

August 23, 2005

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Re: Rulemaking to implement HB 1189 requiring the Commission to designate Hazel, Eagle, Chambers and Forney Creeks as Outstanding Resource Waters

Please accept these comments on behalf of the Southern Environmental Law Center in support of the pending rulemaking to implement House Bill 1189 directing the Environmental Management Commission to designate Hazel, Eagle, Chambers and Forney Creeks in the Great Smoky Mountains National Park as Outstanding Resource Waters. SELC reserves the right to supplement these comments. We are continuing our efforts to collect documents and studies that will be useful to inform the rulemaking process and will supplement this filing as more become available.

Because of the unique geology and topography of the watersheds surrounding Hazel, Eagle, Chambers and Forney Creeks, these waters require special management strategies to ensure that their outstanding resource values are maintained and protected. In particular, because of the risk of degradation associated with excavation of the acid-producing rock that predominates in these watersheds, the extensive atmospheric acid deposition in the Park that has rendered these waters unusually vulnerable to additional acid deposition, and the sensitivity of the outstanding resource values that characterize these waters, such as habitat for rare southern strain native brook trout, management strategies that restrict excavation of acid-producing rock are required to protect these waters.

I. Hazel, Eagle, Chambers and Forney Creeks Are Outstanding Resource Waters Characterized By Exceptional Outstanding Resource Values.

As recognized by the legislature, these four pristine trout streams meet all of the requirements for designation as outstanding resource waters in that they are truly unique and special waters with outstanding resource values that may not be protected by existing

water quality standards. Each of these waters is characterized by the outstanding resource values identified by 15 NCAC 02B .0225(b).

Outstanding Fish Habitat. Hazel, Eagle, Chambers and Forney Creeks are outstanding fish habitat and fisheries. Each of these streams is classified as trout water. The legislature found that “Forney, Chambers, Hazel, and Eagle Creeks are renowned for exceptional trout fishing in the Eastern United States and have attracted notable anglers including author Horace Kephart, Governor Luther Hodges, United States Secretary of the Interior Stewart Udall, Wildlife Resources Commissioner T.N. Massie and others.” See H.B. 1189. The North Carolina Division of Water Quality has also noted that the watershed surrounding Fontana Lake “contains some of the most famous trout streams in the state, including Hazel, Forney, Deep, and Noland creeks.” Little Tennessee Basinwide Management Plan May 1997 at 4-19 (hereinafter BMP 1997) (http://h2o.enr.state.nc.us/basinwide/Little_Tennessee/lt_wq_management_plan.htm).

The North Carolina Wildlife Resources Commission recently emphasized the importance of the trout population in the Great Smoky Mountains National Park, noting that “[l]imited accessibility and disturbance, natural obstructions, and high quality habitat have enabled southern strain brook trout populations to persist in the GSMNP, which further adds to the uniqueness and importance of the Park.” Letter from N.C. Wildlife Resources Commission to National Park Service dated April 8, 2004 (attached). Furthermore, “many wild populations of brook trout in North Carolina are either northern or mixed genetic strain because of past stocking with imported fish, whereas numerous streams in the GSMNP study area support populations that are pure southern genetic strain.” *Id.*

Unusually High Levels of Recreation. Hazel, Eagle, Chambers and Forney Creeks are characterized by an unusually high level of water based recreation or potential for such recreation. As noted by the legislature, “Fontana Lake in Graham and Swain Counties,” to which Hazel, Eagle, Forney and Chambers Creeks flow, “provides over \$4,700,000 in annual recreational benefits to the citizens of North Carolina.” H.B. 1189. These waters are important components of America’s most-visited National Park with over 10 million visitors per year. In the summer, 28% of those visitors report that they came to the park to enjoy fishing or swimming. Great Smoky Mountains National Park Visitor’s Studies, Summer and Fall 1996 at 23 (www.nps.gov/grsm/pphtml/documents.html).

Special Designations. In addition, Hazel, Eagle, Chambers and Forney Creeks have received special designations that do not provide additional water quality protection. All of these waters are designated as Wild Trout Waters. In addition, these waters are important components of the National Park which has been recognized by listing on the World Heritage List and as an International Biosphere Reserve. In its letter nominating the Park for the World Heritage list, the Department of Interior emphasized the “diversity of its plant and animal resources, the beauty of its ancient mountains, and the depth and integrity of the wilderness sanctuary within its boundaries” as the basis for the designation. Hazel, Eagle, Chambers and Forney Creeks, as four of the most significant

and pristine waters flowing through the heart of the wildest part of the Park, are an important component of the characteristics that qualified the Park for World Heritage listing.

Important Component of National Park. Hazel, Eagle, Chambers and Forney Creeks represent important components of the Great Smoky Mountains National Park. The current Strategic Plan for the Great Smoky Mountains National Park identifies four elements that define the “primary significance: of the park including “the beauty of its mountain terrain and waterways.” Great Smoky Mountains National Park Strategic Plan, October 1, 2005-September 30, 2008, at *Background on the Park* (www.nps.gov/grsm/pphtml/documents.html). A core goal of the strategic plan is to ensure that all waters in the park are unimpaired. Id.

The General Management Plan for the Park recognizes the core nature of the GSMNP as a “sanctuary” from human intrusion and safeguards that element of the GSMNP from degradation. Great Smoky Mountains National Park General Management Plan at 5 (hereinafter GMP) (attached). Fundamental to the Great Smoky Mountains National Park’s role as a sanctuary from human intrusion is the wild core of the Park which includes the Hazel, Eagle, Chambers and Forney Creek watersheds. That section of the Park has been recognized by NPS as an area that retains “its primeval character and influence, without permanent improvements or human habitation” and that is eligible for designation under the Wilderness Act. 16 U.S.C. § 1131(c). In keeping with that recognition, NPS manages these watershed as wilderness in which “visitor uses and park management practices are to be of a transient nature and nonmotorized except in extreme emergencies.” GMP at 19. As integral elements of the wild core of the Park, which is in turn fundamental to the nature of the Park as a sanctuary, Hazel, Eagle, Chambers and Forney Creeks are important components of the Great Smoky Mountains National Park.

Special Ecological Significance. These waters are of special ecological and scientific significance because they provide habitat for rare or endangered species and serve as areas for research and education. The legislature noted as a basis for the ORW designation of these streams that Forney, Chambers, Hazel, and Eagle Creeks provide habitat for federally and State listed endangered species. H.B. 1189. The N.C. Wildlife Commission recognizes these streams as important refuges for native southern strain brook trout. In addition, water quality sampling conducted by the NC Division of Water Quality in 1994 and 1999 in Forney Creek found the best NCBI score, a measure of the abundance and tolerance value of species, ever recorded in the state. Existing Conditions Report, North Shore Road Environmental Impact Statement, January 2004, at 102 (hereinafter ECR) (www.northshoreroad.info/documents.htm).

Because of their exceptional water quality, even as compared to other waters within the Park, these waters also serve important research and educational purposes as critical components of Park-wide research and educational efforts. The All Taxa Biodiversity Inventory Project, for example, is a large scale effort to inventory the estimated 100,000 species of living organisms in Great Smoky Mountains National Park in a relatively short time period. Education is an integral role of the ATBI project.

II. Hazel, Eagle, Chambers and Forney Creeks Are Subject to Unique Circumstances that Require Special Management Strategies to Maintain And Protect Their Outstanding Resource Values.

North Carolina's antidegradation policy requires the Environmental Management Commission to maintain the water quality of waters classified as Outstanding Resource Waters "such that existing uses, including outstanding resource values of said Outstanding Resource Waters shall be maintained and protected." 15 NCAC 02B .0201(e) (emphasis added). As a result, Hazel, Eagle, Chambers and Forney Creeks must be protected not only against degradation that eliminates fishing or swimming as uses, but also against any degradation that renders the fish habitat in these streams any less outstanding, leaves their ecological and scientific significance any less special, reduces their importance as components of the Great Smoky Mountains National Park, or in any way diminishes their recreation value. To ensure that water quality conditions are "maintained to protect the outstanding resource values of waters classified ORW," the Department is authorized to develop "[m]anagement strategies to protect resource values," 15 NCAC 02B .0225(c)(1), and to take "additional actions to protect resource values" including "anything within the powers of the Commission." *Id.* at .0225(c).

Because of the unique topography and geology of the Hazel, Eagle, Chambers and Forney Creek watersheds and because of long term threats to their water quality from atmospheric acid deposition, these waters require implementation of management strategies to ensure maintenance of their outstanding resource values. For this reason, the General Assembly recognized that "Forney, Chambers, Hazel, and Eagle Creeks . . . require special protection to maintain their existing uses." HB 1189.

Acid-Producing Rock. In addition to sedimentation and other threats to water quality normally associated with land disturbing activity, the specific geology of the Hazel, Eagle, Forney and Chambers watersheds means that excavation in these watersheds will also generate acidic drainage contaminated with heavy metals that would devastate water quality and aquatic life in these streams.

The Great Smoky Mountains National Park in general, and the watersheds for Hazel, Eagle, Chambers and Forney Creeks in particular, are characterized by rock formations that generate acidic drainage when exposed to air and water. Acid drainage results from the chemical breakdown of iron sulfide minerals like pyrite and pyrrhotite. That acidic runoff, in turn, leaches heavy metals such as copper, zinc, aluminum, and lead from the rock formations. ECR at 86. This problem is complicated by the fact that these rocks have an extremely low acid buffering capacity. *Id.*

The name Anakeesta is often used as a generic term for rocks capable of producing this acid drainage, but the Anakeesta Formation is not the only rock unit within this region capable of producing acid drainage. ECR at 86-87. Other rock formations in the region have the same tendency, including the Copperhill Formation and the Wehuttu Formation. Essentially all of the rock formations in the Great Smoky

Mountains National Park can contain sufficient concentrations of minerals such as pyrite to produce acid drainage. The National Park Service has estimated that 99% of rocks along the northern shore of Fontana Lake could generate acid. *Id.* The Copperhill Formation, which is the predominant formation throughout the region along the northern shore of Fontana Lake between the terminus of Lake View Road and Fontana Dam, is a serious acid-producing formation. *Id.* The Park Service has concluded that the western portion of the Park, in particular, including portions of the Hazel Creek watershed, has the highest potential for acid production in the Park and is likely to contain higher concentrations of metallic minerals than the surrounding rocks. See Preliminary Alternatives Report, North Shore Road Environmental Impact Statement, January 2005, at 102 (hereinafter PAR) (www.northshoreroad.info/documents.htm).

Acid-producing rock is identified using Net Acid-Base Accounting (NAB) tests. ECR at 89. Pulverized rock is tested to determine its acid-producing potential (AP) and its acid-neutralizing potential (NP). Both the AP and NP are expressed in tons of calcium carbonate per 1,000 pounds of excavated material. The net neutralization potential (NNP) is the NP excess or deficiency determined by subtracting the value of AP from the value of NP. An NNP of -5 or less is indicative of material capable of generating acid drainage. Because occurrences of acid producing rock cannot be predicted in with certainty absent laboratory testing, even with the use of geophysical testing techniques, all rock formations in these watershed must be presumed to have the potential to generate acid drainage. ECR at 87.

Even when undisturbed, these rock formations increase the acidity of Eagle, Hazel, Chambers and Forney Creeks and introduce heavy metal contaminants into those waters. The geology of bedrock formations has a significant effect on the chemical composition of surface water and on the sensitivity of aquatic ecosystems to acid drainage. BMP 1997 at 4-9. Sediments collected along the mouth of Hazel Creek in Fontana Lake show an elevated increase in copper content, which indicates the input of metal compounds. ECR at 87. Low pH values were found in several tributaries of Fontana Lake, including Forney and Eagle creeks. ECR at 105. Some streams in the region suffer from long-term trend of increasing sulfate concentrations between 1975 and 1995, with soils gradually becoming saturated with sulfates. BMP 1997 4-8. In water quality studies of acid mine drainage generated from inactive mine sites within the park, the USGS found that aluminum and iron contaminants were found in higher concentrations in waters further downstream from the mine sites than they were from waters near the mine sites which USGS attributed to “areas of natural ‘acid-rock drainage’ within the Anakeesta formation away from the mines.” ECR at 108. Finally, studies have confirmed that acid drainage from naturally occurring outcroppings of Anakeesta and ambient acidic flows affected benthic communities within Walker Camp Prong in the Park by reducing community density and diversity and creating a community dominated by tolerant organisms. *Aquatic Ecological response to Acid-Toxic Metal Leachate Mitigation in Southern Appalachian Mountains: Highway Drainage Control, Part II – Citico River, 1 July 1987 – 30 June 1980*, at 5 (hereinafter Tellico Study 1980) (attached).

When excavated or otherwise exposed to weathering, however, these rock formations generate acid drainage enriched with heavy metal contaminants that can devastate aquatic ecosystems. Acid drainage can dramatically reduce stream pH. Stream pH is an overall indicator of suitability for aquatic life. ECR at 104. The NC standard for pH in surface waters is 6.0 to 9.0. Trout will not survive in waters with pH values below 5.5. BMP 1997 at 3-8. Landslides or excavation of Anakeesta rock for road construction and other projects can cause stream pH values less than 5.0. BMP 1997 at 4-9.

The water quality impacts of excavating acid-producing rock within these watersheds is further exacerbated by the rugged terrain in this part of the Park. Excavations and rock cuts within regions of extreme topographic relief necessitate large footprints to effectively minimize the risk of landslides. ECR at 88. Because the rock formations in these watersheds are unstable and prone to fracture and landslides, extensive excavation is necessary to achieve stable slopes. Even without the disturbance created by excavation for a construction project, the Park is prone to natural debris flows and landslides which can expose acid-producing rock and create acidic drainage. See Hammarstrom et. al., *Weathering of Sulfidic Shale and Copper Mine Waste: Secondary Minerals and Metal Cycling in Great Smoky Mountains National Park, Tennessee and North Carolina, USA*, 45 Environmental Geology 35, at 39, 42-43 (2003) (hereinafter Hammarstrom) (attached). As a result, very large volumes of acid-producing rock must be excavated and disposed. In addition, the resulting cut creates a large surface area of exposed acid-producing material which, when exposed to the warm, wet climate of the Park, rapidly oxidizes and creates acid drainage. Id.

Previous land disturbing activities in this region, including road construction and former mine sites, demonstrate the potential consequences to water quality of excavating these acid-generating rock formations. The National Park Service abandoned efforts to construct a road through the Park generally and through these watershed specifically in 1968 after concluding that the rugged terrain through the Park would require extensive excavation and the geology was so unstable such that “the damage to the landscape and natural park values is so severe and the future maintenance will be so great” that the project could not be justified. See *Report of the Technical Committee for the Inspection of the Bryson-Fontana Road Construction, Great Smoky Mountains* at 3 (attached). The technical advisory committee established by the National Park Service to evaluate the project found that “over the centuries the natural terrain here has attained a rather delicate balance of stability which when disturbed even in a small way brings about an imbalance which is much more difficult to correct and re-establish than is the case in most of our parks.” Id. at 2 (emphasis added). The committee found that “it is doubtful whether these cut slopes can ever be made completely stable.” Id.

Rock faces exposed during construction of that project continue to generate sulfate-rich blooms. Protected rock overhangs create sheltered settings that allow highly soluble sulfitic salts to accumulate despite the high annual precipitation in the region. Hammarstrom at 39. These salts temporarily sequester iron, other metals and acidity generated by weathering of Anakeesta rock, but “dissolution of these minerals during

storm events can dramatically alter surface chemistry with catastrophic short-term effects.” Hammarstrom at 53.

Similar degradation of aquatic habitats resulted in 1963 from construction of US 441 near Clingman's Dome which exposed acid-producing rock and caused low pH and heavy metal contamination in the headwaters of Beech Flats Prong, a headwater of the Oconaluftee River. Runoff from acid-producing rock excavated during the construction and used as roadfill coated the streambed with aluminum hydroxide precipitates for 2 km downstream from the site, and killed native brook trout 8 km downstream. Hammarstrom at 39. The streams remained devoid of fish life and salamanders for as long as 10 years after construction. Tellico Study 1980 at 5. The acid-producing rock used in the roadfill created a long-term source of pollution that caused this HWQ stream to be classified as Support-Threatened. Water sampling from a 1998 study revealed pH measurements from 4.6 to 5.8 in the affected reaches of the stream, as compared to a pH of 6.2 immediately upstream of the site. Hammarstrom at 44. Sediment data collected 22 years after construction shows that the roadfill material continues to contribute iron, aluminum, manganese and base metals to sediments immediately downstream. Id. at 52.

A dramatic example of the devastation that can be caused by exposure of acid-producing rock is offered by construction of the Tellico-Robbinsville Road near the western boundary of the Park. Acid drainage from Anakeesta rock used as roadfill in that project depressed pH levels and increased acidity, sulfate and metal concentrations in McNabb and Hemlock Creeks of the North River drainage and Grassy Branch of the Citico Creek drainage. Tellico Study 1980 at 2-3. In 1977, the United States Forest Service conducted surveys in the Cherokee National Forest that found no fish life in McNabb, Hemlock or Grassy Creeks. In-stream survivability tests showed 100% mortality of rainbow trout within 24 hours of exposure at the mouths of Hemlock and McNabb Creeks. Morgan et. al, *Evaluation of Mitigation Techniques and Development of a Management/Recovery Plan for Streams Degraded by Road Construction-Related Acid Drainage in the Southern Appalachians* (hereinafter Morgan) (attached). Multiple remediation efforts, including application of sodium hydroxide neutralization, lime slurry, and curbs, ditches and drains designed to prevent water infiltration into the acid-producing material failed to provide long term remediation of the problem. Tellico Study 1980 at 3-4. Nearly a decade after remediation efforts were undertaken, 100% trout mortality was observed during a 12 hours in situ exposure test in McNabb Creek and a similar 24 hour exposure in Hemlock Creek. Morgan at 5. Both streams were devoid of fish life during electrofishing surveys in 1989 while reference streams exhibited healthy biological communities characteristic of mountain streams. Id.

These projects demonstrate the extent of the devastation that could be caused by excavation of acid-producing rocks in the Hazel, Eagle, Chambers and Forney Creek watersheds. Even if mitigation and remediation strategies could reduce the magnitude of the impact, however, the tendency of acid-producing rocks within the Park to affect water quality in these streams even when undisturbed suggests that some degradation of water quality and aquatic habitat almost inevitably would result from excavating large quantities of those rocks in the steep and unstable terrain found in these watersheds.

Furthermore, as shown below, the atmospheric conditions unique to the Park have eliminated the capacity of Hazel, Eagle, Chambers and Forney Creeks to accept acid drainage without suffering degradation leaving them far more vulnerable to such drainage, even as compared to other streams in the region.

Atmospheric Acid Deposition. Any acid drainage created by excavation of acid-producing rock in the Hazel, Eagle, Chambers and Forney Creeks would only exacerbate existing threats to water quality in these watersheds. These watersheds are already threatened by acidity and heavy metal contaminants generated by atmospheric acid deposition which has rendered Hazel, Eagle, Chambers and Forney Creeks exceptionally vulnerable to degradation from acidic drainage.

The Park receives some of the highest rates of atmospheric acid deposition of any forested ecosystem in North America. Hammarstrom at 35. The NPS monitors streams within the Park to evaluate the impacts of acidic atmospheric deposition and has documented low pH values in several tributaries of Fontana Lake, including Forney and Eagle creeks. ECR at 104. The National Biological Service has documented low pH problems in some of the streams within the Great Smoky Mountains National Park. That study found about 5% of the samples had pH values less than 5.0, 11% had pH values less than 5.5, and 22% had pH values less than 6.0. BMP at 4-9.

These streams have headwaters in old growth, undisturbed forests, but years of acid precipitation have saturated the forest system with nitrogen and depleted the system's capacity to neutralize the resulting acidity. ECR at 104. With the expectation of continued atmospheric acid deposition, nitrogen saturation likely will extend downslope and downstream as new soils reach their saturation point. BP at 4-9. Models based on historical acid deposition rates project an increase in the percentage of acidic streams within the Park from 0% to 10%. Id.

One of the most significant problems caused by atmospheric deposition is the low acid neutralizing capacity (ANC) of streams throughout the Park. ANC measures the ability of a stream to neutralize acid inputs. BMP at 4-8. The effects of nitrate and sulfate reaching the streams are high enough to create chronically low pH and low ANC. ECR at 107. A low ANC is an indicator that the stream is very vulnerable to acid deposition and acid runoff. BMP at 4-8. Thus, the high rates of atmospheric acid deposition that are unique to the Park have rendered otherwise high quality streams exceptionally vulnerable to acid drainage from excavation of acid-producing rock.

Past Mining. In addition to the threat to these waters posed by acid deposition, Hazel and Eagle creeks are also threatened by the lingering impacts of historical mines that disturbed acid-producing rocks in those watersheds. There are two inactive mines, one near the headwaters of Eagle Creek, the Fontana Mine, and one near the headwaters of Hazel Creek, the Hazel Creek Mine. The USGS has studied the effects of these mines on groundwater and surface waters. Both mines are characterized by massive sulfide deposits that are easily oxidized or decomposed to sulfuric acid enriched with heavy

metals. ECR at 107. Furthermore, the surrounding rock formations are limited in their capability to neutralize the acid.

USGS collected water samples from surface waters within the mines, streams that flow past the mines, and streams in watersheds other than those affected by the historical mining operations. USGS found a wide range of pH values and concentrations of dissolved metals in these samples. Waters from the Fontana Mine site near Eagle Creek had pH values as low as 2.4. ECR at 108. Dissolved heavy metals in those samples were well above regulatory standards. Id. Waters at the Hazel Creek Mine and in nearby streams had pH as low as 3.7. Id. All of the water samples taken from the mines exceeded aluminum toxicity limits for freshwater fish, and mine effluent exceeded the toxicity limits of zinc and lead in all samples and aluminum in some samples. Id. Because these historical mining sites continue to contribute acidic drainage to Eagle and Hazel Creeks, the outstanding resource values of these streams would be especially threatened by additional excavation of acid-producing rock within their watersheds.

III. Suggested Management Strategies to Protect the Outstanding Resource Values of Hazel, Eagle, Chambers and Forney Creeks.

Because of the unusual geology of the Hazel, Eagle, Chambers and Forney Creek watersheds which (1) will result in acidic drainage contaminated with heavy metals if excavated, (2) will require extensive excavation if any construction project is undertaken in the steep terrain of these watersheds, and (3) is unstable and prone to slides when disturbed which further contributes to the exposure of acid-producing rock, management strategies are required to protect the outstanding resource values of these waters from the threat of acid drainage. Furthermore, because these streams are subject to additional threats, including atmospheric acid deposition and acid drainage from historical mining in the Hazel and Eagle Creek watersheds, that render them especially vulnerable to acid drainage, the deleterious effects and resulting degradation caused by excavating acid-producing rock in these watersheds must be avoided. Finally, because these watersheds are contained entirely within the Great Smoky Mountains National Park, which manages them to preserve their natural resource values, allowing only transient visitor uses and park management practices, affording these waters the greatest possible protection will have no effect on private property or conflict with the larger resource plans of the federal land management agency with jurisdiction over these waters.

Accordingly, the Southern Environmental Law Center requests that the Environmental Management Commission implement the following management strategies for Hazel, Eagle, Chambers and Forney Creeks as part of the pending rulemaking to designate these waters as outstanding resource waters.

Amendment to 15A NCAC 02B .0225(e).¹

The following management strategies, in addition to the discharge requirements specified in Subparagraph (c)(1) of this Rule, shall be applied to protect the designated ORW areas:

- 1) all undesignated waterbodies that are tributary to Hazel, Eagle, Chambers or Forney Creeks waters shall comply with Paragraph (c) of this Rule in order to protect the designated waters as per Rule .0203 of this Section;
- 2) no dredge or fill activities shall be allowed;
- 3) no bridge bents or in water work on bridges shall be allowed;
- 4) stormwater controls described in paragraph (c)(1) of this Rule, shall be applied to land within one mile of and that drains to the designated ORW areas;
- 5) stormwater flows direct to any of these waters shall not be allowed, rather stormwater must discharge to a properly designed stormwater detention facility;
- 6) land-disturbing activity requiring the blasting, excavation or other exposure of acid-producing rock with a net neutralization potential of -5 or less shall not be allowed within the watersheds for Hazel, Eagle, Chambers or Forney Creeks.

Respectfully submitted,

/s Austin D Gerken

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¹ Some of these restrictions are taken directly from policy statements made by the Department of Environment and Natural Resources Water Quality Division and the and the N.C. Wildlife Commission in comment letters addressed to the National Park Service regarding a proposed road project that would cross Hazel, Eagle, Chambers and Forney Creeks. See Letter to Melba McGee from Division of Water Quality, August 11, 2003 (attached); Letter to Phillip A. Francis from N.C. Wildlife Resources Commission, April 8, 2004 (attached); Letter to Superintendent NPS-GSMNP from N.C. Wildlife Resources Commission, May 23, 2003 (attached).