



# United States Department of the Interior

## FISH AND WILDLIFE SERVICE

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September 16, 2010

Mr. John F. Sullivan, III, P.E.  
Division Administrator  
Federal Highway Administration  
310 New Bern Avenue, Suite 410  
Raleigh, North Carolina 27601

Attention: Mr. Donnie Brew, Preconstruction and Environment Engineer

Dear Mr. Sullivan:

Subject: Biological Opinion, Proposed Replacement of Bridge No. 419 (TIP No. B-3656) over the Pigeon River in Haywood County, North Carolina, and Its Effects on the Federally Endangered Appalachian Elktoe

This document transmits the U.S. Fish and Wildlife Service's (Service) Biological Opinion (Opinion) based on our review of the Biological Assessment (BA) on the effects of the subject bridge replacement on the Appalachian elktoe in accordance with section 7 of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 et seq.) (Act).

This Opinion is based on information provided in the May 25, 2010, BA; other available literature; personal communications with experts on the federally endangered Appalachian elktoe (*Alasmidonta raveneliana*); and other sources of information. A complete administrative record of this consultation is on file at this office.

In the BA, you determined that the following federally listed species would not be affected by the proposed bridge replacement: the bog turtle (*Clemmys muhlenbergii*), Carolina northern flying squirrel (*Glaucomys sabrinus coloratus*), Eastern puma (=cougar) (*Puma concolor cougar*), gray bat (*Myotis grisescens*), Indiana bat (*Myotis sodalis*), spruce-fir moss spider (*Microhexura montivaga*), small whorled pogonia (*Isotria medeoloides*), and rock gnome lichen (*Gymnoderma lineare*). In view of the information in the BA, we concur with your determination that the bridge replacement project will have no effect on these species. Therefore, we believe the requirements under section 7 of the Act are fulfilled for these species. However, obligations under section 7 of the Act must be reconsidered if: (1) new information reveals impacts of this identified action that may affect listed species or critical habitat in a

manner not previously considered, (2) this action is subsequently modified in a manner that was not considered in this review, or (3) a new species is listed or critical habitat is determined that may be affected by the identified action.

## **CONSULTATION HISTORY**

July 13, 2009 – North Carolina Department of Transportation (NCDOT) and Service biologists conducted a mussel survey at the bridge site (four live Appalachian elktoes were found).

August 18, 2009 - NCDOT and Service biologists conducted another mussel survey at the bridge site (five live Appalachian elktoes were found).

October 22, 2009 - Mr. Troy Wilson of our staff attended an on-site field meeting with the NCDOT and Federal Highway Administration (FHWA) to discuss plans for B-3656 as well as avoidance and minimization measures that could be used for the Appalachian elktoe. The NCDOT was represented at the meeting by Division Engineers and members of the Roadway Design, Structures, Natural Environment, Hydraulics, and Bridge Units. NCDOT and Service biologists made site reviews of potential riparian conservation areas.

February 2010 – The NCDOT notified the Service regarding potential issues with utilities relocation associated with the project.

February 23, 2010 - NCDOT engineers and biologists met on site with Service biologists to discuss the options for relocation of the utility pipes. The NCDOT agreed to use directional-boring techniques to relocate the utility pipes. The NCDOT and Service met with the Town of Canton to discuss the storm-water drainage plans. NCDOT biologists accompanied Service biologists to the site for a review of potential riparian conservation areas.

May 10, 2010 – The NCDOT and the Service discussed the Town of Canton’s desire for a foot path underneath the eastern approach and the potential design features necessary to accommodate this request.

May 26, 2010 - The Service received the Federal Highway Administration’s (FHWA) BA and request to initiate formal consultation.

## **BIOLOGICAL OPINION**

### **I. DESCRIPTION OF THE PROPOSED ACTION**

As defined in the Service’s section 7 regulations (50 CFR 402.02), “action” means “all activities or programs of any kind authorized, funded, or carried out, in whole or in part, by federal agencies in the United States or upon the high seas.” The action area is defined as “all areas to be affected directly or indirectly by the federal action and not merely the immediate area involved in the action.” The direct and indirect effects of the actions and activities must be considered in conjunction with the effects of other past and present federal, state, or private

activities, as well as the cumulative effects of reasonably certain future state or private activities within the action area. This Opinion addresses only those actions from which the Service believes adverse effects may result. In their BA, the NCDOT outlined those activities involved in the construction and demolition of Bridge No. 419 on US 19/23/74 over the Pigeon River (B-3656) that would affect the Appalachian elktoe. This Opinion addresses whether replacing the existing bridge is likely to jeopardize the continued existence of the Appalachian elktoe.

The NCDOT has determined that the subject bridge is deficient because of deteriorating structural integrity. The NCDOT's Bridge Management Unit records indicate Bridge No. 419 has a sufficiency rating of 2.8 out of a possible 100. In addition, it received a structural evaluation of 3 out of 9 according to FHWA standards and is functionally obsolete due to a deck geometry appraisal of 2 out of 9. The proposed action, as defined in the BA, is to demolish and replace Bridge No. 419 on US 19/23/74 over the Pigeon River. The existing structure has 11-foot (ft) lanes with 5-ft-wide sidewalks and is comprised of four 47-ft spans, has three piers in the river channel, is 189 feet (ft) in length, and has a superstructure composed of reinforced concrete deck girders. The substructure is comprised of vertical masonry abutments on reinforced concrete web bents with reinforced concrete footings founded on timber piles. The proposed replacement bridge will have three 75-ft spans supported by 33-inch reinforced concrete box-beam girders on two drilled-shaft reinforced concrete piers in the river channel and will be about 225 ft long with a clear roadway width of 53.5 ft. The bridge will include three 11-ft travel lanes with a 2-ft offset on the north side of the bridge to accommodate bicycle traffic. On each side of the bridge, 5.5-ft sidewalks will be provided. The additional width is due to lining up the 2-ft gutter on the roadway approaches with the bridge and additional width for gutter spread.

The existing bridge will be replaced in place, and traffic will be detoured off-site during construction. The removal and construction is proposed to begin from the east side of the river and will occur in two phases, each with three stages. The second phase will begin from the west side of the river. Twice during removal and construction (two Phase/Stage intervals) more than 50 percent of the Pigeon River will be blocked by temporary stone work pads. The work pad during Phase I, Stage I will block 56 percent of the channel and is required for the removal of the middle pier, which will be surrounded by the work pad and removed (cut off) at the river bed. This work pad will be in place no more than 14 calendar days. The work pads during Phase II, Stage 2 and Phase I, Stage 3 together will block 55 percent of the channel and are required for the setting of box beams in Spans B and C and the construction of drilled pier foundations for both proposed bents. This blockage will be in place for about 60 calendar days.

#### **A. Action Area**

The project action area is defined as all areas to be affected directly or indirectly by the federal action and not merely the immediate area involved in the action (50 CFR §402.02). The action area for this Opinion includes the areas directly impacted by construction activities; the areas potentially impacted by indirect impacts; a 1,640-ft boundary around the bridge site, which includes 1,312 ft downstream and 328 ft upstream of both the existing and newly constructed bridges; and the areas the NCDOT is considering for riparian buffer preservation and/or restoration along the Pigeon River to help offset impacts that occur as a result of the project.

Because no specific areas were identified prior to the BA, the action area will include the area upstream from the project, up to and including the 11.1 miles of designated critical habitat within the upper Pigeon River basin in Haywood County, North Carolina, which begins in the West Fork Pigeon River at the confluence with the Little East Fork Pigeon River and continues downstream to the confluence with the East Fork Pigeon River, and the main stem of the Pigeon River from the confluence of the East Fork Pigeon River and West Fork Pigeon River downstream to the NC 215 crossing, south of Canton, Haywood County, North Carolina (Appendix A, Figures 1 and 2).

**Pigeon River Physical Characteristics** - The Pigeon River originates near Sam Knob, at an elevation of 6,130 ft, approximately 30 miles from Asheville, North Carolina. From its origin it flows north to Canton, North Carolina, then on to Hartford, Tennessee. The river's elevation from Canton to Hartford decreases from 2,580 ft to 1,260 ft above sea level. Over the course of this 40-mile path, the river represents an average descent drop of 33 ft per river mile. The uppermost portion of the basin is steep, contributing to high rainfall runoff. The East Fork Pigeon River and West Fork Pigeon River are generally steep along their upper reaches, with bedrock and large boulder colluvial substrates, while the substrate of their lower reaches have more cobble and some alluvial deposits with cobble point bars, though still much bedrock and boulder substrate.

#### Land Use

Most of the land in the Pigeon River subbasin is forested (84 percent), but a significant portion (14 percent), mostly along the alluvial areas of the middle Pigeon River and lower East Fork Pigeon River and West Fork Pigeon River, is cultivated cropland and pasture (North Carolina Department of Environment and Natural Resources [NCDENR] 2003). Historically, the economy of the Pigeon River subbasin depended on natural resources. The farming of tobacco, corn, wheat, rye, and other crops was the main source of income for the area. Forest products were also important, especially in the early 1900s (Natural Resources Conservation Service [NRCS] 1997). Land use in the area has seen decreases in farm and forested acreage in the last century (U.S. Department of Agriculture, Agricultural Statistics).

**Ecological Significance** - The upper Pigeon River subbasin is known to support a number of rare fish and freshwater mussel species, including the federally protected Appalachian elktoe (Table 1). The wavy-rayed lampmussel (*Lampsilis fasciola*) and the hellbender (*Cryptobranchus alleganiensis*) have been found in the same short reach of the Pigeon River where the Appalachian elktoe occurs. Significant pollutant discharges into the Pigeon River from Blue Ridge Paper (BRP), a paper mill in the town of Canton since 1906, have impaired the lower reaches of the river. Recent improvements in the water quality of the Pigeon River in Tennessee have prompted the Tennessee Department of Environment and Conservation, North Carolina Wildlife Resources Commission (NCWRC), BRP, and many other cooperators to begin a long-term project to restore native fishes to the Pigeon River. So far, eight fish species, six snail species, and nine mussel species have been reintroduced to the lower Pigeon River. All of the snails and mussels are surviving, and at least four snail species are reproducing. Subsequent surveys have documented survival and successful reproduction in the reintroduced populations. Longer-term goals include possibly propagating some of the more rare species that can't be

collected in large enough numbers for reintroduction. Once regarded as one of most polluted waters in the country, the Pigeon River has rebounded due to improvements in paper manufacturing and wastewater treatment at BRP.

<b>Table 1. Rare Aquatic Species in the Pigeon River.</b>			
<b>Scientific Name</b>	<b>Common Name</b>	<b>North Carolina Status</b>	<b>Federal Status</b>
<b>Mussels:</b>			
<i>Alasmidonta raveneliana</i>	Appalachian elktoe	Threatened	Endangered
<i>Lampsilis fasciola</i>	Wavy-rayed lampmussel		
<b>Amphibians:</b>			
<i>Cryptobranchus alleganiensis</i>	Hellbender		Federal Species of Concern
<b>Insects:</b>			
<i>Eurylophella minimella</i>	A mayfly		
<i>Nixe c.f. spinosa</i>	A mayfly		
<i>Ephemerella aurivillii</i>	A mayfly		
<i>Attaneuria ruralis</i>	A stonefly		
<i>Isoperla lata</i>	A stonefly		
<i>Parapsyche apicalis</i>	A caddisfly		

Water Quality - Water quality is generally good in the Pigeon River subbasin, but several areas still cause concern. The greatest impacts to water quality occur along the middle and lower Pigeon River and some smaller tributaries. Apple orchards and croplands for corn, tomatoes, and burley tobacco, along with dairy operations and urban development, contribute significant amounts of nonpoint-source pollution, including pesticides, fertilizers, oil, heavy metals, animal waste, and eroded sediment that are washed from land or paved surfaces when it rains.

Best Usage Classification and Water Quality Assessment - The NCDENR assigns a best usage classification to all the waters of North Carolina. These classifications provide for a level of water quality protection to ensure that the designated usage of that water body is maintained.

The portion of the Pigeon River that is occupied by the Appalachian elktoe has a “WS-III, Trout,” usage classification.<sup>1</sup> Trout waters are those waters that have conditions which will

<sup>1</sup> **15A NCAC 02B .0101 GENERAL PROCEDURES** (c) Freshwater shall be assigned to one of several classifications, including: (1) Class C: freshwaters protected for secondary recreation, fishing, aquatic life including propagation and survival, and wildlife. All freshwaters shall be classified to protect these uses at a minimum, (5) Class WS-III: waters protected as water supplies which are generally in low to moderately developed watersheds. Point-source discharges of treated wastewater are permitted pursuant to Rules .0104 and .0211 of this

sustain and allow for trout propagation and the survival of stocked trout on a year-round basis. Additionally, the supplemental classification “Unique wetland (UWL)” probably applies, because the Pigeon River is occupied by the endangered Appalachian elktoe and its designated critical habitat. The UWL supplemental classification is applied to:

. . . wetlands of exceptional state or national ecological significance which require special protection to maintain existing uses. These wetlands may include wetlands that have been documented to the satisfaction of the [North Carolina Wildlife Resources] Commission as habitat essential for the conservation of state or federally listed threatened or endangered species.<sup>2</sup>

Additionally, 15A NCAC 02B.0110 CONSIDERATIONS FOR FEDERALLY-LISTED THREATENED OR ENDANGERED AQUATIC SPECIES states the following:

Certain waters provide habitat for federally-listed aquatic animal species that are listed as threatened or endangered by the U.S. Fish and Wildlife Service or National Marine Fisheries Service under the provisions of the Endangered Species Act, 16 U.S.C. 1531-1544 and subsequent modifications. Maintenance and recovery of the water quality conditions required to sustain and recover federally-listed threatened and endangered aquatic animal species contributes to the support and maintenance of a balanced and indigenous community of aquatic organisms and thereby protects the biological integrity of the waters. The Division [of Water Quality (DWQ)] shall develop site-specific management strategies under the provisions of 15A NCAC 2B.0225 or 15A NCAC 2B.0227 for those waters. These plans shall be developed within the basin-wide planning schedule with all plans completed at the end of each watershed’s first complete five year cycle following adoption of this Rule. Nothing in this Rule shall prevent the Division from taking other actions within its authority to maintain and restore the quality of these waters.

Point-source Pollution – Point-source discharge refers to discharges that enter surface waters through a pipe, ditch, or other well-defined point of discharge. These include municipal (city and county) and industrial wastewater treatment facilities, small domestic discharging treatment systems (i.e., schools, commercial offices, subdivisions, and individual residences), and

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Subchapter. Local programs to control nonpoint sources and storm-water discharges of pollution shall be required. Suitable for all Class C uses.

<sup>2</sup>15A NCAC 02B .0101 GENERAL PROCEDURES (e) describes supplemental classification, as: (1) Trout waters (Tr): freshwaters protected for natural trout propagation and survival of stocked trout. (4) Outstanding Resource Waters (ORW): unique and special waters of exceptional state or national recreational or ecological significance which require special protection to maintain existing uses. (5) High Quality Waters (HQW): including waters which are rated as excellent based on biological and physical/chemical characteristics through Division monitoring or special studies, native and special native trout waters (and their tributaries) designated by the [North Carolina] Wildlife Resources Commission. (7) Unique wetland (UWL): wetlands of exceptional state or national ecological significance which require special protection to maintain existing uses. These wetlands may include wetlands that have been documented to the satisfaction of the Commission as habitat essential for the conservation of state or federally listed threatened or endangered species.

storm-water systems from large urban areas and industrial sites. The primary substances and compounds associated with point-source discharge include nutrients, oxygen-demanding wastes, and toxic substances (such as chlorine, ammonia, and metals).

There are 20 National Pollutant Discharge Elimination System (NPDES)<sup>3</sup> permitted discharges in the subbasin, most of which are small wastewater treatment plants that serve schools or subdivisions, including Waynesville's Wastewater Treatment Plant (WWTP) (6 million gallons per day [MGD]), Maggie Valley's WWTP (1 MGD), and BRP (29.9 MGD). The Appalachian elktoe persists, and its critical habitat is designated, in the upper Pigeon River basin, upstream (south) of the Town of Canton. The Pigeon River downstream of Canton has been degraded for decades as wastewater discharges from BRP caused serious pollution of the river. In spite of improvements made at the plant in the 1970s and 1980s, dioxin (a by-product of the bleaching process and a significant contaminant) still entered the river. BRP replaced chlorine as a bleaching agent in 1993. Employees bought the company in 1999, pledging to cooperate with state agencies and environmentalists to improve the condition of the river. A decade ago, an observer might see a solid raft of foam on the Pigeon River from the company's wastewater. Today the view is of a progressively cleaner river that supports rafting, paddling, and fishing.

As part of BRP's NPDES permit for the bleached Kraft paper mill in the Town of Canton, the facility was required to conduct a balanced and indigenous species study at several sites on the Pigeon River. The purpose of the study was to justify the continued temperature variance granted in the permit. Progress Energy (formerly Carolina Power & Light Company) is required by the Federal Energy Regulatory Commission to monitor the biological communities and water quality in the Pigeon River at four locations every 3 years (begun in 1995). Fish and benthic communities are monitored at NC 215 (above the Town of Canton); at SR 1338 (Hepco Bridge), near Harmon Den and Interstate 40; and above the powerhouse, near SR 1332. Although an index of biotic integrity is applied to the fish data, the collection methods, index, and ratings are not comparable to DWQ methods. However, some summaries can be gleaned from the data. The 1998 and 2001 data showed that fish abundance, total species diversity, the diversity of darters and cyprinids, and the number of intolerant species were greater above Canton (at NC 215) than downstream at the Hepco Bridge (at SR 1338) and Harmon Den. The percentage of pollutant-tolerant fish was greater at the Hepco Bridge and at Harmon Den than above Canton and at the powerhouse (near SR 1332).

However, a "fish consumption advisory" remains for Walters Lake/Waterville Reservoir, advising the following:

Carp in Walters Lake (also known as Waterville Reservoir) may contain low levels of dioxins. Women of childbearing age and children should eat no carp taken from this area until further notice. For all others, consumption of carp should be limited to no more than one meal per month. Swimming, boating, and other recreational activities are not affected by this advisory.

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<sup>3</sup>Under Section 301 of the Clean Water Act of 1977 (CWA), the discharge of pollutants into surface waters is regulated by the Environmental Protection Agency. Section 402 of the CWA establishes the National Pollutant Discharge Elimination System permitting program, which delegates permitting authority to qualifying states. In North Carolina, the NCDENR's DWQ is responsible for the permitting and enforcement of the NPDES program.

Nonpoint-source Pollution – Nonpoint-source pollution refers to runoff that enters surface waters through storm water or snowmelt. There are many types of land-use activities that are sources of nonpoint-source pollution, including land development, construction activities, animal waste disposal, mining, and agriculture and forestry operations, as well as impervious surfaces, such as roadways and parking lots. On a statewide basis, including the upper Pigeon River subbasin, various nonpoint-source management programs have been developed by a number of agencies to control specific types of nonpoint-source pollution (e.g., forestry, pesticide, urban, and construction-related pollution). Each of these management programs develops Best Management Practices (BMPs) to control the specific type of nonpoint-source pollution.

The Sedimentation and Erosion Control Program applies to construction activities, such as roadway construction, and is established and authorized under the Sedimentation Pollution Control Act of 1973 (SPCA). This act delegates the responsibility of administration and enforcement to the NCDENR's Division of Land Resources (DLR) (Land Quality Section) and requires, prior to construction, the submission and approval of erosion-control plans on all projects that will disturb 1 acre or more. On-site inspections by the NCDENR's DLR are conducted to determine compliance with the plan and to evaluate the effectiveness of the BMPs that are being used. Haywood County has a delegated erosion-control program that is basically the same as the minimum requirements of the SPCA. Haywood County's ordinance is taken from a model provided by the State of North Carolina. These rules and regulations were originally adopted by the state in the SPCA. This legislation has been periodically amended and is also supported by Title 15A of the North Carolina Administrative Code. Haywood County adopted the ordinance in 1988 and began its own erosion-control program. The Haywood County permitting threshold is at ½ acre of disturbed area instead of 1 acre (Marc Pruett, Haywood County Erosion Control Office, personal communication, 2005).<sup>4</sup>

## **B. Conservation Measures**

Conservation measures represent actions, pledged in the project description, that the action agency will implement in order to minimize the effects of the proposed action and further the recovery of the species under review. Such measures should be closely related to the action and should be achievable within the authority of the action agency. The beneficial effects of conservation measures are taken into consideration in the Service's conclusion of a jeopardy versus a nonjeopardy opinion and in the analysis of incidental take. However, such measures must minimize impacts to listed species within the action area in order to be factored into the Service's analyses.

The following conservation measures are proposed by the NCDOT to avoid and/or minimize potential impacts to the Appalachian elktoe from construction and demolition activities. These measures have been incorporated into the design and implementation plans for the bridge replacement projects. The NCDOT's guidelines for BMPs for the Protection of Surface Waters, Design Standards for Sensitive Watersheds, Erosion and Sediment Control Guidelines for Contract Construction, and BMPs for Bridge Demolition and Removal are incorporated into

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<sup>4</sup>Other local initiatives have targeted nonpoint-source pollution in the upper Pigeon River subbasin, including those funded by the Pigeon River Fund.



projects that occur within, or upstream of, water bodies that contain federally protected aquatic species. When projects occur in watersheds that contain protected aquatic species, the NCDOT develops erosion-control measures that exceed the standard BMPs, incorporating the Design Standards in Sensitive Watersheds, regardless of the DWQ stream classification. The areas adjacent to the stream (Pigeon River in this case) will be identified as “Environmentally Sensitive Areas”<sup>5</sup> on the Sedimentation and Erosion Control Plans for this project. By definition, the Environmentally Sensitive Areas will be identified as a 50-ft buffer zone on both sides of the stream measured from the top of the stream bank. Within the identified 50-ft Environmentally Sensitive Areas, the following shall apply:

1. The contractor may perform clearing operations, but no grubbing operations until immediately prior to beginning the grading operations.
2. Once grading operations begin in identified Environmentally Sensitive Areas, work shall progress in a continuous manner until complete.
3. Erosion-control devices shall be installed immediately following the clearing operation.
4. Seeding and mulching shall be performed on the areas disturbed by construction immediately following final grade establishment.
5. Seeding and mulching shall be done in stages on cut-and-fill slopes that are greater than 20 ft in height measured along the slope, or greater than 2 acres in area, whichever is less.

The following are additional measures intended to further reduce deleterious construction-related impacts to the waterway:

1. The Service will be invited to attend the preconstruction meeting, and all procedures for construction will be reviewed.
2. All sedimentation and erosion-control measures, throughout the project limits, must be cleaned out when half full of sediment in order to ensure proper function of the measures.
3. Regular inspection and maintenance of mechanical equipment during construction must be conducted to prevent contamination of the river waters.
4. Class II riprap slope protection will be installed simultaneously with the embankment construction.
5. Deck drains will not discharge directly into the river channel.

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<sup>5</sup>Additional erosion-control measures as outlined in Design Standards in Sensitive Watersheds (15A NCAC 04B.0124 (b) - (e)) may be implemented for projects within WS-I or WS-II water supply watersheds, critical areas, waters designated for shell fishing, or any waters designated by the DWQ as High Quality Waters.

6. Embankment construction and grading shall be managed in such a manner to prevent surface runoff/drainage from discharging directly into the riparian buffer; instead, all interim surfaces will be graded to drain to temporary erosion-control devices. Temporary berms, ditches, etc., will be incorporated as necessary to prevent temporary runoff from discharging into the riparian buffer untreated.
7. The Town of Canton's excess storm-water runoff discharge will be moved to the downstream side of the bridge instead of the upstream side, where the Appalachian elktoe is known to occur.
8. The directional-boring method will be used to relocate the utility lines that are currently attached to the existing structure. This method will have less impact on the river channel than the originally proposed trenching method.
9. The NCDOT will continue to consult with the Service to come to a conservation solution in order to adequately offset project impacts. The NCDOT has initiated a watershed search for potential riparian properties within the Pigeon River subbasin above Canton. Efforts to acquire a 30-ft minimum buffer will be focused on the defined action area (upstream of Bridge 419 to below Lake Logan), with priority areas for potential conservation measures designated in a map provided by the Service (Appendix A, Figure 3). Every attempt will be made by the NCDOT to have these conservation measures in place within 3 years of the project let date. The NCDOT will prioritize its efforts to address impacts through conservation by using one or more of the following approaches:
  - a. Contact individual landowners of active agricultural operations (crop and livestock) to treat pesticide or waste pollution sources by redirecting drainage ditches that currently discharge directly into the river into upland-created wetlands or vegetated ponds that are adequately sized to catch, treat, and encourage infiltration of agricultural field runoff from a 3-year, or greater, storm event. As willing landowners are identified and the NCDOT chooses to use this approach (or in combination with the opportunities listed below), the amount of restoration considered adequate will be agreed upon through consultation between the Service and representatives from the NCDOT's Project Development and Environmental Analysis Branch.
  - b. Maintain/improve water quality functions and restore/enhance aquatic habitat through perpetual conservation easements with landowners or acquisition. Restore forested riparian buffers with a minimum width of 30 ft by planting native trees, shrubs, and herbs in priority/problem areas (actively eroding/scouring stream banks, areas with narrow or nonexistent buffers, areas contributing nonpoint-source silt or other pollutants, etc.) along the main stem,

which should be given priority, and tributaries of the Pigeon River and/or West Fork Pigeon River. The NCDOT will determine the specific areas of bank/floodplain enhancement in consultation with the Service. The amount of area restored should be equal to or exceed the area of combined permanent and temporary impacts associated with the project (971 ft<sup>2</sup> and 18,295 ft<sup>2</sup>, respectively) at a 2:1 ratio.

- c. Secure existing forested riparian and floodplain buffers with a minimum width of 30 ft through perpetual conservation easements with landowners or acquisition. The amount of area restored should be equal to or exceed the area of combined permanent and temporary impacts associated with the project (971 ft<sup>2</sup> and 18,295 ft<sup>2</sup>, respectively) at a 10:1 ratio.
- d. Participate in ongoing efforts conducted by the NCWRC to propagate the Appalachian elktoe and fund efforts to augment the population of this species within the Pigeon River subbasin.

## **II. STATUS OF THE SPECIES**

### **A. Species Description**

#### **STATUS OF THE SPECIES AND ITS CRITICAL HABITAT**

##### **Species Description and Life History**

The Appalachian elktoe has a thin, but not fragile, kidney-shaped shell, reaching up to about 3.2 inches in length, 1.4 inches in height, and 1 inch in width. Juveniles generally have a yellowish-brown periostracum (outer shell surface), while the periostracum of the adults is usually dark brown to greenish-black in color. Although rays are prominent on some shells, particularly in the posterior portion of the shell, many individuals have only obscure greenish rays. The shell nacre (inside shell surface) is shiny, often white to bluish-white, changing to a salmon, pinkish, or brownish color in the central and beak cavity portions of the shell; some specimens may be marked with irregular brownish blotches.

The Appalachian elktoe has been reported from relatively shallow medium-sized creeks and rivers with cool, clean, well-oxygenated, moderate- to fast-flowing water. The species is most often found in riffles, runs, and shallow flowing pools with stable, relatively silt-free, coarse sand and gravel substrate associated with cobble, boulders, and/or bedrock (Gordon 1991; Service 1994, 1996, 2002). Stability of the substrate appears to be critical to the Appalachian elktoe, and the species is seldom found in stream reaches with accumulations of silt or shifting sand, gravel, or cobble (Service 2002). Individual specimens that have been encountered in these areas are believed to have been scoured out of upstream areas during periods of heavy rain and have not been found on subsequent surveys (Service 2002).

Like other freshwater mussels, the Appalachian elktoe feeds by filtering food particles from the water column. The specific food habits of the species are unknown, but other freshwater mussels have been documented to feed on detritus (decaying organic matter), diatoms (various minute algae) and other algae and phytoplankton (microscopic floating aquatic plants), and zooplankton (microscopic floating aquatic animals).

The reproductive cycle of the Appalachian elktoe is similar to that of other native freshwater mussels. Males release sperm into the water column, and the sperm are then taken in by the females through their siphons during feeding and respiration. The females retain the fertilized eggs in their gills until the larvae (glochidia) fully develop. The mussel glochidia are released into the water and, within a few days, must attach to the appropriate species of fish, which they then parasitize for a short time while they develop into juvenile mussels. They then detach from their fish host and sink to the stream bottom where they continue to develop, provided they land in a suitable substrate with the correct water conditions. Both the banded sculpin (*Cottus carolinae*) and the mottled sculpin (*C. bairdi*) have been identified as host species for glochidia of the Appalachian elktoe (Service 2002). Dr. Jim Layzer (Tennessee Technological University, unpublished data) has identified ten species of fish that successfully transformed glochidia of Appalachian elktoes into juveniles under laboratory conditions (Table 2). The life span and many other aspects of the Appalachian elktoe's life history are currently unknown.

**Table 2. Fish Hosts for the Appalachian Elktoe.**

<b>Species</b>	<b>Information Source</b>
Mottled sculpin ( <i>Cottus bairdi</i> )	Gordon 1991
Banded sculpin ( <i>Cottus carolinae</i> )	Gordon 1991
Wounded darter ( <i>Etheostoma vulneratum</i> )	Layzer, unpublished data
Greenfin darter ( <i>Etheostoma chlorobranchium</i> )	Layzer, unpublished data
Greenside darter ( <i>Etheostoma blenniodes</i> )	Layzer, unpublished data
River chub ( <i>Nocomis micropogon</i> )	Layzer, unpublished data
Northern hogsucker ( <i>Hypentilum nigricans</i> )	Layzer, unpublished data
Central stoneroller ( <i>Campostoma anomalum</i> )	Layzer, unpublished data
Longnose dace ( <i>Rhinichthys cataractae</i> )	Layzer, unpublished data
Rosyside dace ( <i>Clinostomus funduloides</i> )	Layzer, unpublished data

### **Status and Distribution**

The Appalachian elktoe is known only from the mountain streams of western North Carolina and eastern Tennessee. Although the complete historical range of the Appalachian elktoe is unknown, available information suggests that the species once lived in the majority of the rivers and larger creeks of the upper Little Tennessee River system in North Carolina, with the possible exception of the Hiwassee and Watauga River systems (the species has not been recorded from either of these river systems). In Tennessee the species is known only from its present range in the main stem of the Nolichucky River.

**Distribution.** The Appalachian elktoe has a very fragmented, relict distribution. The species still survives in scattered pockets of suitable habitat in portions of the Little Tennessee River system, Pigeon River system, the Mills River and the Little River in the upper French Broad River basin in North Carolina, and the Nolichucky River system in North Carolina and Tennessee.

Little Tennessee River Subbasin. In the Little Tennessee River system in North Carolina, populations survive in the reach of the main stem of the Little Tennessee River, between the city of Franklin and the Fontana Reservoir, in Swain and Macon Counties (McGrath 1999; Service 1994, 1996, 2002), and in scattered reaches of the main stem of the Tuckasegee River in Jackson and Swain Counties (Mark Cantrell, Service, personal communication, 1996; McGrath 1998; Tim Savidge, NCDOT, personal communication, 2001; Service 2002), from below the town of Cullowhee downstream to Bryson City. The Appalachian elktoe was first recorded in 2000 from the Cheoah River, though there was a prior record from Tulula Creek (Clarke 1981), a tributary to the Cheoah River, below Santeetlah Lake, in Graham County (Service 2002). Also, biologists with the NCDOT, U.S. Forest Service, and our staff have recorded Appalachian elktoes from the Cheoah River, below Santeetlah Dam, during surveys of portions of the river in each year since (in 2002, 2003, 2004, and 2005).

French Broad River Subbasin. In the Pigeon River system in North Carolina, the Appalachian elktoe occurs in small, scattered sites in the West Fork Pigeon River and in the main stem of the Pigeon River, above Canton, in Haywood County (McGrath 1999, Service 2002, The Catena Group 2005). The Little River (upper French Broad River system) population of the species, in Transylvania County, North Carolina (Service 2002), is restricted to small, scattered pockets of suitable habitat downstream of Cascade Lake. The Appalachian elktoe occurs in a short reach of the Mills River in Henderson County, North Carolina, from just above the Highway 280 Bridge (Savidge, The Catena Group, personal communication, 2003) to about 1 mile below the bridge (Jeff Simmons, NCWRC, personal communication, 2004).

Nolichucky River Subbasin. In the Nolichucky River system, the Appalachian elktoe survives in a few scattered areas of suitable habitat in the Toe River, Yancey and Mitchell Counties, North Carolina (McGrath 1996, 1999; Service 1994, 1996); the Cane River, Yancey County, North Carolina (McGrath 1997; Service 1994, 1996); and the main stem of the Nolichucky River, Yancey and Mitchell Counties, North Carolina, extending downstream to the vicinity of Erwin in Unicoi County, Tennessee (Service 1994, 1996, 2002). Also, two individuals were found recently in the North Toe River, Yancey and Mitchell Counties, North Carolina, below the confluence of Crabtree Creek (McGrath 1999); and 15 live individuals, with no more than 2 to 3 at each site (Service 2002), and one shell (Service 2002) have been recorded from the South Toe River, Yancey County, North Carolina. The majority of the surviving occurrences of the Appalachian elktoe appear to be small to extremely small and restricted to scattered pockets of suitable habitat.

Extirpated Sites. In addition to formerly occurring in Tulula Creek (see above), the species also formerly occurred in the Swannanoa River (Clarke 1981; Service 1994, 1996). There is also a historical record of the Appalachian elktoe from the North Fork Holston River in Tennessee

(S. S. Haldeman collection); however, this record is believed to represent a mislabeled locality (Gordon 1991). If the historical record for the species in the North Fork Holston River is accurate, the species has apparently been eliminated from this river as well.

**Status.** Available information indicates that several factors have contributed to the decline and loss of populations of the Appalachian elktoe and threaten the remaining populations. These factors include pollutants in wastewater discharges (sewage treatment plants and industrial discharges); habitat loss and alteration associated with impoundments, channelization, and dredging operations; and the runoff of silt, fertilizers, pesticides, and other pollutants from land-disturbing activities that were implemented without adequate measures to control erosion and/or storm water (Service 1994, 1996). Mussels are known to be sensitive to numerous pollutants, including, but not limited to, a wide variety of heavy metals, high concentrations of nutrients, ammonia, and chlorine—pollutants commonly found in many domestic and industrial effluents. In the early 1900s, Ortmann (1909) noted that the disappearance of unionids (mussels) is the first and most reliable indicator of stream pollution. Keller and Zam (1991) concluded that mussels are more sensitive to metals than commonly tested fish and aquatic insects. The life cycle of native mussels makes the reproductive stages especially vulnerable to pesticides and other pollutants (Fuller 1974, Gardner et al. 1976, Stein 1971). Effluent from sewage treatment facilities can be a significant source of pollution that can severely affect the diversity and abundance of aquatic mollusks. The toxicity of chlorinated sewage effluents to aquatic life is well-documented (Bellanca and Bailey 1977, Goudreau et al. 1988, Tsai 1975), and mussel glochidia (larvae) rank among the most sensitive invertebrates in their tolerance of toxicants present in sewage effluents (Goudreau et al. 1988). Goudreau et al. (1988) also found that the recovery of mussel populations may not occur for up to 2 miles below the discharge points of chlorinated sewage effluent.

Land-clearing and disturbance activities carried out without proper sedimentation and storm-water control pose a significant threat to the Appalachian elktoe and other freshwater mussels. Mussels are sedentary and are not able to move long distances to more suitable areas in response to heavy silt loads. Natural sedimentation resulting from seasonal storm events probably does not significantly affect mussels, but human activities often create excessively heavy silt loads that can have severe effects on mussels and other aquatic organisms. Siltation has been documented to adversely affect native freshwater mussels, both directly and indirectly (Aldridge et al. 1987, Ellis 1936, Marking and Bills 1979). Siltation (1) degrades water and substrate quality, limiting the available habitat for freshwater mussels (and their fish hosts), thereby limiting their distribution and potential for the expansion and maintenance of their populations; (2) irritates and clogs the gills of filter-feeding mussels, resulting in reduced feeding and respiration; (3) smothers mussels if sufficient accumulation occurs; and (4) increases the potential exposure of the mussels to other pollutants. Ellis (1936) found that less than 1 inch of sediment deposition caused high mortality in most mussel species. Sediment accumulations that are less than lethal to adults may adversely affect or prevent the recruitment of juvenile mussels into the population. Also, sediment loading in rivers and streams during periods of high discharge is abrasive to mussel shells. Erosion of the outer shell allows acids to reach and corrode underlying layers that are composed primarily of calcium, which dissolves under acid conditions. Though Haywood County has made significant strides in controlling sediment and erosion, agricultural practices and land development continue to stress riparian areas, while

in-channel rock- and gravel-mining remains a source of channel alteration and redistributes fine sediments downstream.

The effects of impoundments on mussels are also well-documented. For the most part, lakes do not occur naturally in western North Carolina and eastern Tennessee (most of them are man-made), and the Appalachian elktoe, like the majority of our other native mussels, fish, and other aquatic species in these areas, is adapted to stream conditions (flowing, highly oxygenated water and coarse sand and gravel bottoms). Dams change the habitat from flowing to still water. Water depth increases, flow decreases, and silt accumulates on the bottom (Williams et al. 1992), altering the quality and stability of the remaining stream reaches by affecting water flow regimes, velocities, temperature, and chemistry. Dams that operate by releasing cold water from near the bottom of the reservoirs alter the downstream water temperature from those typical of warm- or cool-water streams to that seen in cold-water streams; this may affect their suitability for many of the native species inhabiting these stream reaches (Miller et al. 1984, Layzer et al. 1993). Impoundments change fish communities (fish host species may be eliminated) and mussel communities (species requiring clean gravel and sand substrates are eliminated) (Bates 1962). In addition, dams result in the fragmentation and isolation of populations of species and act as effective barriers to the natural upstream and downstream expansion or recruitment of mussel and fish species.

The information available demonstrates that habitat deterioration resulting from sedimentation and pollution from numerous point and nonpoint sources, when combined with the effects of other factors (including habitat destruction, alteration, and fragmentation resulting from impoundments, channelization projects, etc.), has played a significant role in the decline of the Appalachian elktoe. We believe this is particularly true of the extirpation of the Appalachian elktoe from the Swannanoa and French Broad Rivers and portions of the Pigeon, upper Little River, and upper Little Tennessee River systems. We believe these factors also have contributed to the extirpation of the species from parts of the upper Tuckasegee River, Cheoah River, and Tulula Creek, though the effects of impoundments are believed to have played an even more significant role in the loss of the species in the upper reaches of these streams.

The most immediate threats to the remaining populations of the Appalachian elktoe are associated with sediment and other pollutants (i.e., fertilizers, pesticides, heavy metals, oil, salts, organic wastes, etc.) from nonpoint sources, and most of the remaining populations are restricted to small, scattered pockets of stable, relatively clean, and gravelly substrates.

## **ENVIRONMENTAL BASELINE**

Under section 7(a)(2) of the Act, when considering the “effects of the action” on federally listed species, we are required to take into consideration the environmental baseline. The environmental baseline includes past and ongoing natural factors and the past and present impacts of all federal, state, or private actions and other activities in the action area (50 CFR 402.02), including federal actions in the area that have already undergone section 7 consultation, and the impacts of state or private actions that are contemporaneous with the consultation in process. The environmental baseline for this Opinion considers all projects approved prior to the initiation of formal consultation.

Since the discovery of the Appalachian elktoe in the Pigeon River system in May 1999, various surveys of the Pigeon River subbasin have been accomplished (Service 2002, The Catena Group 2005). The results of these surveys indicate that the Appalachian elktoe still occupies scattered areas of suitable habitat in about 12.2 miles of river channel of the West Fork Pigeon River and Pigeon River, extending from below Lake Logan on the West Fork Pigeon River, near the confluence of the Little East Fork Pigeon River, down to Canton at BRP's water intake impoundment on the Pigeon River. The Appalachian elktoe has not been found in any other tributaries to the Pigeon River or in the Pigeon River below BRP's water intake impoundment. In fact, the majority of the Pigeon River drainage appears to be devoid of any mussel fauna, likely from past pollution detailed above. Because the species was only recently rediscovered in the Pigeon River system, adequate surveys for estimating densities or population levels have not yet been conducted.

Because it was discovered only recently in the Pigeon River basin, further research is needed to determine the present and historic distribution of the Appalachian elktoe throughout the drainage. Based on the current distribution in the Pigeon River system, a reasonable estimate can be made that the Appalachian elktoe historically occurred as one large contiguous population from at least the current upper limits of the West Fork Pigeon River and to a corresponding elevation on the East Fork Pigeon River, downstream to the Ridge and Valley Province in Tennessee. A number of factors, such as point-source and nonpoint-source discharge, in-stream stone/gravel-mining, and the loss of riparian buffers, have likely contributed to the elimination of the Appalachian elktoe from significant reaches of its historic range in the Pigeon River and East Fork Pigeon River, thus creating a very small, relict population.

Although more survey work is needed to determine the distribution of the Appalachian elktoe within the Pigeon River basin, the distribution in the action area (Haywood County) is 10.5 river miles. The mussel is rare in the upper portion of its range in the East Fork Pigeon River and patchily distributed in the lower portions of this range downriver to the Town of Canton. The Appalachian elktoe is patchily distributed between river mile 69.5 of the Pigeon River and river mile 4.5 of the West Fork Pigeon River.

#### **Status of the Species Within the Action Area**

The action area is essentially the entire portion of the known range of the Appalachian elktoe in the Pigeon River subbasin. Because this population appears to be relatively small, it is likely particularly vulnerable to changes in population numbers, and losses of only a few individuals could result in the loss of the population. Critical habitat was designated for the Appalachian elktoe in the Pigeon River and West Fork Pigeon River. The *Recovery Plan for the Appalachian Elktoe* (Service 1996) was published before the rediscovery of the Pigeon River population. The immediate footprint for the bridge replacement project (B-3656) does not occur within designated critical habitat and will therefore not result in its adverse modification.



## **Factors Affecting the Species' Environment Within the Action Area**

Residential development and agricultural practices have had serious impacts on the aquatic habitat in the project area. Much of the riparian habitat within the project area has been severely impacted by both agriculture and residential development. Because riparian areas have been cleared of trees and other woody vegetation, recent high-water events have resulted in bank erosion and failure along much of the Pigeon and West Fork Pigeon Rivers, upstream, downstream, and within the project area. The poor condition of the riparian habitat also likely leads to excessive runoff from adjacent agriculture fields that contain not only silt but also the fertilizers and pesticides used in those fields. In addition to many seasonal irrigation water withdrawals, the Town of Canton's water intake structure, and Lake Logan upstream of the action area, there are also multiple point-source discharges into the Pigeon River above the project area that affect water quality and quantity in the action area.

During August and September of 2004, significant flooding occurred in the Pigeon River drainage. Several other areas within the Pigeon River have been identified as having significant stream-bank damage. Stream-bank repairs should result in improved habitat quality, though the Appalachian elktoe does not occur at those sites. Other federal actions proposed for the upper Pigeon River basin include another bridge replacement project by the Federal Highway Administration/NCDOT over the West Fork Pigeon River on SR 1112 (Chambers Farm Lane). At least one bridge, previously scheduled for replacement, was replaced after being lost entirely during the September 2004 flooding. We do not have any information concerning any additional federal actions ongoing or proposed for the action area at the present time.

## **EFFECTS OF THE ACTION**

Under section 7(a)(2) of the Act, "effects of the action" refers to the direct and indirect effects of an action on the species or critical habitat, together with the effects of other activities that are interrelated or interdependent with that action. The federal agency is responsible for analyzing these effects. The effects of the proposed action are added to the environmental baseline to determine the future baseline, which serves as the basis for the determination in this Opinion. Should the effects of the federal action result in a situation that would jeopardize the continued existence of the species, we may propose reasonable and prudent alternatives that the federal agency can take to avoid a violation of section 7(a)(2). The discussion that follows is our evaluation of the anticipated direct and indirect effects of implementing the Emergency Watershed Protection Program in Haywood County. Indirect effects are those caused by the proposed action that occur later in time but that are still reasonably certain to occur (50 CFR 402.02).

### **A. Factors to be Considered**

Proximity of the Action – Based on the 2009 mussel surveys conducted by the NCDOT and the Service, at least five individual Appalachian elktoes occur in the vicinity of the existing bridge. Although measures to avoid and minimize impacts to the Pigeon River and the Appalachian elktoe are included in the project plans, implementation of this project will result in unavoidable impacts to the river habitat and to individual mussels.

Nature of the Effect – In-stream habitat will be impacted permanently by the removal and construction of the piers within the river channel. Suitable in-stream habitat at the project site will also be affected for the duration of the construction and demolition and likely for some period after completion of the project. Portions of the habitat may be impacted permanently by the construction and use of the causeways. A small portion of the riparian area at both sites may be cleared for equipment access and could result in temporary increases in water temperature at each location until reforestation can occur.

Disturbance Duration, Frequency, and Intensity – Disturbance to the riverbed will occur over a relatively short period of time from the construction of the bridge piers. However, the disturbance to the river's flow pattern at the piers will exist throughout the life of the bridge. The causeways for construction and demolition will be in place for the length of time needed to construct and demolish the bridge; therefore, the disturbance to the riverbed associated with the causeways will be over an extended period of time. Although there will be direct impacts to the riverbed associated with the causeways, the construction of the causeways will be phased to limit the amount of causeway in the river at any one time, and only the causeways needed for an activity will be in place during that activity and will be removed when the action is completed. The causeways will be constructed with clean stone. There will be impacts to the hydrology of the river both upstream and downstream of the causeways. Riparian vegetation removal will be conducted and stabilized through erosion-control measures and a combination of hardened work pads or immediate seeding and mulching.

## **B. Analyses of Effects of the Action**

### Potential Beneficial Effects

The construction and demolition of the existing bridge have some negative impacts but also have some long-term beneficial effects. Specifically, the NCDOT has described the following beneficial effects that could result from this project:

*Reduction in number of bents in the main river channel.* The existing B-3656 bridge has three piers within the river channel totaling an estimated area of 480 ft<sup>2</sup>. The new bridge construction will require the placement of two piers in the river, which will result in 126 ft<sup>2</sup> of fill. Given that bents in the river trap debris during high flows and can change the hydraulics in the immediate vicinity of the structure (causing scour and deposition), the reduction in the number of piers in the Pigeon River is expected to reduce the bridge's effects on stream-flow patterns at the bridge site.

Direct Effects - Actions that may result in direct impacts include the construction of causeways for the construction of new structures and the demolition of existing structures, land-clearing for access, potential toxic spills, the removal of causeways after construction, the demolition and removal of existing bridge structures, and the resulting changes in flow patterns and destabilization of the substrate. All of these activities have the potential to kill or injure mussels by crushing them; poisoning them with the release of some toxic substance; or causing siltation,

which may suffocate them or displace them into potentially unsuitable habitat, resulting in their death. These actions may result in direct harm to individuals or negative changes in currently suitable habitat.

Substrate Disturbance and/or Habitat Loss

The construction of the new bridge will require the placement of two piers in the river, which will result in 126 ft<sup>2</sup> of permanent fill. This will be a 354-ft<sup>2</sup> reduction from the existing structure, which has three bents totaling 480 ft<sup>2</sup> of fill in the river. Rock causeways will be required to construct the new bridge and demolish the existing bridge. The temporary construction/demolition of causeways used for the project is designed to result in the least amount of rock fill in the river while providing sufficient area to accomplish the construction and demolition. The construction of the causeways will follow a phasing plan that will minimize impacts to the flow of the river; at the narrowest point, 44 percent of the river will be open. To construct the piers and use cranes to set box beams for the new bridge, the largest area concurrently impacted for the causeways will result in 13,940 ft<sup>2</sup> of temporary rock fill in the river. There also will be a temporary rock fill associated with the causeways during demolition and construction. These impacts are summarized in Table 3.

<b>Table 3. Summary of Temporary Stream Impacts.</b>			
<b>Phase</b>	<b>Stage</b>	<b>Impact (ft<sup>2</sup>)</b>	<b>Concurrent Intervals</b>
I	1	10,455	
I	2	7,840	
I	3	6,100	
II	1	6,535	Concurrent with Phase I, Stage 3 = 12,635 ft <sup>2</sup>
II	2	7,840	Concurrent with Phase I, Stage 3 = 13,940 ft <sup>2</sup>
II	3	6,535	Concurrent with Phase I, Stage 3 = 12,635 ft <sup>2</sup>

A total of 845 ft<sup>2</sup> of permanent stream impacts will result from slope stabilization of the east bank. There will also be a combined temporary loss of stream habitat from the construction/demolition of the causeways for each phase, totaling 18,295 ft<sup>2</sup>. Based on the surveys conducted in 2009 by the NCDOT and the Service, it is likely that at least five individual Appalachian elktoe mussels will be impacted by the project. The Service will be responsible for the coordination of the removal and relocation of any individuals from the impact site (see the “Additional Conservation Measures” in the “Conservation Measures” section of this Opinion). While the causeways will be placed in the river only temporarily, it is difficult to predict if the impacts to the streambed will permanently or temporarily impact habitat and mussel recruitment to the sites.

Impacts from Sedimentation

Because of the topography and the erodible nature of the soils in the project area (fine loamy soils with moderate erodibility), project construction has the potential to result in sedimentation in the Pigeon River. To minimize the potential for sedimentation, the NCDOT has developed specific erosion-control measures for this project that are designed to protect environmentally

sensitive areas (see the “Conservation Measures” section of this Opinion). The primary concerns for sedimentation entering the river are during the demolition of the bridge and exposure of bare soil during construction activities.

### Impacts from Changes in Hydrology

The temporary causeways proposed at the project site will narrow the channel and will alter the hydrology, resulting in localized changes in flow patterns at the site. This change in hydrology and any associated scour could result in the loss or displacement of mussels. However, the change in hydrology will be temporary, during the life of the respective causeways, and the design of the causeways (allowing for flow through the causeways) should minimize the impacts to hydrology and associated impacts.

### Impacts to Fish Hosts

In addition to the potential changes in hydrology as a result of the causeways, there is the potential for the causeways to act as a barrier to fish migration. The disruption of fish migrations could indirectly impact the Appalachian elktoe if the fish that are disturbed serve as fish hosts for the elktoe. While temporary disruptions to fish migration may occur during construction of the causeways, the following design factors should reduce the long-term effects of the causeways on fish migration: (1) the causeways will be temporary structures in the river, (2) at least 44 percent of the channel will be unrestricted by the causeways at any given time, and (3) the causeways are designed to allow for linear flow. Given these design features, the causeways are not expected to have a significant impact, if any, on the natural migration of fish species and therefore should not impact the life cycle or distribution of the Appalachian elktoe in the Pigeon River.

Indirect Effects - Indirect effects are defined as those that are caused by the proposed action and are later in time but are still reasonably certain to occur (50 CFR 402.02). Indirect effects to the Appalachian elktoe may include permanent changes in channel substrate or stability that adversely affect the availability of suitable habitat in the vicinity of the bridge. The infrastructure improvements associated with this bridge replacement could indirectly affect and improve levels of service, better accommodate merging and exiting traffic, or reduce travel times, all of which could have land-development impacts outside the project area. Given that the project involves the replacement of an existing structure in essentially the same location, it is not likely that the new structure would increase accessibility to the adjacent land or result in changes in the type or volume of traffic using the structures. Although the existing bridge will be replaced with a wider structure, potentially allowing access to the surrounding land by larger trucks (including construction equipment), there are other existing bridge and road access surrounding the existing bridge that allow for the passage of large vehicles and provide access to the same land area as the subject bridge. Careful implementation of project plans, including work access, should reduce permanent impacts to Pigeon River habitat.

Indirect Impacts - Indirect effects are defined as those that are caused by the proposed action and are later in time but are still reasonably certain to occur (50 CFR 402.02). Indirect effects to the Appalachian elktoe may include permanent changes in channel substrate or stability that adversely affect the availability of suitable habitat in the vicinity of the B-3656 project site.

Additional indirect effects could result from infrastructure improvements or any resulting changes that could have land-development impacts outside the project area.

Interrelated and Interdependent Actions - An interrelated activity is an activity that is part of the proposed action and depends on the proposed action for its justification. An interdependent activity is an activity that has no independent utility apart from the action under consultation. A determination of whether other activities are interrelated to, or interdependent with, the proposed action under consultation is made by applying the “but for” test. That is, it must be determined that the other activity under question would not occur “but for” the proposed action under consultation. There are no other projects planned that would satisfy the “but for” test; therefore, there are no interrelated or interdependent actions that should be considered in this Opinion.

## **CUMULATIVE EFFECTS**

### Action Area

Cumulative effects include the combined effects of any future state, local, or private actions that are reasonably certain to occur within the action area covered in this Opinion. Future federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the Act.

The only potential private action we are aware of that may occur and produce significant cumulative impacts is the continued residential development in the watershed. This continued residential development could have the potential to significantly impact the Pigeon River subbasin and the Appalachian elktoe. However, given the uncertainty of this action, we will not address residential development further in this Opinion. We are not aware of any other future state, local, or private actions that are reasonably certain to occur within the action area that would not be subject to section 7 review. Therefore, cumulative effects, as defined by the Act, will not occur and will not be addressed further in this Opinion.

### Cumulative Impacts of Incidental Take Anticipated by the Service in Previously Issued Biological Opinions

In reaching a decision of whether the implementation of activities outlined in the BA are likely or are not likely to jeopardize the continued existence of the Appalachian elktoe, we must factor into our analysis previous biological opinions issued involving the species, especially those opinions where incidental take was presented as the area of habitat disturbed. Because this species was only recently rediscovered in the Pigeon River drainage, all previously issued biological opinions involving the Appalachian elktoe involved activities in other subbasins. All of these have been nonjeopardy opinions, and they assessed the amount of take to be “minimal.”

## **CONCLUSION**

After reviewing the current status of the Appalachian elktoe; the environmental baseline for the action area; the effects of implementation of the proposed action; measures identified in the NCDOT’s BA to help minimize the potential impacts of the proposed project and assist in the

protection, management, and recovery of the species; previously issued Service nonjeopardy biological opinions that allow various levels of incidental take; any potential interrelated and interdependent actions associated with the proposed action; and any potential cumulative effects, it is the Service's biological opinion that implementing this project is not likely to jeopardize the continued existence of the Appalachian elktoe. Critical habitat will not be adversely affected or destroyed by implementing this project as proposed.

## **INCIDENTAL TAKE STATEMENT**

Section 9 of the Act and federal regulations pursuant to section 4(d) of the Act prohibit the taking of endangered and threatened species, respectively, without special exemption. Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or attempt to engage in any such conduct. Harm is further defined by the Service to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavioral patterns, such as breeding, feeding, or sheltering. Harass is defined by the Service as intentional or negligent actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavior patterns that include, but are not limited to, breeding, feeding, or sheltering. Incidental take is defined as take that is incidental to, and not for the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited under the Act, provided that such taking is in compliance with the terms and conditions of this incidental take statement.

### **Amount of Take Anticipated**

The Service anticipates that incidental take of the Appalachian elktoe may occur as a result of construction of the subject bridge. During construction, individual mussels may be crushed, harmed by siltation or other water-quality degradation, or dislocated because of physical changes in their habitat.

Approximately 18,295 ft<sup>2</sup> of the streambed will be temporarily impacted by the construction of the temporary causeways, although this total area of impact will not occur all at the same time. The largest area to concurrently be impacted by causeway construction is 13,940 ft<sup>2</sup>. There will be 685 ft<sup>2</sup> of permanent impacts due to the armoring of the east bank. All Appalachian elktoes within this area and that occur within 100 ft of disturbed areas are likely to be taken as a result of this proposed action. If project impacts extend beyond this distance and if incidental take is exceeded, all work should stop, and the Service should be contacted immediately.

### **EFFECT OF THE TAKE**

In this Opinion the Service has determined that this level of take is not likely to result in jeopardy to the Appalachian elktoe or destruction or adverse modification of its critical habitat.

## **Reasonable and Prudent Measures**

The Service believes the following reasonable and prudent measures are necessary and appropriate to minimize take of the Appalachian elktoe. These nondiscretionary measures include, but are not limited to, the terms and conditions outlined in this Opinion.

1. The NCDOT will ensure that the contractor understands and follows the measures listed in the “Conservation Measures,” “Reasonable and Prudent Measures,” and “Terms and Conditions” sections of this Opinion.
2. Construction and demolition activities shall be implemented consistent with measures developed to protect the Appalachian elktoe, including those designed to maintain, improve, or enhance its habitat.
3. All appropriate NCDOT BMPs for bridge maintenance, construction, and demolition will be followed or exceeded for this project, and any additional BMPs listed in the “Terms and Conditions” section of this Opinion will be followed.

## **Terms and Conditions**

In order to be exempt from the prohibitions of section 9 of the Act, the NCDOT must comply with the following terms and conditions, which implement the reasonable and prudent measures described previously and outline required reporting and/or monitoring requirements. These terms and conditions are nondiscretionary and apply to the Pigeon River.

1. A Service biologist will be present at the preconstruction meeting to cover permit conditions and discuss any questions the contractor has regarding implementation of this project. After the contractor submits plans for various stages of the project, a Service biologist will review and provide comments on the plans and will attend any meetings to discuss implementation of the plans.
2. All appropriate NCDOT BMPs for bridge maintenance, construction, and demolition will be followed or exceeded for this project.
3. Construction will be accomplished so that wet concrete does not contact water entering or flowing in the river.
4. Activities in the floodplain will be limited to those absolutely necessary to construct the proposed bridge and remove the existing bridge. Areas used for borrow or construction by-products will not be located in wetlands or the 100-year floodplain.
5. The drill rig and crane can be refueled while inside the 100-year floodplain provided that spill response materials (such as spill blankets and fueling diapers) are used during the refueling. When weather forecasts indicate the potential for flooding, the NCDOT will immediately remove equipment, hazardous materials,

fuel, lubricating oils, or other chemicals outside the 100-year floodplain or at least 200 ft from all water bodies (whichever distance is greater), preferably at an upland site.

6. Unconsolidated material (such as sand and dirt) will not be placed directly on the causeways since the material could be washed off or settle into the causeways and enter the river. If unconsolidated material must be placed on the causeways, a solid barrier will be placed on the causeways prior to the placement of the material. The barrier and unconsolidated material will be removed anytime throughout a work day when the water level rises to a point, or is expected to rise overnight to a point, where material could wash off the causeways or during periods of inactivity (2 or more consecutive days). Also, any equipment that is placed on the causeways will be removed anytime throughout a work day when the water level rises to a point, or is expected to rise overnight to a point, where material could wash off the causeways or during periods of inactivity (2 or more consecutive days). The only exception to this measure is that the drill rig may be left in place for periods of inactivity; however, it must also be removed if the water rises to a point, or is expected to rise to a point, where the drill rig could be flooded.
7. Riparian vegetation will be maintained to the maximum extent possible, especially large trees.
8. If riparian areas are disturbed, they will be revegetated with native species as soon as possible.

## **CONSERVATION RECOMMENDATIONS**

Section 7(a)(1) of the Act directs federal agencies to use their authorities to further the purposes of the Act by carrying out conservation programs for the benefit of endangered and threatened species. The following conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop information:

1. Pursue funding and partnership opportunities to complete any additional research, inventory, and monitoring work in order to better understand the distribution and autecology of the Appalachian elktoe in the Little Tennessee, French Broad, and Nolichucky watersheds.
2. Where opportunities exist, work with landowners, the general public, and other agencies to promote education and the dissemination of information about endangered mussels and their conservation.
3. Pursue additional buffers and conservation opportunities along the main stem of the Pigeon River and its tributaries, either individually or in concert with other conservation organizations.



4. Explore opportunities to work with local and state water-quality officials in order to minimize or eliminate sources of pollution, including wastewater and storm-water discharges into the upper Pigeon River watershed.
5. Consult with the Service on projects that affect aquatic habitat in the Pigeon River drainage, regardless of the funding source, to ensure compliance with all provisions of the Act.

In order for the Service to be kept informed about actions that minimize or avoid adverse effects or that benefit listed species or their habitats, we request notification of the implementation of any conservation recommendations.

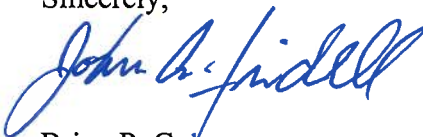
#### REINITIATION/CLOSING STATEMENT

This concludes formal consultation on the actions outlined in your BA dated May 25, 2010, requesting formal consultation. As provided in 50 CFR 402.16, reinitiation of formal consultation is required where discretionary federal agency involvement or control over the action has been retained (or is authorized by law) and if: (1) the amount or extent of incidental take is exceeded, (2) new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this Opinion, (3) the agency action is subsequently modified in a manner that causes an effect to the listed species or critical habitat not considered in this Opinion, or (4) a new species is listed or critical habitat is designated that may be affected by the action. In instances where the amount or extent of incidental take is exceeded, any operation causing such take must cease, pending reinitiation.

Consultation should also be reinitiated if new biological information comes to light that invalidates the assumptions made regarding the biology or distribution of the Appalachian elktoe in the Pigeon River in North Carolina.

If there are any questions, please contact Mr. Troy Wilson of our staff at 828/258-3939, Ext. 226, or me, Ext. 223. We have assigned our log number 4-2-10-092 to this consultation; please refer to this number in any future correspondence concerning this matter.

Sincerely,

  
for Brian P. Cole  
Field Supervisor

Enclosures

Electronic copy to:

- Mr. David Baker, Asheville Regulatory Field Office, U.S. Army Corps of Engineers, 151 Patton Avenue, Room 208, Asheville, NC 28801-5006
- Ms. Marla J. Chambers, Western NCDOT Permit Coordinator, North Carolina Wildlife Resources Commission, 12275 Swift Road, Oakboro, NC 28129
- Mr. Mark Davis, Environmental Supervisor, North Carolina Department of Transportation, 253 Webster Road, Sylva, NC 28779
- Ms. Elizabeth Lusk, Natural Environment Unit Project Management Group Supervisor, North Carolina Department of Transportation, 1598 Mail Service Center, Raleigh, NC 27699-1598
- Mr. Mike Parker, North Carolina Division of Water Quality, Asheville Regional Office, 2090 U.S. Highway 70, Swannanoa, NC 28778
- Mr. J. Michael Sanderson, Natural Environment Unit Biological Surveys Group, North Carolina Department of Transportation, 1598 Mail Service Center, Raleigh, NC 27699-1598
- Mr. Logan Williams, Natural Environment Biological Surveys Group Supervisor, North Carolina Department of Transportation, 1598 Mail Service Center, Raleigh, NC 27699-1598
- Mr. Brian Wrenn, North Carolina Division of Water Quality, Central Office, 2321 Crabtree Blvd., Suite 250, Raleigh, NC 27604

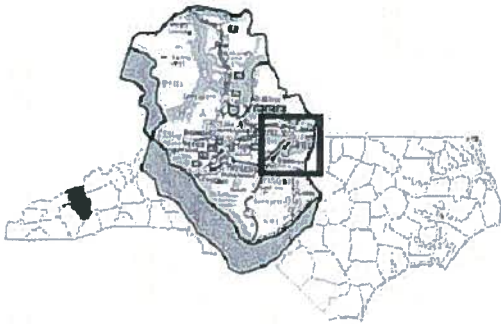
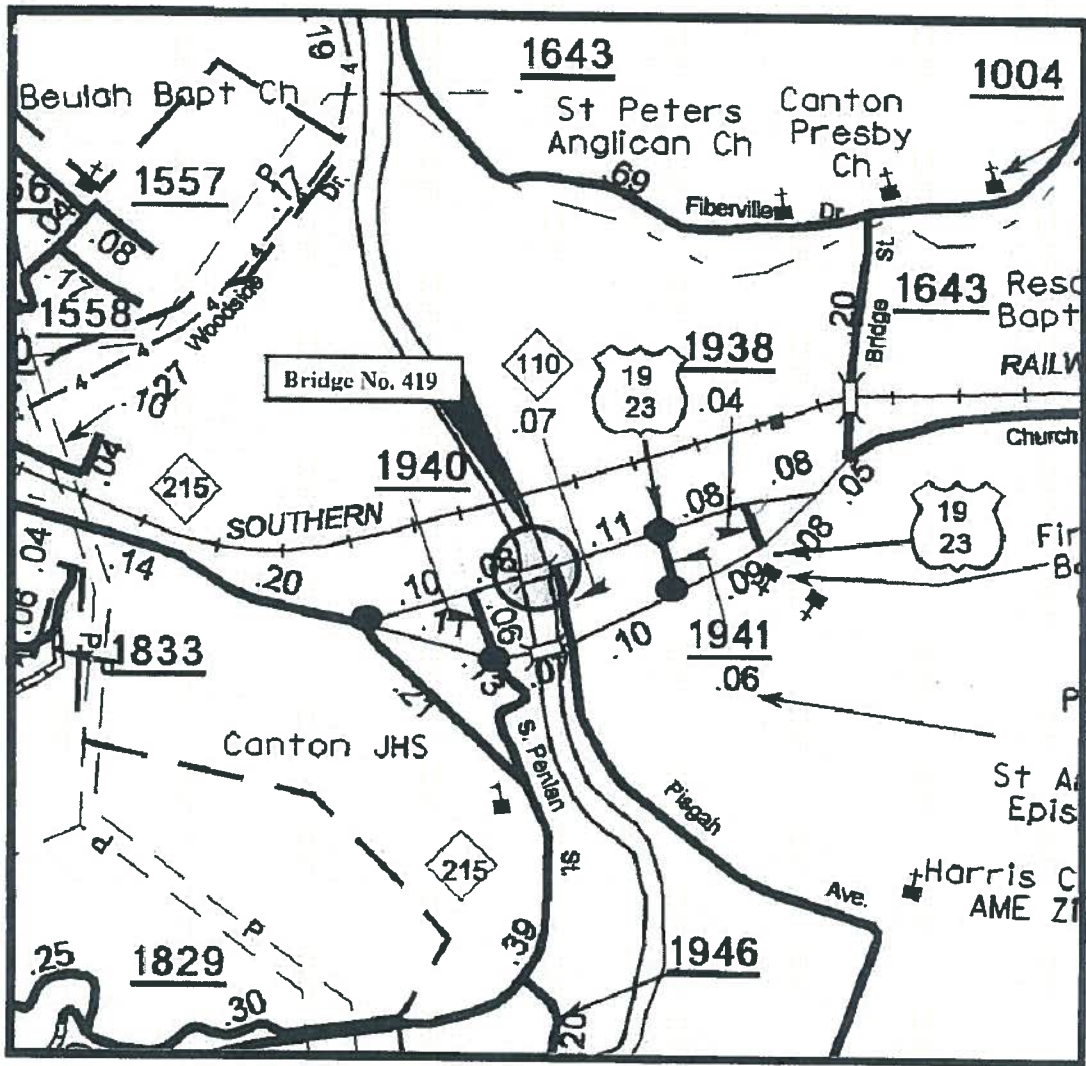
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## **Appendix A**



STUDIED DETOUR ROUTE —●—●—●—

 NORTH CAROLINA DEPARTMENT OF TRANSPORTATION  
DIVISION OF HIGHWAYS  
PROJECT DEVELOPMENT & ENVIRONMENTAL ANALYSIS BRANCH

HAYWOOD COUNTY  
REPLACE BRIDGE NO. 419 ON US 19-23-74  
OVER PIGEON RIVER  
B-3656

Figure 1

Figure 1. Map of project area.

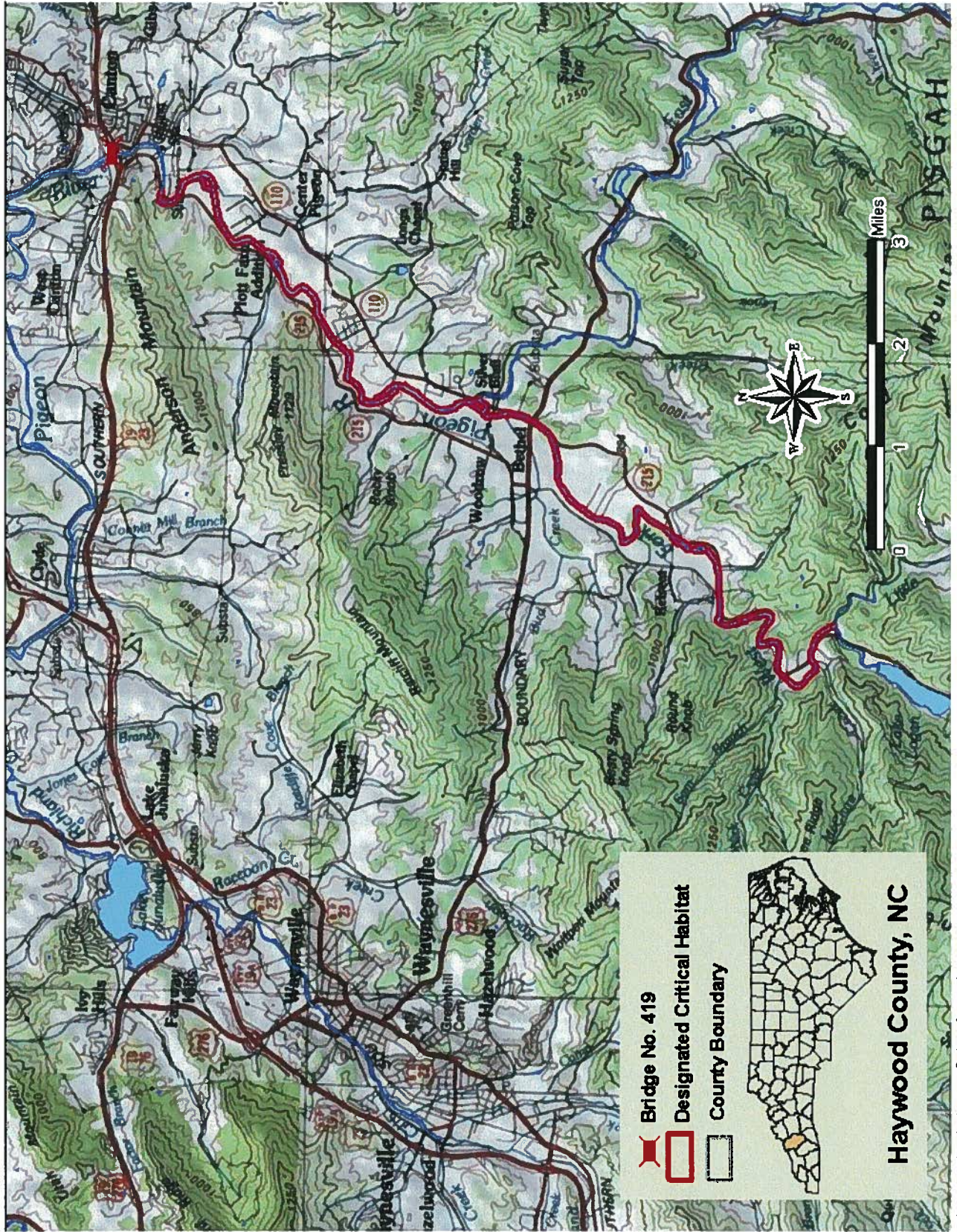


Figure 2. Map of Action Area.



Figure 3. Map of Priority Area for Conservation Measures.