these alternatives would produce no direct or indirect effects, there would be no cumulative effects.

Determination of Effect: **Alternative A**: This alternative would not directly or indirectly impact Southern nodding trillium.

Alternative B: This alternative may directly and indirectly impact individuals, but would not cause a trend toward federal listing or a loss of viability across the Nantahala and Pisgah National Forests for Southern nodding trillium.

Alternative C and D: This alternative would not directly or indirectly impact Southern nodding trillium.

3.8.2.3 Terrestrial Wildlife Threatened, Endangered, and Sensitive Species Evaluated

After filtering by county, one federally proposed, five federally endangered, two federally threatened, and 23 forest sensitive species (PETS) remained for consideration (Table 3.8.2.3, pages 88 and 89). The list was further narrowed by eliminating those species whose associated natural community type was not present within the analysis area. Where possible, species whose specialized habitat types 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 analysis 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 would have no effect or impact on these species. The analysis of potential effects or impacts focused on the eleven remaining species; these species are listed in Table 3.8.2.3 and discussed in the following pages.

The NCNHP database was queried for PETS element occurrences at two spatial scales. The first query included PETS element occurrences within the analysis area, whereas the second query included PETS element occurrences within two miles of the analysis area. None of the 13 remaining species are known to occur within the analysis area. Three PETS species have been documented within two miles of the project vicinity: Rafinesque's big-eared bat (*Corynorhinus rafinesquii)*, eastern small-footed bat (*Myotis leibii)*, and Southern water shrew (*Sorex palustris punctulatus)*. Determinations of effect were completed for threse three additional species. The analysis area was surveyed for specialized habitat types and evidence of PETS species. FWA personnel conducted these field surveys in June 2008 and June 2009. Forest Service wildlife biologists reviewed past surveys in fall 2013 and spring 2014 and concluded that no new field visits were necessary to determine potential effects to PETS species in the analysis area.

Table 3.8.2.3. Terrestrial Wildlife Species Considered in the Analysis, Part I.

Group	Designation*	*Scientific Name*	Common Name	Associated Natural Community Type or Specialized Habitat Type	Analyzed Further/Evaluation Criteria*
Insect	Endangered	*Microhexura montivaga*	spruce-fir moss spider	Spruce-fir forests on well-drained moss mats	No/1
Mammal	Endangered	*Glaucomys sabrinus coloratus*	Carolina northern flying squirrel	Mature spruce-fir and northern hardwoods generally above 4000 feet	No/1
Mammal	Endangered	*Myotis grisescens*	gray bat	Caves in summer and winter	No/1
Mammal	Endangered	*Myotis sodalis*	Indiana Bat	Roosts in caves, hollow trees or under loose bark of trees in riparian areas	Yes
Mammal	Proposed	*Myotis septentrionalis*	Northern long-eared bat	Hibernates in caves or mines with constant temperatures and high humidity with no air currents (winter). In the warmer months, this species is opportunistic, choosing roosts in live trees or snags regardless of tree species, underneath bark or in cavities and crevices.	Yes
Mollusk	Threatened	*Mesodon clarki nantahala*	noonday globe snail	Cliffs; cool, wet areas under vegetation and leaf litter	No/1
Reptile	Threatened (S/A)	*Clemmys muhlenbergi*	bog turtle	Sunlit, marshy meadows, bogs, and wet pastures	No/1
Amphibian	Sensitive	*Desmognathus santeetlah*	Santeetlah dusky salamander	Headwaters, seepage in hardwood, coves and spruce-fir, generally higher than 2220 feet	Yes
Insect	Sensitive	*Callophrys irus*	frosted elfin	Open woods and borders, usually in dry situations; host plants - lupines(Lupinus) and wild indigos (Baptisia)	Yes
Insect	Sensitive	*Cicindela ancocisconensis*	a tiger beetle	High elevation forests, >4000 feet	No/1
Insect	Sensitive	*Melanoplus divergens*	divergent Melanoplus	Glades and balds, 1800' - 4717'; no records	No/1
Insect	Sensitive	*Melanoplus serrulatus*	serrulate Melanoplus	Valleys and lower slopes	No/1
Insect	Sensitive	*Nesticus cooperi*	lost Nantahala cave spider	Caves and along Nantahala River	No/1
Insect	Sensitive	*Nesticus sheari*	cave spider	High elevation, n-facing rocky slopes, apparently endemic to Graham county, NC	No/3
Mammal	Sensitive	*Myotis leibii*	Eastern small-footed Bat	Hemlock forests, rock crevices, caves, mines or buildings, above 2000 ft	Yes/2
Mammal	Sensitive	*Microtus chrotorrhinus carolinensis*	Southern rock vole	Cool, damp, coniferous and mixed forests at higher elevations in the Southern Appalachians	Yes/2
Amphibian	Sensitive	*Plethodon aureolus*	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	*Plethodon teyahalee*	Southern Appalachian salamander	Moist forests at all elevations	Yes
Bird	Sensitive	*Thryomanes bewickii altus*	Appalachian Bewick's wren	Woodland borders or openings at high elevations	No/1
Insect	Sensitive	*Scudderia septentrionalis*	Northern bush katydid	In the treetops of edges of broadleaved forests	Yes
Insect	Sensitive	*Semiothisa fraserata*	Fraser fir angle	Spruce-fir forests with Fraser fir	No/1

Table 3.8.2.3. Terrestrial Wildlife Species Considered in the Analysis, Part II.

Group	Designation*	*Scientific Name*	Common Name	Associated Natural Community Type or Specialized Habitat Type	Analyzed Further/Evaluation Criteria*
Insect	Sensitive	*Speyeria diana*	diana fritillary	Mature deciduous and pine woodlands near streams; mostly along roadsides in coves below 4000'; nectar - joe-pye-weed, ironweed, butterflyweed; host plants - violets	Yes
Insect	Sensitive	*Trechus luculentus unicoi*	a ground beetle	Beneath rocks and moss in wet ravines and near seeps and springs > 3000'	No/1
Mammal	Sensitive	*Sorex palustris punctulatus*	Southern water shrew	Streambanks w/rhododendron cover in n. hardwood or spruce-fir forests; known from > 3000', mostly over 4000'	Yes/2
Mollusk	Sensitive	*Paravitrea placentula*	glossy supercoil	Under leaf litter on wooded hillsides and ravines	Yes

***1 Associated natural community type and/or specialized habitat type do not occur in the activity area; therefore, these habitats would not be affected. Given no effects to the habitat, the proposal alternatives would 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 two miles of the analysis area (however, no records for this species exist *within* the analysis area).**
***3 Analysis area is outside of the known, localized geographic range for the species.**

Indiana bat (*Myotis sodalis*) **–** In summer, habitat consists of wooded or semi wooded 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 analysis area, nor within two miles of the analysis 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 would 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 analysis 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 – Past actions that may have affected Indiana bat in the analysis area include road building and timber extraction. As wildlife surveys were not conducted prior to those past events, the Forest Service cannot determine past effects to the Indiana bat. Due to the absence of direct effects to individuals, as well as the lack of indirect negative effects associated with the proposed action, there are no cumulative effects to Indiana bat from this project.

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 would 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. Implementation of Alternative B, Alternative C, or Alternative D, **may affect, but is not likely to adversely affect** the Indiana bat. All standards and guides for the protection of the Indiana bat, as listed in Amendment 25 of the LRMP, would be followed. **Consultation with the U.S. Fish and Wildlife Service is required.**

The proposed action is to authorize new road construction and use of existing roads for access of a private tract surrounded by National Forest System lands. **Development and associated impacts to federally protected species within this private tract is considered a *connected action* in the context of the Forest Service's authorizing this access across National Forest System 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 3 of this document.

Northern Long-eared bat (*Myotis septentrionalis*) – On May 4, 2015, the northern long-eared bat (NLEB) was listed as a threatened species and an interim 4(d) rule was published in the Federal Register. The USDA Forest Service Southern Region is currently formally consulting, at a regional scale, with the US Fish and Wildlife Service on NLEB. After the issuance of the final Biological Opinion, including any reasonable and prudent measures, terms and conditions, or any authorized incidental take, the project-level Biological Assessment will be amended if needed and the appropriate project-level consultation will be completed.**Consultation with the U.S. Fish and Wildlife Service is required.**

Frosted elfin *(Callophrys irus)* – 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 analysis area or within two miles of the analysis area.

Direct and Indirect Effects – If individuals are present within the analysis area during road reconstruction and 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 analysis area. The forest within the analysis area is relatively

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

Cumulative Effects – Past actions that may have affected frosted elfin in the analysis area include road building and timber extraction. As wildlife surveys were not conducted prior to those past events, the Forest Service cannot determine past effects to frosted elfin. Because of the low likelihood of direct impacts to individuals, or indirect impacts in the form of habitat loss or gain to individuals, there are no cumulative effects to frosted elfin from this project.

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 analysis area during construction, it is not expected to eliminate or measurably create suitable habitat. Alternative A will not affect frosted elfin. Alternatives B, C, or D **may impact individuals but is not likely to cause a trend to federal listing or a loss of viability** of this species.

Santeetlah dusky salamander (*Desmognathus santeetlah*) **–** 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 a few feet of open water.

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

Direct and Indirect Effects – Desmognathus santeetlah is not likely to occur in the analysis 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 would be no cumulative effects as a result of this project.

Determination of Effect – Alternatives A, B, C, and D would have **no impacts** on the viability of this species.

Southern rock vole (*Microtus chrotorrhinus carolinensis*) **–** 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 or Cherokee County. Possible habitat for this species is present within the analysis 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 analysis area.

Direct and Indirect Effects – Microtus chrotorrhinus carolinensis is not highly likely to occur in the analysis area, due to the lack of optimal habitat. No direct impacts are anticipated. Indirect impacts to the marginal habitat located within the analysis 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 analysis 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 effects to this species are expected to be imperceptible.

Determination of Effect – Alternative A would have no effect to the Southern rock vole. If there is marginal habitat and the species were to occur in the analysis area, direct displacement may occur under Alternatives B, C, or D.

Eastern small-footed bat (*Myotis leibii*) – *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 analysis area. *Myotis leibii* may use the analysis area for foraging.

The Eastern small-footed bat has been recorded in Clay County, Cherokee County, and 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 analysis area, but has not been documented within the analysis 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 analysis area; optimal roost habitat was not observed along the existing roadways or proposed new road alignments.

Direct and Indirect Effects – The prohibition on felling trees during the summer months (see *Effects* discussion for *Myotis sodalis* previous pages), would ensure that no direct impacts to *Myotis leibii* would occur. This species may forage in portions of the analysis 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 – Past actions that may have affected Eastern small-footed bat in the analysis area include road building and timber extraction. As wildlife surveys were not conducted prior to those past events, the Forest Service cannot determine past effects to the Eastern small-footed bat. Due to the absence of negative indirect impacts, and the small amount of potential foraging habitat created under the proposed action alternatives, no cumulative effects to the Eastern small-footed bat are anticipated.

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

Glossy supercoil *(Paravitrea placentula)* **–** Associated natural community types 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 analysis area. Although associate species are present, this species has not been document in Clay County or Cherokee 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 analysis area. However, due to the limited mobility of gastropods, limited distribution outside the analysis area, and obscure record, this species is not likely to occur within the analysis area.

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

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

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

Southern Appalachian salamander (*Plethodon teyahalee*) **–** 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 analysis area. Based on the presence of many of the associated botanical species listed above, this species may occur within the analysis area.

Direct and Indirect Effects – Direct impacts to *Plethodon teyahalee* may result during road construction activities. Individuals within the analysis 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 – Past actions that may have affected the Southern Appalachian salamander in the analysis area include road building and timber extraction. As wildlife surveys were not conducted prior to those past events, the Forest Service cannot determine past effects to the Southern Appalachian salamander. Due to the absence of direct effects to individuals, as well as the lack of indirect negative effects associated with the proposed action, there are no cumulative effects to the Southern Appalachian salamander from this project. 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 effects to this species are expected to be imperceptible.

Determination of Effect – Alternative A would have no effects on the Southern Appalachian salamander. 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*) **–** This species is known to utilize treetops at the edges of broad leaved 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 analysis area during road construction and reconstruction, 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 analysis area. The forest within the analysis 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 would be destroyed or created as a result of the proposed action.

Cumulative Effects – Past actions that may have affected the Northern bush katydid in the analysis area include road building and timber extraction. As wildlife surveys were not conducted prior to those past events, the Forest Service cannot determine past effects to the Northern bush katydid. Due to the absence of direct effects to individuals, as well as the lack of indirect negative effects associated with the proposed action, there are no cumulative effects to the Northern bush katydid from this project. 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 effects to this species are expected to be imperceptible.

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*) **–** *Sorex palustris punctulatus* occurs near swift, rocky streams with *Rhododendron* cover. This species may occur in the analysis

area; it has been documented along Fires Creek within two miles of the analysis 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 analysis 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 would be cleared during road reconstruction, 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 reconstruction, road construction, and culvert replacement/installation within the analysis area. Similarly, short-term indirect impacts to individuals could also result from acid runoff during road construction if fresh, unweathered acidic rock is exposed and is not appropriately treated or disposed of. Short-term and long-term sedimentation and acid run off would be avoided or minimized through the successful use of BMPs, design criteria, and requirements listed in the Biological Evaluation, Appendix 2.

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 would 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 – Past actions that may have affected the Southern water shrew in the analysis area include road building and timber extraction. As wildlife surveys were not conducted prior to those past events, the Forest Service cannot determine past effects to the Southern water shrew. Due to the absence of direct effects to individuals, as well as the lack of indirect negative effects associated with the proposed action, there are no cumulative effects to the Southern water shrew from this project. 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 effects to this species are expected to be imperceptible.

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 would be avoided or minimized through the successful use of BMPs design criteria, and requirements listed under heading 3.1.3 of the BE in Appendix 2. 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*) – 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 analysis area or within two miles of the analysis area.

Direct and Indirect Effects – If individual adults or larvae are present within the analysis 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 analysis area does not appear to support an abundance of violets, and this species is not known to occur within the analysis 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 effects 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 would not eliminate current roadside habitat. A small amount of additional permanent edge habitat along the new road alignment would 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.

3.8.2.4 Summary of Determinations of Effect for PETS Species

For the discussions summarizing the determinations for effect for aquatic, botanical, and terrestrial wildlife PETS species, please refer to Table 3.8.2.4, page 97.

Aquatic Species: Because no endangered or threatened aquatic species were located in the proposed treatment areas, there would be no direct, indirect or cumulative effects to any endangered or threatened aquatic species. For the sensitive aquatic species *Cambarus parrishi*, the project may impact individuals, but is not likely to affect the viability of the species across the forest as a whole. For all other sensitive aquatic species, there would be no direct, indirect or cumulative effects to any sensitive aquatic species because none were found in the analysis area. Consultation with the U.S. Fish and Wildlife Service **is not required** for aquatic species.

Botanical Species: Because no federally endangered or threatened plant species were located in the proposed treatment areas, there would be no direct, indirect or cumulative effects to any endangered or threatened plant species. The proposed project may directly and indirectly impact the sensitive plant Southern nodding trillium (*Trillium rugelii*). However, the proposed project would not affect the viability of this species across the Nantahala and Pisgah National Forests nor cause a trend towards federal listing. The proposed project would not affect any other sensitive plant species. Consultation with the USFWS **is not required** for botanical resources.

Table 3.8.2.4. Summary of Determinations of Effect for PETS Species.

Group	Designation	*Scientific Name*	Common Name	Determination of Effect or Impact
AQUATIC SPECIES				
Crayfish	Sensitive	*Cambarus parrishi*	Hiwassee headwaters crayfish	May impact individuals but not likely to cause a trend to federal listing or a loss of viability
BOTANICAL SPECIES				
Vascular plant	Sensitive	*Trillium rugelii*	Southern nodding trillium	May directly and indirectly impact individuals but would not cause a trend towards federal listing or a loss of viability across the forest
TERRESTRIAL WILDLIFE SPECIES				
Mammal	Endangered	*Myotis sodalis*	Indiana bat	May affect, but not likely to adversely affect
Mammal	Proposed	*Myotis septentrionalis*	Northern long-eared bat	Determination of effect to be made after the Biological Opinion is finalized
Amphibian	Sensitive	*Desmognathus santeetlah*	Santeetlah dusky salamander	No impacts
Amphibian	Sensitive	*Plethodon teyahalee*	Southern Appalachian salamander	May impact individuals but not likely to cause a trend to federal listing or a loss of viability
Insect	Sensitive	*Callophrys irus*	frosted elfin	May impact individuals but not likely to cause a trend to federal listing or a loss of viability
Insect	Sensitive	*Scudderia septentrionalis*	Northern bush katydid	May impact individuals but not likely to cause a trend to federal listing or a loss of viability
Insect	Sensitive	*Speyeria diana*	diana Fritillary	May impact individuals but not likely to cause a trend to federal listing or a loss of viability
Mammal	Sensitive	*Microtus chrotorrhinus carolinensis*	Southern rock vole	No impacts
Mammal	Sensitive	*Myotis leibii*	Eastern small-footed bat	No impacts
Mammal	Sensitive	*Sorex palustris punctulatus*	Southern water shrew	May impact individuals but not likely to cause a trend to federal listing or a loss of viability
Mollusk	Sensitive	*Paravitrea placentula*	glossy supercoil	No impacts

Terrestrial Wildlife Species: Alternatives B, C, and D **may affect, but are not likely to adversely affect** the Indiana bat (*Myotis sodalis*) because all standards and guides for the protection of this species, as listed in Amendment 25 of the Land and Resources Management Plan, would be followed, and the project-specific mitigation measures identified in 3.8.2.2 would be implemented. Consultation with the USFWS **is required** for the Indiana bat. **Consultation is required** for the northern long-eared bat (*Myotis septentrionalis*) and will occur after the Biological Opinion is finalized.

For the sensitive terrestrial wildlife species *Callophrys irus, Plethodon teyahalee, Scudderia septentrionalis, Sorex palustris punctulatus, and Speyeria diana,* the project may impact individuals, but is not likely to affect the viability of the species across the forest as a whole. For all other sensitive terrestrial wildlife species, there would be no direct, indirect or cumulative effects to any sensitive terrestrial wildlife species.

3.8.3 Forest Concern Species

Forest concern species are designated by the NFsNC and occur at the periphery of their range or disjunct from their main range. The Nantahala and Pisgah National Forests maintain a list of

Forest Concern species on National Forest System lands; all of these species were originally considered (see the species lists attached to the Biological Evaluation in Appendix 2). The list was filtered by considering only those species listed by the Forest Service as occurring or probably occurring in Clay and Cherokee Counties, 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 42 plant species, 38 terrestrial animal species, and ten 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 analysis 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 analysis area were conducted by Fish and Wildlife Associates, Inc. (FWA) in March 2007, June 2008, June 2009, and March 2010 and by members of the ID Team in May and June of 2013 and 2014.

3.8.3.1 Aquatic Forest Concern Species

Boundaries of Aquatic Analysis Area

This analysis addresses analysis area waters and analysis area waters associated with the Laurel Creek Property Owners Association Access Across National Forest System Lands project. These are defined as those in the area of potential direct and indirect effects on aquatic habitat and populations, and do not necessarily overlap with the effects to botanical and wildlife resources. In addition to analysis area waters, the analysis area encompasses waters downstream that potentially could be impacted by project activities when considered within the watershed context. The aquatic analysis areas consist of the following watersheds: Laurel Creek from its headwaters downstream to the confluence with Rockhouse Creek and Rockhouse Creek to the confluence with Fires Creek; Coldspring Branch, Tatham Cabin Branch; Aaron Creek, Alfred Creek, and Colvard Creek.

Aquatic Species Evaluated and Rationale

Thirteen aquatic Forest Concern Species are known to occur in the Nantahala and Pisgah National Forests and Clay County (Attachment 5a to the BE, Appendix 2). These 13 species were then filtered based upon habitats available within the proposed treatment areas. All four species are listed in Table 3.8.3.1 with a general habitat description. All four species were included in the effects analysis due to the possibility of their occurrence within the analysis area or within a reasonable distance downstream, but only two, hellbenders and smoky dace, were addressed in detail because they are known to occur in the analysis area.

Table 3.8.3.1. Aquatic Forest Concern species known to occur in Clay County on Nantahala and Pisgah National Forests and their likelihood of occurrence in the analysis area or downstream of analysis area.

Group	Species	Habitat	Likelihood of Occurrence
Amphibian	*Cryptobranchus alleganiensis*	large, clear, fast-flowing streams	Occurs downstream
Amphibian	*Necturus maculosus*	Small to large streams	May occur
Crustacean	*Cambarus sp. A*	Streams in Hiwassee River watershed	May occur
Fish	*Clinostomus funduloides sp. 1*	Hiwassee River and Fires Creek	Occurs downstream

Effects of Alternatives on Aquatic Forest Concern Species

Direct, Indirect, and Cumulative Effects –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 would be minimal with proper installation of erosion control measures. Under Alternative B, these effects would be confined to the Hickory Cove Creek and Laurel Creek watersheds. Alternative C would result in effects to streams in the Rockhouse Creek, Hickory Cove Creek, and Laurel Creek watersheds and Alternative D would result in effects to Nancy Hawkins Branch, Coldspring Branch, Alfred Creek, Aaron Creek, and Colvard Creek watersheds. Furthermore, 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). 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 sediment occurs. Given the project design criteria, recommendations, and successful BMP implementation, this project would have little effects to the aquatic resources (See Coldwater Streams Effects discussion, Section 3.8.1).

Hellbenders (*Cryptobranchus alleganiensis*); **Mudpuppy** (*Necturus maculosus*) – Hellbenders occur within the main stem of Fires Creek downstream and into the Hiwassee River. Laurel Creek does not provide suitable habitat for the hellbender. Environmental DNA testing has indicated that hellbenders may occur within Rockhouse Creek, although, no individuals have been located within this stream (Williams, unpublished data). Environmental DNA testing has also indicated the presence of mudpuppies within Rockhouse Creek although no individuals have been located within the Fires Creek watershed.

Project design features would confine any sediment and acid runoff from the road reconstruction/construction activities to the riparian buffers within the Laurel Creek watershed. Any effects of the proposed culvert installations, road reconstruction, and construction would dissipate prior to reaching Fires Creek. The effects of the proposed project on the hellbender or mudpuppy would be similar to those described for *Cambarus parrishi* (Section 3.8.2.1, page 82). Any hellbenders or mudpuppies that may occur within Laurel Branch would be able to avoid disturbed areas during culvert installation activities; therefore, direct effects to the species are unlikely to occur.

Smoky Dace (*Clinostomus funduloides* sp.1) – The Smoky dace was recently discovered within Fires Creek in 2011. Laurel Creek does not provide suitable habitat for the Smoky dace. Project design features would confine any sediment and acid runoff that might result from the road reconstruction/construction activities to the riparian buffers within the Laurel Creek watershed. Any effects of the proposed culvert installations, road reconstruction, and construction would dissipate prior to reaching Fires Creek. Therefore, there would be no direct or indirect effects to this species resulting from this project.

If individuals were present, the proposed action may 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 ten 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.

Cambarus sp. A – The effects of this project on this species would be the same as the effects on the Hiwassee headwaters crayfish. If individuals were present, 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. This project may impact individuals of *Cambarus sp. A.* Habitat for this species is common across its range. 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.

3.8.3.2 Botanical Forest Concern Species

Boundaries of Botanical Analysis Area

The boundaries of the botanical analysis area have been described in the Biological Communities section (Section 3.8.1).

Botanical Forest Concern Species Evaluated and Rationale

In Clay and Cherokee County, there are 41 forest concern botanical species known or historically known to occur (Attachment to the BE, Appendix 2). Out of these, three forest concern botanical species are known or historically known to occur in the LCPOA botanical analysis area (Table 3.8.3.2).

Table 3.8.3.2. Botanical forest concern species occurring in LCPOA botanical AA.

Group	Species	Common Name	Habitat*	Analyzed Further/Evaluation Criteria*
Vascular Plant	*Carex purpurifera*	purple sedge	Rich Cove Forest, Montane Alluvial Forest	No/2
Vascular plant	*Hackelia virginiana*	Virginia stickseed	Woods and thickets, circumneutral soils	No/2
Vascular plant	*Stewartia ovata*	mountain camellia	Acidic Cove Forest, Montane Alluvial Forest	No/2

***1 Based on available habitat descriptions for this species, no habitat is present within the analysis area; no habitat for this species would be impacted by the proposed action.**
***2 NCNHP database indicates that this species has been recorded within two miles of the analysis area (however, no records for this species exist *within* the analysis area and the species was not found during botanical field surveys).**

Effects of Alternatives on Botanical Forest Concern Species

Direct, Indirect, and Cumulative Effects - Field surveys completed in the proposed analysis area did not locate these three species or any other forest concern plant species. For that reason Alternative A, Alternative B, Alternative C, and Alternative D would have no direct, indirect, or cumulative effects to any forest concern plant species.

3.8.3.3 Terrestrial Wildlife Forest Concern Species

Boundaries of Terrestrial Wildlife Analysis Area

The boundaries of the terrestrial wildlife analysis area have been described in the Biological Communities section (Section 3.8.1).

Terrestrial Wildlife Forest Concern Species Evaluated and Rationale

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 analysis area. Where possible, species whose specialized habitat types 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 analysis 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 would therefore have would have no effect or impact on these four species. The analysis of potential effects or impacts focused on the 21 remaining species; these species are listed in Table 3.8.3.3 (pages 101 and 102). Discussion follows the table.

Table 3.8.3.3. Terrestrial Wildlife Forest Concern species, habitat, and Likelihood of Occurrence in the Analysis area.

Group	Species	Habitat	Likelihood of Occurrence
Amphibian	*Eurycea longicauda longicauda* (long-tailed salamander)	streams, seeps, springs in moist woods and floodplains; breeds in streams/ponds	May occur
Arachnid	*Nesticus species 2*	small rocks scattered over n-facing cove forests, southwest-facing talus fields	May occur
Bird	*Dendroica cerulea* (cerulean warbler)	mature hardwood forests; steep slopes and coves in mountains	May occur
Bird	*Sphyrapicus varius appalachiensis* (Appalachian yellow-bellied sapsucker)	mature, open hardwoods with scattered dead trees above 3500', breeding season only	May occur

Group	Species	Habitat	Likelihood of Occurrence
Bird	*Vireo gilvus* (warbling vireo)	open groves of hardwoods along rivers and streams below 3000'	May occur
Butterfly	*Autochton cellus* (golden-banded skipper)	moist woods near streams or ponds; nectar -- blackberry, trailing arbutus, hollyhock, and abelia; host -- legumes, mainly hog peanut	May occur
Butterfly	*Celastrina nigra* (dusky azure)	rich, moist deciduous forests; nectar - wild geranium; host - goat's beard	May occur
Butterfly	*Chlosyne gorgone* (gorgone checkerspot)	woodland borders and openings; host plants are sunflowers and other tall composites	May occur
Butterfly	*Polygonia progne* (gray comma)	rich deciduous forests; host plants - mainly gooseberries (*Ribes*), but also on wild azalea (*Rhododendron nudiflorum*)	May occur
Grasshopper/ Katydid	*Melanoplus cherokee* (Cherokee Melanoplus)	woodlands, 1800' - 5100'; no records	May occur
Grasshopper/ Katydid	*Melanoplus viridipes eurycerus* (green-legged Melanoplus)	woodlands and forest edges; no records	May occur
Mammal	*Corynorhinus rafinesquii* (Rafinesque's big-eared bat)	Roosts in old buildings, caves, and mines, under loose bark, usually near water	May occur
Terrestrial gastropod	*Appalachina chilhoweensis* (queen crater)	under leaf litter and rock piles in rich coves	May occur
Terrestrial gastropod	*Glyphyalinia junaluskana* (dark glyph)	moist leaf litter in mixed, mesic woods on mountainsides	May occur
Terrestrial gastropod	*Glyphyalinia pentadelphia* (pink glyph)	pockets of moist leaves in rich or acidic cove forests; no actual records	May occur
Terrestrial gastropod	*Haplotrema kendeighi* (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
Terrestrial gastropod	*Helicodiscus fimbriatus* (fringed coil)	leaf litter and under rocks on wooded hillsides, crevices in slates; no actual records	May occur
Terrestrial gastropod	*Paravitrea lamellidens* (lamellate supercoil)	deep moist leaf litter and ravines in acidic cove, rich cove, and montane-oak hickory forests; no actual records	May occur
Terrestrial gastropod	*Paravitrea umbilicaris* (open supercoil)	cove forests with rocky slopes	May occur
Terrestrial gastropod	*Patera clarki clarki* (dwarf proud globe)	Rich cove forest, high elevation red oak forest, leaf litter on mountainsides; no actual records	May occur
Terrestrial gastropod	*Zonitoides patuloides* (Appalachian gloss)	deep, moist leaf litter on mountainsides or in ravines, beneath bark of logs; no records	May occur

Effects of Alternatives on Terrestrial Wildlife Forest Concern Species

Forest Concern Land Snails – 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 (Table 3.8.3.3), 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 analysis 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 Cherokee and Clay County. No rare gastropods were documented during those surveys.

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

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

Rafinesque's big-eared bat (*Corynorhinus rafinesquii*) **–** 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 Cherokee and Graham Counties. The NCNHP database does indicate that this species has been documented within two miles of the analysis area, but has not been documented within the analysis area.

Due to the lack of caves or buildings, this species is not likely to utilize the analysis area for roosting or maternity colonies. The species may use the analysis 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 new road construction.

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 effects to the Rafinesque's big-eared bat are anticipated.

Golden banded skipper (*Autochton cellus*) **–**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 analysis area; this habitat includes moist woods and streams. Adult nectar plants and host plants (blackberry and hog-peanut) are also present within the analysis area.

Direct and Indirect Effects – Direct impacts to individuals may result from the proposed action, as any individuals present within the analysis 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 blackberry to colonize disturbed areas, it may reestablish itself along portions of roadside within the analysis area.

Cumulative Effects – 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 road construction activities, although blackberry is more likely. Due to the small size of the proposed treatment areas and the widespread availability of habitat and host/nectar plants across the forest, cumulative effects, if any, are expected to be imperceptible.

Dusky azure (*Celastrina nigra*) **–** 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 analysis area; however, host and nectar plants for this species were not observed within areas to be impacted under the action alternative.

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

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

Gorgone checkerspot (*Chlosyne gorgone*) **–** 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 analysis area; limited openings and borders are present and host plants were observed there.

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

Cumulative Effects – 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 actions; however improvement of existing forest roads and construction of new road alignments would create/maintain some additional woodland border habitat over the long term. Due to the small size of the proposed treatment areas versus the widespread availability of general habitat and host plants across the forest, cumulative effects, if any, are expected to be imperceptible.

Pink glyph (*Glyphyalinia pentadelphia*) **–** 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 analysis area, although snail surveys have been conducted for other Forest Service projects in Cherokee and Clay County. No rare gastropods were documented during those surveys.

Direct and Indirect Effects – If present within the analysis 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 two acres of forested habitat (Alternative B), nine acres (Alternative C) and 45 acres (Alternative D).

Cumulative Effects – 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 analysis area versus the widespread availability of rich cove habitat across the forest, cumulative effects, if any, are expected to be imperceptible.

Cherokee melanoplus (*Melanoplus cherokee*) **and Green-legged melanoplus** (*Melanoplus viridipes eurycerus*) **–** 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 and* general habitat for *Melanoplus viridipes eurycerus* includes woodlands and forest edges.

Existing Condition - The likelihood of occurrence within the analysis 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 analysis area.

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

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

A Nesticus spider (*Nesticus* sp. 2) – This species has only been documented in the Chunky Gal Mountains of Clay County. Only four element occurrences exist. Habitat is described as small rocks scattered over north-facing cove forests, and southwest-facing talus fields.

Existing Condition - North-facing cove forest may exist within the analysis area of Alternative D.

Direct and Indirect Effects – If present, direct impacts to individuals may result from the proposed actions, as any individuals present within the analysis 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 Effects – 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 effects, if any, are expected to be imperceptible.

Dwarf proud globe (*Patera clarki clarki*) – This species has been documented in Clay County and the surrounding counties, but it not known to occur in the vicinity of the analysis 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*, *Acer saccharum*, *Acer 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 analysis 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 Cherokee and Clay County. No rare gastropods were documented during those surveys.

Direct and Indirect Effects – If present within the analysis 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 two acres of forested habitat (Alternative B), nine acres (Alternative C) and 45 acres (Alternative D).

Cumulative Effects – 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 analysis area versus the

widespread availability of general habitat across the forest, cumulative effects, if any, are expected to be imperceptible.

Gray comma (*Polygonia progne*) – 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 gray comma caterpillars include gooseberry (*Ribes sp.)* and rhododendron *(Rhododendron nudiflorum)* (Opler et al., 2006).

Existing Condition - Habitat for this species is present within the analysis 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 Effects – If present within the analysis area, adults could be directly impacted due to crushing or displacement during land clearing and road construction activities. Indirect impacts consist of the temporary disturbance of a small amount of edge habitat along the existing roadbeds, as well as streamside habitat at stream crossings.

Cumulative Effects – 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 areas versus the widespread availability of edge, clearing, and roadside habitat through rich deciduous forest across the forest, cumulative effects, if any, are expected to be imperceptible.

Long-tailed salamander (*Eurycea longicauda longicauda*) – 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 analysis area contains habitat (streams, seepages) for this species.

Direct and Indirect Effects – 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 would be temporarily impacted during construction activities.

Cumulative Effects – 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 analysis area during construction activities, cumulative effects to this species or its habitat are expected to be minimal.

Cerulean warbler (*Dendroica cerulea*) – 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 analysis area includes tracts of mature, deciduous forests with mesic conditions, habitat suitable for the cerulean warbler. Surveys did not locate cerulean warblers in the analysis area.

Direct and Indirect Effects – 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 two acres (Alternative B), nine acres (Alternative C), and 45 acres (Alternative D) of currently forested habitat would be disturbed. Indirect impacts would be due to the permanent loss of this habitat.

Cumulative Effects – This project would result in the loss of approximately two acres (Alternative B), nine acres (Alternative C), and 45 acres (Alternative D) of potential habitat in the area of the new road alignments. Due to the small size of the area to be impacted relative to the availability of mature deciduous habitat across the forest, cumulative effects associated with the proposed action are expected to be imperceptible.

Appalachian yellow-bellied sapsucker (*Sphyrapicus varius appalachiensis*) – This species has been documented in Cherokee, 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 analysis 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 Effects – 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 two acres (Alternative B), nine acres (Alternative C), and 45 acres (Alternative D) of currently forested habitat would be disturbed. Indirect impacts would be due to the permanent loss of this habitat.

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

Warbling vireo (*Vireo gilvus*) – This species has been documented in Macon County, but not Clay or Cherokee Counties. 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 analysis area.

Direct and Indirect Effects – *Vireo gilvus* is not likely to occur within the portions of the analysis area where road construction activities would occur. The portion of the analysis area supporting habitat for this species would be subject only to road reconstruction under Alternatives B and C, with no impacts to warbling vireos from new road construction under Alternatives B and C. No direct or indirect impacts are anticipated as a result of any the proposed actions under Alternatives B, C, or D.

Cumulative Effects – Due to the small size of the area to be impacted, relative to the availability of mature hardwoods and snags across the forest, and because there are no direct and indirect effects, cumulative effects associated with the proposed action are expected to be imperceptible.

3.8.4 Non-native Invasive Plants (NNIP)

A. Analysis Boundary

The direct, indirect, and cumulative effects to NNIP species was primary confined to the Laurel Creek activity area. Existing access routes via FS roads were coarsely surveyed to determine the current NNIP condition in the activity area.

B. Occurrence in Analysis Area

There are 124 species of non-native plants documented to occur on the Nantahala and Pisgah National Forests (Danley and Kauffman, personal observation). Out of these, 17 are currently recognized as having aggressive invasive qualities (Danley and Kauffman 2004, Kauffman 2009). A list of 17 high priority invasive plant species across the Nantahala and Pisgah National Forests was developed from botanical surveys completed over the past 15 years. In addition, species inventories were conducted in 2002-2003 across selected watersheds within the Nantahala and Pisgah National Forests. These results illustrated that in over 70% of the plots along roadsides within the Nantahala and Pisgah National Forests there were spot occurrences of NNIP. These species were assigned a relative priority for treatment based on their known impacts to rare species and communities, their ability to rapidly spread, and their ability to persist in the forest. These species have been identified as the highest priority NNIP species at the present time, but the list is intended to be dynamic and will be updated as needed, based on new information regarding species' spread and infestation characteristics.

Incomplete NNIP data are available within the Fire Creeks area. Plots taken in 2002 only located Japanese stiltgrass. Other field notes recorded during the last 15 years indicated other small outbreaks of privet, multiflora rose, Japanese honeysuckle, and autumn olive (Table 3.8.4.1, page 110). These coarse surveys primarily located the outbreaks in existing wildlife openings or along roads adjacent to rich cove forests. In general, the abundant acidic cove forest, with its dense *Rhododendron maximum* layer, helps to discourage outbreaks.

Direct, Indirect and Cumulative Effects

Alternative A: With no road reconstruction or realignment activities, the potential habitat for spread of existing NNIP infestations and outbreaks of new infestations would be less in comparison to the action alternative. However, NNIP species already present within the analysis area would likely increase. With no control, NNIP infestations would continue to spread in existing disturbed areas along FS roads, wildlife openings and linear wildlife openings. NNIP

Table 3.8.4.1: High Priority NNIP on the Nantahala and Pisgah National Forests with listed occurrences in the Fires Creek watershed.

Species	Occurrence in Activity Area
Microstegium vimineum Japanese stiltgrass	Generally infested along open and closed roads, scattered throughout
Ligustrum sinense Chinese privet	Spotty occurrences along FSR 340, & 6148, primarily in lower portions of drainage
Rosa multiflora multiflora rose	Spotty occurrences along FSR 340, 340A, 340C, 427 & 6148
Lonicera japonica Japanese honeysuckle	Along FS roads throughout activity area
Elaeagnus umbellata autumn olive	Variable occurrences within wildlife opening and roads leading toward them, in lower portions of drainage

species capable of spreading under closed forest canopies, such as privet and Japanese stiltgrass will have the greatest likelihood of spreading. Japanese stiltgrass is the most prevalent NNIP known across the Nantahala and Pisgah National Forests. Given the amount of resources required to control this species, control efforts would only be implemented within rare communities such as Southern Appalachian bogs. Alternative A would create no suitable habitat for NNIP, and therefore produce no cumulative effects for invasive plant species.

Alternatives B, C, and D: Ground disturbance and the increased light conditions resulting from road construction or reconstruction would increase the amount of acreage suitable for invasive exotic species by approximately two acres (Alternative B), nine acres (Alternative C), and 45 acres (Alternative D) (Trombulak and Frissell 2000). It is difficult to estimate the amount of infestation potential from the proposed actions. The rate of invasion and spread varies based on the amount NNIP seed rain from nearby areas and the ambient weather during the disturbance. The greatest amount of risk from invasion by NNIP is based on the amount and intensity of disturbance. The risk of spread of non-native invasive plant species from the proposed road construction and reconstruction activities would be greater than the non-action alternative.

For the action alternatives, the application of herbicides along the affected roadside could help curtail the spread of invasive species. Prior experience across the Nantahala and Pisgah National Forests indicates it would require multiple applications, for two to four years depending on species, to successfully diminish the risk. Multiflora rose, autumn olive, and privet can be controlled and maintained at low densities with persistence. If those species occur within or near the proposed activity areas, with control treatments several years prior to the disturbance and follow-up treatment(s) after the road construction and reconstruction, the action alternative should not dramatically increase these species.

For Japanese stiltgrass and Japanese honeysuckle, the level of infestation is too great to effectively control either species. Japanese stiltgrass has been documented within 75% of all the plots examined in 2002 and 2003 across the Nantahala and Pisgah National Forests. Japanese honeysuckle was less frequently encountered, over 40% of the plots. The NFsNC prioritize control of these species only when they are infesting rare high quality habitats such as Southern Appalachian bogs. Both Japanese stiltgrass and Japanese honeysuckle are expected to increase with the proposed activities both in the short-term and long-term, although the amount of new disturbed habitat would be low.

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 would result in certain cold-adapted species' (such as northern hardwoods) ranges moving northward. In turn, species that currently have a more southerly range might start appearing on the Nantahala and Pisgah National Forests. 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 System lands affected by the proposed access. The time frame used in this analysis is up to ten years after completion of the project activities.

Direct and Indirect Effects

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

Alternatives B, C, and D: The action alternatives would not substantially alter the effects of climate change in the analysis area. The action alternatives would remove biomass as a result of road construction and directly affect an area of approximately two acres (Alternative B), nine acres (Alternative C) and 45 acres (Alternative D) through road construction activities permitted by the access. This would reduce the amount of carbon stored in the area affected by the road prism.

The impacts of the action alternatives on global carbon sequestration and atmospheric concentrations of CO_2 are miniscule. However, the forests of the United States substantially reduce atmospheric concentrations of CO_2 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 CO_2 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 19-20th century, and 20$_{th}$ 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 measurable fraction of existing carbon stocks (Pacala et al. 2008; Canadell et al. 2007). Management actions 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 alternatives, 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 five acres (Alternative B), ten acres (Alternative C), and fifty acres (Alternative D).

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

Raymond R. Bergeron –Geologist (retired), USDA Forest Service Region 8
Ruth Berner – Planner (retired), National Forests in North Carolina (NFsNC)
Erik Crews – Landscape Architect, NFsNC
David Danley – Botanist (retired), Pisgah National Forest
Luke Decker – Wildlife Biologist (detailed) - Nantahala National Forest (NNF)
Brady N. Dodd – Hydrologist, NFsNC
Jason Farmer – Fisheries Biologist – NNF
Andrew Gaston – Acting District Ranger, Tusquitee/Cheoah Ranger Districts, NNF
Angela Gee – District Ranger, Cheoah and Tusquitee Ranger Districts
Raymond M. Johns II – Lands & Minerals Program Manager (retired), NFsNC
Gary Kauffman – Botanist, NFsNC
Steve Lohr – Former District Ranger, Tusquitee/Cheoah Ranger Districts, NNF
Heather Luczak – Assistant Forest Planner, NFsNC
Doreen Miller – Wildlife Biologist (retired), NNF
Steverson Moffat – NEPA Planning Team Leader/Project Coordinator, NNF
Julie Moore – Lands and Minerals Program Manager, NFsNC
April Punsalan – Botanist, NNF
Duke Rankin, Former Botanist, NNF
Rick Semingson, NEPA Planning Team Leader (retired) – NNF
M. Scott Shumate – Archaeologist, Blue Ridge Archaeological Consultants (contractor)
Le'Andra Smith – Former Wildlife Biologist, NNF
Lauren Stull – Former District Ranger, Tusquitee/Cheoah Ranger Districts, NNF
Andrew Triplett – Archaeologist, NNF
Ben Laseter – Senior Biologist/Project Manager, Fish and Wildlife Associates, Inc. (contractor)
Leslie Bilbrey – Project Biologist/Wildlife Specialist, Fish and Wildlife Associates, Inc. (contractor)

Eastern Band of Cherokee Indians Tribal Historic Preservation Office
North Carolina Department of Environmental Quality
North Carolina Division of Water Quality
North Carolina Natural Heritage Program
North Carolina State Historic Preservation Office
North Carolina Wildlife Resources Commission
U.S. Army Corps of Engineers
U.S. Fish and Wildlife Service
U.S.D.A. Forest Service Southern Region

Appendices

Appendix 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 ¾ 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 a mixture of plants known to be effective at stabilizing exposed soil and palatable to wildlife and which are not invasive 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.

Roads Accessing More than Five Homes and Commercial Buildings

18. The road shall be designed and sealed by a Professional Engineer (PE).
19. The design will be developed following the Guidelines for Geometric Design of Very Low-Volume Local Roads (ADT < or = 400) as published by American Association of State Highway and Transportation Officials. Ph (202) 624-5800; www.transportation.org.
20. The road will be located and staked for review by Forest Service officials.
21. Once the tentative location is approved, all necessary surveys will be accomplished andstaked on the ground for review.
22. Assuming the project is eventually approved, construction staking must be accomplished.
23. Once complete, the PE must certify that the road has been built according to the approved design.
24. Cut slopes should not exceed a maximum of ¾ to 1.
25. Fills will be engineered based on the material type, location, and other site factors.
26. Roads shall be ditched (one side minimum) with cross drains.
27. Cross drain culverts shall be minimum of 18 inches in diameter and of sufficient length to assure disposal of water on natural ground outside fill slope toe.
28. Culverts utilized to carry stream flows shall be designed to handle the water generated by a50 year flow event.
29. If permitted by the Environmental Analysis, 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.
30. 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.
31. Construction season shall be April 1st – September 30th. Seeding activities must be completed by September 30th.
32. No disturbed area outside the travel way may be left without seeding and mulching for more than 15 days.
33. Disturbed or newly constructed slopes within 25 feet of stream courses shall be immediately protected by seeding with a mixture of plants known to be effective at stabilizing exposed soil and palatable to wildlife and which are not invasive and covered with straw mulch and small limbs (or netting) the same day as the disturbance (whether or not completed).
34. Silt traps (small retention ponds) must be considered and if warranted, must be constructed and maintained until turf is established.
35. An erosion control permit approved by the state will be required.
36. Surfacing shall be included to meet the intended use of the road.

Note: Other or more stringent requirements (including long term seeding) may be identified in the Environmental Analysis.

Appendix 2: Biological Evaluation

Biological Evaluation

for the

Laurel Creek Property Owners Association Access Across National Forest System Lands Project

National Forests in North Carolina
Nantahala National Forest
Tusquitee Ranger District
Clay County
North Carolina

Proposed Action

The National Forests in North Carolina is evaluating a request to grant legal access to a private inholding near the town of Hayesville in Clay County, North Carolina. This property is a parcel of privately owned land which is completely surrounded by National Forest System lands. The Forest Service considered in detail a no action alternative and three action alternatives. The Forest Service also considered alternative methods and routes of access, although not in detail, for reasons disclosed in the Environmental Analysis. If an action alternative is selected, the Forest Service would grant a special use authorization to the Laurel Creek Property Owners Association providing the association access across National Forest System lands to their property at the headwaters of Laurel Creek for their stated purpose of ingress and egress to their property to construct, use, and enjoy four primitive cabins.

1. Proposed, Endangered, Threatened, and Sensitive Species

The Nantahala and Pisgah National Forests maintains a list of Proposed, Endangered, Threatened and Region 8 Forest Sensitive (PETS) species on National Forest System 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 and or Cherokee Counties, 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 (Graham, Macon, and Swain). A total of 58 species remained after this initial step, and included 27 plant species, 30 terrestrial animal species, and one 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 did not occur within the analysis 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 PETS element occurrences at two spatial scales. The first query included PETS element occurrences within the analysis area, whereas the second query included PETS element occurrences within two miles of the analysis area. Results of NCNHP database queries are discussed for each species group below.

Site visits and pedestrian field surveys of the analysis area were conducted by Fish and Wildlife Associates, Inc. (FWA) in March 2007, June 2008, June 2009, and March 2010, and by members of the ID Team in May and June of 2014.

1.1. Aquatic Threatened, Endangered, and Sensitive Species Evaluated

After filtering by county, one Forest Sensitive species *(Cambarus parrishi*) remained for consideration (Table 1.1; also see Attachment 5). The NCNHP database also indicates that this species has been recorded within two miles of the analysis area (in Rockhouse Branch), but is not known to occur within the proposed treatment area. The analysis evaluates this species; background information and potential impacts to this species are discussed below.

Table 1.1. 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	*Cambarus parrishi*	Hiwassee headwaters crayfish	Hiwassee River headwaters, Rockhouse Creek; swift, clear headwater streams	Yes*

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

Hiwassee headwaters crayfish (*Cambarus parrishi*) - 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 analysis 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 proposed treatment area. However, this species has been documented within two miles of the analysis area in Rockhouse Creek. Hickory Cove Creek and Laurel Creek are tributaries of Rockhouse Creek, and join Rockhouse Creek downstream of the analysis area. The species has been located within Fires Creek, the Hiwassee River, Tusquitee Creek, Big Tuni Creek, Compass Creek, Morgan Creek, and Shooting Creek. The populations within Rockhouse Creek and Fires Creek have been surveyed in 1984 and 2007. Both populations are persisting within these two streams. Additional surveys were deemed unnecessary for this species because available inventory information is adequate to guide project design, support determination of effects, and meet requirements for conservation of the species.

Direct and Indirect Effects: *Cambarus parrishi* may occur in tributary streams in the analysis 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 analysis 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 entire range of proposed actions (Alternatives B, C, and D) 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, including crushing of individuals during culvert installation. These effects would only occur during construction and are unlikely to affect the viability of the species across the forest as a whole due to the restricted duration and geographic extent of effects. Installation of a culvert on Hickory Cove Creek, rather than requiring a bridge or arched bottomless culvert may fragment the Hiwassee headwaters crayfish population at this location by limiting passage.

Short-term indirect impacts to individuals could result from increased sedimentation associated with road construction and culvert replacement/installation within the analysis area. The effects of increased turbidity and sedimentation would be highest during culvert installation, which would occur for approximately one 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 sediment downstream of the culvert installation would persist until the next bankfull flow event, which occurs approximately every 2.5 years. Similarly, short-term indirect impacts to individuals could also result from acid runoff during road construction if fresh, unweathered acidic rock is exposed and is not appropriately treated or disposed of. Exposure of acid bearing rock (and failure to properly treat the material with limestone) can result in long-term negative effects to aquatic organisms (Bacon and Maas 1979, Mathews and Morgan 1982, Kucken et al. 1994, Huckabee et al. 1975, and Daniels and Orndorff 2003).

Daniels and Orndorff (2003) noted that lime additions to the surface of road fill material was "minimally effective" at neutralizing acid bearing rock. Furthermore, Daniels and Orndorff (2003) recommend blending agricultural limestone with road fill materials containing acidic rock and/or placing an "engineered cap" over waste areas. Short-term and long-term sedimentation and acid run off would be avoided or minimized through the successful use of BMPs, design criteria, and requirements listed in Chapter 2. The proposed road reconstruction for this project is expected to have minimal effects to the Hiwassee headwaters crayfish because no fresh rock would be exposed during reconstruction and the existing cut-fill slopes would not be disturbed. The 0.34 miles of new road construction in the Nantahala Formation (Alternative B), 0.71 miles (Alternative C), and 0.81 miles (Alternative D) would be constructed using project design features to reduce acid bearing rock exposure (Chapter 2).

It is also possible that long-term indirect impacts associated with the proposed actions could be positive, in that the replacement of the dislodged culvert at the Hickory Cove crossing (Alternative B) would 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, poorly installed and poorly functioning culverts associated with the proposed actions

under Alternatives B, C, and D may also prevent similar failures and sediment loss during future high-flow events.

Cumulative Effects: Previous activities within the analysis area include timber harvest and road construction and maintenance activities consistent with the management levels for Forest Service roads in the analysis area. Portions of Rockhouse Road, Phillips Ridge Road, and Little Fires Creek Road were 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 action alternatives proposed in this EA. These activities were designed to prevent chronic erosion and sedimentation; 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 ten years ago.

There are no ongoing or reasonably foreseeable future actions occurring or proposed on Federal lands within the analysis area; therefore, there are no ongoing or future effects to analysis area waters anticipated. There are no ongoing activities or reasonably foreseeable future actions on private lands that are known to be, or would affect the aquatic resources in the analysis area.

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 would be avoided or minimized with successful implementation of BMPs 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 analysis area would be stabilized, and non-functional culverts in the analysis area would 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 would avoid chronic sedimentation and acid runoff impacts to habitat for this species.

1.2 Botanical Threatened, Endangered, and Sensitive Species Evaluated

In Clay and Cherokee County, there is one federally endangered, one federally threatened, and 27 Region 8 sensitive plant species that are known or historically known to occur. Out of these plant species, five Region 8 sensitive plant species are known or historically known to occur in the LCPOA botanical analysis area (Table.2). No federally proposed, endangered, or threatened plant species are known or historically known to occur in the LCPOA botanical analysis area. In addition, no federally proposed, endangered, or threatened plant species were located during botanical field surveys of the analysis area. Only one sensitive plant, Southern nodding trillium

(*Trillium rugelli*) was located by Fish and Wildlife Associates, Inc. (FWA) during botanical surveys of the analysis area in June 2008. This species was not located during botanical surveys conducted in May and June of 2014. Because this species closely resembles the common sweet trillium (*Trillium vaseyi*), there may have been an identification error, especially since other botanists (Ed Schwartzman, NC Natural Heritage Program and Mike Schafale, NC Natural Heritage Area) have conducted surveys in the surrounding area and have not found this species. To be thorough, an effects analysis was completed for Southern nodding trillium.

Botanical field surveys of the analysis area were conducted by Fish and Wildlife Associates, Inc. (FWA) in March 2007, June 2008, and June 2009. Forest Service botanists made field visits in June 2013 and June 2014.

Table 1.2. Federally Proposed, Endangered, and Threatened, and Region 8 Sensitive Plant Species Known or Historically Known to Occur in the LCPOA Botanical AA.

Group	Designation	*Scientific Name*	Common Name	Associated Natural Community Type or Specialized Habitat Type	Analyzed Further/Evaluation Criteria*
Vascular plant	Sensitive	*Monotropsis odorata*	sweet pinesap	Rich Cove Forest, Mesic Oak-Hickory, Dry Oak-Hickory, Dry-Mesic Oak Forest, Pine-Oak/Heath Forest	No/2
Vascular plant	Sensitive	*Sceptridium jenmanii*	Alabama grape fern	Rich Cove Forest	No/2
Vascular plant	Sensitive	*Scutellaria saxatilis*	rock skullcap	Northern Hardwood Forest, Boulderfield Forest, Rich Cove Forest	No/2
Vascular plant	Sensitive	*Stachys clingmanii*	Clingman's hedge-nettle	Northern Hardwood Forest, Boulderfield Forest	No/2
Vascular plant	Sensitive	*Trillium rugelii*	Southern nodding trillium	Rich Cove Forest, low elevation	Yes

***1** Based on available habitat descriptions for this species, no habitat is present within the analysis area; no habitat for this species would be impacted by the proposed actions.
***2** NCNHP database indicates that this species has been recorded within two miles of the analysis area (however, no records for this species exist *within* the analysis area and the species was not found during botanical field surveys).

Southern nodding trillium (*Trillium rugelii*) - Southern nodding trillium has been documented within 20 North Carolina counties, 13 of which occur within the western North Carolina Mountains (Buchannan & Finnegan 2008; David Danley, Pisgah National Forest botanist, personal communication; Gary Kauffman, National Forests in NC botanist, personal communication). The species primarily occurs at lower elevations in the mountains, from 1,200-3,500 feet above sea level. Southern nodding trillium requires a fairly rich, moist microhabitat most often found in rich coves and bottomlands with a closed canopy. Twenty Southern nodding trillium populations have been documented within the Nantahala and Pisgah National Forests. These populations vary in abundance from 20-50 individuals covering less than one acre to more than ten thousand individuals covering an area greater than 100 acres. This would be the second population documented on National Forest System lands in Clay County; four populations have been documented on National Forest System lands within Cherokee County.

During the June 2008 field survey of the analysis area, eight Southern nodding trillium stems were observed on the east side of the existing roadbed of FSR 340A1, approximately 150 feet

southwest of the crossing of an unnamed tributary. During a June 2009 field survey, an additional (single) Southern nodding trillium plant was also located on the west side of the existing FSR 340A1 roadbed, approximately 15 feet from the southern bank of Hickory Cove Creek.

Direct and Indirect Effects: **Alternative A:** There would be no direct or indirect effects to Southern nodding trillium because there would be no disturbance that would affect this species.

Alternative B: Individuals of Southern nodding trillium may have been found along the side of FSR 340A1. If present, individuals may be directly affected and top-killed by road runoff and debris during road reconstruction. Indirect impacts to individuals could consist of compaction of adjacent soil, increased surface storm water flow, or increased light levels at the forest floor.

Alternative C and D: There would be no direct or indirect effects to Southern nodding trillium because there would be no disturbance that would affect this species.

Cumulative Effects: **Alternative A:** Past actions that may have affected Southern nodding trillium in the analysis area include road building and timber extraction. As botanical surveys were not conducted prior to those past events, the Forest Service cannot determine past effects to Southern nodding trillium. Since Alternative A would produce no direct or indirect effects, there would be no cumulative effects.

Alternative B: During the last ten years, Southern nodding trillium has been impacted in two 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 analysis area. Past actions that may have affected Southern nodding trillium in the analysis area include road building and timber extraction. As botanical surveys were not conducted prior to those past events, the Forest Service cannot determine past effects to Southern nodding trillium. There are no ongoing or reasonably foreseeable future actions within the LCPOA botanical analysis area that would impact this species.

Alternative C and D: Past actions that may have affected Southern nodding trillium in the analysis area include road building and timber extraction. As botanical surveys were not conducted prior to those past events, the Forest Service cannot determine past effects to Southern nodding trillium. Since these alternatives would produce no direct or indirect effects, there would be no cumulative effects.

Determination of Effect: **Alternative A**: This alternative would not directly or indirectly impact Southern nodding trillium.

Alternative B: This alternative may directly and indirectly impact individuals, but would not cause a trend toward federal listing or a loss of viability across the Nantahala and Pisgah National Forests for Southern nodding trillium.

Alternative C and D: This alternative would not directly or indirectly impact Southern nodding trillium.

1.3. Terrestrial Wildlife Threatened, Endangered, and Sensitive Species Evaluated

After filtering by county, one federally proposed, five federally endangered, two federally threatened, and 23 forest sensitive species (PETS) remained for consideration (Table 3). The list was further narrowed by eliminating those species whose associated natural community type was not present within the analysis area. Where possible, species whose specialized habitat types 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 analysis 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 would have no effect or impact on these species. The analysis of potential effects or impacts focused on the ten remaining species; these species are listed in Table 1.3 and discussed in the following pages.

The NCNHP database was queried for PETS element occurrences at two spatial scales. The first query included PETS element occurrences within the analysis area, whereas the second query included PETS element occurrences within two miles of the analysis area. None of the 13 remaining species are known to occur within the analysis area. Three PETS species have been documented within two miles of the project vicinity: Rafinesque's big-eared bat (*Corynorhinus rafinesquii)*, eastern small-footed bat (*Myotis leibii)*, and Southern water shrew (*Sorex palustris punctulatus)*. The analysis area was surveyed for specialized habitat types and evidence of PETS species. FWA personnel conducted these field surveys in June 2008 and June 2009. Forest Service wildlife biologists reviewed past surveys in fall 2013 and spring 2014 and concluded that no new field visits were necessary to determine potential effects to PETS species in the analysis area.

Table 1.3. Terrestrial Wildlife Species Considered in the Analysis, Part I.

Group	Designation*	*Scientific Name*	Common Name	Associated Natural Community Type or Specialized Habitat Type	Analyzed Further/Evaluation Criteria*
Insect	Endangered	*Microhexura montivaga*	spruce-fir moss spider	Spruce-fir forests on well-drained moss mats	No/1
Mammal	Endangered	*Glaucomys sabrinus coloratus*	Carolina northern flying squirrel	Mature spruce-fir and northern hardwoods generally above 4000 feet	No/1
Mammal	Endangered	*Myotis grisescens*	gray bat	Caves in summer and winter	No/1
Mammal	Endangered	*Myotis sodalis*	Indiana bat	Roosts in caves, hollow trees or under loose bark of trees in riparian areas	Yes
Mammal	Proposed	*Myotis septentrionalis*	Northern long-eared bat	Hibernates in caves or mines with constant temperatures and high humidity with no air currents (winter). In the warmer months, this species is opportunistic, choosing roosts in live trees or snags regardless of tree species, underneath bark or in cavities and crevices.	Yes
Mollusk	Threatened	*Mesodon clarki nantahala*	noonday globe	Cliffs; cool, wet areas under vegetation and leaf litter	No/1

Group	Designation*	*Scientific Name*	Common Name	Associated Natural Community Type or Specialized Habitat Type	Analyzed Further/Evaluation Criteria*
Reptile	Threatened (S/A)	*Clemmys muhlenbergi*	bog turtle	Sunlit, marshy meadows, bogs, and wet pastures	No/1
Amphibian	Sensitive	*Desmognathus santeetlah*	Santeetlah dusky salamander	Headwaters, seepage in hardwood, coves and spruce-fir, generally higher than 2220 feet	Yes
Insect	Sensitive	*Callophrys irus*	frosted elfin	Open woods and borders, usually in dry situations; host plants - lupines(Lupinus) and wild indigos (Baptisia)	Yes
Insect	Sensitive	*Cicindela ancocisconensis*	a tiger beetle	High elevation forests, >4000 feet	No/1
Insect	Sensitive	*Melanoplus divergens*	divergent Melanoplus	Glades and balds, 1800' - 4717'; no records	No/1
Insect	Sensitive	*Melanoplus serrulatus*	serrulate Melanoplus	Valleys and lower slopes	No/1
Insect	Sensitive	*Nesticus cooperi*	lost Nantahala cave spider	Caves and along Nantahala River	No/1
Insect	Sensitive	*Nesticus sheari*	cave spider	High elevation, n-facing rocky slopes, apparently endemic to Graham county, NC	No/3
Mammal	Sensitive	*Myotis leibii*	Eastern small-footed bat	Hemlock forests, rock crevices, caves, mines or buildings, above 2000 ft	Yes/2
Mammal	Sensitive	*Microtus chrotorrhinus carolinensis*	Southern rock vole	Cool, damp, coniferous and mixed forests at higher elevations in the Southern Appalachians	Yes/2
Amphibian	Sensitive	*Plethodon aureolus*	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	*Plethodon teyahalee*	Southern Appalachian salamander	Moist forests at all elevations	Yes
Bird	Sensitive	*Thryomanes bewickii altus*	Appalachian Bewick's wren	Woodland borders or openings at high elevations	No/1
Insect	Sensitive	*Scudderia septentrionalis*	Northern bush katydid	In the treetops of edges of broadleaved forests	Yes
Insect	Sensitive	*Semiothisa fraserata*	Fraser fir angle	Spruce-fir forests with Fraser fir	No/1
Insect	Sensitive	*Speyeria diana*	Diana fritillary	Mature deciduous and pine woodlands near streams; mostly along roadsides in coves below 4000'; nectar - joe-pye-weed, ironweed, butterflyweed; host plants - violets	Yes
Insect	Sensitive	*Trechus luculentus unicoi*	a ground beetle	Beneath rocks and moss in wet ravines and near seeps and springs > 3000'	No/1
Mammal	Sensitive	*Sorex palustris punctulatus*	Southern water shrew	Streambanks w/rhododendron cover in n. hardwood or spruce-fir forests; known from > 3000', mostly over 4000'	Yes/2
Mollusk	Sensitive	*Paravitrea placentula*	glossy supercoil	Under leaf litter on wooded hillsides and ravines	Yes

***1 Associated natural community type and/or specialized habitat type do not occur in the activity area; therefore, these habitats would not be affected. Given no effects to the habitat, the proposal alternatives would 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 two miles of the analysis area (however, no records for this species exist *within* the analysis area).**
***3 Analysis area is outside of the known, localized geographic range for the species.**

Indiana bat (*Myotis sodalis*) – In summer, habitat consists of wooded or semi wooded 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 analysis area, nor within two miles of the analysis 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 would 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 analysis 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 – Past actions that may have affected Indiana bat in the analysis area include road building and timber extraction. As wildlife surveys were not conducted prior to those past events, the Forest Service cannot determine past effects to the Indiana bat. Due to the absence of direct effects to individuals, as well as the lack of indirect negative effects associated with the proposed action, there are no cumulative effects to Indiana bat from this project.

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 would 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. Implementation of Alternative B, Alternative C, or Alternative D, **may affect, but is not likely to adversely affect** the Indiana bat.

All standards and guides for the protection of the Indiana bat, as listed in Amendment 25 of the LRMP, would be followed. **Consultation with the U.S. Fish and Wildlife Service is required.**

The proposed action is to authorize new road construction and use of existing roads for access of a private tract surrounded by National Forest System lands. **Development and associated impacts to federally protected species within this private tract is considered a *connected action* in the context of the Forest Service's authorizing this access across National Forest System 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 3 of this document.

Northern Long-eared bat (*Myotis septentrionalis*) – On May 4, 2015, the northern long-eared bat (NLEB) was listed as a threatened species and an interim 4(d) rule was published in the Federal Register. The USDA Forest Service Southern Region is currently formally consulting, at a regional scale, with the US Fish and Wildlife Service on NLEB. After the issuance of the final Biological Opinion, including any reasonable and prudent measures, terms and conditions, or any authorized incidental take, the project-level Biological Assessment will be amended if needed and the appropriate project-level consultation will be completed. **Consultation with the U.S. Fish and Wildlife Service is required.**

Frosted elfin *(Callophrys irus)* – 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 analysis area or within two miles of the analysis area.

Direct and Indirect Effects – If individuals are present within the analysis area during road reconstruction and 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 analysis area. The forest within the analysis area is relatively contiguous, containing little or no edge habitat; only a very limited portion of the analysis area contains forest that could be considered "open" or "dry" habitat. Indirect impacts are also very unlikely. No existing suitable habitat would be destroyed, and little or no suitable habitat would be created as a result of the proposed action.

Cumulative Effects – Past actions that may have affected frosted elfin in the analysis area include road building and timber extraction. As wildlife surveys were not conducted prior to those past events, the Forest Service cannot determine past effects to frosted elfin. Because of the low likelihood of direct impacts to individuals, or indirect impacts in the form of habitat loss or gain to individuals, there are no cumulative effects to frosted elfin from this project.

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 analysis area during construction, it is not expected to eliminate or measurably create suitable habitat. Alternative A will not affect frosted elfin. Alternatives B, C, or D **may impact individuals but is not likely to cause a trend to federal listing or a loss of viability** of this species.

Santeetlah dusky salamander (*Desmognathus santeetlah*) – 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 a few feet of open water.

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

Direct and Indirect Effects – Desmognathus santeetlah is not likely to occur in the analysis 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 would be no cumulative effects as a result of this project.

Determination of Effect – Alternatives A, B, C, and D would have **no impacts** on the viability of this species.

Southern rock vole (*Microtus chrotorrhinus carolinensis*) – 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 or Cherokee County. Possible habitat for this species is present within the analysis 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 analysis area.

Direct and Indirect Effects – Microtus chrotorrhinus carolinensis is not highly likely to occur in the analysis area, due to the lack of optimal habitat. No direct impacts are anticipated. Indirect impacts to the marginal habitat located within the analysis 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 analysis 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 effects to this species are expected to be imperceptible.

Determination of Effect – Alternative A would have no effect to the Southern rock vole. If there is marginal habitat and the species were to occur in the analysis area, direct displacement may occur under Alternatives B, C, or D.

Eastern small-footed bat (*Myotis leibii*) – *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 analysis area. *Myotis leibii* may use the analysis area for foraging.

The Eastern small-footed bat has been recorded in Clay County, Cherokee County, and 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 analysis area, but has not been documented within the analysis 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 analysis area; optimal roost habitat was not observed along the existing roadways or proposed new road alignments.

Direct and Indirect Effects – The prohibition on felling trees during the summer months (see *Effects* discussion for *Myotis sodalis* previous pages), would ensure that no direct impacts to *Myotis leibii* would occur. This species may forage in portions of the analysis 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 – Past actions that may have affected Eastern small-footed bat in the analysis area include road building and timber extraction. As wildlife surveys were not conducted prior to those past events, the Forest Service cannot determine past effects to the Eastern small-footed bat. Due to the absence of negative indirect impacts, and the small amount of potential foraging habitat created under the proposed action alternatives, no cumulative effects to the Eastern small-footed bat are anticipated.

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

Glossy supercoil *(Paravitrea placentula)* – Associated natural community types 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 analysis area. Although associate species are present, this species has not been document in Clay County or Cherokee 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 analysis area. However, due to the limited mobility of gastropods, limited

distribution outside the analysis area, and obscure record, this species is not likely to occur within the analysis area.

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

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

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

Southern Appalachian salamander (*Plethodon teyahalee*) – 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 analysis area. Based on the presence of many of the associated botanical species listed above, this species may occur within the analysis area.

Direct and Indirect Effects – Direct impacts to *Plethodon teyahalee* may result during road construction activities. Individuals within the analysis 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 – Past actions that may have affected the Southern Appalachian salamander in the analysis area include road building and timber extraction. As wildlife surveys were not conducted prior to those past events, the Forest Service cannot determine past effects to the Southern Appalachian salamander. Due to the absence of direct effects to individuals, as well as the lack of indirect negative effects associated with the proposed action, there are no cumulative effects to the Southern Appalachian salamander from this project. 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 effects to this species are expected to be imperceptible.

Determination of Effect – Alternative A would have no effects on the Southern Appalachian salamander. 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*) – This species is known to utilize treetops at the edges of broad leaved 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 analysis area during road construction and reconstruction, 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 analysis area. The forest within the analysis 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 would be destroyed or created as a result of the proposed action.

Cumulative Effects – Past actions that may have affected the Northern bush katydid in the analysis area include road building and timber extraction. As wildlife surveys were not conducted prior to those past events, the Forest Service cannot determine past effects to the Northern bush katydid. Due to the absence of direct effects to individuals, as well as the lack of indirect negative effects associated with the proposed action, there are no cumulative effects to the Northern bush katydid from this project. 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 effects to this species are expected to be imperceptible.

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*) – *Sorex palustris punctulatus* occurs near swift, rocky streams with *Rhododendron* cover. This species may occur in the analysis area; it has been documented along Fires Creek within two miles of the analysis 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 analysis 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 would be cleared during road reconstruction, 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 reconstruction, road construction, and culvert replacement/installation within the analysis area. Similarly, short-term indirect impacts to individuals could also result from acid runoff during road construction if fresh, unweathered acidic rock is exposed and is not appropriately treated or disposed of. Short-term and long-term sedimentation and acid run off would be avoided or minimized through the successful use of BMPs, design criteria, and requirements in this Biological Evaluation.

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 would 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 – Past actions that may have affected the Southern water shrew in the analysis area include road building and timber extraction. As wildlife surveys were not conducted prior to those past events, the Forest Service cannot determine past effects to the Southern water shrew. Due to the absence of direct effects to individuals, as well as the lack of indirect negative effects associated with the proposed action, there are no cumulative effects to the Southern water shrew from this project. 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 effects to this species are expected to be imperceptible.

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 would be avoided or minimized through the successful use of BMPs design criteria, and requirements listed in 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*) – 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 analysis area or within two miles of the analysis area.

Direct and Indirect Effects – If individual adults or larvae are present within the analysis 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 analysis area does not appear to support an abundance of violets, and this species is not known to occur within the analysis 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 effects 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 would not eliminate current roadside habitat. A small amount of additional permanent edge habitat along the new road alignment would 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.

1.4. Summary of Determinations of Effect for PETS Species

Aquatic Species: Because no endangered or threatened aquatic species were located in the proposed treatment areas, there would be no direct, indirect or cumulative effects to any endangered or threatened aquatic species. For the sensitive aquatic species *Cambarus parrishi*, the project may impact individuals, but is not likely to affect the viability of the species across the forest as a whole. For all other sensitive aquatic species, there would be no direct, indirect or cumulative effects to any sensitive aquatic species because none were found in the analysis area. Consultation with the U.S. Fish and Wildlife Service (USFWS) **is not required** for aquatic species.

Botanical Species: Because no federally endangered or threatened plant species were located in the proposed treatment areas, there would be no direct, indirect or cumulative effects to any endangered or threatened plant species. The proposed project may directly and indirectly impact the sensitive plant Southern nodding trillium (*Trillium rugelii*). However, the proposed project would not affect the viability of this species across the Nantahala and Pisgah National Forests nor cause a trend towards federal listing. The proposed project would not affect any other sensitive plant species. Consultation with the USFWS **is not required** for botanical resources.

Terrestrial Wildlife Species: Alternatives B, C, and D **may affect, but are not likely to adversely affect** the Indiana bat (*Myotis sodalis*) because all standards and guides for the protection of this species, as listed in Amendment 25 of the Land and Resources Management Plan, would be followed, and the project-specific mitigation measures identified in 3.8.2.2 would be implemented. Consultation with the USFWS **is required** for the Indiana bat. **Consultation is required** for the northern long-eared bat (*Myotis septentrionalis*) and will occur after the Biological Opinion is finalized.

For the sensitive terrestrial wildlife species *Callophrys irus, Plethodon teyahalee, Scudderia septentrionalis, Sorex palustris punctulatus, and Speyeria diana,* the project may impact individuals, but is not likely to affect the viability of the species across the forest as a whole. For all other sensitive terrestrial wildlife species, there would be no direct, indirect or cumulative effects to any sensitive terrestrial wildlife species.

Table 1.4. Summary of Determinations of Effect for PETS Species.

Group	Designation	*Scientific Name*	Common Name	Determination of Effect or Impact
AQUATIC SPECIES				
Crayfish	Sensitive	*Cambarus parrishi*	Hiwassee headwaters crayfish	May impact individuals but not likely to cause a trend to federal listing or a loss of viability
BOTANICAL SPECIES				
Vascular plant	Sensitive	*Trillium rugelii*	Southern nodding trillium	May directly and indirectly impact individuals but would not cause a trend towards federal listing or a loss of viability across the forest
TERRESTRIAL WILDLIFE SPECIES				
Mammal	Endangered	*Myotis sodalis*	Indiana bat	May affect, but not likely to adversely affect
Mammal	Proposed	*Myotis septentrionalis*	Northern long-eared bat	Determination of effect to be made after the Biological Opinion is finalized
Amphibian	Sensitive	*Desmognathus santeetlah*	Santeetlah dusky salamander	No impacts
Amphibian	Sensitive	*Plethodon teyahalee*	Southern Appalachian salamander	May impact individuals but not likely to cause a trend to federal listing or a loss of viability
Insect	Sensitive	*Callophrys irus*	frosted elfin	May impact individuals but not likely to cause a trend to federal listing or a loss of viability
Insect	Sensitive	*Scudderia septentrionalis*	Northern bush katydid	May impact individuals but not likely to cause a trend to federal listing or a loss of viability
Insect	Sensitive	*Speyeria diana*	Diana fritillary	May impact individuals but not likely to cause a trend to federal listing or a loss of viability
Mammal	Sensitive	*Microtus chrotorrhinus carolinensis*	Southern rock vole	No impacts
Mammal	Sensitive	*Myotis leibii*	Eastern small-footed bat	No impacts
Mammal	Sensitive	*Sorex palustris punctulatus*	Southern water shrew	May impact individuals but not likely to cause a trend to federal listing or a loss of viability
Mollusk	Sensitive	*Paravitrea placentula*	glossy supercoil	No impacts

2. Forest Concern Species

Forest Concern species are designated by the NFsNC and occur at the periphery of their range or disjunct from their main range. The Nantahala and Pisgah National Forests maintain a list of Forest Concern species on National Forest System lands; all of these species were originally considered (see the species lists attached to this Biological Evaluation). The list was filtered by considering only those species listed by the Forest Service as occurring or probably occurring in Clay and Cherokee Counties, 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 42 plant species, 38 terrestrial animal species, and ten 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 analysis 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 analysis area were conducted by Fish and Wildlife Associates, Inc. (FWA) in March 2007, June 2008, June 2009, and March 2010 and by members of the ID Team in May and June of 2013 and 2014.

2.1 Aquatic Forest Concern Species

Boundaries of Aquatic Analysis Area

This analysis addresses analysis area waters and analysis area waters associated with the Laurel Creek Property Owners Association Access Across National Forest System Lands project. These are defined as those in the area of potential direct and indirect effects on aquatic habitat and populations, and do not necessarily overlap with the effects to botanical and wildlife resources. In addition to analysis area waters, the analysis area encompasses waters downstream that potentially could be impacted by project activities when considered within the watershed context. The aquatic analysis areas consist of the following watersheds: Laurel Creek from its headwaters downstream to the confluence with Rockhouse Creek and Rockhouse Creek to the confluence with Fires Creek; Coldspring Branch, Tatham Cabin Branch; Aaron Creek, Alfred Creek, and Colvard Creek.

Aquatic Species Evaluated and Rationale

Thirteen aquatic Forest Concern Species are known to occur in the Nantahala and Pisgah National Forests and Clay County (Attachment 5a). These 13 species were then filtered based upon habitats available within the proposed treatment areas. All four species are listed in Table 2.1 with a general habitat description. All four species were included in the effects analysis due to the possibility of their occurrence within the analysis area or within a reasonable distance downstream, but only two, hellbenders and smoky dace, were addressed in detail because they are known to occur in the analysis area.

Table 2.1. Aquatic Forest Concern species known to occur in Clay County on Nantahala and Pisgah National Forests and their likelihood of occurrence in the analysis area or downstream of analysis area, Part I.

Group	Species	Habitat	Likelihood of Occurrence
Amphibian	*Cryptobranchus alleganiensis*	large, clear, fast-flowing streams	Occurs downstream
Amphibian	*Necturus maculosus*	Small to large streams	May occur
Crustacean	*Cambarus sp. A*	Streams in Hiwassee River watershed	May occur
Fish	*Clinostomus funduloides sp. 1*	Hiwassee River and Fires Creek	Occurs downstream

Effects of Alternatives on Aquatic Forest Concern Species

Direct, Indirect, and Cumulative Effects –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 would be minimal with proper installation of erosion control measures. Under Alternative B, these effects would be confined to the Laurel Creek watershed. Alternative C would result in effects to streams in the Rockhouse Creek watershed and Alternative D would result in effects to Nancy Hawkins Branch, Coldspring Branch, Alfred Creek, Aaron Creek, and Colvard Creek. Furthermore, 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). 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.

Hellbenders (*Cryptobranchus alleganiensis***); Mudpuppy** (*Necturus maculosus*). Hellbenders occur within the main stem of Fires Creek downstream and into the Hiwassee River. Laurel Creek does not provide suitable habitat for the hellbender. Environmental DNA testing has indicated that hellbenders may occur within Rockhouse Creek, although, no individuals have been located within this stream (Williams, unpublished data). Environmental DNA testing has also indicated the presence of mudpuppies within Rockhouse Creek although no individuals have been located within the Fires Creek watershed.

Project design features would confine any sediment and acid runoff from the road reconstruction/construction activities to the riparian buffers within the Laurel Creek watershed. Any effects of the proposed culvert installations, road reconstruction, and construction would dissipate prior to reaching Fires Creek. The effects of the proposed project on the hellbender or mudpuppy would be similar to those described for *Cambarus parrishi*. Any hellbenders or mudpuppies that may occur within Laurel Branch would be able to avoid disturbed areas during culvert installation activities; therefore, direct effects to the species are unlikely to occur.

Smoky Dace (*Clinostomus funduloides* sp.1) – The Smoky dace was recently discovered within Fires Creek in 2011. Laurel Creek does not provide suitable habitat for the Smoky dace. Project design features would confine any sediment and acid runoff from the road reconstruction/construction activities to the riparian buffers within the Laurel Creek watershed. Any effects of the proposed culvert installations, road reconstruction, and construction would dissipate prior to reaching Fires Creek. Therefore, there would be no direct or indirect effects to this species resulting from this project.

If individuals were present, the proposed action may 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 ten 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.

Cambarus sp. A – The effects of this project on this species would be the same as the effects on the Hiwassee headwaters crayfish above (Section 1.1). If individuals were present, 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. This project may impact individuals of *Cambarus sp. A*. Habitat for this species is common across its range. 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.

2.2 Botanical Forest Concern Species

Boundaries of Botanical Analysis Area

The botanical analysis area or "boundary of effects" used for this proposal is defined as the total area within two miles of any proposed activity area. The botanical analysis area helps determine which federally proposed, threatened and endangered, Forest Service Region 8 sensitive (PETS), and forest concern (FC) plant species have the highest likelihood of occurring in the proposed activity area. Because plants are rooted species that must be present in proposed activity areas to undergo effects, potential direct and indirect effects were evaluated for PETS and FC plant species that occur within proposed activity areas. In addition, potential direct and indirect effects were only evaluated for MIS botanical species, biological communities, and special habitats that occur within proposed activity areas.

Botanical Species Evaluated and Rationale

In Clay and Cherokee County, there are 41 forest concern botanical species known or historically known to occur. Out of these, three forest concern botanical species are known or historically known to occur in the LCPOA botanical analysis area (Table 2.2).

Table 2.2. Botanical forest concern species occurring in LCPOA botanical analysis area.

Group	Species	Common Name	Habitat*	Analyzed Further/Evaluation Criteria*
Vascular Plant	*Carex purpurifera*	purple sedge	Rich Cove Forest, Montane Alluvial Forest	No/2
Vascular plant	*Hackelia virginiana*	Virginia stickseed	Woods and thickets, circumneutral soils	No/2
Vascular plant	*Stewartia ovata*	mountain camellia	Acidic Cove Forest, Montane Alluvial Forest	No/2

***1 Based on available habitat descriptions for this species, no habitat is present within the analysis area; no habitat for this species would be impacted by the proposed action.**
***2 NCNHP database indicates that this species has been recorded within two miles of the analysis area (however, no records for this species exist *within* the analysis area and the species was not found during botanical field surveys).**

Effects of Alternatives on Botanical Forest Concern Species

Direct, Indirect, and Cumulative Effects - Field surveys completed in the proposed analysis area did not locate these three species or any other forest concern plant species. For that reason Alternative A, Alternative B, Alternative C, and Alternative D would have no direct, indirect, or cumulative effects to any forest concern plant species.

2.3 Terrestrial Wildlife Forest Concern Species

Direct, Indirect, and Cumulative Effects - Field surveys completed in the proposed analysis area did not locate these three species or any other forest concern plant species. For that reason Alternative A, Alternative B, Alternative C, and Alternative D would have no direct, indirect, or cumulative effects to any forest concern plant species.

Boundaries of Terrestrial Wildlife Analysis Area

Only terrestrial wildlife resources within or adjacent to the LCPOA project activity areas were analyzed in detail. This includes the areas above and below the existing Forest Service roads 340A1, 427, 6148A, and the corridors for the segments of new road construction.

Terrestrial Wildlife Species Evaluated and Rationale

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 analysis area. Where possible, species whose specialized habitat types 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 analysis 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 would therefore have would have no effect or impact on these four species. The analysis of potential effects or impacts focused on the 21 remaining species; these species are listed in Table 2.3. Discussion follows the table.

Table 2.3. Terrestrial Wildlife Forest Concern species, habitat, and Likelihood of Occurrence in the Analysis area.

Group	Species	Habitat	Likelihood of Occurrence
Amphibian	*Eurycea longicauda longicauda* (long-tailed salamander)	streams, seeps, springs in moist woods and floodplains; breeds in streams/ponds	May occur
Arachnid	*Nesticus species 2*	small rocks scattered over n-facing cove forests, southwest-facing talus fields	May occur
Bird	*Dendroica cerulea* (cerulean warbler)	mature hardwood forests; steep slopes and coves in mountains	May occur
Bird	*Sphyrapicus varius appalachiensis* (Appalachian yellow-bellied sapsucker)	mature, open hardwoods with scattered dead trees above 3500', breeding season only	May occur
Bird	*Vireo gilvus* (warbling vireo)	open groves of hardwoods along rivers and streams below 3000'	May occur

Group	Species	Habitat	Likelihood of Occurrence
Butterfly	*Autochton cellus* (golden-banded skipper)	moist woods near streams or ponds; nectar -- blackberry, trailing arbutus, hollyhock, and abelia; host -- legumes, mainly hog peanut	May occur
Butterfly	*Celastrina nigra* (dusky azure)	rich, moist deciduous forests; nectar - wild geranium; host - goat's beard	May occur
Butterfly	*Chlosyne gorgone* (gorgone checkerspot)	woodland borders and openings; host plants are sunflowers and other tall composites	May occur
Butterfly	*Polygonia progne* (gray comma)	rich deciduous forests; host plants - mainly gooseberries (*Ribes*), but also on wild azalea (*Rhododendron nudiflorum*)	May occur
Grasshopper/ Katydid	*Melanoplus cherokee* (Cherokee Melanoplus)	woodlands, 1800' - 5100'; no records	May occur
Grasshopper/ Katydid	*Melanoplus viridipes eurycerus* (green-legged Melanoplus)	woodlands and forest edges; no records	May occur
Mammal	*Corynorhinus rafinesquii* (Rafinesque's big-eared bat)	Roosts in old buildings, caves, and mines, under loose bark, usually near water	May occur
Terrestrial gastropod	*Appalachina chilhoweensis* (queen crater)	under leaf litter and rock piles in rich coves	May occur
Terrestrial gastropod	*Glyphyalinia junaluskana* (dark glyph)	moist leaf litter in mixed, mesic woods on mountainsides	May occur
Terrestrial gastropod	*Glyphyalinia pentadelphia* (pink glyph)	pockets of moist leaves in rich or acidic cove forests; no actual records	May occur
Terrestrial gastropod	*Haplotrema kendeighi* (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
Terrestrial gastropod	*Helicodiscus fimbriatus* (fringed coil)	leaf litter and under rocks on wooded hillsides, crevices in slates; no actual records	May occur
Terrestrial gastropod	*Paravitrea lamellidens* (lamellate supercoil)	deep moist leaf litter and ravines in acidic cove, rich cove, and montane-oak hickory forests; no actual records	May occur
Terrestrial gastropod	*Paravitrea umbilicaris* (open supercoil)	cove forests with rocky slopes	May occur
Terrestrial gastropod	*Patera clarki clarki* (dwarf proud globe)	Rich cove forest, high elevation red oak forest, leaf litter on mountainsides; no actual records	May occur
Terrestrial gastropod	*Zonitoides patuloides* (Appalachian gloss)	deep, moist leaf litter on mountainsides or in ravines, beneath bark of logs; no records	May occur

Effects of Alternatives on Terrestrial Wildlife Forest Concern Species

Forest Concern Land Snails – 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 (Table 2.3), 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 analysis 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 Cherokee County and Clay County. No rare gastropods were documented during those surveys.

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

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

Rafinesque's big-eared bat (*Corynorhinus rafinesquii*) – 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 two miles of the analysis area, but has not been documented within the analysis area.

Due to the lack of caves or buildings, this species is not likely to utilize the analysis area for roosting or maternity colonies. The species may use the analysis 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 new road construction.

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 effects to the Rafinesque's big-eared bat are anticipated.

Golden banded skipper (*Autochton cellus*) – 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 analysis area; this habitat includes moist woods and streams. Adult nectar plants and host plants (blackberry and hog-peanut) are also present within the analysis area.

Direct and Indirect Effects – Direct impacts to individuals may result from the proposed action, as any individuals present within the analysis 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 blackberry to colonize disturbed areas, it may reestablish itself along portions of roadside within the analysis area.

Cumulative Effects – 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 road construction activities, although blackberry is more likely. Due to the small size of the proposed treatment areas and the widespread availability of habitat and host/nectar plants across the forest, cumulative effects, if any, are expected to be imperceptible.

Dusky azure (*Celastrina nigra*) – 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 analysis area; however, host and nectar plants for this species were not observed within areas to be impacted under the action alternative.

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

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

Gorgone checkerspot (*Chlosyne gorgone*) – 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 analysis area; limited openings and borders are present and host plants were observed there.

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

Cumulative Effects – 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 actions; however improvement of existing forest roads and construction of new road alignments would create/maintain some additional woodland border habitat over the long term. Due to the small size of the proposed treatment areas versus the widespread availability of general habitat and host plants across the forest, cumulative effects, if any, are expected to be imperceptible.

Pink glyph (*Glyphyalinia pentadelphia*) – 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 analysis area, although snail surveys have been conducted for other Forest Service projects in Cherokee County Clay County. No rare gastropods were documented during those surveys.

Direct and Indirect Effects – If present within the analysis 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 two acres of forested habitat (Alternative B), nine acres (Alternative C) and 45 acres (Alternative D).

Cumulative Effects – 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 analysis area versus the widespread availability of rich cove habitat across the forest, cumulative effects, if any, are expected to be imperceptible.

Cherokee melanoplus (*Melanoplus cherokee*) **and Green-legged** melanoplus (*Melanoplus viridipes eurycerus*) – 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 and* general habitat for *Melanoplus viridipes eurycerus* includes woodlands and forest edges.

Existing Condition - The likelihood of occurrence within the analysis 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 analysis area.

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

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

A Nesticus spider (*Nesticus* sp. 2) – This species has only been documented in the Chunky Gal Mountains of Clay County. Only four 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 analysis area.

Direct and Indirect Effects – If present, direct impacts to individuals may result from the proposed actions, as any individuals present within the analysis 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 Effects – 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 effects, if any, are expected to be imperceptible.

Dwarf proud globe (*Patera clarki clarki*) – This species has been documented in Clay County and the surrounding counties, but it not known to occur in the vicinity of the analysis 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 analysis 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 Cherokee and Clay County. No rare gastropods were documented during those surveys.

Direct and Indirect Effects – If present within the analysis 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 two acres of forested habitat (Alternative B), nine acres (Alternative C) and 45 acres (Alternative D).

Cumulative Effects – 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 analysis area versus the widespread availability of general habitat across the forest, cumulative effects, if any, are expected to be imperceptible.

Gray comma (*Polygonia progne*) – 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 gray comma caterpillars include gooseberry (*Ribes sp.)* and rhododendron *(Rhododendron nudiflorum)* (Opler et al., 2006).

Existing Condition - Habitat for this species is present within the analysis 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 Effects – If present within the analysis area, adults could be directly impacted due to crushing or displacement during land clearing and road construction activities. Indirect impacts consist of the temporary disturbance of a small amount of edge habitat along the existing roadbeds, as well as streamside habitat at stream crossings.

Cumulative Effects – 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 areas versus the widespread availability of edge, clearing, and roadside habitat through rich deciduous forest across the forest, cumulative effects, if any, are expected to be imperceptible.

Long-tailed salamander (*Eurycea longicauda longicauda*) – 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 analysis area contains habitat (streams, seepages) for this species.

Direct and Indirect Effects – 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 would be temporarily impacted during construction activities.

Cumulative Effects – 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 analysis area during construction activities, cumulative effects to this species or its habitat are expected to be minimal.

Cerulean warbler (*Dendroica cerulea*) – 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 analysis area includes tracts of mature, deciduous forests with mesic conditions, habitat suitable for the cerulean warbler. Surveys did not locate cerulean warblers in the analysis area.

Direct and Indirect Effects – 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 two acres (Alternative B), nine acres (Alternative C), and 45 acres (Alternative D) of currently forested habitat would be disturbed. Indirect impacts would be due to the permanent loss of this habitat.

Cumulative Effects – This project would result in the loss of approximately two acres (Alternative B), nine acres (Alternative C), and 45 acres (Alternative D) of potential habitat in the area of the new road alignments. Due to the small size of the area to be impacted relative to the availability of mature deciduous habitat across the forest, cumulative effects associated with the proposed action are expected to be imperceptible.

Appalachian yellow-bellied sapsucker (*Sphyrapicus varius appalachiensis*) – 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 analysis 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 Effects – 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 two acres (Alternative B), nine acres (Alternative C), and 45 acres (Alternative D) of currently forested habitat would be disturbed. Indirect impacts would be due to the permanent loss of this habitat.

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

Warbling vireo (*Vireo gilvus*) – 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 analysis area.

Direct and Indirect Effects – Vireo gilvus is not likely to occur within the portions of the analysis area where road construction activities would occur. The portion of the analysis area supporting habitat for this species would be subject only to road reconstruction under Alternatives B and C, with no impacts to warbling vireos from new road construction under Alternatives B and C. No direct or indirect impacts are anticipated as a result of any the proposed actions under Alternatives B, C, or D.

Cumulative Effects – Due to the small size of the area to be impacted, relative to the availability of mature hardwoods and snags across the forest, and because there are no direct and indirect effects, cumulative effects associated with the proposed action are expected to be imperceptible.

/s/ *Jason Farmer*
Jason Farmer
Fisheries Biologist, Nantahala National Forest
October 17, 2011 and as Updated October 2, 2014 & June 19, 2015

Wilson T. Rankin	**Doreen Miller**
Botanist	**Wildlife Biologist**
Gary Kauffman	**April Punsalan**
Botanist	**Botanist**

Luke Decker
Detailed Wildlife Biologist

Biological Evaluation – Attachment 1: Federal proposed, endangered, threatened and Region 8 sensitive species (PETS) filtered for analysis area from Nantahala and Pisgah National Forests List.

Group	Designation	Scientific Name	Common Name	Habitat
Aquatic Species				
Crayfish	Sensitive	*Cambarus parrishi*	Hiwassee Headwaters Crayfish	Headwaters of the Hiwassee River
Botanical Species				
Vascular plant	Endangered	*Sarracenia oreophila*	Green Pitcher Plant	Low elevation Southern Appalach
Vascular plant	Threatened	*Isotria medeloides*	Small whorled Pogonia	White Pine Forest, Montane Oak-
Vascular plant	Sensitive	*Carex misera*	Miserable Sedge	High Elevation Rocky Summit, M High Elevation Granitic Dome
Vascular plant	Sensitive	*Cleistesiopsis bifaria*	Small spreading pogonia	Pine-Oak/Heath Forest or Woodla Forest
Liverwort	Sensitive	*Drepanolejeunea appalachiana*	A Liverwort	Acidic Cove, Montane Oak-Hicko Woodland, Serpentine Forest
Vascular plant	Sensitive	*Euphorbia purpurea*	Glade Spurge	Northern Hardwood Forest, Rich C oak-hickory
Vascular plant	Sensitive	*Helianthus glaucophyllus*	Whiteleaf Sunflower	Rich Cove Forest, Northern Hardw Elevation Red Oak Forest, Mesic C Roadside
Vascular plant	Sensitive	*Juglans cinerea*	Butternut	Rich Cove Forest, Mesic Oak-Hick Forest
Vascular plant	Sensitive	*Juncus caesariensis*	Rough Rush	Low elevation Southern Appalach
Hornwort	Sensitive	*Megaceros aenigmaticus*	A Hornwort	Stream
Vascular plant	Sensitive	*Monotropsis odorata*	Sweet Pinesap	Rich Cove Forest, Mesic Oak-Hick Hickory, Pine-Oak/Heath Forest
Lichen	Sensitive	*Peltigera venosa*	An Aquatic Lichen	Streams
Liverwort	Sensitive	*Plagiochila caduciloba*	A Liverwort	Spray Cliff, Streamside, Rock Out Forest in Gorge
Liverwort	Sensitive	*Plagiochila sharpii*	A Liverwort	High Elevation Rocky Summit, Ro Cove Forest in Gorge

Group	Designation	Scientific Name	Common Name	Habitat
Liverwort	Sensitive	*Plagiochila sullivantii var. sullivantii*	Sullivant's Leafy Liverwort	Spray Cliff, Spruce-Fir Forest
Vascular plant	Sensitive	*Platanthera integrilabia*	White Fringeless Orchid	High Elevation Seep, Southern Ap
Vascular plant	Sensitive	*Prenanthes roanensis*	Roan Rattlesnakeroot	Northern Hardwood Forest, Grassy Roadside, High Elevation Red Oak
Liverwort	Sensitive	*Radula sullivantii*	A Liverwort	Spray Cliff, Rock Outcrop in Acid Gorge
Vascular plant	Sensitive	*Sabatia capitata*	Rose Gentian	Glade, Pine-Oak Woodland
Vascular plant	Sensitive	*Sceptridium jenmanii*	Alabama Grape Fern	Rich Cove Forest
Vascular plant	Sensitive	*Silene ovata*	Mountain Catchfly	Rich Cove Forest, Montane Oak-H Roadside, forest associated with m
Vascular plant	Sensitive	*Thalictrum macrostylum*	Small-Leaved Meadowrue	Serpentine Woodland, Serpentine
Vascular plant	Sensitive	*Trillium pusillum var. ozarkanum*	Alabama Least Trillium	Rich Cove Forest, Mesic Oak-Hick
Vascular plant	Sensitive	*Trillium rugelii*	Southern Nodding Trillium	Rich Cove Forest
Vascular plant	Sensitive	*Trillium simile*	Sweet White Trillium	Rich Cove Forest,
Vascular plant	Sensitive	*Tsuga caroliniana*	Carolina Hemlock	Carolina Hemlock Forest, Montane Oak/Heath, High Elevation Rocky
Vascular plant	Sensitive	*Viola appalachiensis*	Appalachian Violet	Serpentine Woodland, Serpentine Forest, Mesic Oak-Hickory
Terrestrial Wildlife Species				
Mammal	Endangered	*Glaucomys sabrinus coloratus*	Carolina Northern Flying Squirrel	Mature spruce-fir and northern har above 4,000 feet
Insect	Endangered	*Microhexura montivaga*	Spruce-Fir Moss Spider	On rocks in spruce-fir forests
Mammal	Endangered	*Myotis grisescens*	Gray Bat	Roosts in caves

Group	Designation	Scientific Name	Common Name	Habitat
Mammal	Endangered	*Myotis sodalis*	Indiana Bat	Roosts in caves, hollow trees or ur in riparian areas
Mammal	Proposed	*Myotis septentrionalis*	Northern Long-eared Bat	Hibernates in caves or mines (winter this species is opportunistic, choosin snags regardless of tree species, unde cavities and crevices.
Reptile	Threatened (S/A)	*Glyptemys muhlenbergi*	Bog Turtle	Sunlit, marshy meadows, bogs, an
Mollusk	Threatened	*Patera clarki nantahala*	Noonday Globe	Cliffs; cool, wet areas under veget
Insect	Sensitive	*Callophrys irus*	Frosted Elfin	Open woods and borders, usually i plants - lupines(Lupinus) and wild
Insect	Sensitive	*Cicindela ancocisconensis*	A Tiger Beetle	High elevation forests, >4,000 feet
Amphibian	Sensitive	*Desmognathus santeetlah*	Santeetlah Dusky Salamander	Headwaters, seepage in hardwood generally higher than 2220 feet
Insect	Sensitive	*Euchlaena milnei*	Milne's Euchlaena	Unknown
Amphibian	Sensitive	*Eurycea junaluska*	Junaluska Salamander	Streams; wider, base level portions 2395'
Bird	Sensitive	*Haliaeetus leucocephalus*	Bald Eagle	Mature forests near large bodies of
Insect	Sensitive	*Melanoplus divergens*	Divergent Melanoplus	Glades and balds, 1800' - 4717'; no
Insect	Sensitive	*Melanoplus serrulatus*	Serrulate Melanoplus	Valleys and lower slopes
Mammal	Sensitive	*Microtus chrotorrhinus carolinensis*	Southern Rock Vole	Rocky areas in spruce-fir, n. hardw above 3200'
Mammal	Sensitive	*Myotis leibii*	Eastern Small-Footed Bat	Hemlock forests, rock crevices, ca buildings, above 2000 ft
Insect	Sensitive	*Nesticus cooperi*	Lost Nantahala Cave Spider	Caves
Insect	Sensitive	*Nesticus sheari*	Cave Spider	High elevation, n-facing rocky slo forest at all aspects; no records

Group	Designation	Scientific Name	Common Name	Habitat
Insect	Sensitive	*Nesticus silvanus*	Cave Spider	High elevation, n-facing rocky slo forest at all aspects; no records
Mollusk	Sensitive	*Pallifera hemphilli*	Black Mantleslug	High elevation forests, mainly spru
Mollusk	Sensitive	*Paravitrea placentula*	Glossy Supercoil	Under leaf litter on wooded hillsid
Amphibian	Sensitive	*Plethodon aureolus*	Tellico Salamander	Mixed forest, hardwood forests wi and organic soil
Amphibian	Sensitive	*Plethodon teyahalee*	Southern Appalachian Salamander	Moist forests at all elevations
Insect	Sensitive	*Scudderia septentrionalis*	Northern Bush Katydid	In the treetops of edges of broadle
Insect	Sensitive	*Semiothisa fraserata*	Fraser Fir Angle	Spruce-fir forests with fraser fir
Mammal	Sensitive	*Sorex palustris punctulatus*	Southern Water Shrew	Streambanks 12-15' wide w/rhodo hardwood or spruce-fir forests; kn mostly over 4000'
Insect	Sensitive	*Speyeria diana*	Diana Fritillary	Mature deciduous and pine woodl mostly along roadsides in coves be joe-pye-weed, ironweed, butterfly
Bird	Sensitive	*Thryomanes bewickii altus*	Appalachian Bewick's Wren	Woodland borders or openings at l
Insect	Sensitive	*Trechus luculentus unicoi*	A Ground Beetle	Beneath rocks and moss in wet rav and springs > 3000'

Biological Evaluation – Attachment 2

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 semi wooded 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 five single family residences (primitive cabins) on the LCPOA tract.

Biological Evaluation - Attachment 3

Forest Concern Species that occur in Clay and Cherokee Counties, Including Surrounding Counties

Group	Designation	Scientific Name	Common Name	Habitat
Botanical Species				
Vascular Plant	Locally Rare	*Brachyelytrum aristosum*	Northern Shorthusk	Serpentine Forest, Northern Hardwood Forest, Rich Cove Forest
Vascular Plant	Locally Rare	*Calamagrostis porteri*	Porter's Reedgrass	Serpentine Woodland, Montane Oak-Hickory Forest
Vascular Plant	Locally Rare	*Campanula aparinoides*	Marsh Bellflower	Southern Appalachian Bog, Wet Meadow
Vascular Plant	Locally Rare	*Carex cherokeensis*	Cherokee Sedge	Montane Alluvial Forest, Roadside, Rich Cove Forest
Vascular Plant	Locally Rare	*Carex oligocarpa*	Few-Fruited Sedge	Rich Cove Forest
Vascular Plant	Locally Rare	*Carex projecta*	Necklace Sedge	High Elevation Seep, Southern Appalachian Bog, Marsh, Wetland
Vascular Plant	Locally Rare	*Carex purpurifera*	Purple Sedge	Rich Cove Forest, Montane Alluvial Forest
Vascular Plant	Locally Rare	*Carex woodii*	Wood's Sedge	Northern Hardwood Forest, Rich Cove Forest, Acidic Cove Forest, Mesic Oak-Hickory
Liverwort	Locally Rare	*Cephaloziella spinicaulis*	A liverwort	High Elevation Rocky Summit
Vascular Plant	Locally Rare	*Crocanthemum propinquum*	Creeping Sunrose	Glade, Southern Appalachian Fen, Montane Acidic Cliff
Vascular Plant	Locally Rare	*Cypripedium parviflorum var. parviflorum*	Small Yellow Lady's-Slipper	High Elevation Red Oak Forest
Vascular Plant	Locally Rare	*Deschampsia cespitosa ssp. glauca*	Tufted Hairgrass	Serpentine Woodland, Serpentine Forest
Vascular Plant	Locally Rare	*Elymus trachycaulus ssp. trachycaulus*	Slender Wheatgrass	Serpentine Woodland
Vascular Plant	Locally Rare	*Frasera caroliniensis*	Columbo	Rich Cove Forest, Mesic Oak-Hickory Forest
Vascular Plant	Locally Rare	*Gentianopsis crinita*	Fringed Gentian	Serpentine Woodland, Glade
Vascular Plant	Locally Rare	*Hackelia virginiana*	Virginia Stickseed	Woods and thickets, circumneutral soils
Vascular Plant	Locally Rare	*Helenium brevifolium*	Littleleaf Sneezeweed	Southern Appalachian Bog, Wet Meadow, Seeps, Riverbanks
Vascular Plant	Locally Rare	*Hexalectris spicata*	Crested Coralroot	Rich Cove Forest, Glade, Mesic Oak-Hickory, mafic rock
Vascular Plant	Locally Rare	*Houstonia longifolia var. glabra*	Granite Dome Bluet	High Elevation Granitic Dome
Vascular Plant	Locally Rare	*Liparis loeselii*	Fen Orchid	Seep, Roadside
Nonvascular Plant	Locally Rare	*Macrocoma sullivantii*	Macrocoma Moss	Montane Cedar Hardwood Forest, Pine-Oak/Heath Forest
Vascular Plant	Locally Rare	*Muhlenbergia glomerata*	Bristly Muhly	Serpentine Woodland, Southern Appalachian Fen, Montane Mafic Cliff

Group	Designation	Scientific Name	Common Name	Habitat
Vascular Plant	Locally Rare	*Oenothera perennis*	Perennial Sundrops	Southern Appalachian Bog, Roadside
Vascular Plant	Locally Rare	*Packera paupercula var. appalachiana*	Prairie Ragwort	Serpentine Woodland, Serpentine Forest, Montane Mafic Cliff, Montane Calcareous Cliff
Vascular Plant	Locally Rare	*Parnassia grandifolia*	Large-Leaved Grass-Of-Parnassus	Seep, Fen, Serpentine Woodland, Roadside, mafic rock
Vascular Plant	Locally Rare	*Pedicularis lanceolata*	Swamp Lousewort	Serpentine Woodland, Southern Appalachian Bog, Seep, Swamp, Wet Meadow
Liverwort	Locally Rare	*Plagiochila ludoviciana*	A liverwort	Rock outcrop in Acidic Cove forest in Gorge
Vascular Plant	Locally Rare	*Platanthera flava var. herbiola*	Northern Green Orchid	Southern Appalachian Bog, Swamp Forest-Bog Complex
Vascular Plant	Locally Rare	*Platanthera grandiflora*	Large Purple-Fringed Orchid	High Elevation Seep, Grassy Bald, Roadside, Northern Hardwood Forest, Southern Appalachian Bog
Vascular Plant	Locally Rare	*Platanthera peramoena*	Purple Fringeless Orchid	Southern Appalachian Bog, Seep, Marsh
Vascular Plant	Locally Rare	*Poa saltuensis*	A Bluegrass	Serpentine Woodland, Serpentine Forest
Vascular Plant	Locally Rare	*Ranunculus fascicularis*	Early Buttercup	Roadside, Serpentine Woodland
Nonvascular Plant	Locally Rare	*Scopelophila ligulata*	Copper Moss	Copper-rich Soils, Roadsides
Vascular Plant	Locally Rare	*Smilax hugeri*	Huger's Carrion-Flower	Rich Cove Forest, Mesic Oak-Hickory, mafic rock
Vascular Plant	Locally Rare	*Solidago uliginosa*	Bog Goldenrod	High Elevation Seep, Southern Appalachian Bog
Vascular Plant	Locally Rare	*Spiranthes lacera var. lacera*	Northern Slender Ladies-Tresses	Balds
Vascular Plant	Locally Rare	*Sporobolus heterolepis*	Prairie Dropseed	Serpentine Woodland
Vasular Plant	Locally Rare	*Stewartia ovata*	Mountain Camellia	Acidic Cove Forest, Alluvial Forest
Vascular Plant	Locally Rare	*Symphyotrichum rhiannon*	Rhiannon's Aster	Serpentine Barren
Vascular Plant	Locally Rare	*Symphyotrichum shortii*	Short’s Aster	Dry rocky slopes
Vascular Plant	Locally Rare	*Trientalis borealis*	Starflower	Northern Hardwood Forest, Rich Cove Forest
Terrestrial Species				
Bird	Locally rare	*Aegolius acadicus pop. 1*	Northern Saw-Whet Owl-So. Appal.	spruce-fir forests or mixed hardwood/spruce forests for nesting; over 5000'

Group	Designation	Scientific Name	Common Name	Habitat
Amphibian	Locally rare	*Ambystoma talpoideum*	Mole Salamander	Floodplains, bottomlands;breeds in fish-free semipermanent woodland ponds; forages in adjacent woodlands
Amphibian	Locally rare	*Aneides aeneus*	Green Salamander	shady, moist, granite-gneiss rock outcrops with abundant connecting crevices
Mollusk	Locally rare	*Appalachina chilhoweensis*	Queen Crater	under leaf litter and rock piles in deciduous forests; no actual records
Invertebrate Animal	Locally rare	*Autochton cellus*	Golden Banded Skipper	moist woods near streams or ponds; nectar -- blackberry, trailing arbutus, hollyhock and abelia; host -- legumes, mainly hog peanut
Bird	Locally rare	*Catharus guttatus*	Hermit Thrush	spruce-fir forest for nesting
Invertebrate Animal	Locally rare	*Celastrina nigra*	Dusky Azure	rich, moist deciduous forests; nectar - wild geranium; host - goat's beard
Invertebrate Animal	Locally Rare	*Chlosyne gorgone*	Gorgone Checkerspot	dry, sand hill pine oak woodland
Bird	Locally rare	*Dendroica cerulea*	Cerulean Warbler	mature hardwood forests; steep slopes and coves in mountains
Bird	Locally rare	*Dendroica magnolia*	Magnolia Warbler	spruce-fir forests, especially in immature stands, breeding season only
Invertebrate Animal	Locally rare	*Eulonchus marialicia*	Mary Alice's Small-Headed Fly	high elevation, nectaring on rubus
Invertebrate Animal	Locally rare	*Euphydryas phaeton*	Baltimore Checkerspot	wet meadows, herbaceous wetlands
Amphibian	Locally rare	*Eurycea longicauda longicauda*	Long-Tailed Salamander	streams, seeps, springs in moist woods and floodplains; breeds in streams/ponds
Mollusk	Locally rare	*Glyphyalinia junaluskana*	Dark Glyph	moist leaf litter in deciduous woods on mountainsides
Mollusk	Locally rare	*Glyphyalinia pentadelphia*	Pink Glyph	pockets of moist leaves in upland woods; no actual records
Mollusk	Locally rare	*Haplotrema kendeighi*	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	*Helicodiscus bonamicus*	Spiral Coil	leaf litter on wooded hillsides
Mollusk	Locally rare	*Helicodiscus fimbriatus*	Fringed Coil	leaf litter and under rocks on wooded hillsides, crevices in slates; no actual records
Invertebrate Animal	Locally rare	*Hepialus sciophanes*	A Ghost Moth	spruce-fir forest
Mollusk	Locally rare	*Inflectarius ferrissi*	Smokey Mountain Covert	moss covered boulderfields; spruce-fir forest; under rock ledges and boulders with seepages
Invertebrate Animal	Locally rare	*Itame subcessaria*	Barred Itame	high elevation forests with gooseberry

Group	Designation	Scientific Name	Common Name	Habitat
Mollusk	Locally rare	*Melanoplus cherokee*	Cherokee Melanoplus	woodlands, 1800' - 5100'; no records
Invertebrate Animal	Locally rare	*Melanoplus viridipes eurycerus*	Green-Legged Melanoplus	woodlands and forest edges; no records
Invertebrate Animal	Locally rare	*Nesticus species 2*	An Undescribed Nesticus Spider	small rocks scattered over n-facing cove forests, southwest-facing talus fields
Invertebrate Animal	Locally rare	*Papilio cresphontes*	Giant Swallowtail	primarily coastal in maritime forests or thickets; host plants - prickly ash (Zanthoxylum), hoptree (Ptelea)
Mollusk	Locally rare	*Paravitrea lacteodens*	Ramp Cove Supercoil	leaf litter in mesic coves
Mollusk	Locally rare	*Paravitrea lamellidens*	Lamellate Supercoil	deep moist leaf litter on wooded hillsides and ravines; no actual records
Mollusk	Locally rare	*Paravitrea umbilicaris*	Open Supercoil	deep, moist leaf litter on wooded hillsides
Mollusk	Locally rare	*Patera clarki clarki*	Dwarf Proud Globe	Rich cove forest, high elevation red oak forest, leaf litter on mountainsides; no actual records
Invertebrate Animal	Locally rare	*Phyciodes batesii maconensis*	Tawny Crescent	dry hillsides, upland pastures; host plants - Aster undulatus, Andropogon sp.
Invertebrate Animal	Locally rare	*Polygonia progne*	Gray Comma	rich deciduous forests; host plants - mainly gooseberries (Ribes), but also on wild azalea (Rhododendron nudiflorum)
Mammal	Locally rare	*Sorex dispar*	Rock Shrew	high elevation forests with talus or rocky slopes, also man-made talus; > 3500'
Mammal	Locally rare	*Corynorhinus rafinesquii rafinesquii*	Rafinesque's Big-Eared Bat	Roosts in old buildings, caves, and mines, under loose bark, usually near water
Bird	Locally rare	*Sphyrapicus varius appalachiensis*	Appalachian Yellow-Bellied	mature, open hwds. with scattered dead trees above 3500', breeding season only
Reptile	Locally Rare	*Sternotherus minor*	Loggerhead Musk Turtle	streams and rivers in the Mississippi drainage
Bird	Locally rare	*Vermivora pinus*	Blue-Winged Warbler	low elevation (below 3000') brushy fields and thickets, breeding season only
Bird	Locally rare	*Vireo gilvus*	Warbling Vireo	open groves of hardwoods along rivers and streams below 3000'
Mollusk	Locally rare	*Zonitoides patuloides*	Appalachian Gloss	deep, moist leaf litter on mountainsides or in ravines, beneath bark of logs; no records
Aquatic Species				
Mayfly	Locally rare	*Baetopus trishae*	A Mayfly	no habitat data available

Group	Designation	Scientific Name	Common Name	Habitat
Amphibian	Locally rare	*Cryptobranchus alleganiensis*	Hellbender	large, clear, fast-flowing streams
Fish	Locally rare	*Erimystax insignis*	Blotched Chub	French Broad River drainage
Mayfly	Locally rare	*Habrophlediodes spp*	A Mayfly	no habitat data available
Caddisfly	Locally rare	*Micrasema burksi*	A Caddisfly	no habitat data available
Fish	Locally rare	*Moxostoma species 1*	Sicklefin Redhorse	Little Tennessee and Hiwassee drainages
Caddisfly	Locally rare	*Rhyacophila amicus*	A Caddisfly	no habitat data available
Dragonfly	Locally rare	*Somotochlora elongata*	Ski-Tailed Emerald	no habitat data available
Mussel	Locally rare	*Villosa iris*	Rainbow	Little Tennessee and Hiwassee drainages

Biological Evaluation Attachment - 4. References and Data Sources

Aquatic

Bacon, J.R. and R.P. Maas. 1979. Contamination of Great Smoky Mountains trout streams by exposed anakeesta formation. Journal of Environmental Quality. 8: 538-543.

Bonner, W.R. 1983. Survey and classification of state-managed trout streams: district 9. Mountain Fish. Invest. Federal Aid in Fish Restoration Project F24-S. 313 pp.

Bryan, S.A., J.D. Riley, and D.M Hill. 2004. NFMA Monitoring Report for Aquatic Resources of the Nantahala and Pisgah National Forests (unpublished).

Ratzlaff, Allen. US Fish and Wildlife Service, 160 Zillicoa St., Asheville, NC, 28801.

Daniels, W.L., and Z.W. Orndorff. 2003. Acid rock drainage from highway and construction activities in Virginia, USA. In "Proceedings, 6th International Conference on Acid Rock Drainage." Cairns, Qld. (Ed. C Bell) pp 479-487. (Australian Institute of Mining and Metallurgy: Carlton, Vic.).

Durkin, P.R. 2003a. Glyphosate – Human health and ecological risk assessment-final report. Syracuse Environmental Research Associates, Inc. SERA TR 02-43-09-04a.

Durkin, P.R. 2003b. Triclopyr – Revised human health and ecological risk assessments-final reports. Syracuse Environmental Research Associates, Inc. SERA TR 02-43-13-03b.

Durkin, P.R. 2004. Imazapic – Human health and ecological risk assessment – final report. Syracuse Environmental Research Associates, Inc. SERA TR 04-43-17-04b.

Etnier, D.A. and W.C. Starnes. 1993. The fishes of Tennessee. The University of Tennessee Press, Knoxville, Tennessee. 681 pages.

Hillis, R.E. and E.D. Bellis. 1971. Some aspects of the ecology of the hellbender, *Cryptobranchus alleganiensis alleganiensis*, in a Pennsylvania stream. Journal of Herpetology 5(3-4):121-126.

Hobbs, H.H. Jr. 1989. An illustrated checklist of the American crayfishes (Decapoda: Astacidae, Cambaridae, and Parastacidae). Smithsonian Contributions to Zoology Number 480. 236 pp.

Huckabee, J.W., C.P. Goodyear, R.D. Jones. 1975. Acid rock in the Great Smokies: Unanticipated impact on aquatic biota of road construction in regions of sulfide mineralization. Transactions of the American Fisheries Society. 104:677-684.

Jenkins, R.E. and N.M. Burkhead. 1994. Freshwater fishes of Virginia. American Fisheries Society, Bethesda, Maryland. 1079 pages.

Kohler, C.C. and W.A. Hubert, editors. 1993. Inland fisheries management in North America. American Fisheries Society, Bethesda, Maryland. 594 pages.

Kucken, D.J., J.S. Davis, J.W. Petranka, and C.K. Smith. 1994. Anakeesta stream acidification and metal contamination: effects on a salamander community. Journal of Environmental Quality. 23: 1311-1317.

Mathews, R.C., and E.L. Morgan. 1982. Toxicity of anakeesta formation leachates to shovel-nosed salamander, Great Smoky Mountains National Park. Journal of Environmental Quality. 11: 102-106.

Meehan, W. R. (editor) 1991. Influences of forest and rangeland management on salmonid fishes and their Habitat Components. American Fisheries Special Publication #19, Bethesda, Maryland. 751 pages.

Menhinick, E. F. 1991. Freshwater fishes of North Carolina. North Carolina Wildlife Resources Commission Publication, Raleigh, North Carolina. 227 pages.

Merritt, R.W. and K.W. Cummins. 1996. An introduction to the aquatic insects of North America, third edition. Kendall/Hunt Publishing Company, Dubuque, Iowa. 962 pages.

Moran, J.D., C.N. Roghair. 2005. Stream channel and habitat attributes in the National Forests in North Carolina before and after the hurricane flooding events of 2004. Center for Aquatic Technology Transfer, U.S. Forest Service, pp 192-195 and 200-203.

The Nature Conservancy. 1999. Natural Heritage Conservation Databases. Accessed by USDA Forest Service under Grant no. 97-CCS-230.

North Carolina Natural Heritage Program. 2013. Biological Conservation Data. Computerized database.

NCDENR. 2005. Basinwide assessment report – Little Tennessee River Basin. North Carolina Department of Environment and Natural Resources, Division of Water Quality.

Ridout, S. 2002. Unpublished data. Department of Biology, Virginia Commonwealth University. Richmond, Virginia.

Swift, L.W. 1985. Forest road design to minimize erosion in the southern Appalachians. In: Blackmon, B.G., ed. Proceedings of forestry and water quality: a mid-south symposium. Monticello, AR: University of Arkansas. 141-151.

Swift, L.W. 1986. Filter strip widths for forest roads in the southern Appalachians. Southern Journal of Applied Forestry 10: 27-34.

Waters, T.F. 1995. Sediment in streams: sources, biological effects, and control. American Fisheries Society Monograph 7, Bethesda, Maryland. 251 pages.

Wohl, D.L., J.B. Wallace, and J.L. Meyer. 1995. Benthic macroinvertebrate community structure, function, and production with respect to habitat type, reach and drainage basin in the southern Appalachians (U.S.A.). Freshwater Ecology. 34: 447-464.

Botanical

Dodson, Stanley I., Timothy F. H. Allen, Stephen R. Carpenter, Anthony R. Ives, Robert L. Jeanne, James F. Kitchell, Nancy E. Langston, and Monica G. Turner. 1998. Ecology. Oxford University Press, New York. 434 pp.

Elliot, K. J., L. R. Boring, W. T. Swank, B. R. Haines. 1997. Successional changes in plant species diversity and composition after clearcutting a Southern Appalachian watershed. Forest Ecol. Manage. **92**:67-85.

Elliot, K. J., W. T. Swank. 1994. Changes in tree species diversity after successive clearcuts in the Southern Appalachians. Vegetatio **115**: 11-18.

Franklin, Misty A., and John T. Finnegan. 2010. Natural Heritage Program List of Rare plant species of North Carolina. North Carolina Natural Heritage Program, N.C. Department of Environment and Natural Resources, Raleigh, North Carolina. 136 pp.

Godfrey, R. K., J. W. Wooten. 1979. Aquatic and wetland plants of southeastern United States: Monocotyledons. University of Georgia Press, Athens, GA. 712 pp.

Goff, F. G., G. A. Dawson, J. J. Rochow. 1982. Site examination for threatened and endangered plant species. Environ. Manage. **6**: 307-316.

Harrelson, S. M., G. R. Matlack. 2006. Influence of stand age and physical environment on the herb composition of second-growth forest, Strouds Run, Ohio, USA. Journal of Biogeography. *In press.*

Harrod, J., P. S. White, M. E. Harmon. 1998. Changes in xeric forests in western Great Smoky Mountains National Park, 1936-1995. Castanea **63**: 454-360.

Hicks, M. L. 1992. Guide to the Liverworts of North Carolina. Duke University Press, Durham, NC. 239 pp.

Hicks, M. L. and J. L. Amoroso. 1996a. Bryophyte status survey: *Megaceros aenigmaticus* Schuster: Brief report recommending 3C status. NC Natural Heritage Program and Endangered Species Field Office, US Fish and Wildlife Service. Raleigh and Asheville, North Carolina. Revised 1997. 16 pp.

Meier, A. J., S. P. Bratton. 1996. Disturbance Dynamics in the Chattooga Watershed. Unpublished report submitted to the United States Forest Service, Atlanta, Ga.

Miller, J. H. 2003. Nonnative invasive plants of southern forests: a field guide for identification and control. Gen. Tech. Rep. SRS-62. Asheville, NC: USDA, Forest Service, Southern Research Station. 93 pp.

NatureServe: An online encyclopedia of life. 20**12**. Version 1.2. Arlington, Virginia, USA: Association for Biodiversity Information. Available: http://www.NatureServe.org/.

Odum, E. P. 1971. Fundamentals of Ecology (Third Edition). Saunders, New York, NY.

Peet, R. K., N. L. Christensen. 1987. Competition and tree death. BioScience **37**: 586-594.

Radford, A. E., H. E. Ahles, C. R. Bell. 1968. *Manual of the Vascular Flora of the Carolinas.* University of North Carolina Press, Chapel Hill, North Carolina.

Rankin, W. T., Elliot J. Tramer. 2002. Understory succession and the gap regeneration cycle in a *Tsuga canadensis* forest. Canadian Journ. Forest Research. **32**: 16-23.

Schafale, M. P, A. S. Weakley. 1990. *Classification of the Natural Communities of North Carolina: Third Approximation.* North Carolina Natural Heritage Program, Raleigh, NC.

Schuster, R. M. 1980. *The Hepaticae and Anthocerotae of North America east of the hundredth meridian, volume IV*. Columbia University Press, New York, NY. 1334 p.

Trombulak, S. C, C. A. Frissell. 2000. Review of ecological effects of roads on terrestrial and aquatic communities. Conservation Biology **14**: 18-30.

United States Forest Service. 2001. Biological Conservation Database. Internal Database, National Forests in North Carolina, Asheville, NC. (Accessed March, 2006)

United States Forest Service. 2012. Endangered, Threatened, Proposed, Sensitive and Forest Concern Species. Internal Document, National Forests in North Carolina, Asheville, NC.

Weakley, Alan S. 2011. *Flora of the Southern and Mid-Atlantic States (Working Draft of 15 May, 2011).* University of NC Herbarium, University of NC at Chapel Hill, Chapel Hill, North Carolina. 1072 p.

Williamson, M. 1996. *Biological Invasions*. Chapman & Hall, London.

Wildlife

Braswell, Alvin L. 1989. Conservation status of North Carolina amphibians and reptiles. Scientific council report to the Nongame Advisory Committee.

Clark, Mary Kay, ed. 1987. Endangered, threatened, and rare fauna of North Carolina. Part 1. A reevaluation of the mammals. Occ. Papers of the North Carolina Biological Survey 1987-3. 50 pp.

Gatrelle, Ronald R. 1998. Two new Nymphalidae from western North Carolina: New subspecies of *Speyeria aphrodite* and *Phyciodes batesii*. The taxonomic report of the international lepidoptera survey. Volume 1. Number 3.

Lee, David S. and James F. Parnell. Endangered, threatened, and rare fauna of North Carolina. Part Ill. A re- evaluation of the birds. Occasional Papers of the North Carolina Biological Survey 1990-1.

Martof, Bernard S., William M. Palmer, Joseph R. Bailey, and Julian R. Harrison 111. 1980. Amphibians and reptiles of the Carolinas and Virginia, U.N.C. Press, Chapel Hill, N.C. 264 pp.

Sever, David M., H.A. Dundee, and C.D. Sullivan. 1976. A new Eurycea (Amphibia: Plethodontidae) from southwestern North Carolina. Herpetologica 32:26-29.

Vanderah, Glenda C. and Scott K. Robinson. 1992. Distribution and habitat selection of the Cerulean Warbler (Dendroica cerulea) in s. Illinois. Report submitted to the Audubon Council of Ill. 1 0 pp.

Webster, Wm. David, James F. Parnell, and Walter C. Biggs, Jr. 1985. Mammals of the Carolinas, Virginia, and Maryland. U. of North Carolina Press, Chapel Hill and London. 255 pp.

Biological Evaluation - Attachment 5a: Endangered, threatened and sensitive aquatic species, Nantahala National Forest.

USFS Status	Type	Species	Habitat/Distribution
Endangered/ Threatened	Bivalve	*Alasmidonta raveneliana*	Little Tennessee River drainage and Tuckaseegee River; Nolichucky River
	Bivalve	*Pegias fabula*	Lower Little Tennessee River; historic record from Valley River, Cherokee Co.
	Bivalve	*Villosa trabalis*	Hiwassee River, below Appalachia Dam
	Fish	*Erimonax monachus*	Little TN River; French Broad River system
Sensitive	Bivalve	*Fusconaia barnesiana*	Lower Little TN River and Hiwassee River
	Bivalve	*Lasmigona holstonia*	Valley River, Historic Record, Cherokee Co.
	Crustacean	*Cambarus georgiae*	Streams in Little TN River, Macon Co.
	Crustacean	*Cambarus parrishi*	Streams in Hiwassee River drainage
	Crustacean	*Cambarus reburrus*	Tributary to Horsepasture River, Transylvannia Co.; upper French Broad River
	Crustacean	*Cambarus chaugaensis*	Streams in Savannah River drainage, Jackson, Macon, and Transylvannia Co.; SC and GA
	Dragonfly	*Macromia margarita*	Rivers, Macon, Swain, Transylvannia Co.; Caldwell Co.
	Fish	*Etheostoma vulneratum*	Large streams and rivers, Little TN River system, Jackson, Macon, Swain Co.; Cheoah River, Graham
	Fish	*Percina squamata*	Higher gradient upland rivers, Tennessee River system, Cherokee, Jackson, Macon, Swain Co.
Forest Concern	Amphibian	*Cryptobranchus alleganiensis*	Rivers and large streams, TN and Savannah River systems
	Amphibian	*Necturus maculosus*	Wayah Cr, Cullasaja R. - Macon, Fires Creek - Clay
	Bivalve	*Alasmidonta viridis*	Little Tennessee River, Macon, Swain Co.
	Bivalve	*Elliptio dilatata*	Little TN and Hiwassee Rivers, Cherokee, Swain Co.; New River; Macon, Swain

USFS Status	Type	Species	Habitat/Distribution
	Bivalve	*Fusconaia subrotunda*	Cherokee, Clay Counties, Macon, and Swain
	Bivalve	*Lampsilis fasciola*	Little TN, French Broad and Pigeon Rivers, historic records ; Cherokee, Clay, Graham, Jackson, Macon, Swain
	Bivalve	*Pleurobema oviforme*	Little TN and Hiwassee drainages, Cherokee, Clay, Macon, Swain Co.
	Bivalve	*Villosa vanuxemensis*	Hiwassee River system, Cherokee and Clay Co.; French Broad River system
	Bivalve	*Villosa iris*	Little TN and Hiwassee Rivers, Martin and Brasstown Crks; French Broad R.; Cherokee, Clay, Jackson, Macon, Swain
	Crustacean	*Cambarus carolinus*	Little Tennessee River & Hiwassee River drainages. Burrowing species; bogs, and edges of small spring-fed streams; within 10 feet of standing water.
	Crustacean	*Cambarus sp. A*	Streams in Hiwassee & New River drainages. Riffles of large streams and rivers.
	Crustacean	*Cambarus tuckasegee*	Streams in Tuckasegee River watershed; Jackson and Macon Counties
	Crustacean	*Skistodiaptomus carolinensis*	Lake Ravenel, Macon Co.
	Dragonfly	*Ladona julia*	Bogs and marshes in Tuckasegee River watershed; Jackson County
	Fish	*Clinostomus funduloides sp. 1*	Little TN River drainage and Hiwassee River watershed; Cherokee, Clay,Graham, Jackson, Macon, and Swain Co.
	Fish	*Cyprinella spiloptera*	Moderate to large streams in Cherokee & Macon Counties.
	Fish	*Erimystax insignis eristigma*	Hiwassee River, Cherokee and Clay Co.
	Fish	*Etheostoma inscriptum*	Large streams in Savannah River system; Jackson and Macon Counties
	Fish	*Luxilis chrysocephalus*	Reported in Little TN River system and Hiwassee River watershed; Cherokee, Clay, Macon, Swain, Jackson Co.; Cane River system
	Fish	*Moxostoma breviceps*	Cherokee, Jackson, Macon and Swain Counties

USFS Status	Type	Species	Habitat/Distribution
	Fish	*Moxostoma sp. 2*	Little TN and Hiwassee River drainages – Cherokee, Clay, Jackson, Macon, Swain
	Fish	*Moxostoma carinatum*	Hiwassee River & Little Tennessee River, Cherokee, Graham, & Macon
	Fish	*Notropis micropteryx*	Cheerokee, Jackson, Macon and Swain County
	Fish	*Notropis lutipinnis*	Savannah and Little TN River systems, Jackson and Transylvannia Co.; Broad River system
	Fish	*Notropis volucellus*	Tuckasegee River; Jackson, Macon, Swain Counties
	Fish	*Noturus flavus*	Warmwater streams and rivers, Little TN River drainage, Macon and Swain Co.; Nolichucky and French Broad River systems
	Gastropod	*Elimia christyi*	Hiwassee River and tributaries (Cherokee County)
	Mayfly	*Barbaetis benfieldi*	Tuckasegee River watershed; Jackson County
	Stonefly	*Megaleuctra williamsae*	UT Cullasaga River, Macon Co.; Mull Crk, Jackson Co.; Cove Crk, Haywood Co.; Swain Co.
	Stonefly	*Zapada chila*	Small streams, Beech Flat Prong, Tuckasegee River watershed - Swain Co.; Ashe Co.

Attachment 5b: Endangered, threatened, sensitive, and forest concern aquatic species evaluated for the Laurel Creek Property Owners Association Project. This analysis includes known and potentially occurring rare aquatic species from Clay Counties, NC, and the Hiwassee River systems. Potential occurrence is based on known distributions of the species and the presence of suitable habitat.

Type	**Name**	**Likelihood of Occurrence in Analysis Area**
Threatened and Endangered Species		
Mollusk	*Alasmidonta raveneliana*	Does not occur[3]
Mollusk	*Pegias fabula*	Does not occur[3]
Fish	*Erimonax monachus*	Does not occur[3]
Sensitive Species		
Crustacean	*Cambarus parrishi*	May occur[2]
Mollusk	*Fusconaia barnesiana*	Does not occur[3]
Forest Concern Species		
Amphibian	*Cryptobranchus alleganiensis*	May occur[2]
Amphibian	*Necturus maculosus*	May occur[2]
Mollusk	*Fusconaia subrotunda*	Does not occur[3]
Mollusk	*Lampsilis fasciola*	Does not occur[3]
Mollusk	*Pleurobema oviforme*	Does not occur[3]
Mollusk	*Villosa vanuxemensis*	Does not occur[3]
Mollusk	*Villosa iris*	Does not occur[3]
Crustacean	*Cambarus carolinus*	Not likely to occur[1]
Crustacean	*Cambarus sp. A*	May occur[2]
Fish	*Clinostomus funduloides sp. 1*	May occur[2]
Fish	*Erimystax insignis eristigma*	Does not occur[3]
Fish	*Luxilis chrysocephalus*	Does not occur[3]
Fish	*Moxostoma sp. 2*	Does not occur[3]

Notes:

1 = No suitable habitat present or vicinity records in the analysis area, but the species may be present in the county.
2 = Suitable habitat present, but no vicinity records.
3 = Vicinity records, in or downstream of the analysis area, but not necessarily in project area.

Biological Evaluation - Attachment 6: Endangered, threatened and sensitive plant species, Pisgah and Nantahala National Forests.

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

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

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

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

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

Biological Evaluation - Attachment 7: Endangered, threatened and sensitive terrestrial wildlife species, Nantahala and Pisgah National Forests.

Species	Type	Habitat
Federally Listed Threatened and Endangered Species		
Microhexura montivaga Spruce-fir moss spider	Arachnid	In moss of spruce-fir forests (endemic to NC & adjacent TN)
Glaucomys sabrinus coloratus Carolina northern flying squirrel	Mammal	High elevation forest, mainly spruce-fir and northern hardwood above 4,000’
Myotis grisescens Gray bat	Mammal	Roosts in caves; forages mainly over open water
Myotis sodalis Indiana bat	Mammal	Roosts in hollow trees and under loose bark and snags (warmer months); in caves (winter months)
Patera clarki nantahala Noonday globe	Terrestrial Gastropod	Nantahala Gorge (endemic to this site in Swain Co)
Regional Forester’s Sensitive Species		
Desmognathus santeetlah Santeetlah dusky salamander	Amphibian	Stream headwaters and seepage areas; southwestern mountains
Eurycea junaluska Junaluska salamander	Amphibian	Forests near seeps and streams in the Cheoah River system
Plethodon aureolus Tellico salamander	Amphibian	Forests in the Unicoi Mountains
Plethodon teyahalee Southern Appalachian salamander	Amphibian	Moist forests at all elevations
Nesticus cooperi Lost Nantahala cave spider	Arachnid	Caves and along Nantahala River (apparently endemic to this area)

Nesticus mimus a cave spider	Arachnid	Rocky areas; known from Grandfather Mountain and Table Rock; also in VA
Nesticus sheari a cave spider	Arachnid	On ground in moist or rich forests (apparently endemic to Graham Co); Known from Joyce Kilmer Wilderness & Wright Creek
Nesticus silvanus a cave spider	Arachnid	Habitat not indicated (apparently endemic to southern mountains); Known from Water Rock Knob, Jackson County at 5,800'; Ellijay Creek, Macon County at 2,500'; Steestachee Bald, Haywood County at 4,799'
Falco peregrinus Peregrine falcon	Bird	Cliffs (for nesting); coastal ponds and mudflats (for foraging in winter)
Haliaeetus leucocephalus Bald eagle	Bird	Mature forests near large bodies of water (for nesting); lakes and sounds
Thryomanes bewickii altus Appalachian Bewick's wren	Bird	Woodland borders or openings, farmlands or brushy fields at high elevations [breeding season only]
Trechus carolinae a ground beetle	Beetle	Black Mountains (endemic to NC); Known from the summit of Mt. Mitchell
Trechus luculentus unicoi a ground beetle	Beetle	Apparently the mountains of Graham Co; known from Clingman's Dome in Swain Co, Haw Knob and Laurel Top in Monroe Co, TN and Graham Co, NC above 5,200'
Trechus mitchellensis a ground beetle	Beetle	Black Mountains (endemic to NC); Known from Celo Mountain and Mt. Mitchell, Yancey Co, Balsam Gap, Buncombe Co, and Pinnacle Mountain, McDowell Co usually between 5,000-5,500'
Trechus rosenbergi a ground beetle	Beetle	Plott Balsam and Great Balsam mountains (endemic to NC); Known from Water Rock Knob, Haywood & Jackson Counties and Richland Balsam, Haywood Co above 6,000'
Trechus satanicus a ground beetle	Beetle	Vicinity of Devils Courthouse and Graveyard Fields (endemic to NC)
Callophrys irus Frosted elfin	Butterfly	Open woods and borders, usually in dry situations; host plants: lupines (*Lupinus*) and wild indigos (*Baptisia*)
Speyeria diana Diana fritillary	Butterfly	Montane and foothill forest edges and openings; host plant: violets (*Viola*)
Melanoplus divergens Divergent melanoplus	Grasshopper/ Katydid	Glades and balds, 1,800-4,717'
Melanoplus serrulatus Serrulate melanoplus	Grasshopper/ Katydid	Valley and lower slopes in the Nantahala Mountains
Scudderia septentrionalis Northern bush katydid	Grasshopper/ Katydid	Mature oak, hickory, and maple forests
Euchlaena milnei Milne's euchlaena	Moth	Habitats uncertain but are probably riparian (Graham)
Semiothisa fraserata Fraser fir geometrid moth	Moth	Spruce-fir forests with Fraser fir
Microtus chrotorrhinus carolinensis Southern rock vole	Mammal	Rocky areas at high elevations, forests or fields
Myotis leibii Eastern small-footed bat	Mammal	Roosts in hollow trees and in rock crevices (warmer months), in caves and mines (winter)
Sorex palustris punctulatus Southern water shrew	Mammal	Stream banks in montane forest with rhododendron cover
Pallifera hemphilli Black mantleslug	Terrestrial Gastropod	High elevation forests, mainly spruce-fir
Paravitrea placentula Glossy supercoil	Terrestrial Gastropod	Leaf litter on wooded hillsides and ravines
Glyptemys muhlenbergii Bog turtle	Reptile	Bogs, wet pastures, wet thickets

Appendix 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 semi wooded 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 five single family residences (primitive cabins) on the LCPOA tract.

Appendix 4: Response to Comments

Introduction

On October 2, 2014 an Environmental Assessment (EA) for the *Laurel Creek Property Owners Association Access Across National Forest System Lands Project* was made available to the general public and the Forest Service invited comments on the proposed action. The legal notice starting the 30 day notice and comment period was published in the *Asheville Citizen Times* on October 2, 2014. A total of 40 comments were received via mail, email, facsimile, and telephone.

While every comment was read and its contents summarized for analysis, the volume of correspondence - - and in many cases the similarity of opinion expressed by interested individuals - - precludes a specific response for each comment. Accordingly, comments are grouped together by topic for response. Comments received from the public are presented in plain text and the Forest Service response is in italics.

Comment: Concern over potential degradation of water quality.

Forest Service Response: *Potential effects to water quality are presented in Sections 3.3 and 3.8 of the EA. Proposed road reconstruction and construction activities would conform to Best Management Practices to control nonpoint-source water pollution and the effects are not anticipated to result in a violation of any state, federal or local thresholds because they are short-term in nature, limited in their spatial extent, and because of Forest Service experience with other similar projects.*

Comment: Concern over potential degradation of scenery.

Forest Service Response: *Potential effects to scenery are presented in Section 3.2 of the EA. Alternatives A and B would meet visual quality objectives (VQOs) and be consistent with other aspects of the Forest Plan with regards to scenery. Alternatives C and D would not meet VQOs and would require an amendment to the Forest Plan to be selected.*

Comment: Concern that the project could result in markedly increased traffic flow in the area.

Response: *As no new open roads would be authorized under any of the proposed action alternatives, and as only members of the LCPOA and their assigns would be using motorized vehicles along the access route, little increase in traffic is anticipated. Please also refer to Appendix 1 in the EA: General Guidelines for Road Construction.*

Comment: Concern over the potential for nonpoint-source water pollution under the action alternatives.

Forest Service Response: *Potential impacts from nonpoint-source water pollution are presented in Sections 3.3 and 3.8 of the EA. Also, design criteria to control nonpoint-source water pollution are presented in Section 2.3.3 of the EA. Proposed road reconstruction and construction activities would conform to Best Management Practices to control nonpoint-source*

water pollution and the effects are not anticipated to result in a violation of any state, federal or local thresholds because they are short-term in nature, limited in their spatial extent, and because of Forest Service experience with other similar projects.

Comment: Concern over the potential for impacts to black bears.

Forest Service Response: *Potential impacts to black bears are discussed in the Management Indicator Species analysis in Section 3.8.1 of the EA. Also, as there would be no change in open road density if access is granted, the Forest Service has concluded that there would be few negative impacts to wildlife corridors and to black bears in the analysis area.*

Comment: Concern over impacts to recreation.

Forest Service Response: *Potential effects on recreation are discussed in detail in Section 3.1 of the EA. Alternative A would have no imacts to recreation resources in the analysis area. Alternatives B, C, and D would have varying impacts on recreation, explained in detail in Section 3.1.*

Comment: Request that the LCPOA donate the land to the Forest Service.

Forest Service Response: *This is beyond the jurisdictional authority of the Forest Service as well as the scope of the project.*

Comment: Request that the Forest Service select Alternative D, the route that would likely be the most expensive to implement, so that construction costs would be so high that the LCPOA sells the property to a conservation buyer or donates the land to the Forest Service.

Forest Service Response: *The Forest Service's legal requirements under the Code of Federal Regulations (CFR) are presented in Section 1.9 of the EA. The CFRs do not authorize the Forest Service to use the NEPA process as suggested by this comment.*

Comment: Concern that the LCPOA would use the property for commercial purposes if granted a special use authorization.

Forest Service Response: *This concern is addressed in Section 1.9.4 of the EA. The LCPOA application for access does not include commercial activity. If the LCPOA wishes to engage in commercial activity in the future, the owners would have to apply for another special use authorization and go through a separate environmental analysis process and would be subject to the road construction guidelines summarized in Appendix 1.*

Comment: Concern over general and widespread impacts to environmental quality.

Forest Service Response: *Potential impacts to the environment are presented in Chapter 3 of the EA. Potential imacts are disclosed to recreation, scenery, water quality, geology, soils, air quality, cultural and historic resources, biological resources, and climate change.*

Comment: Concern over impacts to wilderness.

Forest Service Response: *As presented in Section 1.7 of the EA, the Fires Creek area is not within an inventoried roadless area or wilderness study area. While a largely undeveloped part of the forest primarily devoted to outdoor recreation, the Fires Creek watershed is not "wilderness" as defined by the 1964 Wilderness Act nor is it part of a wilderness study area or inventoried roadless area.*

Comment: Concern over impacts to proposed, endangered, threatened, and sensitive (PETS) species.

Forest Service Response: *Potential impacts to PETS are addressed in section 3.8.2 of the EA. Alternatives B, C, and D may affect, but are not likely to adversely affect the Indiana bat (Myotis sodalis) because all standards and guides for the protection of this species, as listed in Amendment 25 of the Land and Resources Management Plan, would be followed, and the project-specific mitigation measures identified in Section 3.8.2.2 would be implemented. The On May 4, 2015, the northern long-eared bat (NLEB) was listed as a threatened species and an interim 4(d) rule was published in the Federal Register. The USDA Forest Service Southern Region is currently formally consulting, at a regional scale, with the US Fish and Wildlife Service on NLEB. After the issuance of the final Biological Opinion, including any reasonable and prudent measures, terms and conditions, or any authorized incidental take, this project-level analysis will be amended if needed and the appropriate project-level consultation will be completed.*

For the sensitive terrestrial wildlife species Callophrys irus, Plethodon teyahalee, Scudderia septentrionalis, Sorex palustris punctulatus, and Speyeria diana, the project may impact individuals, but is not likely to affect the viability of the species across the forest as a whole. For all other sensitive terrestrial wildlife species, there would be no direct, indirect or cumulative effects to any PETS species.

Comment: Concern over economic impacts from the proposed action.

Forest Service Response: *Please refer to Section 1.9 of the EA for a presentation of the legal requirements the Forest Service must meet when considering access across National Forest System lands. The CFRs do not require the Forest Service to assess potential economic impacts (negative and/or positive) when evaluating requests for access.*

Comment: Request that the Forest Service purchase the LCPOA property.

Forest Service Response: *This is beyond the scope of the proposal. The Forest Service attempted to purchase the property in the 1970s, 1980s and early 2000s but the Westfelt family was not interested in selling when approached by the Forest Service.*

Comment: Concern over the potential exposure of acidic rock and the potential for acidic runoff reaching streams.

Forest Service Response: *These concerns are addressed in Section 2.3, Design Criteria, and in Section 3.4 of the EA. In addition to the analysis presented in the EA, on March 6, 2012, Members of the ID Team, including the Geologist for the Forest Service Southern Region, made a site visit to to assess the condition of Nantahala Formation. The geologist concluded that the rock surfaces exposed during the initial road construction have weathered and are no longer leaching sulfidic compounds. The geologist recommended that if access is granted that design criteria be incorporated that would limit soil disturbance in the Nantahala Formation. These design criteria are described in Section 2.3 of the EA.*

Comment: Questions regarding the effectiveness of Best Management Practices (BMPs) for preventing nonpoint-source water pollution.

Forest Service Response: *Numerous scientific studies conducted in the Southern Appalachians have demonstrated that roads constructed to meet best management practices (BMPs) to minimize nonpoint-source water pollution are effective at controlling erosion and can minimize the environmental impacts from roads on aquatic resources:*

1. *Soil losses are greatest immediately after construction (Swift 1984);*
2. *Bare cut and fill slopes accounted for 70 to 80 percent of the total soil losses (Swift 1984);*
3. *The use of vegetated filter strips and brush barriers on fill slopes retains the majority of eroded sediments within the roadway (Swift 1985, 1986);*
4. *Proper design of stream crossings, isolating roads from adjacent streams, and diverting road runoff onto the forest floor greatly reduce and may even prevent stream sedimentation (Douglass 1974; Swift 1985; Swift and Burns 1999);*
5. *Riedel and Vose (2003) found that road reconstruction to install BMPs on forest roads in the Southern Appalachians reduced average sediment yield by 70%; and*
6. *Riedel, Leigh, and Vose (2004) found that implementation and long-term maintenance of forest road BMPs facilitates stream restoration because mountain streams are capable of clearing the road sediments from their substrate if external sediment sources are eliminated.*

Research and personal observations by the Hydrologist for the NFsNC and the Fisheries Biologist for the Nantahala National Forest have determined that BMPs are effective at controlling sediment from roads.

Comment: Concern over the risk of landslides.

Forest Service Response: *According to the North Carolina Department of Environment and Natural Resources (NCDENR): "Every landslide, or slope movement, is unique, and is best judged on a case-by-case basis. The specific behavior of individual landslides is most often unpredictable, even when studied in detail. When they will move, and by how much, is often speculative. Cycles of wet weather with above average rainfall, particularly when followed by storms with intense rainfall, trigger landslides." (http://portal.ncdenr.org/web/lr/landslides-information) Research by the United States Geologic Survey, NCDENR, and USDA Forest Service Southern Research Station has linked landslide risk with heavy rainfall events (intense*

thunderstorms, tropical storms, and hurricanes), terrain shape, slope steepness, total soil thickness / depth to bedrock, soil series, and vegetation type.

According to research synthesis presented in the Western North Carolina Vitality Index: "Information collected to date indicates that less rainfall is needed to trigger landslides on slopes where modifications to the hillside, such as cut slopes or fill slopes, have contributed to the instability. In cases studied so far, three inches or less of rainfall within a 24-hour period have triggered landslides on modified slopes where some had pre-existing signs of instability. In all, at least 380 slope failures from embankments built for road, house pads, or waste areas have mobilized into damaging landslides. Lack of compaction, inadequate ground surface preparation, large woody debris, and untreated acid-producing rock incorporated into embankments contribute to their instability."

The Forest Service notes that the engineering standards, BMPs, and design criteria for this project would require compaction of road surfaces, have standards for ground surface preparation of cut banks and fill slopes, include management requirements for the use of large wood debris, and prevent acidic rock from being incorporated into embankments, practices designed to reduce landslide risk.

Comment: Concern that if access is granted, development of the inholding will have negative impacts on the values of tracts of private property in neighboring subdivisions.

Forest Service Response: *This is beyond the scope of the proposal because land values on adjacent and neighboring tracts of private property are not identified in the Code of Federal Regulations as factors the Forest Service must consider when evaluating applications for access.*

Comment: Concern over the effects to tourism.

Forest Service Response: *The proposed action is consistent with past practices and is also consistent with the effects to tourism identified in the Final Environmental Impact Statement produced with the Land and Resource Management Plan for the Nantahala and Pisgah National Forests.*

Comment: Concerns over the accuracy of the similarly situated lands analysis presented in Section 1.9 of the EA.

Forest Service Response: *The the methodology and approach to the similarly situated lands analysis is presented in Section 1.9 of the EA.*

Comment: Concern that the access route would be used by multiple families and therefore use would exceed the design capacity of the road.

Forest Service Response: *This concern is addressed in Section 1.9.4 of the EA. The LCPOA is requesting access under guidelines designed for road serving five or fewer homes with very low traffic volumes (Appendix 1 of the EA). The Forest Service does not anticipate heavy traffic volumes under Alternatives B, C, or D.*

Comment: Concern that roads are being considered on excessively steep slopes.

Forest Service Response: *This concern is addressed in Sections 1.6, 2.2, and 2.4 of the EA. Forest Service engineers evaluated slope gradients and designed access routes that comply with Forest Service road gradient standards.*

Comment: Concern that existing roads would have to be widened to accommodate access.

Forest Service Response: *This concern is addressed in Sections 2.2 and 2.3 of the EA. In some areas existing roads would have to be widened to accommodate design vehicles. If access is granted, the Forest Service would work with the LCPOA to minimize the amount of widening that would need to occur.*

Comment: Why is the Forest Service not considering modifying construction guidelines for new road construction?

Forest Service Response: *The General Guidelines for Road Construction (Single Lane Roads with Turnouts – Five Homes or Less) are designed to allow for sustainable roads to be constructed that minimize impacts to resources. Modifying the guidelines would result in a less robust roadway and could result in a violation of state, federal or local thresholds.*

Comment: Who is responsible for overseeing the LCPOA compliance if access is granted?

Forest Service Response: *The Lands and Minerals Program Manager for the National Forests in North Carolina and the Lands and Special Uses Coordinator for the Tusquitee and Cheoah Ranger Districts.*

Comment: Allegation that the EA lacks scientific rigor.

Forest Service Response: *The EA and the project record indicate that the best available scientific information was used to inform the environmental analysis. There is no known scientific controversy with respect to the effects of the proposed special use authorization. The effects associated with this type of action are well understood and documented in scientific literature referenced in this EA and potential impacts are consistent with Forest Service experience with other similar projects.*

Comment: Concern over potential damage to stream morphology.

Forest Service Response: *Please refer to Sections 3.3 and 3.8 of the EA for discussion of hydrology and aquatic resources. Reconstruction and construction activities that would be authorized under Alternatives B, C, and D have been designed to protect aquatic resources, including the effects from baseflow, stormflow, and peakflow of streams in the analysis area.*

Comment: Concern that non-monetary economic values associated with the current condition of the Fires Creek watershed would be irreparably harmed if access is granted.

Forest Service Response: *Please refer to Section 1.9 of the EA for a presentation of the legal requirements the Forest Service must meet when considering access across National Forest System lands. The CFRs do not require the Forest Service to assess potential economic impacts (negative and/or positive) when evaluating requests for access.*

Comment: Assertion that Alternatives C and D did not receive the same level of analysis as Alternative B.

Forest Service Response: *The Interdisciplinary Team reviewed each proposed alternative and the EA discloses potential impacts from Alternatives A, B, C, and D to recreation (Section 3.1), scenery (Section 3.2), water quality and hydrology (Section 3.3), air quality (Section 3.6), cultural and historic resources (Section 3.7), biological resources (Section 3.8), and climate change (Section 3.9) as well as analyzing and discussing geology (Section 3.4) and soils (Section 3.5). Please also refer to Chapters 1, 2, and 3 of the EA for a comparison of alternatives.*

Comment: Recommendation that the Forest Service take all possible actions to discourage and prevent development of the LCPOA's property.

Forest Service Response: *This is beyond the jurisdictional authority of the Forest Service as well as the scope of the project.*

Comment: Concern that any development of the LCPOA property would prevent the Forest Service from recommending that the Fires Creek watershed receive wilderness designation.

Forest Service Response: *The Fires Creek area contains approximately 52 miles of roads, one developed campground, and one developed picnic area. While a popular recreation destination that offers backcountry recreation, the area currently does not meet criteria to be proposed for a wilderness study area. Potential development of the LCPOA property would not affect the potential for the Fires Creek area to be considered for wilderness designation.*

Comment: Concern that the similarly situated lands analysis did not analyze similarly situated lands.

Forest Service Response: *Please refer to table 1.9.2.1 in the EA. The table indicates how the properties were evaluated in relation to the subject property.*

Comment: Observation that the Management Areas described in Chapter 1 of the EA are not consistent with the Management Areas analyzed in Chapter 3 of the EA.

Forest Service Response: *The EA has been updated in Chapters 1 and 3 to address this observation.*

Comment: The Forest Service should delay action and seek to acquire the inholding.

Forest Service Response: *This is beyond the jurisdictional authority of the Forest Service as well as the scope of the project.*

Comment: The EA should address the impact road reconstruction and construction activities could have on future brook trout reintroduction efforts in Hickory Cove Creek and Laurel Creek.

Forest Service Response: *This is beyond the scope of the proposal. However, because BMPs would be followed and culverts that are barriers to fish migration replaced with bottomless arches under Alternatives B, C, and D, and as a bottomless arch or bridge built over the road crossing at Hickory Cove Creek under Alternative B, road reconstruction and construction activities would have no impacts to future efforts to restore brook trout in these streams.*

Comment: Questions regarding the stabilization work done to the lower section of FSR 340A1 (Phillips Ridge Road) in 2005.

Forest Service Response: *FSR 340A1 is 3.5 miles in length and is closed to vehicular traffic, however, it provides critical administrative access to perform resource management and fire protection. In October 2005 a contract was awarded to repair the first 0.95 miles of this road which sustained significant damage from the September 2004 storm events. Since it is an important road on the district, for the reasons listed above, it was approved for repair by the Forest Supervisor and the District Ranger, a decision supported by the Forest Engineer.*

In hindsight, if the inspectors surveying the damage had continued to the Hickory Cove Creek crossing the Forest Service would have extended the length of road repairs and would have replaced the damaged culvert. These repairs addressed erosion issues and replaced undersized culverts which were damaged, plugged or washed out. At the same time the road surface was stabilized and vegetation reestablished along the entire length of road. These actions reduced or eliminated sediment contributions into Laurel Creek along this road segment.

This road also serves as a trail corridor. There are a number of dual designation roads/trails across the forest. Closed roads are always open for non-motorized uses.

Comment: Concern over the potential costs of building the future Rim Trail Bypass.

Forest Service Response: *This is beyond the scope of this proposal. The Future Rim Trail Bypass is a separate action unconnected from the LCPOA request for access.*

Comment: Why did the Forest Service not bring forward Alternatives 1a and 1b (approach from the north via Ramp Cove) from the 2013 EA?

Forest Service Response: *Portions of this EA respond to points made in the appeal of the June 2013 decision by analyzing in detail potential access routes from the north and east, and includes a detailed engineering study to refine and to specify road corridor locations from the north and east. (Refer also to Section 1.6 of the EA.) This engineering study utilized LIDAR Data produced in April of 2007 to generate topographic surfaces in AutoCad, a widely used computer modeling program.*

Forest Service engineering staff created horizontal and vertical road corridor alignments and identified the optimal road corridor locations that were the most technologically feasible given

the topography. AutoCad was then used to apply typical road sections along the corridor to generate proposed surfaces. This LIDAR and AutoCad approach differed from the engineering processes utilized for the June 2013 EA, which did not utilize computer mapping and design programs and the process produced road corridors that differ in length, location, and potential environmental impacts from those presented in the 2013 EA.

The LIDAR and AutoCad approach provided more precision and detail in the analysis, and showed that the Alternatives 1a and 1b from the 2013 EA would have exceeded Forest Service gradient guidelines. Accordingly, a new road corridor consistent with Forest Service gradient guidelines was produced for the current EA (Alternative D).

Comment: Do FSR 340A1 and FSR 427 meet road gradient guidelines for National Forest System Roads?

Forest Service Response: *FSR 340A1 and FSR 427 meet guidelines for National Forest System Roads. National Forest System Roads are designed by Forest Service engineers to meet guidelines set forth in the Forest Service Handbook and by American Association of State Highway and Transportation Officials (AASHTO) policy. In places grades may be greater than 12% but the drainage features and roadway section are designed to be consistent with Forest Service road gradient guidelines.*

Comment: Request that the Forest Service waive the 12% maximum sustained slope guideline which would allow additional routes to be designed and analyzed to provide access to the LCPOA property from the north.

Forest Service Response: *The 12% maximum grade should not be waived for proposing and analyzing routes from the north. Forest Service engineers considered resource protection, safety and technological feasibility during the layout of the most favorable routes which were preliminarily designed and used as alternatives.*

Forest Service design guidance does allow for a maximum of 18% vertical grades based on design vehicle, soil conditions, and engineering judgment. The NFsNC does not design roads with sustained grades greater than 12%. Grades between 12% and 18% are used for short segments (generally up to 500 feet) to hit critical terrain points on a good location. Sustained grades of this steepness raise concerns over safety and resource protection. Significant drainage structures (closely spaced culverts and full ditches), and high quality surfacing are required to insure road stability, prevent erosion and provide adequate traction for vehicles.

Comment: Observation that the differences in road conditions between FSR 340A1 and FSR 427 would result in different amounts and intensity of road reconstruction activity.

Response: *Comment noted. All road reconstruction and construction efforts would be the responsibility of the LCPOA. The length of the road segments that would require reconstruction activities is presented in Section 2.2 and 2.4 of the EA.*

Comment: Concern that aquatic resources were not adequately analyzed.

Response: *For analysis of potential impacts to aquatic resources and water quality, please refer to sections 3.3 and 3.8 of the EA.*

Comment: Concern over the effectiveness of BMPs for acidic rock.

Response: *The BMPs to address acid rock were developed by the North Carolina Division of Water Quality based on the Division's extensive experience with acid rock in western North Carolina. The Forest Service believes they are sufficient for this project.*

Comment: Concern that the potential for long-term negative water quality effects were not acknowledged or considered.

Response: *There are approximately 52 miles of roads (open, closed, state, Forest Service) that result in approximately 85 stream crossings in the Fires Creek watershed. Most of those roads and stream crossings were constructed in the 1940s, 1950s, and 1960s prior to the development and widespread use of BMPs for nonpoint-source water pollution (practices that are effective at preventing and controlling nonpoint-source water pollution) and BMPs for acidic rock. As stated in the EA in section 3.3, the streams in the Fires Creek watershed support some of the cleanest water in North Carolina. Given that any road reconstruction and construction activities authorized under this project would adhere to BMPs for nonpoint-source water pollution and acidic rock, past experience with the sustainability of the roads network in the Fires Creek watershed, and past experience in other watersheds on National Forest System lands in North Carolina, the Forest Service has concluded that the potential for long-term negative water quality effects from this project would be very low.*

Comment: Concern that water quality information was not collected as part of the EA process.

Response: *Stream water grab samples were collected from Fires Creek at two locations (just upstream of the Rockhouse Creek confluence with Fires Creek and just upstream of the Trail 78 crossing on Fires Creek) in 2008. The lower site had a pH of 6.6 and an Acid Neutralizing Capacity (ANC) of 37.6. The upper site had a pH of 6.6 and an ANC of 37.7. Stream pH was also measured during baseflow conditions on August 22, 2013. Stream pH results were: Hickory Cove Creek was 6.8, Laurel Creek (upstream of Hickory Cove) was 6.8, Rockhouse Creek (upstream of a culvert near confluence with Laurel Creek) was 6.8, Rockhouse Creek (at bridge) was 7.0, and Fires Creek downstream of Rockhouse Creek confluence was 6.8. These results indicate that streams within the Fires Creek watershed have pH values that support a healthy aquatic ecosystem and stream pH's are equal to or better than many streams of similar size and elevations on the Nantahala National Forest.*

Comment: Concern that no research was conducted in relation to the Hiwassee headwaters crayfish (*Cambarus parrishi*).

Response: *The need for additional surveys was considered using the 1989 Vegetation Management Standard for Threatened & Endangered and Sensitive Species Inventory, as*

interpreted by the Interim Guidance for National Forests in Texas (November 1, 2005). No additional aquatic surveys for PETS species were conducted for this project because suitable habitat is available for the sensitive species, Cambarus parrishi, and existing survey information is adequate to guide project development. Existing data were used in this analysis because previous surveys for aquatic species have been conducted and the project would be implemented to prevent visible sediment and acidic runoff from entering analysis area streams. The effects to the Hiwassee headwaters crayfish are analyzed within Section 3.8.2.1 of the EA.

Comment: The EA should present a worst-case scenario for acid runoff associated with each alternative.

Response: *This exercise would be highly speculative and subject to interpretation. Please refer to Section 2.2 and Table 2.4.1 of the EA for a comparison of alternatives, including the amount of road reconstruction and construction associated with each alternative in the Nantahala Formation.*

Comment: Are there brook trout in headwater streams in the analysis area?

Response: *Previous surveys within the Fires Creek watershed have failed to locate any wild brook trout populations (wild brook trout are defined as being of Southern Appalachian brook trout genetic origin). Creel surveys were conducted by the North Carolina Wildlife Resources Commission (NCWRC) in 1964 within Rockhouse Creek. Surveyed anglers caught only rainbow trout within this stream (Fish, 1968). Electrofishing surveys within Rockhouse Creek in 1978 conducted by the NCWRC produced rainbow trout but no brook trout (Bonner, 1983). The USFS conducted electrofishing surveys within Hickory Cove Creek in 2010. Rainbow trout were located at the first stream crossing but no fish were located at the second stream crossing upstream. Rainbow trout were located within Laurel Creek near the confluence with Hickory Cove Creek (USFS, unpublished data).*

Comment: Concern that the EA did not adequately address potential water quality impacts from landslides.

Response: *According NCDENR: "Every landslide, or slope movement, is unique, and is best judged on a case-by-case basis. The specific behavior of individual landslides is most often unpredictable, even when studied in detail. When they will move, and by how much, is often speculative. Cycles of wet weather with above average rainfall, particularly when followed by storms with intense rainfall, trigger landslides." (http://portal.ncdenr.org/web/lr/landslides-information).*

Accordingly, estimating water quality impacts from landslides would be highly speculative and subject to interpretation. The Forest Service notes that the design criteria, engineering standards, and BMPs for this project would require compaction of road surfaces; have guidelines for ground surface preparation of cut banks and fill slopes; include management recommendations for large wood debris; and prevent acidic rock from being incorporated into embankments, practices designed to reduce landslide risk. Please also refer to Section 2.2 and

Table 2.4.1 of the EA for a comparison of alternatives, including the amount of road reconstruction and construction associated with each alternative.

Comment: Concern that the Forest Service would not monitor road maintenance needs and enforce maintenance if access is granted.

Response: *It is the responsibility of the landowner to perform road maintenance, acceptable to the Forest Service, to prevent damage on adjacent National Forest System lands. The Forest Service conducts periodic inspections.*

Comment: The EA fails to address stormwater impacts in the hydrological analysis.

Response: *Base flow, peak flow, and storm flow levels were incorporated into the engineering analysis and hydrological analysis in Chapter 3. Hydrological analysis resulted in recommendations for stream crossing design, including specifications for culvert size and bottomless arch installation for new construction and the identification of undersized, underperforming, and/or improperly installed culverts that would need to be replaced.*

Comment: Concerns regarding the legal precedents that could result from the change in land use associated with the project, with the observation that until the tract was acquired by the current landowners, the property was raw, undeveloped land surrounded by public property.

Response: *Clay County, North Carolina does not have zoning regulations limiting land use changes that would be impacted by this proposal. The LCPOA applied for access across National Forest System lands consistent with the current Code of Federal Regulations and NFsNC guidelines for roads that access five or fewer homes, standards that do not stipulate that the Forest Service consider land use change as deterministic criteria.*

Comment: What is the duration of the special use authorization?

Response: *If road access is granted, the special use authorization would continue as long as needed by the LCPOA to access the tract consistent with their Application for Transportation and Utility Systems and Facilities on Federal Lands (Standard Form 299) and as long as the use is still consistent with the Forest Plan and the LCPOA remains in compliance with all terms of the authorization.*

Comment: What timeframes are necessary to implement “routine maintenance”?

Response: *There are no specific timeframes to implement. The access holder must comply with the terms and conditions set forth in the special use authorization at all times.*

Comment: Who reviews/oversees maintenance work?

Response: *Depending on the level of maintenance to be performed, District personnel, an engineering technician, or an engineer could oversee the work.*

Comment: Where would "designated areas" for off-site wasting of acidic material be located?

Response: *Sites for wasting acidic material would not be located on National Forest System lands (EA at Section 2.3.4, page 26).*

Comment: Assertion that the proposal does not meet requirements for access to non-federal lands. The applicant has not provided the required information under 36 C.F.R. § 251.54(d) and the applicant has not met the initial screening requirements under 36 C.F.R. § 251.54(e).

Response: *The National Forests in North Carolina evaluated the requirements under 36 C.F.R. § 251.54(d) and screened for the nine initial criteria under 36 C.F.R. § 251.54(e) and determined that the proposal qualified for further evaluation.*

Comment: Assertion that Alternatives B and C would violate state law protections for outstanding resource trout waters and alternatives B, C, and D would violate federal law under Section 404 of the Clean Water Act. If access is granted, the LCPOA would not be able to obtain discharge permits from the state nor Section 404 permits from the US Army Corps of Engineers. Also, Alternatives B and C (and likely D) would violate the North Carolina Sedimentation Pollution Control Act.

Response: *Please refer to Section 1.9.4 of the EA, which states that "The Forest Service would grant the special use authorization conditional upon the LCPOA's compliance with all applicable Federal and State laws, such as but not limited to, the North Carolina Sediment Control Act, the Clean Water Act, and the Endangered Species Act. The special use authorization would also be conditional on the LCPOA's receiving (1) all necessary permits and waivers by the North Carolina Department of Environmental Quality and (2) all necessary permits and waivers by the United States Army Corps of Engineers."*

Comment: Observation that Alternatives C and D would violate the forest plan and federal law because they would violate forest plan standards for visual quality objectives (VQOs).

Response: *Please refer to Section 3.2 of the EA where the Forest Service discloses that Alternatives C and D would not meet VQOs. If either Alternative C or D is selected, the NFsNC would have to amend the forest plan.*

Comment: Assertion that Alternatives B, C, and D attempt to create a perpetual right.

Response: *The special use authorization would continue as long as needed by the LCPOA to access the tract consistent with their Application for Transportation and Utility Systems and Facilities on Federal Lands (Standard Form 299) and as long as the LCPOA remains in compliance with the terms and conditions of the authorization. Special use authorizations are not assignable or transferable. If the special use authorization holder ceases being the owner of the real property accessed by the authorized road, the authorization would terminate. If the property is conveyed to a new owner, a Holder Initiated Revocation of Existing Authorization Request for a Special-Use Permit or Term Special-Use Permit form would need to be submitted along with a copy of the conveyance deed. Per 36 CFR § 251.59:*

> *"If the holder, through death, voluntary sale, transfer, or through enforcement of a valid legal proceeding or operation of law, ceases to be the owner of the authorized improvements, the authorization terminates upon change of ownership. Except for easements issued under authorities other than § 251.53(e) and leases and easements under § 251.53(l) of this subpart, the new owner of the authorized improvements must apply for and receive a new special use authorization. The new owner must meet requirements under applicable regulations of this subpart and agree to comply with the terms and conditions of the authorization and any new terms and conditions warranted by existing or prospective circumstances."*

Comment: Assertion that the applicant has not met the second-level screening requirements under 36 C.F.R. § 251.54(e) – a: the proposed us would not be in the public interest and b: the proponent does not or cannot demonstrate technical or economic feasibility of the proposed us or the financial and technical capability to undertake the use and fully comply with the terms and conditions of the authorization.

Response: *Point a - public interest: The National Forests in North Carolina screened for public interest when the LCPOA made their initial application in 2008. This screening considered*

- *the location of the property;*
- *if the proposed use could be reasonably accommodated on non-National Forest System lands; and*
- *if the proposed use would be consistent with the mission of the Forest Service to manage National Forest System lands and resources in a manner that will best meet the present and future needs of the American people.*

This screening process concluded that the public interest would not be compromised by the project.

Point b – technical / economic feasibility or financial / technical capability: The LCPOA provided adequate documentation to show that the association has the financial and technical capability to develop the proposed use to its operational phase and to maintain the proposed use in accordance with the authorization.

Comment: The EA released for notice and comment in 2014 did not describe a proposed action, and that it specifically did not identify a preferred alternative.

Response: *The EA has been updated to indicate that Alternative B is the proposed action.*

Comment: Assertion that the Forest Service prematurely dismissed other route alternatives, particularly Alternatives 2a and 2b, which were identified as technologically infeasible.

Response: *A description of the process used by NFsNC engineers to identify potential access corridors is described in Section 1.6 of the EA. The National Environmental Policy Act requires federal agencies to explore and objectively evaluate a range of reasonable alternatives and*

briefly discuss the reason for eliminating alternatives that were not considered in detail (40 CFR 1502.14). Examples of alternatives that may be eliminated from further study:

- *are inconsistent with law, regulation or policy*
- *fail to meet the purpose and need*
- *are technologically unable or unfeasible to implement*
- *are a duplication of an alternative considered in detail*
- *are one on which a decision has already been made at a higher level*
- *are determined to cause unreasonable environmental harm*
- *are remote or speculative in nature.*

In response to this comment, the Forest Service updated section 2.5 of the EA to indicate that routes 2a and 2b were identified as technologically unfeasible because the route would require 1.65 miles (2a) and 0.65 (2b) miles of blasting and grading to level the ridgetop, actions determined to be technologically unfeasible by FS engineers.

Comment: Assertion that the EA violates NEPA because it fails to adequately assess and disclose environmental impacts, particularly on acid-producing rock and erosion.

Response: *The EA identifies areas with potential to contain acidic rock formations (Sections 1.7, 2.3.2, 2.3.4, 3.3.4, and 3.4) and provides design criteria to manage acidic rock (Section 2.3.4). The EA notes that the Forest Service Regional Geologist and NFsNC hydrological and biological staffs have made visits to assess the area for acidic rock on multiple occasions (Section 3.4.3). Erosion potential is addressed in Section 3.5 of the EA. Additionally, assessments and disclosures of potential impacts from the alternatives are compared in Sections 2.5, 3.1, 3.2, 3.3, 3.4, 3.5, 3.6, 3.7, 3.8, and 3.9 of the EA.*

Comment: Assertion that the Forest Service fails to prohibit landowners from using acidic rock as fill in road construction.

Response: *Please refer to item #6, Design Measures for Acid Rock, page 27 of the EA.*

Comment: Observation that the Forest Service did not designate waste areas for acidic rock.

Response: *In response to this comment, the Forest Service has stipulated in the EA that in the event that conditions require the LCPOA to excavate acidic rock and establish waste areas, material would have to be removed from NFS lands for treatment (EA at Section 2.3.4).*

Comment: Assertion that the EA fails to assess indirect and cumulative impacts, particularly in Section 3.3 on water quality.

Response: *In response to this comment, the Forest Service has updated Section 3.3 of the EA. Indirect and cumulative impacts are also assessed and disclosed in Sections 3.1, 3.2, 3.4, 3.5, 3.6, 3.7, 3.8, and 3.9.*

Comment: Assertion that the EA fails to assess impacts to landscape conservation resources, particularly habitat connections and wildlife movement connections, with the concern that the project will fragment habitat and reduce nesting, denning, foraging, and dispersal opportunities for wildlife.

Response: *While open roads and development in the wildland-urban interface are associated with negative impacts to landscape conservation resources, no new open roads would result from providing access to the LCPOA and development would be limited to fewer than five structures on a 50 acre parcel. Accordingly, potential impacts to landscape conservation resources are projected to be unmeasurable.*

Comment: Assertion that the EA fails to assess impacts from nonnative invasive species.

Response: *An evaluation of nonnative invasive species is presented in Section 3.8.4 of the EA.*

Comment: The public has not had an opportunity to review the TAP (travel analysis plan) and that there are flaws in the TAP.

Forest Service Response: *The TAP was made available for members of the public who requested it. An updated TAP is available on the NFsNC internet site for review during the 45 day objection process.*

Comment: Assertion that the Forest Service must prepare an Environmental Impact Statement given the extent of unknown environmental impacts associated with the project.

Forest Service Response: *The Forest Service ID Team has evaluated the proposed action and does not find that there are significant known environmental impacts and/or substantial unknown impacts that merit conducting an Environmental Impact Statement for this project. The EA and the Biological Evaluation present, analyze, and disclose the impacts to the human environment of the proposed actions consistent with the National Environmental Policy Act.*

Comment: Request that the Forest Service attach terms and conditions to special use authorizations.

Response: *Special use authorizations contain terms, provisions, and conditions applicable to the Grantee, its permittees, contractors, assignees, and successors in interest. The Forest Service can attach additional terms and conditions if deemed necessary.*

Literature Cited in the Response to Comments

Bonner, W.R. 1983. Survey and classification of state-managed trout streams: district 9. Mountain Fish. Invest. Federal Aid in Fish Restoration Project F24-S. 313 pp.

Douglass, J.E. 1974. Flood frequencies and bridge and culvert sizes for forested mountains of North Carolina. USDA Forest Service Gen. Tech. Rep. SE - 4. Asheville, NC: USDA Forest Service, Southeastern Forest Experiment Station. 12 p.

Fish, Frederic F. 1968. A catalog of the inland fishing waters in North Carolina. Division of Inland Fisheries, North Carolina Wildlife Resources Commission. Raleigh, North Carolina. pp. 140 – 142.

N.C. Department of Environment and Natural Resources, Division of Energy, Mineral and Land Resources, North Carolina Geological Survey. Landslides Information. 2015. http://portal.ncdenr.org/web/lr/landslides-information. Last accessed March 20, 2015.

Riedel, M.S., and J.M. Vose. 2003. Collaborative research and watershed management for optimization of forest road best management practices. In: CL Irwin, P Garrett, and KP McDermott (eds.) 2003 Proceedings of the international conference on ecology and transportation. Raleigh, NC:Center for Transportation and the Environment, North Carolina State University: 148-158.

Riedel, M.S., J.M. Vose, and D.S. Leigh. 2004. The road to TMDL is paved with good intentions - Total Maximum Daily Loads for a Wild and Scenic River in the southern Appalachians. In: Ali Saleh (ed.) Proc. of the second conference on watershed management to meet emerging TMDL environmental regulations, Amer. Soc. Ag. Engr., Albuquerque, NM, Nov. 18 - 12. St. Joseph, MI: American Society of Agricultural Engineers: 356-366.

Swift, L.W. Jr. 1984. Gravel and grass resurfacing reduces soil loss from mountain roads. Forest Science 30(3):657-670.

Swift, L.W. Jr. 1985. Forest road design to minimize erosion in the southern Appalachians. In: BG Blackmon (ed.). Proceedings - Forestry and water quality: A mid-south symposium. Little Rock, Arkansas, 8-9 May 1985: 141 - 151.

Swift, L.W. Jr. 1986. Filter strip widths for forest roads in the Southern Appalachians. Southern Journal of Applied Forestry 10(1):27-34.

Swift, L.W. Jr. and RG Burns. 1999. The three R's of roads. Journal of Forestry 97(8):40-45.

Western North Carolina Vitality Index, Risks, Hazards, and Stressors, Landslides and Landlisde Hazards. 2015. http://www.wncvitalityindex.org/risks-hazards-and-stressors/landslides-and-landslide-hazards. Last accessed March 20, 2015.

Appendix 5: Errata

Table 1.3 and 1.4 in the Biological Evaluation (BE) (Appendix 2 of this document) and table 3.8.2.4 in this Environmental Assessment have the northern long-eared bat (NLEB) identified as proposed for listing under the Endangered Species Act of 1973. This species was listed as a threatened species on April 2, 2015.

The official BE has been updated as of March 24, 2016 to reflect the correct status of the NLEB and the determination of effect was made for the NLEB indicating that Altermative B *may affect, but is not likely to adversely affect* the NLEB. Required consultation with the U.S. Fish and Wildlife Service was completed on March 24, 2016, to reflect that the project would adhere to the Final 4(d) rule with regards to the NLEB as implemented on January 14, 2016.