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North Cumberland Wildlife Management Area

Tennessee Lands Unsuitable for Mining Draft Petition Evaluation Document / Environmental Impact Statement OSM-EIS-37

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NORTH CUMBERLAND WILDLIFE MANAGEMENT AREA, TENNESSEE LANDS UNSUITABLE FOR MINING DRAFT PETITION EVALUATION DOCUMENT / ENVIRONMENTAL IMPACT STATEMENT, OSM-EIS-37

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Abstract

On September 30, 2010, pursuant to the Surface Mining Control and Reclamation Act (SMCRA), 30 USC § 1272(c), the State of Tennessee filed a petition with the Office of Surface Mining and Reclamation and Enforcement (OSMRE) to designate certain lands in the State as unsuitable for surface coal mining operations. These lands include the area within 600 feet of certain ridgelines (a 1,200 foot corridor) lying within the North Cumberland Wildlife Management Area (NCWMA)—comprised of the Royal Blue Wildlife Management Area, the Sundquist Wildlife Management Area, and the New River Wildlife Management Area (also known as the Brimstone Tract Conservation Easement)—and the Emory River Tracts Conservation Easement (ERTCE), encompassing approximately 67,326 acres and 505 miles of ridgelines. In accordance with its responsibility in administering the federal program in Tennessee, the OSMRE must process and make decisions on all petitions submitted to designate areas in the State as unsuitable for surface coal mining operations.

The petition includes two primary allegations with numerous allegations of fact and supporting statements. In primary allegation (1), the petitioner contends that the petition area should be designated unsuitable for surface coal mining operations because surface coal mining in the area would be incompatible with existing state or local land use plans or programs. In primary allegation (2), the petitioner contends that the OSMRE should designate the petition area as unsuitable for surface coal mining operations because such operations would affect fragile or historic lands, resulting in significant damage to important historic, cultural, scientific, and aesthetic values and natural systems.

The draft petition evaluation document / environmental impact statement (draft PED/EIS) was prepared by OSMRE's Knoxville Field Office as required by section 522(d) of the SMCRA and in accordance with section 102(2)(C) of the National Environmental Policy Act of 1969 (NEPA). The document is divided into seven chapters. "Chapter 1: Purpose and Need" describes why the OSMRE is taking action at this time with respect to the petition from the State of Tennessee to designate certain lands in the State as unsuitable for surface coal mining operations. "Chapter 2: Petition Evaluation" evaluates the petition with respect to the unsuitability criteria specified in section 522 of SMCRA and the requirements for evaluating the petitioner's allegations. "Chapter 3: Alternatives" presents six alternatives—five action alternatives for designating certain lands unsuitable for surface coal mining and the no-action alternative, in which the OSMRE would deny the petition. "Chapter 4: Affected Environment" provides a baseline characterization of the human environment as defined by NEPA. As required by SMCRA, section 522(d), "Chapter 5: Evaluation of Coal Resources" analyzes the potential coal resources of the petition area, the demand for coal from the petition area, and the impact on the economy and coal supply resulting from implementing any of the six alternatives including designating the petition area unsuitable for surface coal mining operations. "Chapter 6: Environmental Consequences" analyzes the effects of the six alternatives on the resources described in "Chapter 4: Affected Environment." Finally, "Chapter 7: Coordination and Consultation" describes agency coordination and consultation associated with specific laws and the public involvement process.

The Secretary of the Interior is required to make a decision to grant, grant in part, or deny the petition. The draft PED/EIS currently considers in detail the following alternatives for action by the Secretary: alternative 1—deny the petition and do not designate any of the petition area as unsuitable for surface coal mining operations (no action); alternative 2—grant the petition and designate the entire petition area as unsuitable for all surface coal mining operations; alternative 3—grant the state petition designation while allowing remining and road access; alternative 4—grant an expanded corridor designation while allowing remining and road access; alternative 5—designate lands based on the presence of sensitive resources; and alternative 6—grant a reduced corridor designation. The draft PED/EIS evaluates the direct, indirect, and cumulative impacts of the State's petition and its alternatives. OSMRE has identified alternative 3 as its preferred alternative.

A public file containing the petition, public comments, and related information is maintained for public review by the OSMRE at its Knoxville, Tennessee Field Office. The address and phone number are provided at the top of this cover sheet.

NORTH CUMBERLAND WILDLIFE MANAGEMENT AREA, TENNESSEE LANDS UNSUITABLE FOR MINING

Draft Petition Evaluation Document / Environmental Impact Statement

Office of Surface Mining, Reclamation and Enforcement

December 2015

SUMMARY

The Office of Surface Mining Reclamation and Enforcement (OSMRE) has prepared this draft petition evaluation document / environmental impact statement (draft PED/EIS) as required by section 522(d) of the Surface Mining Control and Reclamation Act of 1977 (SMCRA) (30 USC § 1272(d)) and in accordance with section 102(2)(C) of the National Environmental Policy Act of l 969 (NEPA) (42 USC § 4332(2)(C)). This draft PED/EIS presents OSMRE's evaluation of the North Cumberland Wildlife Management Area (NCWMA) and Emory River Tracts Conservation Easement (ERTCE) as it pertains to the Petition for Lands Unsuitable for Coal Mining filed by the State of Tennessee on September 30, 2010. It includes an assessment of the potential coal resources of the petition area, including the supply and demand for the coal resources; the potential impacts of the petition designation to the environment and the economy; and alternatives to the petition. Based on this draft PED/EIS, the OSMRE may decide to designate the petition area if it finds the assertions made by the petitioners to be valid. However, the OSMRE has the discretion to deny the petition in whole or in part or to designate an alternative area to the petition. Even if OSMRE finds the petitioners assertions to be valid, it may also choose to protect impacted resources in other ways such as requiring actions to ensure impacts are reduced.

This draft PED/EIS consists of three volumes as follows. Volume I contains chapters 1 through 5, whereas volume II contains chapters 6, 7, references, glossary, and index. Each of these chapters are summarized in the following pages. Volume III contains appendices to volumes I and II.

CHAPTER 1: PURPOSE AND NEED

BACKGROUND

"Chapter 1: Purpose and Need" in this draft PED/EIS describes why the OSMRE is taking action at this time with respect to the petition from the State of Tennessee to designate certain lands in the state as unsuitable for surface coal mining operations.

On September 30, 2010, the State of Tennessee filed a petition with the OSMRE to designate certain lands in the State as unsuitable for surface coal mining operations. These lands include the area within 600 feet of all ridge lines lying within the NCWMA, comprised of the Royal Blue Wildlife Management Area, the Sundquist Wildlife Management Area, and the New River Wildlife Management Area (also known as the Brimstone Tract Conservation Easement), and the ERTCE, encompassing approximately 67,326 acres.

PURPOSE AND NEED

The purpose of the agency action is to process the petition in accordance with SMCRA and other applicable federal laws.

The proposed action is necessary because it is the responsibility of OSMRE to evaluate the merits of the petitioner's allegations and determine whether the petition area is entirely or partially eligible for designation as unsuitable for surface coal mining operations based on the criteria in section 522(a)(3) of SMCRA. This action is also needed to accommodate the mission of OSMRE as the regulatory authority for surface coal mining operations in Tennessee.

SCOPE OF THE EVALUATION

The scope of the analysis for this PED/EIS focuses on the State's petition, reasonable alternatives to the petition, and the no-action alternative. The ultimate decision will not result in the approval of any specific surface coal mining operation. Approval or denial of a specific surface coal mining operation can be issued only after an applicant has submitted to the OSMRE a permit application with site-specific data that meet all the requirements of SMCRA and the implementing regulatory program. As a part of reviewing any such application for compliance with SMCRA regulations, the OSMRE would provide an opportunity for public comment and would undertake an appropriate environmental review in compliance with NEPA and other environmental laws such as the Endangered Species Act, Clean Water Act, and National Historic Preservation Act, among others (see "Chapter 7: Consultation and Coordination").

The scope of the evaluation of the petition is defined based on several criteria. As described in SMCRA, section 522 (a)(3), an area may be found unsuitable for surface coal mining operations if certain criteria are met (30 USC § 1272(a)(3)). The State's petition lists the following two criteria, asserting that surface coal mining operations in the petition area would

- "be incompatible with existing federal, state, and local land use plans or programs; or
- affect fragile or historic lands in which such operations could result in significant damage to important historic, cultural, scientific, or esthetic values and natural systems…" (30 USC § 1272(a)(3)(A)(B).

To adequately evaluate the petition, the OSMRE must also describe the areas where the alternatives and affected coal resources occur. This includes both the coal resource in the petition area as well as coal resources in adjacent areas.

SCOPING PROCESS AND PARTICIPATION

Regulations implementing NEPA require an "early and open process for determining the scope of issues to be addressed and for identifying the significant issues related to a proposed action" (40 CFR § 1501.7). To determine the scope of issues to be analyzed in depth in this draft PED/EIS, the OSMRE conducted internal and agency scoping as well as formal public scoping. The OSMRE used the scoping process to inform the development of alternatives and to identify the issues and impact topics carried forward for analysis in this draft PED/EIS.

The OSMRE identified seven federal agencies that may have either jurisdiction by law or special expertise with respect to environmental issues related to the State's petition. On March 30, 2011, these agencies were invited to participate as "cooperating agencies" in the development of this draft PED/EIS. Three agencies, the US Fish and Wildlife Service (USFWS); the National Park Service (NPS), specifically the Big South Fork National River and Recreation Area and the Obed Wild and Scenic River; and the US Environmental Protection Agency (EPA), accepted this invitation. One agency, the US Army Corps of Engineers, chose not to participate. The US Geological Survey chose not to be a formal cooperating agency but did agree to provide technical expertise as needed. The US Department of Agriculture, National Resource Conservation Service, and the US Forest Service did not respond.

The public scoping period for this draft PED/EIS began on February 8, 2011, with publication of the Notice of Intent in the *Federal Register* (76 FR 6826) and continued until April 14, 2011. During the public scoping period, three public scoping meetings were held in Scott, Campbell, and Anderson counties, in Tennessee.

ISSUES AND IMPACT TOPICS

The OSMRE identified a range of issues and impact topics for evaluation in this draft PED/EIS in order to

- determine whether fragile or historic lands exist and to evaluate the importance of these lands;
- assess federal, state, and local land use plans, and assess whether surface coal mining operations would be incompatible with any of those plans; and
- ensure public and agency scoping comments are adequately considered in the development of the draft PED/EIS.

Impact topics included:

- Earth Resources (Geology, Topography and Physiographic Setting)
- Air Quality and Greenhouse Gases
- Groundwater (Quantity and Quality)
- Surface Water (Quantity and Quality)
- Wetlands
- Vegetation
- Fish and Wildlife (Aquatic and Terrestrial Species, Including Migratory Birds)
- Special-Status Species
- Land Use
- Aesthetics (including Visual Resources and Soundscapes)
- Socioeconomics and Environmental Justice
- Cultural Resources (Archaeological, Historic, Ethnographic Resources)
- Public Health and Safety

CHAPTER 2: PETITION EVALUATION

REGULATORY BACKGROUND

Congress passed SMCRA in 1977 to "establish a nationwide program to protect society and the environment from the adverse effects of surface coal mining operations" (SMCRA 102(a), 30 USC § 1202(a)). SMCRA balances this goal with the goal of "assur[ing] that the coal supply [meets] the Nation's energy requirements" (30 USC § 1202(f)). Section 522(c) of SMCRA allows "any person having an interest which is or may be adversely affected … to petition the regulatory authority to have an area designated as unsuitable for surface coal mining operations, or to have such a designation terminated" (30 USC § 1254(c)). The petition process is the chief process by which the OSMRE reviews lands to assess whether there are areas unsuitable for all or certain types of surface coal mining operations under section 522(b) of the Act. The intent of SMCRA section 522 is to provide a higher degree of protection to specific public and environmental values from surface coal mining operations where it is determined that the significance of these values could be compromised.

DESCRIPTION OF THE EVALUATION PROCESS

The OSMRE is responsible for evaluating the merits of the petitioner's allegations and determining whether the petition area is entirely or partially eligible for designation as unsuitable for surface coal mining operations based on the discretionary criteria in section 522(a)(3) of SMCRA (30 USC § 1272 (a)(3)) and 30 CFR § 764.13 (ii)-(iv). The OSMRE must determine if the record supports a determination that surface coal mining operations would be incompatible with existing state or local land use plans or programs, or whether or not there are fragile or historic lands present, and if so, whether surface coal mining operations in the petition area would affect such lands.

The OSMRE reviewed the petition allegations in accordance with SMCRA section 522 and 30 CFR § 764, which specifies the process by which the OSMRE determines whether or not to prohibit or limit all or certain types of surface coal mining operations.

PARTIES TO THE PETITION

The State of Tennessee is the petitioner in this case. In petitioning the OSMRE to designate lands unsuitable for surface coal mining operations, the petitioner is required to

1. provide allegations of fact and supporting evidence which cover the entire petition area, and which tend to establish that the area is unsuitable for all or certain types of surface coal mining operations pursuant to the specific criteria of SMCRA section 522(a)(2) and (a)(3), assuming that contemporary mining practices required under the regulatory program will be followed; and
2. provide allegations of fact that are specific as to the portions of the petition area and petitioner's interests to which the allegation applies and that are supported by evidence that tends to establish the validity of the allegations for the portion of the petition area (30 CFR § 764.13(b)(1)(v)).

As provided by 30 CFR § 764.15(c), "any person may intervene in the proceeding by filing allegations of facts describing how the designation determination directly affects the intervenor … [and] supporting evidence." A number of parties have formally intervened in the petition process. The following parties support the petition:

- The National Parks Conservation Association
- The National Audubon Society, Warioto Chapter
- The Tennessee Ornithological Society
- The Tennessee Environmental Council
- The Natural Resources Defense Council
- Defenders of Wildlife
- The Sierra Club

The following parties oppose the petition:

- The National Mining Association
- The Tennessee Mining Association
- Campbell County
- National Coal, LLC

ANALYSIS OF THE ALLEGATIONS

The discretionary unsuitability criteria specified in specified in section 522(a)(3)(A) and (B) of SMCRA and 30 CFR § 762.ll(b)(1) and (2) are the base of the North Cumberland petition. The petitioner provided several allegations of fact and supporting statements under each primary allegation. In reviewing the petition, the OSMRE concluded there were allegations of fact and supporting statements that were to some extent redundant or so similar in nature such that some restructuring was necessary in order to minimize redundancy of analysis and provide a more logical flow to the document.

The North Cumberland petition includes two primary allegations with numerous allegations of fact and supporting statements.

- In primary allegation (1), the petitioner contends that the petition area should be designated unsuitable for surface coal mining operations because mining in the area would be incompatible with existing state or local land use plans or programs.
- In primary allegation (2), the petitioner contends that the OSMRE should designate the petition area as unsuitable for surface coal mining operations because such operations would affect fragile or historic lands, resulting in significant damage to important historic, cultural, scientific, and aesthetic values and natural systems.

CONCLUSIONS OF ANALYSIS

Primary allegation (1): After reviewing all information available relevant to primary allegation (1), the OSMRE has concluded that surface coal mining operations would be incompatible with the 2015 Tennessee State Wildlife Action Plan and Tennessee's Comprehensive Wildlife Conservation Strategy (TWRA 2005). The OSMRE concludes that surface coal mining is not inherently inconsistent with other statewide plans, including the "Connecting the Cumberlands" project, Tennessee 2020, and the 2008 Tennessee Greenways and Trails Plan. Finally, the OSMRE concludes that the draft plans for the Royal Blue Wildlife Management Area and the Sundquist Wildlife Management Area, as well as the Brimstone and ERTCE, are not existing state or local land use plans for the purposes of 30 CFR § 762.11(b)(1).

Primary allegation (2): The OSMRE has determined that the record supports a conclusion that the petition area or areas adjacent to it contain valuable fish and wildlife habitat that could be significantly damaged by surface coal mining operations in the petition area, specifically as it relates to forest-dependent birds such as a the cerulean warbler and plants such as the Ozark bunchflower and pale corydalis. Thus, portions of area meet the definition of fragile lands as described by 30 CFR § 762.5. The OSMRE has also determined that the elk viewing tower provides recreational value due to high environmental quality that could be significantly damaged as a result of surface coal mining operations. However, the OSMRE rejects the assertion that surface coal mining could significantly damage the Cumberland State Trail, as SMCRA protections are already in place and intended to afford parks sufficient protection from surface coal mining operations. Finally, the OSMRE rejects the assertion that there are historic resources in the NCWMA or ERTCE and the petition area that could be significantly damaged as a result of surface coal mining operations. The petition failed to provide sufficient information to prove its assertion and through its own analysis the OSMRE finds the assertion lacks merit as these resources, although present, would be adequately protected by current regulations. Therefore, the area does not qualify as either historic or fragile lands, defined by 30 CFR § 762.10.

CHAPTER 3: ALTERNATIVES

DESCRIPTION OF THE NO-ACTION ALTERNATIVE

As set forth in 40 CFR § 1502.14(d), the Council on Environmental Quality regulations for implementing NEPA require that an EIS "include the alternative of no action." In this draft PED/EIS, the no-action alternative would require OSMRE to

- deny the state petition and
- continue authorizing, where appropriate, surface coal mining within the petition area.

The OSMRE calculated an average annual surface coal mining rate based on approximately 30 years (1984–2014) of data for the greater NCWMA and ERTCE area. During this period, 74 individual permits were issued. Calculations used for each of these 74 permits were based on estimated disturbed acreage as submitted in the permit application. The OSMRE found the average annual rate of surface coal mining to be approximately 112 acres per year.

DESCRIPTIONS OF THE ACTION ALTERNATIVES

NEPA also requires federal agencies to consider a range of alternatives and to fully evaluate all reasonable alternatives that address the purpose of and need for taking action (43 CFR § 46.420). As part of the PED/EIS, OSMRE has developed 5 action alternatives, described below. In considering the action alternatives, it is important to note that the OSMRE cannot designate as unsuitable for surface coal mining operations lands that are covered by an existing permit issued under SMCRA (30 CFR § 762.13(b)). As such, any designation made by the OSMRE to declare any portion of the petition area unsuitable for mining would not include areas under permit at the time of the designation. Moreover, a designation would permit any specific surface coal mining operation by OSMRE under one of the action alternatives only designating certain areas as unsuitable for surface coal mining thus allowing mining in undesignated areas, would not constitute authorization to mine. An operator would need to apply to receive a mining permit before any mining in the undesignated areas could occur. The permit application and site-specific NEPA analysis would be required.

Alternative 2: State Petition Designation

Under alternative 2, the OSMRE would designate as unsuitable for surface coal mining operations all public access lands proposed in the State petition. Under this alternative, 505 miles of ridgelines with a 1,200-foot corridor (600 feet on both sides of the ridgeline) would be designated as unsuitable for surface coal mining. The proposed area covers approximately 67,326 acres. Underground mining and auger mining from outside the petition area that resulted in no surface disturbance within the petition area would be allowed.

Alternative 3: State Petition Designation with Remining and Road Access (Preferred Alternative)

Under alternative 3, the OSMRE would designate as unsuitable for surface coal mining operations all public access lands proposed in the State's petition, as described under alternative 2—67,326 acres. Similarly, it would allow underground mining and auger mining from outside the petition area so long as no surface disturbance within the petition area occurs. However, the OSMRE would also allow remining (pursuant to 30 CFR § 785.25) to engage in surface coal mining and reclaim previously mined areas. In addition, the development and use of access and haul roads through the designated area, would be allowed to facilitate remining efforts. The OSMRE concludes that under this alternative, as much as 183.7 miles of highwall within the petition area might be subject to future remining.

Alternative 4: Expanded Corridor Designation with Remining and Road Access

Under alternative 4, the OSMRE would designate as unsuitable for surface coal mining operations 569 miles of ridgeline (1,200-foot corridor) covering 76,133 acres. Alternative 4 includes the ridgelines proposed in the State’s petition, as described under alternative 2, plus additional ridgelines identified by the OSMRE. Access and haul roads as well as remining and reclamation activities as described under alternative 3 would be allowed. Using the same methodology as used in alternative 3 for estimating the amount of land that would be appropriate for remining, the OSMRE concludes that under this alternative, as much as 219.5 miles might be subject to future remining.

Alternative 5: Targeted Resource Protection Designation

Under alternative 5, the OSMRE would designate 12,331 acres of public access lands within the NCWMA as unsuitable for surface coal mining operations. This alternative focuses on designating lands based on the presence of sensitive resources within the ridgelines proposed in the State’s petition. The 1,200-foot corridor designation applies only to portions of the State-defined petition area with or adjacent to sensitive resources. This alternative would designate as unsuitable a 1,500-foot wide corridor centered on the Cumberland Trail State Park (3,678 acres) with any associated Park campgrounds (55 dB acoustic impact area; 329 acres). In addition, areas associated with environmentally sensitive wetlands located in Campbell County on Stinking Creek just downstream of Stell Branch, on Meadow Creek, and on Thompson Creek (3,068 acres) would also be designated. Alternative 5 would also designate 1,327 acres around the Hatfield Knob elk viewing tower area (45 dB acoustic impact area; 5,759-foot radius); cerulean warbler core breeding habitat (4,545 acres); and areas with occurrences of Ozark bunchflower, Canada Lily, American ginseng, pink ladyslipper, pale corydalis, and leatherleaf meadowrue (500 acres). Underground mining and auger mining from outside the petition area that resulted in no surface disturbance within the petition area would be allowed as described in alternative 2. Remining and access road activities would not be permitted under this alternative.

Alternative 6: Reduced Corridor Designation

Alternative 6 is a reduced corridor designation wherein the OSMRE would designate as unsuitable for surface coal mining operations on all public access lands proposed in the State’s petition as discussed under alternative 2, but with a narrower corridor. Under this alternative, 505 miles of ridgelines with a 600-foot corridor (300 feet on both sides of the ridgeline) would be designated as unsuitable for surface coal mining operations. The proposed area covers approximately 39,106 acres. As with alternative 2, implementation of this alternative would effectively preclude (with the exception of the areas that are already covered by a permit) all mining activities conducted on the surface of lands in connection with a surface coal mine, as well as surface operations and surface impacts incident to an underground coal mine. Remining and access road activities would not be allowed under this alternative.

PREFERRED ALTERNATIVE

The “agency’s preferred alternative” is the alternative the agency believes would best accomplish the purpose and need action, and fulfill its statutory mission and responsibilities, giving consideration to economic, environmental, technical, and other factors. “It may or may not be the same as the bureau’s proposed action, the non-Federal entity’s proposal or the environmentally preferable alternative” (43 CFR § 46.420).

The agency has identified alternative 3 as its preferred alternative because it is the most consistent with the State's request. Although alternative 2 reflects the State's original request, in subsequent communications with OSMRE, the State indicated that it would support an alternative that included remining because of its long-term environmental benefits. The State also indicated that remining would allow for the balancing of mining and conservation interests.

In addition, the State indicated through subsequent communications with OSMRE that it disagreed with the agency's methodology for independently identifying ridgelines. Thus, even though alternative 4 would designate a larger area than the State's proposal, OSMRE has determined that alternative 3 is the most consistent alternative with the State's petition.

ENVIRONMENTALLY PREFERABLE ALTERNATIVE

The OSMRE has identified two environmentally preferable alternatives. Alternative 2, the short-term environmentally preferable alternative, would designate the largest area of land while avoiding the impacts of remining and access road development, as described in "Chapter 6: Environmental Consequences." However, the long-term impacts associated with acid mine drainage and sedimentation from pre-SMCRA mine sites would continue. Alternative 4 would be considered the long-term environmentally preferable alternative because it would designate the largest area and would reduce the impacts of acid mine drainage, although there would be short-term impacts as a result of remining. Therefore, alternatives 2 and 4 are considered to best protect, preserve, and enhance historic, cultural, and natural resources.

CHAPTER 4: AFFECTED ENVIRONMENT

EARTH RESOURCES (GEOLOGY, TOPOGRAPHY AND PHYSIOGRAPHIC SETTING)

The evaluation area is located within portions of the Cumberland Plateau and the Cumberland Mountains region, which are a physiographic subsection of the larger Appalachian Plateau province, which in turn is part of the larger Appalachian Mountains physiographic division. (USGS 2009). There are three predominant geologic structural features identified near and within the evaluation area: the North Cumberland Plateau, Wartburg Basin, and the Cumberland Block (OSMRE 1984). The evaluation area lies predominantly within two of these distinct structural features: the North Cumberland Plateau/Wartburg Basin and the Cumberland Block. The surface geology within the evaluation area is primarily Pennsylvanian and Mississippian (360 to 320 million years old) (USGS 2002) age sedimentary rock sequences, with the vast majority being of Pennsylvanian age and only a few small areas in the northeast section being of Mississippian age or older. Shale and sandstone are the most abundant rock types found within the area. Sandstone can be found in some areas to the south and to the north along Interstate 75. Some limestone can be found in the northern portion of the evaluation area as well. A significant portion of the evaluation area consists of a steep mountainous region with slope gradients equal to or in excess of 20 degrees (36.4%). Steep slopes are susceptible to land movement or mass wasting.

AIR QUALITY AND GREENHOUSE GASES

Campbell, Morgan, and Scott Counties meet all the requirements for the National Ambient Air Quality Standards (NAAQS); therefore, their designation is attainment for all criteria pollutants (EPA 2014a). Anderson County is in marginal nonattainment for ozone and moderate nonattainment for particulate matter less than 2.5 micrometers in diameter ($PM_{2.5}$). Ambient air quality is monitored in Anderson County by a station meeting EPA design criteria for state and local air monitoring stations and national air monitoring stations. The Tennessee Department of Environment & Conservation (TDEC), Division of Air Pollution Control monitors major industrial sources for air pollutants. Any facility that emits 250 tons or more per year of any pollutant may require a prevention of significant deterioration review as a major stationary source. Coal mining-related fugitive dust and mobile source emissions do not count toward the 250-ton threshold.

The principal greenhouse gases emitted into the atmosphere through human activities are carbon dioxide, methane, nitrous oxide, and fluorinated gases, such as hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride (EPA 2010b). In 2011, Tennessee ranked 18th in terms of annual carbon dioxide emissions totaling 103 million metric tons. This was only 1.9% of the total emissions for the United States (EIA 2014e). However, the forests of Tennessee also provide carbon sequestration services that result in the net sequestration of 921,810 metric tons of carbon per year (EPA 2014b). Tennessee does not currently have any state-level regulations for greenhouse gas emissions. While there are baseline greenhouse gas inventories for Chattanooga and Nashville, there is no available emissions data for the four counties within the evaluation area.

WATER RESOURCES

The Cumberland River and Tennessee River basin watersheds both drain the NCWMA and ERTCE. The Tennessee Valley Divide separates these two basins and follows a general southwest to northeast direction around and through the evaluation area. These large basin watersheds can be divided into smaller subwatersheds or assessment areas using hydrologic unit codes developed by the US Geological Survey (Seaber, Kapinos, and Knapp 1987). Waterbodies in the evaluation area include: the Emory River, South Fork Cumberland River (or Big South Fork of the Cumberland River), Upper Cumberland River, Upper Clinch River, and Powell River. The Upper Cumberland and South Fork Cumberland are within the larger Cumberland River drainage basin and the Emory, Powell, and Upper Clinch are within the Tennessee River drainage basin. The evaluation area constitutes portions of the headwater area for each of these river systems.

The majority of the evaluation area is unpopulated forestland with no identified surface water or groundwater users and no surface water or groundwater intakes. Based on biennial assessments conducted by the State under the Clean Water Act, portions of seven streams within the evaluation area are on the 303(d) list and considered impaired. Impaired streams include: the Elk Fork Creek, Joe Branch, an unnamed tributary to the Joe Branch, Smokey Creek, Hickory Creek, Davis Creek, and Thompson Creek. Based on examination of the OSMRE and TDEC data using criteria for the protection of fish and aquatic life, aluminum appears to be the most consistent contaminant. Of the metals cadmium, chromium (III), copper, lead, nickel, silver, and zinc, only copper and cadmium commonly showed an exceedance of EPA criterion continuous concentration thresholds.

Regional groundwater flow is through stress-relief fractures and bedding planes located horizontally along the valley floors and vertically along the valley walls (Wyrick and Borchers 1981). The main aquifers in the evaluation area are the Pennsylvanian sandstone and Mississippian sandstone-carbonate aquifers (USGS 2003). A well inventory of the four-county region surrounding the evaluation area provided by the TDEC showed 82 wells. Generally, groundwater within the Cumberland Mountains and Cumberland Block is adequate for most purposes, although treatment for iron and manganese is common for domestic uses.

Wetlands within the evaluation area include both naturally occurring wetlands and wetlands created as a result of past mining activities (both through incidental creation and intentional remediation actions). The Cowardin Classification System defines wetlands based on major classes of wetlands, which include estuarine, riverine, lacustrine, and palustrine. Wetland types within the evaluation area include palustrine and riverine wetland systems. According to the National Wetlands Inventory, the evaluation area contains 338.62 acres of wetlands, 198 acres of palustrine and 140.62 acres of riverine. Palustrine wetlands of various types make up approximately 58.5% of the total wetlands in the evaluation area. Palustrine wetlands are “nontidal” wetlands dominated by trees, shrubs, emergents, mosses, or lichens, and all such wetlands that occur in tidal areas where salinity due to ocean-derived salts is below 0.5 parts per thousand (Cowardin et al. 1979). Riverine wetlands make up approximately 41.5% of the wetlands in the evaluation area. Riverine wetland systems include all wetlands and deepwater habitats contained in natural or artificial channels periodically or continuously containing flowing water or which forms a connecting link between the two bodies of standing water. An unpublished wetland study by the Tennessee Valley Authority (TVA) on the 53,000-acre Koppers Coal Reserve identified approximately 242 acres of sensitive wetlands (about 6% of the land surface of the 4,057-acre ground survey area) with irreplaceable or irretrievable ecological features such as vernal pools, extensive sphagnum mats, mature forests, springs and seeps, caves, sinkholes, cliffs, waterfalls, headwaters, perched water tables, slope wetlands, etc.

SOILS AND VEGETATION

The soils of the Cumberland Plateau are predominantly loamy and sandy in character, weathered from the broad area of sandstone caprock (NPS 2005). Some soils are formed with additions from acidic shales and siltstone, or combinations of these rock types. The depth of the soil to bedrock ranges from about one foot on steep hillsides to about four to five feet on broad, smooth interstream divides (NPS 2005).

Forests and grasslands comprise more than 97% of the land area within the NCWMA and ERTCE. Forests alone cover more than 94% of the land area. No virgin forests exist within the North Cumberland Lands Unsuitable for Mining (LUM) area. The climax vegetation type for the LUM area is a mixed mesophytic forest. Plant species of herbaceous vascular plants, mosses, and woody plants such as trees and shrubs are present within the evaluation area. Typically forests along rivers and streams are the most susceptible to invasion by nonnative plants, including Japanese spiraea (*Spiraea japonica*) and Nepalese browntop (*Microstegium vimineum*). In addition, tree-of-heaven (*Ailanthus altissima*), multiflora rose (*Rosa multiflora*), garlic mustard (*Alliaria petiolata*), and Japanese knotweed (*Polygonum cuspidatum*) may also be present.

FISH AND WILDLIFE

Tennessee is one of the most biologically-diverse states in the United States, with over 300 species of fish, at least 80 mammal species, 60 reptile species, approximately 70 amphibian taxa, over 340 species of birds, over 225 land snail taxa, 100 aquatic snail species, at least 120 mussel species, 70 crayfish species, and thousands of insect taxa (TNHP 2009). Common fishes in streams draining the NCWMA include minnows, suckers, catfishes, sunfishes, and perches (primarily darters) (Etnier and Starnes 1994). Common game fishes include longear sunfish, rock bass, bluegill, spotted bass, and smallmouth bass. Crayfishes have been collected in and near streams draining the NCWMA. There are more than 10 types of amphibians in and around streams draining the NCWMA. Common benthic macroinvertebrates in streams draining the NCWMA include mayflies, stoneflies, caddisflies, beetles, true flies, dobsonflies, and dragonflies. Non-native aquatic species potentially occurring in the North Cumberland Wildlife Management area include bighead carp, black carp, blueback herring, round goby, New Zealand mud snail, rudd, ruffe, silver carp, snakehead, swamp eel, and zebra mussels (TWRA 2014b). The South Fork of the Cumberland River is home to 26 known species of mussels, including 11 that are federally endangered (Ahlstedt et al. 2004).

Historically, approximately 180 species have been reported in the NCWMA, although many of those are rare or transient (O’Connell, Jackson, and Brooks 2000). Bird species presence in the region varies seasonally, 115 species have been reported during spring, 93 during summer, 105 in autumn, and 66 in the winter (NPS 2011b). Thirty-seven species were reported in all seasons. A recently conducted mammalian inventory at Big South Fork National River and Recreation Area from autumn of 2003 to the autumn of 2004 resulted in the confirmation of 47 species, including 42 native and four nonnative mammals (Britzke 2007). Reported mammals included 15 species of rodent, 11 species of bat, 10 species of carnivore, five species of insectivores, and two species of cervid, including reintroduced elk. A baseline inventory of reptiles and amphibians in the region was conducted from February 2004 to June 2007, and reported 57 species including 17 salamanders, 11 frogs, 16 snakes, 6 lizards, and 7 turtles (table 4-16) (Stephens, Kiser, and MacGregor 2008). Frozen Head State Park has an exhaustive list of 57 families of terrestrial invertebrates.

SPECIAL-STATUS SPECIES

Six federally listed fish and one candidate species are known to occur within the four affected Tennessee counties (USFWS 2014a). Critical habitat has been designated for three of the federally listed species. However, only one species (spotfin chub) has designated critical habitat bordering the evaluation area (USFWS 1977). Five additional species listed as threatened or endangered at the state level in Tennessee may also be present in or near the evaluation area (TDEC 2014c). Critical habitat has been designated for seven mussel species that occur within the evaluation area, although an extensive mussel survey has not been conducted within the evaluation area. No critical habitat for mussels occurs within the evaluation area. One state level endangered crustacean is known to occur in the Clinch and Emory drainages in Anderson and Campbell Counties: the valley flame crayfish (*Cambarus deweesae*). According to the USFWS (2015a) list of threatened and endangered species, there are no federally listed bird species listed for the four counties. However, the USFWS (2015a) lists 22 birds of conservation concern for the four counties, including the cerulean warbler. According to the USFWS (2015a) and TDEC (2015a) list of threatened and endangered species, there are three federally and state-listed bat species currently (July 2015) listed for the four counties. No federally listed threatened or endangered reptiles or amphibians are known to occur within the evaluation area (USFWS 2015a). However, the northern pinesnake (*Pituophis melanoleucus melanoleucus*), a state threatened species, occurs in two of the four counties (Anderson and Morgan) within the evaluation area (TDEC 2015a). The rare plant list issued by the Tennessee Natural Heritage Program includes 20 plant species found in the Cumberland Mountains physiographic province within Tennessee. Within the approximately 172,000-acre evaluation area, three federally listed and five state-listed species are known to occur. The federally listed species include two federally threatened plant species, the Cumberland rosemary (*Conradina verticillata*) and Virginia spiraea (*Spiraea virginiana*); and one federally endangered plant species, the Cumberland sandwort (*Arenaria cumberlandensis*). State endangered species include pale corydalis (*Corydalis sempervirens*) and Ozark bunchflower (*Melanthium woodii*). State threatened species include tubercled rein-orchid also know commonly as the pale green orchid (*Platanthera flava var. herbiola*). State special concern species commercially exploited include American ginseng (*Panax quinquefolius*) and pink lady's slipper (*Cypripedium acaule*).

LAND USE AND RECREATION

The evaluation area consists of approximately 172,000 acres of publicly accessed lands lying within the NCWMA and the ERTCE (NLCD 2011). Maintained by the Tennessee Wildlife Resources Agency (TWRA), the NCWMA consists of more than 151,818 acres in three units — the Royal Blue Unit, Sundquist Unit, and New River Unit, while the ERTCE adds roughly an additional 20,317 acres directly adjoining the NCWMA to the southwest. Forests, agriculture, and developed lands comprise nearly 98% of the land area within the evaluation area. Forests alone comprise more than 91% of the land cover. Land management within the boundary of the evaluation area is characterized by a mix of public lands with mixed mineral rights (NCWMA), private land managed under a conservation easement (Emory River Tracts), and small privately held in-holdings.

Mineral interests within the evaluation area are allocated to a number of entities, including The Brimstone Company, National Coal, LLC, Rowland Land Company, U.S. Inc., and Triple H Coal LLC. Within the northeastern part of the Sundquist Unit, the TWRA owns the surface and timber rights, but does not own oil, gas, or coal. Within both the southwestern part of the Sundquist Unit and the northeastern part of the Royal Blue Unit, the TWRA owns the surface, timber, oil, and gas, and manages the timber harvest. The TVA owns all of the coal rights within the Koppers Coal Reserve, but not the oil or gas (Elkins pers. comm. 2012). National Coal has a lease on a portion of the TVA holdings (Horton pers. comm. 2012). Within the southwestern part of the Royal Blue Unit, the TWRA owns the surface and timber, but does not own oil, gas, or coal. Within the New River Unit, the TWRA has a recreation lease which grants the TWRA the right to offer recreation to the public (Elkins pers. comm. 2012). The annual average amount of land harvested within the evaluation area from 1968 -2002 was 505 acres annually. Logging activity increased dramatically in 2003, resulting in an annual average of 1,605 acres between 2003 and 2014. From 1984 to 2011, a time period for which the OSMRE has the most complete records, the average number of coal mining acres under permit at one time in a given year is 1,787 acres, or slightly over 1 % of the evaluation area. Approximately 33 permits are active in a given year. From data of oil and gas well locations provided by the Tennessee Division of Geology, 289 oil and gas wells were identified within the boundaries of the evaluation area (TDOG 2011).

The majority of acres within the evaluation area are under state ownership or management. Only the Royal Blue and Sundquist units have had formal management plans that have been developed to guide their management and use. Until 2007, the TWRA managed the Royal Blue Unit and the Sundquist Unit as the Sundquist Wildlife Management Area and the Royal Blue Wildlife Management Area. In 2007, the conservation project known as “Connecting the Cumberlands” linked these two wildlife management areas with other public and private lands to provide public access rights on approximately 127,000 acres in Anderson, Campbell, Morgan, and Scott Counties. Other state plans that pertain to land use and recreation include Tennessee’s Comprehensive Wildlife Conservation Strategy (TWRA 2005), the Tennessee State Recreation Plan (TDEC 2009), and the Tennessee Greenways and Trails Plan (TDEC 2008).

Approximately 185,328 total acres of public land within and surrounding the evaluation area offer visitors the opportunity to participate in numerous recreational activities. More than 91,200 acres of privately owned recreation areas provide visitors with the opportunity to participate in many of the same activities as those at state parks, wildlife management areas, and recreational areas. Recreational activities enjoyed in the NCWMA include hunting, trapping, fishing, wildlife viewing, off-highway vehicle use, horseback riding, mountain biking, camping, hiking, rock climbing, swimming, auto touring, and range shooting. Visitors to the Emory River Tracts portion of the evaluation area may also participate in many of these recreational activities. Three state parks – Frozen Head State Park, Cove Lake State Park, and Cumberland Trail State Park – surround the evaluation area and offer a wide range of recreational activities. The Coal Creek Off-Highway Vehicle Area, Brimstone Recreation Area, and the Ride Royal Blue facilities represent the principal privately owned recreational opportunities in the region surrounding the evaluation area.

Aesthetics (Visual Resources and Natural Soundscape)

The scenic quality within the NCWMA, located almost entirely within the Cumberland Mountains, is similar to other watersheds in the Tennessee Cumberland Mountains. The aesthetic character of the area appears relatively natural. The views within the evaluation area are common to the Cumberland Mountains where coal mining, timber logging, and oil and gas well production routinely occurred. The evaluation area has features that are typical of the eastern Tennessee Cumberland Mountains; including vistas predominated by lushly vegetated mountains and valleys. These areas are beautiful but not pristine; the scenic quality of these features has been impacted by many past and current human activities. The evaluation area contains no unique landforms or features that would draw national recognition like features preserved within the National Park system. The evaluation area is highly scenic but in a more subdued way, with landform features of a smaller scale and grandeur.

Approximately 94% of the evaluation area contains forest that restricts distance-viewing opportunities. Many landscapes in the evaluation area have low scenic integrity due to reduced intactness or wholeness, causing these landscapes to appear moderately altered compared to natural scenery. Vistas from within the evaluation area are often not of natural woodland settings, but of previously mined areas with vegetation either planted during reclamation or populated by volunteer plant species though natural succession. Areas within and adjacent to the area exhibit numerous visible scars from surface coal mining practices prior to the Surface Mining Reclamation and Control Act. In some locations, past coal mining operations dominate the views, revealing exposed highwalls, spoil piles, barren slopes, and landslides.

Potential sources of noise from coal mining sites that may affect the evaluation area include active coal preparation facilities, blasting, additional traffic such as coal trucks and heavy equipment associated with active mining, active coal removal from both surface and underground mining operations, underground mining ventilation systems, and other activities necessary for commercial and private coal removal. Sound levels generated by National Coal (identified as the large surface coal mine) are high at close range (about 91.1 dBA at 50 feet) compared to ambient baseline levels (L_{eq}= 42.8 dBA).

SOCIOECONOMICS AND ENVIRONMENTAL JUSTICE

Anderson, Campbell, Morgan, and Scott Counties are mostly rural and largely undeveloped. The populations in the evaluation area and across the state as a whole are predominantly white and non-Hispanic. All four counties have predominantly white populations, with percentages of the white alone population ranging from 93 to 99%. Overall employment in the four-county area has experienced a 2.3% increase between 2001 and 2013, with Anderson, Campbell, and Morgan counties experiencing increases in overall employment (4.8%, 2.7% and 2.0%, respectively), while Scott County has experienced a decline over this period (-12.3%). The Appalachian Regional Commission has categorized Campbell and Scott Counties as “distressed,” and these counties have a number of indicators that reflect lower income and higher unemployment rates than the other counties in the evaluation area. Morgan County is categorized as “at-risk,” while Anderson County is “transitional” (ARC 2014).

Coal production in Tennessee has declined by nearly 89% from its peak of 11.2 million tons in 1972 to its production of 1.19 million tons (OSMRE 2014a) in 2013. Coal mining employment in Tennessee has remained stable in the early 2000s but since 2009 has been declining sharply. According to the Energy Information Administration, coal mining employment in Tennessee totaled 297 employees in 2013, 135 of whom worked in surface mining. In Tennessee, approximately 14 million acres of timberland were harvested in 2012, roughly 53% of the state, yielding 412 million cubic feet of timber (USFS 2014). Tennessee had $305 million in timber sales generated on farm and non-farm acres in 2012, which supports 78,000 jobs (Tennessee Department of Agriculture 2012).

Since 2009, Tennessee has experienced a growth in visitation and visitor spending. The four-county area draws a number of visitors to the region through its parks, wilderness areas, hiking, bike, horse, and off-highway vehicle trails, and other recreation resources. Visitors coming from outside of the local area spend approximately $177.4 million within the four-county area, approximately 65% of which is spent in Anderson County.

There are no known concentrations of low-income populations among the evaluation area. However, as the data shows, the entire evaluation area could be considered to be low-income, as the evaluation area generally exhibits a poverty rate above 20% with portions of counties within the evaluation area reflecting higher rates of poverty compared to the counties overall. Census tracks 9507, 9506, and 9753 have concentrated areas of low income residents (ranging from 29.4-42%).

CULTURAL RESOURCES

Cultural resources that would typically occur within mine sites include cemeteries, historical sites and structures, archeological sites, and other features of cultural significance to surrounding communities. Historical cemetery sites may exist in coal mining areas because they were often located on mountaintops and ridge crests. Documentation indicates that Civil War activity did occur in the area of the evaluation.

In Tennessee, the agency responsible for maintaining an inventory of the State's identified archaeological sites is the Tennessee Division of Archaeology located in Nashville. Berger conducted research at the Tennessee Division of Archaeology in order to compile data on the known archaeological resources located within the evaluation area. Documented archaeological investigations in the evaluation area have been on-going since 1982 (Benthall and Manning 1988; Elmendorf 1986; Lawrence 2003; Niquette 1993; Pietak and Holland 2003). These combined studies have resulted in the identification of 14 sites. The summary data provided on the site forms and published reports indicate that nine of these sites have been classified as Native American in origin. These sites are characterized as open habitation concentrations of lithic artifacts and rockshelters in upland settings. A total of two sites have been inventoried as historic in age related to the largely Anglo-American settlement of the area during the late eighteenth-early nineteenth centuries. A few of these sites are related to farming and mining activities. A total of three sites have both Native American and likely Anglo-American components. According to the Tennessee Historical Commission, 30 properties on the National Register of Historic Places exist within the four counties of the evaluation area; none exist within the evaluation area itself.

PUBLIC HEALTH AND SAFETY

The specific surface-mining related hazards that pose a potential risk to public health and safety within the evaluation area include: highwalls and pits, vehicle traffic, combustion from engines, noise, fugitive dust, blasting, fire, and water contamination. Highwalls are vertical cliffs that can be unstable at the top and the bottom and have the potential to collapse. Water-filled pits pose a potential drowning hazard and can contain submerged physical hazards. Furthermore, the water can be highly acidic or contain harmful chemicals. Noise, dust, and exhaust associated with the traffic could present a risk to the health of the recreational users. There is also potential for coal-related vehicle accidents with recreational users crossing or traveling along haul roads. Combustion from engines negatives impacts air quality and can pose both short and long risks to recreational users and mine workers. Noise, fugitive dust, and flyrock from blasting have the potential to negatively impact members of the public. Coal mine/seam fires could affect mine workers. Highly acidic water rich in metals can leach from surface coal mines and pose a potential public health risk.

CHAPTER 5: EVALUATION OF COAL RESOURCES

POTENTIAL COAL RESOURCE

There are five coal seams within the Cumberland Block that represent 26,500,000 tons of surface minable coal. There are 13 coal seams within the Cumberland Plateau that represent 228,600,000 tons of surface minable coal. The total amount of surface minable coal is 255,100,000 tons.

The following calculations show the augerable coal resource excluding half of the augerable coal tonnage that is adjacent to the previously surface mined coal in the NCWMA and the ERTCE. Under this scenario, the five coal seams within the Cumberland Block represent 6,400,000 tons of augerable coal. The 14 coal seams within the Cumberland Plateau represent 42,900,000 tons of augerable coal. The total amount if augerable coal is 49,300,000 tons.

For second cut mining the five coal seams within the Cumberland Block represent 1,350,000 tons of reminable coal, while the 13 coal seams within the Cumberland Plateau represent 4,960,000 tons. For second cut mining the total amount of reminable coal is 6,310,000. For auger mining the five coal seams within the Cumberland Block represent 1,800,000 tons of reminable coal, while the 13 coal seams within the Cumberland Plateau represent 6,610,000 tons of reminable coal. For auger mining the total amount of reminable coal is 8,410,000 tons.

The Kent coal seam within the Cumberland Block represents 60,800,000 tons of potential underground coal. The Rock Spring, Pewee, Walnut Mountain, and Big Mary coal seams within the Cumberland Plateau represent 41,400,000 tons of potential underground coal. The total amount of potential underground coal is 102,200,000 tons.

ALTERNATIVE ANALYSIS OF COAL RESOURCE

Tables ES-1, ES-2, and ES-3 show a compilation of all the categorizations of the mineable, augerable, remining and underground coal resources for the NCWMA and the ERTCE. Note that there is no effect on the underground coal resource by the petition or patch areas.

TABLE ES-1: MINEABLE AND AUGERABLE RESOURCE – COMPILATION OF ALTERNATIVES

	Petition		Non-Petition		Non-Petition – Patch Areas		Total		%Excluded	
	Surface	Auger	Surface	Auger	Surface	Auger	Surface	Auger	Surface	Auger
Alternative	Tons		Tons		Tons		Tons		Tons	
1	O	0	255,100,000	49,300,000	0	0	255,100,000	49,300,000	0	0
2	138,700,000	23,640,000	92,490,000	22,210,000	23,910,000	3,450,000	255,100,000	49,300,000	64	55
3	138,700,000	23,640,000	114,690,000	25,380,000	1,710,000	280,000	255,100,000	49,300,000	56	49
4	143,000,000	21,640,000	110,070,000	26,960,000	2,030,000	700,000	255,100,000	49,300,000	57	45
5	34,200,000	4,630,000	216,720,000	44,540,000	4,180,000	130,000	255,100,000	49,300,000	15	10
6	74,100,000	10,550,000	158,060,000	35,330,000	22,940,000	3,420,000	255,100,000	49,300,000	38	28

TABLE ES-2: REMINING RESOURCE – COMPILATION OF ALTERNATIVES

	Petition		Non-Petition		Non-Petition – Patch Areas		Total		%Excluded	
	2nd Cut	Auger	2nd Cut	Auger	2nd Cut	Auger	2nd Cut	Auger	2nd Cut	Auger
Alternative	Tons		Tons		Tons		Tons		Tons	
1	0	0	6,310,000	8,410,000	0	0	6,310,000	8,410,000	0	0
2	3,260,000	4,370,000	2,690,000	3,560,000	360,000	480,000	6,310,000	8,410,000	57	58
3	0	0	6,310,000	8,410,000	0	0	6,310,000	8,410,000	0	0
4	0	0	6,310,000	8,410,000	0	0	6,310,000	8,410,000	0	0
5	450,000	590,000	5,860,000	7,820,000	0	0	6,310,000	8,410,000	7	7
6	1,670,000	2,220,000	4,330,000	5,750,000	310,000	440,000	6,310,000	8,410,000	31	32

TABLE ES-3: POTENTIAL UNDERGROUND COAL RESOURCE

Coal Seam	Area (acres)	Thickness (feet)	Coal (tons)
Kent	24,229	2.79	60,800,000
Block Total			**60,800,000**
Rock Spring	108.5	2.88	300,000
Pewee	428.4	3.07	1,200,000
Walnut Mountain	6,106	2.58	14,200,000
Big Mary	9,871	2.90	25,700,000
Plateau Total			**41,400,000**
Grand Total			**102,200,000**

SUPPLY AND DEMAND FOR PETITION AREA COAL

Coal production in Tennessee has declined by nearly 89% from its peak of 11.2 million tons in 1972 to its production of 1.19 million tons (OSMRE 2014a) in 2013. The Energy Information Administration has projected that Appalachian coal production, including Tennessee, will continue to decline over the next 10 years and then level off to relatively constant production levels thorough 2040. In 2013, preliminary coal production in Tennessee is estimated at between 1.19 (OSMRE 2014a) and 1.27 million tons (EIA 2014b), which was only 0.67% of the regions total. In 2013, only about 4.5% of the Tennessee coal production (approximately 54,000 tons) came from permit areas within the NCWMA and the ERTCE. Because of ownership changes and coal markets, it is difficult to estimate the future production levels that might occur or be affected by the proposed petition. In 2008, approximately 25% of all coal produced in Tennessee came from the NCWMA, while approximately 21% was within portions of the ERTCE.

CHAPTER 6: ENVIRONMENTAL CONSEQUENCES

Table ES-4 provides a summary of the environmental impacts from each of the alternatives being analyzed in this draft PED/EIS. These impacts are described in detail in “Chapter 6: Environmental Consequences.” In order to better understand the context and intensity of potential impacts, OSMRE assumes mining could impact on average 112 acres per year (totaling 3,360 acres over the 30-year planning timeframe). OSMRE developed this average rate based on the historic trend; however, the rate could fluctuate over time depending on engineering and economic factors and/or other free market conditions.

CHAPTER 7: COORDINATION AND CONSULTATION

COOPERATING AGENCY COORDINATION

On June 13, 2011, a memorandum of agreement was signed to establish a cooperating agency relationship between several federal agencies, for the purpose of preparing a draft EIS. Parties to the agreement included the OSMRE, USFWS, EPA, and NPS.

TRIBAL CONSULTATION

The OSMRE has initiated coordination and consultation with seven tribes regarding the project. Follow-up letters were sent. Of the tribes contacted, none have requested to participate in a formal government-to-government consultation process.

PUBLIC COMMENT PROCESS

The public scoping period for this draft PED/EIS began on February 8, 2011, with publication of the Notice of Intent in the Federal Register (76 FR 6826) and continued until April 14, 2011. Newspaper advertisements announcing the intent to prepare a PED/EIS and hold public scoping meetings were published in several newspapers. OSMRE hosted a total of 3 public scoping meetings in Huntsville, Lafollette, and Oak Ridge. These meetings were attended by a total of 311 people.

Table ES-4: Summary of Environmental Consequences

	Alternative 1: No-Action Alternative	Alternative 2: State Petition Designation (67,326 acres)	Alternative 3: State Petition Designation with Remining and Road Access (Preferred Alternative) (67,326 acres)	Alternative 4: Expanded Corridor Designation with Remining and Road Access (74,968 acres)	Alternative 5: Targeted Resource Protection Designation (12,331 acres)	Alternative 6: Reduced Corridor Designation (39,106 acres)
Earth Resources (including) • Geology • Topography	Impacts from surface, underground, and auger mining would be permanent, localized, yet comparatively minor because any area subject to surface mining would be reclaimed to the approximate original contour. There would be benefits from remining and restoration of highwalls, and there is a limited amount of surface mining expected (assumed at an average of 112 acres per year). Alternative 1 would not have significant impacts on topography or geology.	Impacts to geology from underground and auger mining underneath the petition area would be permanent, localized, yet comparatively minor, and there would be a benefit since surface geology would remain undisturbed in the petition area. Impacts on topography would be mainly long-term beneficial from the protection of ridgelines in the petition area, but with the ongoing adverse impacts from the inability to remine and reclaim existing highwalls. Impacts would not be significant.	Impacts to geology would be permanent and localized, yet comparatively minor. The overall impacts to geology would be minor and there would be a benefit since surface geology would remain undisturbed in the designation area and reclamation would occur in remined areas. Alternative 3 would have mostly beneficial impacts on topography from the protection of ridgelines within the designation area and the overall beneficial effect on remined areas that are reclaimed. Impacts would not be significant.	Impacts to geology would be permanent and localized, yet comparatively minor, with a benefit since surface geology would remain undisturbed in the designation area and reclamation would occur in remined areas. Impacts on topography under alternative 4 would be mainly beneficial from the protection of ridgelines within the designation area and the overall beneficial effect on remined areas that are reclaimed. Impacts would not be significant.	Impacts to topography and geology from underground and auger mining underneath the petition area would be permanent, localized, yet comparatively minor, and there would be a benefit since surface geology would remain undisturbed in the designation area. Past adverse effects would remain where highwalls exist and cannot be reclaimed since no remining would be permitted. Overall, impacts on topography under alternative 5 would not be significant.	Impacts to geology from underground and auger mining underneath the petition area would be permanent, localized, yet comparatively minor. There would be beneficial impacts because topography and subsurface geology would remain undisturbed in the designation area. Past adverse effects would remain where highwalls exist and cannot be reclaimed since no remining would be permitted. Impacts would not be considered significant.
Air Quality and Greenhouse Gases	Alternative 1 would have near-term adverse impacts to air quality relative to existing ambient conditions for areas in the immediate vicinity of surface mining. Best management practices and compliance with applicable regulations and permit conditions would minimize impacts to this resource, but impacts related to particulate emissions would likely remain unchanged as a result of continued mining in the NCWMA. Greenhouse gas emissions would be less than significant.	Areas within the petition area would potentially experience fewer air quality impacts, but overall emissions in the evaluation area would remain the same as alternative 1. Best management practices and compliance with applicable regulations and permit conditions would minimize impacts to this resource, but impacts related to particulate matter emissions would likely remain unchanged as a result of continued mining in the NCWMA; however, based on the low level of annual production it is unlikely that impacts would be significant. Greenhouse gas emissions from coal extraction would be less than significant.	Areas within the designation area would be less likely to experience localized air quality impacts, because impacts in the designation area would result mainly from remining operations and associated haul roads, which would be a small portion of overall production and would result in periodic and overall minor emissions. Overall emissions in the evaluation area would remain the same as alternative 1. Best management practices and compliance with applicable regulations and permit conditions would minimize impacts to this resource, but impacts related to particulate matter emissions would likely remain unchanged as a result of continued mining in the NCWMA. Greenhouse gas emissions from coal extraction would be less than significant.	Areas within the designation area would be less likely to experience localized air quality impacts, because impacts in the designation area would result mainly from remining operations and associated haul roads, which would be a small portion of overall production and would result in periodic and overall minor emissions. Overall emissions in the evaluation area would remain the same as alternative 1. Best management practices and compliance with applicable regulations and permit conditions would minimize impacts to this resource, but impacts related to particulate matter emissions would likely remain unchanged as a result of continued mining in the NCWMA. Greenhouse gas emissions from coal extraction would be less than significant.	Areas within the designation area would experience few or minor localized air quality impacts from auger or underground mining only, because no surface mining would occur in the designation area. Overall emissions in the evaluation area would remain the same as alternative 1. Best management practices and compliance with applicable regulations and permit conditions would minimize impacts to this resource, but impacts related to particulate matter emissions would likely remain unchanged as a result of continued mining in the NCWMA. Greenhouse gas emissions from coal extraction would be less than significant.	Areas within the designation area would experience few or minor localized air quality impacts from auger or underground mining only, because no surface mining would occur in the designation area. Overall emissions in the evaluation area would remain the same as alternative 1. Best management practices and compliance with applicable regulations and permit conditions would minimize impacts to this resource, but impacts related to particulate matter emissions would likely remain unchanged as a result of continued mining in the NCWMA. Greenhouse gas emissions from coal extraction would be less than significant.

	Alternative 1: No-Action Alternative	Alternative 2: State Petition Designation (67,326 acres)	Alternative 3: State Petition Designation with Remining and Road Access (Preferred Alternative) (67,326 acres)	Alternative 4: Expanded Corridor Designation with Remining and Road Access (74,968 acres)	Alternative 5: Targeted Resource Protection Designation (12,331 acres)	Alternative 6: Reduced Corridor Designation (39,106 acres)
Water Resources (including) • Groundwater • Surface water • Wetlands	Alternative 1 would have short-term and long-term potentially widespread adverse impacts on surface water resources, but this is limited because the expected mining rate is assumed at an average of 112 acres per year. Remining would result in localized short-term adverse impacts to surface water and groundwater, but reclamation would result in localized long-term beneficial impacts to surface water and groundwater. Surface mining could result in widespread short-term and long-term adverse impacts on groundwater resources. Alternative 1 would not result in significant adverse impacts to surface water or groundwater. Both near- and long-term adverse impacts to wetlands could result from mining activities. Best management practices and compliance with applicable regulations and permit conditions would minimize impacts to wetlands and only a small percentage of the evaluation area would be mined based on the expected level of future surface coal mining operations. However, alternative 1 could result in site-specific localized significant impacts to a wetland depending on proximity to a mining operation.	Alternative 2 would reduce the potential for future adverse impacts from surface coal mining operations to surface water and groundwater resources, resulting in widespread long-term beneficial impacts, especially to source water protection and management zones, headwater streams and wells, and wellhead protection zones in the petition area. The continued existence of unreclaimed previously mined land would result in localized long-term adverse impacts to surface water and groundwater. Alternative 2 would not result in significant adverse impacts on surface water or groundwater resources. The designation of the petition area under alternative 2 would have long-term, widespread beneficial impacts on wetland resources in the petition area, but could also have some adverse effects because of underground mining activity and issues related to unreclaimed mines. Alternative 2 would not result in significant impacts to wetlands.	Alternative 3 would reduce the potential for future adverse impacts from surface coal mining operations to surface water and groundwater resources, resulting in widespread long-term beneficial impacts, especially to source water protection and management zones, headwater streams and wells, wellhead protection zones in the designation area. It would contribute localized short-term adverse impacts to surface water and groundwater during remining, but would provide long-term beneficial impacts in the designation area due to reclamation activities. It would not result in significant adverse impacts on surface water and surface water. Alternative 3 would have long-term beneficial impacts to wetlands protected in the designation area. Remining and reclamation activities and haul roads could have near-term adverse impacts and long-term benefits from improved water quality. Alternative 3 would not have significant impacts on wetlands.	Alternative 4 would reduce the potential for future adverse impacts from surface coal mining operations to surface water and groundwater resources, especially to source water protection and management zones, headwater streams and wells, and wellhead protection zones in the designation area. It would contribute localized short-term adverse impacts to surface water and groundwater during remining operations, but would provide long-term beneficial impacts in the designation area due to reclamation activities. Alternative 4 would not result in significant adverse impacts on surface water and groundwater resources. Impacts to wetlands would be similar to alternative 3, with no significant impacts expected.	Alternative 5 would reduce the overall adverse impacts from potential future mining. It would result in localized and relatively limited long-term beneficial impacts to surface water and groundwater resources, especially to source water protection and management zones, headwater streams and wells, and wellhead protection zones in the designation area The continued existence of unreclaimed previously mined land would result in long-term, localized adverse impacts to surface water and groundwater resources. Alternative 5 would not result in significant adverse impacts on surface water and groundwater resources. Similar to alternative 2, alternative 5 would have mainly long-term, widespread beneficial impacts on wetland resources in the designation area, with some adverse effects because of issues related to unreclaimed mines. Impacts would not be significant.	Alternative 6 would reduce the potential for future adverse impacts from surface coal mining operations to surface water and groundwater resources, resulting in widespread long-term beneficial impacts, especially to source water protection and management zones, headwater streams and wells, and wellhead protection zones in the designation area. The continued existence of unreclaimed previously mined land would result in long-term, localized adverse impacts to surface water and groundwater resources. Alternative 6 would not result in significant adverse impacts on surface water and groundwater resources. Similar to alternative 2, alternative 6 would have long-term, widespread beneficial impacts on wetland resources in the designation area, with some adverse effects. Impacts would not be significant.
Soils and Vegetation	Alternative 1 would have both near- and long-term adverse impacts, which would be limited because only a small percentage of the evaluation area would be mined based on the expected level of future surface coal mining operations. Long-term beneficial impacts would be realized once a remined site is reclaimed. Impacts would not be significant.	Alternative 2 would have both near- and long-term beneficial impacts from protection of vegetation and soils in the petition area. Minor adverse impacts would occur because remining and associated reclamation would not be permitted. Impacts would not be at a large or landscape scale, and it is unlikely that impacts would be significant.	Alternative 3 would have long-term beneficial impacts from protection of the designation area and reclamation of remined area, with near-term adverse effects during early stages of remining. It is unlikely that the impacts would be significant.	Alternative 4 would have greater long-term beneficial impacts from protection of the designation area and reclamation of remined area, with near-term adverse effects during early stages of remining. It would result in direct or indirect adverse impacts, but could result in substantial benefits. It is unlikely that the impacts would be significant.	Alternative 5 would have both near- and long-term direct and indirect beneficial impacts from protection of vegetation and soils in the designation area, but the beneficial impacts of reclamation on the potential vegetation acres protected from remining would not occur. It is unlikely that the impacts would be significant.	Alternative 6 would result in both near- and long-term direct and indirect beneficial impacts in the designated area, with adverse effects continuing on lands that have not been reclaimed. It is unlikely that the impacts would be significant.

	Alternative 1: No-Action Alternative	Alternative 2: State Petition Designation (67,326 acres)	Alternative 3: State Petition Designation with Remining and Road Access (Preferred Alternative) (67,326 acres)	Alternative 4: Expanded Corridor Designation with Remining and Road Access (74,968 acres)	Alternative 5: Targeted Resource Protection Designation (12,331 acres)	Alternative 6: Reduced Corridor Designation (39,106 acres)
Fish and Wildlife	Alternative 1 would have near- and long-term adverse impacts to aquatic and terrestrial species. Alternative 1 would potentially impact up to approximately 945 miles of aquatic habitat. Remining may contribute to short-term impacts, but associated reclamation could improve water quality and aquatic habitat conditions in the long term. Based on an assumed average mining rate of 112 acres per year throughout the evaluation area, it is unlikely that widely distributed common species would be significantly impacted. In the event that small, isolated populations are adversely impacted, significant impacts to those populations could occur.	Alternative 2 would result in near- and long-term beneficial impacts to aquatic and terrestrial species. It would result in the protection of approximately 356 miles of aquatic habitat and 18,436 acres of terrestrial tier 1 priority habitat, although any areas that have water quality issues from pre-SMCRA mining would not be remined or reclaimed, resulting in continued adverse effects on aquatic species. Alternative 2 would not result in significant adverse impacts.	Alternative 3 would result in near- and long-term adverse and beneficial impacts to aquatic and terrestrial species. It would result in the protection of approximately 356 miles of aquatic habitat and approximately 18,436 acres of terrestrial tier 1 priority habitat. Remining and reclamation activities along with haul road construction and maintenance within the designation area and adjacent to protected ridgelines would result in near- and long-term adverse impacts to aquatic and terrestrial species. However, protection of lands within the designation area from future surface coal mining operations would result in long-term beneficial impacts by limiting further injury and potentially facilitating ecosystem recovery. Alternative 3 would not likely result in significant adverse impacts.	Alternative 4 would result in near- and long-term adverse and beneficial impacts to aquatic and terrestrial species. Protection of lands within the designation area from future mining activities would also result in long-term beneficial impacts. Alternative 4 would result in the protection of approximately 354 miles of aquatic habitat and approximately 19,728 acres of terrestrial tier 1 priority habitat. Remining and reclamation activities along with haul road construction and maintenance within the designation area and adjacent to protected ridgelines would result in near- and long-term adverse impacts to aquatic and terrestrial species. Protection of lands within the designation area from future mining activities would also result in long-term beneficial impacts by limiting further injury and potentially facilitating ecosystem recovery. Alternative 4 would not result in significant adverse impacts.	Alternative 5 would result in near- and long-term beneficial impacts to aquatic species. Alternative 5 would result in the protection of approximately 381 miles of aquatic habitat and approximately 4,409 acres of tier 1 priority habitat. Any areas that have water quality issues from pre-SMCRA mining would not be remined or reclaimed, resulting in continued adverse effects on aquatic species. Alternative 5 would not result in significant adverse impacts.	Alternative 6 would result in near- and long-term beneficial impacts to aquatic and terrestrial species. Alternative 6 would result in the protection of approximately 356 miles of aquatic habitat and approximately 10,065 acres of terrestrial tier 1 priority habitat. Any areas that have water quality issues from pre-SMCRA mining would not be remined or reclaimed, resulting in continued adverse effects on aquatic species. Alternative 6 would not result in significant adverse impacts.
Special-Status Species (for species-specific analyses, see chapter 6)	Alternative 1 would have near- and long-term adverse impacts to aquatic and terrestrial special-status species. Some species may benefit from active reclamation of mine sites. Depending on where surface coal mining operations occur, some species could experience significant adverse impact to important habitat areas. Alternative 1 would have a potential to adversely affect undetected plant special-status species and their habitat and would have long-term adverse impacts to plant special-status species due to habitat loss.	Alternative 2 would result in near- and long-term beneficial impacts to aquatic and terrestrial special-status species. The protection of lands within the petition area from future mining activities would result in long-term beneficial impacts to special-status species and habitats by limiting the potential for further injury and potentially facilitating ecosystem recovery. It would have long-term direct and indirect beneficial impacts to plant special-status species. Alternative 2 would not result in significant adverse impacts.	Alternative 3 would result in near- and long-term adverse and beneficial impacts to special-status species. Activities under alternative 3 would cause long-term direct adverse impacts due to the loss of individual undetected plant special-status species or their habitat. Protection of lands within the designation area from future mining activities would result in long-term beneficial impacts to special-status species and habitats. Alternative 3 would not result in significant adverse impacts.	Alternative 4 would result in near- and long-term adverse and beneficial impacts to special-status species. Activities under alternative 4 would cause long-term direct adverse impacts due to the loss of individual undetected plant special-status species or their habitat. Protection of lands within the designation area from future mining activities would result in long-term beneficial impacts to special-status species and habitats. Alternative 4 would not result in significant adverse impacts.	Alternative 5 would result in near- and long-term beneficial impacts to special-status species. It would result in the least amount of terrestrial habitat protection compared to the other action alternatives. Alternative 5 would not result in significant adverse impacts.	Alternative 6 would result in near- and long-term beneficial impacts to special-status species. Similar to alternative 2, but over a smaller area, the protection of lands within the designation area from future mining activities would result in long-term beneficial impacts to special-status species and habitats by limiting further loss, degradation, or injury. Alternative 6 would potentially facilitate ecosystem and species recovery by preventing the loss of undetected plant special-status species and their habitat. Alternative 6 would not result in significant adverse impacts.

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Land Use and Recreation	Alternative 1 would have near- and long-term adverse impacts to land use and recreation. Surface mining would result in potential conflicts with existing forestry and oil and gas production uses; potential impacts to dispersed recreation related to noise, traffic, fugitive dust, emissions, area closures, and access restrictions; and potential impacts to designated recreational resources that result primarily from noise impacts. Depending on the location of surface coal mining operations, these impacts would occur to greater or lesser degrees.	Under alternative 2, beneficial impacts would occur from increased potential for implementation of existing surface management plans, reduced impacts to dispersed recreation, and reduced impacts to designated recreational resources. Long-term adverse impacts would result from the continued presence of unreclaimed mine sites. Overall, greater beneficial impacts and fewer adverse impacts would be expected relative to alternative 1, with no significant impacts expected.	Under alternative 3, near-term adverse impacts would result from the remining of unreclaimed, previously mined areas and associated access and haul road construction. Long-term beneficial impacts would result from the reclamation of previously unreclaimed mine sites. Beneficial impacts would occur from reduced potential for land use conflicts, increased potential for implementation of existing surface management plans, reduced impacts to dispersed recreation, and reduced impacts to designated recreational resources. Overall, greater beneficial impacts and fewer adverse impacts would be expected relative to alternative 1, with no significant impacts expected.	Under alternative 4 Impacts would be the same as described for alternative 3, with slightly more benefits related to the larger area designated. Overall, greater beneficial impacts and fewer adverse impacts would be expected relative to alternative 1, with no significant impacts expected.	Under alternative 5, limited beneficial impacts would occur from reduced potential for land use conflicts, increased potential for implementation of existing surface management plans, reduced impacts to dispersed recreation, and reduced impacts to designated recreational resources. Long-term adverse impacts would result from the continued presence of unreclaimed mine sites. Overall impacts would be slightly beneficial compared to alternative 1 and would not be significant.	Under alternative 6, beneficial impacts would occur from reduced potential for land use conflicts, reduced impacts to dispersed recreation, and reduced impacts to designated recreational resources. Long-term adverse impacts would result from the continued presence of unreclaimed mine sites. Impacts would not be significant.
Aesthetics (including) • Visual Resources • Soundscapes	Alternative 1 could have substantial near-term adverse impacts to visual resources. However, given the topography, dense vegetative cover, and the rural nature of the evaluation area, impacts are anticipated to be localized. Impacts from alternative 1 would not likely result in significant impacts to visual resources. Alternative 1 would have near-term localized significant adverse effects on soundscapes. Thresholds for human annoyance and disturbance of wildlife would be exceeded in the vicinity of coal mining areas and along roadways used by coal haul trucks. Following reclamation, these mining-related sources would cease. Therefore, there would be no long-term impact on soundscapes at any one mine site, although mining could continue at varying locations.	Alternative 2 would have long-term beneficial impacts as a result of prohibiting surface coal mining activities allowing lands to remain in their natural condition. Similarly, beneficial impacts would remain predominantly localized based on the topography and dense vegetation within the petition area. Individuals who directly view mining operations could experience adverse impacts; however, based on the relatively small scale of these operations, adverse impacts are anticipated to be infrequent. Alternative 2 would not have significant impacts to visual resources. Alternative 2 would have fewer impacts to soundscapes than alternative 1, but would still result in near-term significant adverse impacts in the vicinity of potential coal mine locations outside the petition area that could affect soundscapes in the petition area.	Alternative 3 would have near-term adverse impacts to visual resources as a result of remining operations. Visual impacts under alternative 3 would offset past impacts and could provide beneficially significant impacts to visual resources. Impacts would not be significant. Alternative 3 would have fewer impacts to soundscapes and would be more beneficial than alternative 1, but would still result in near-term significant adverse impacts in the vicinity of new coal mine locations adjacent to the designation area and previously mined areas undergoing remining.	Alternative 4 would have near-term adverse impacts to visual resources as a result of remining operations and associated road development similar to alternative 2. It would not result in significant adverse impacts to visual resources. Alternative 4 would have fewer noise-related impacts than alternative 1, but would still result in near-term significant adverse impacts in the vicinity of surface coal mining operations and remining areas.	Alternative 5 would have impacts similar to alternative 2, but those impacts would occur in areas with high recreational use providing localized benefits. Alternative 5 would not allow for remining and reclamation and therefore would not reduce existing negative visual impacts. Beneficial impacts from alternative 5 could potentially be significant as the areas identified under alternative 5 are sensitive and more frequently visited. Alternative 5 would have fewer impacts than alternative 1 and would avoid impacts to specific noise-sensitive areas, but would still result in near-term significant adverse impacts in the vicinity of allowable coal mine locations. Following reclamation outside the designation area, these mining-related sources would cease. Therefore, there would be no long-term impact on soundscapes at any one mine site.	Alternative 6 would have impacts similar to alternative 2, but those impacts would occur over a smaller area. Impacts from alternative 6 would not be significant. Alternative 6 would have fewer impacts to soundscapes than alternative 1, but would still result in near-term significant adverse impacts in the designation area from surface coal mining operations in the vicinity. Thresholds for human annoyance and disturbance of wildlife would be exceeded in the vicinity of coal mining areas and along roadways used by coal haul trucks. Following reclamation of mine sites outside the designation area, these mining-related sources would cease. Therefore, there would be no long-term impact on soundscapes at any one mine site.

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Socioeconomics and Environmental Justice (including) • Mining • Recreation • Logging • Oil and Gas	Implementing the no-action alternative would have no new impact on the regional economy. Existing contributions to the local and regional economy would continue to benefit the region's economy because coal would continue to be mined from the petition and evaluation areas. There would be no significant disproportionate impact on environmental justice communities.	Alternative 2 is expected to continue to benefit the region's economy because coal mining would continue to be produced from the evaluation area. Under alternative 2, there would be long-term beneficial impacts to recreation and tourism spending because recreational experience in the petition area would be better than under alternative 1. Continued surface coal mining operations within the evaluation area would not likely change under the action alternatives, although the location of the operations would change. Therefore, alternative 2 (or any action alternative) would not result in significant disproportionate adverse impacts to environmental justice communities.	Alternative 3 is expected to continue to benefit the region's economy because coal would continue to be mined from the evaluation area, and remining would be allowed in the designation area. Under alternative 3, there would be long-term beneficial impacts to recreation and tourism spending because recreational experience in the designation area would be better than under alternative 1. Impacts on environmental justice communities would be the same as alternative 2.	Alternative 4 is expected to continue to benefit the region's economy because coal would continue to be mined from the evaluation area and remining would be allowed in the designation area. Under alternative 4, there would be long-term beneficial impacts to recreation and tourism spending because recreational experience in the designation area would be better than under alternative 1. Impacts on environmental justice communities would be the same as alternative 2.	Alternative 5 is expected to continue to benefit the region's economy because coal would continue to be mined from the evaluation area. Impacts to visitation and associated visitor spending, jobs, and income would be beneficial compared to alternative 1. However, out of all action alternatives, alternative 5 would have the least potential to minimize adverse noise-related impacts to visitors and wildlife, with potential adverse impacts to wildlife viewing opportunities, visitor spending, and associated jobs and income. Impacts on environmental justice communities would be the same as alternative 2.	Alternative 6 is expected to continue to benefit the region's economy because coal would continue to be mined from the evaluation area. Under alternative 6, there would be long-term beneficial impacts to recreation and tourism spending because recreational experience in the designation area would be better than under alternative 1. Impacts on environmental justice communities would be the same as alternative 2.
Cultural Resources	Alternative 1 would have the potential to adversely impact cultural resources, primarily through the continuation of mining, ground-disturbing activities, and inadvertent damage that could occur. Based on an assumed mining rate of on average 112 acres per year and regulatory requirements to avoid or mitigate impacts, no significant impacts under NEPA are expected.	Under alternative 2, land within the petition area would be protected from mining activities, which would be a benefit. No significant impacts under NEPA are expected.	Under alternative 3, land within the designation area would be protected from mining activities, but remining and road construction would have the potential to adversely impact cultural resources, primarily through ground-disturbing activities. However, based on the expected mining rate and regulatory requirements, no significant impacts under NEPA are expected.	Under alternative 4, land within the designation area would be protected from mining activities, but remining and road construction would have the potential to adversely impact cultural resources, primarily through ground-disturbing activities. However, based on the expected mining rate and regulatory requirements, no significant impacts under NEPA are expected.	Under alternative 5, only a small area within the designation area would be protected from mining and related activities, but there would be no remining. Similar to alternative 2, no significant impacts under NEPA are expected.	Under alternative 6, land within the designation area would be protected from mining activities, and there would be no remining. Similar to alternative 2, no significant impacts under NEPA are expected.
Public Health and Safety	There would be near-term adverse localized impacts to public health and safety due to surface mining, underground mining, auger mining, logging operations, oil and gas extraction, road building, and associated transportation. Overall, impacts would be minor and not significant.	Alternative 2 would reduce near-term localized hazards associated with surface mining operations in the petition area, a small benefit to recreational users in that area. However, barring remining from the petition area would allow continued adverse impacts from localized terrain hazards and water quality issues. Overall, impacts would be minor and not significant.	Alternative 3 would reduce near-term localized hazards associated with surface mining operations in the designation area. Remining within the designation area would have near-term localized adverse impacts, but could have localized long-term beneficial impacts if the reclamation reduces the existing terrain hazards and improves water quality. Impacts would be minor and not significant.	Impacts would be the similar to alternative 3, with near-term localized adverse impacts but long-term beneficial impacts. Overall, impacts would be minor and not significant.	Alternative 5 would reduce near-term localized hazards associated with surface mining operations in the designation area. Barring remining from the designation area would allow terrain hazards and water quality issues from pre-SMCRA mines to persist. Impacts would be very minor and not significant.	Alternative 6 would reduce near-term localized hazards associated with surface mining operations in the designation area. Barring remining from the designation area would allow terrain hazards and water quality issues from pre-SMCRA mines to persist. Impacts would be minor and not significant.

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Acronyms

EIS	environmental impact statement
EPA	US Environmental Protection Agency
ERTCE	Emory River Tracts Conservation Easement
ETDD	East Tennessee Development District
FEMA	Federal Emergency Management Agency
GIS	geographic information system
LUM	lands unsuitable for mining
NAAQS	National Ambient Air Quality Standards
NCWMA	North Cumberland Wildlife Management Area
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NPS	National Park Service
OSMRE	Office of Surface Mining Reclamation and Enforcement
PED	petition evaluation document
SMCRA	Surface Mining Control and Reclamation Act
TDEC	Tennessee Department of Environment & Conservation
TDOT	Tennessee Department of Transportation
TVA	Tennessee Valley Authority
TWRA	Tennessee Wildlife Resources Agency
USFWS	US Fish and Wildlife Service

Chapter 1

Purpose of and Need for Action

CHAPTER 1: PURPOSE AND NEED

INTRODUCTION

The "Purpose and Need" chapter in this draft North Cumberland Wildlife Management Area (NCWMA), Tennessee Lands Unsuitable for Mining Petition Evaluation Document / Environmental Impact Statement (draft PED/EIS) describes why the Office of Surface Mining Reclamation and Enforcement (OSMRE) is taking action at this time with respect to the petition from the State of Tennessee to designate certain lands in the state as unsuitable for surface coal mining operations. "Chapter 2: Petition Evaluation" evaluates the petition with respect to the unsuitability criteria specified in section 522 of the Surface Mining Control and Reclamation Act of 1977 (SMCRA), and the requirements for evaluating the petitioner's allegations. "Chapter 3: Alternatives" presents five action alternatives for designating certain lands unsuitable for surface coal mining, including the petition from the State of Tennessee, and the no-action alternative, in which the OSMRE would deny the petition. "Chapter 4: Affected Environment" provides a baseline characterization of the human environment as defined by the National Environmental Policy Act of 1969 (NEPA). As required by SMCRA, section 522(d), "Chapter 5: Evaluation of Coal Resources" analyzes the potential coal resources of the petition area, the demand for coal from the petition area, and the impact on the economy and coal supply resulting from implementing any of the six alternatives including designating the petition area unsuitable for surface coal mining operations. "Chapter 6: Environmental Consequences" analyzes the effects of the six alternatives on the physical, natural, and socioeconomic resources described in "Chapter 4: Affected Environment." Finally, "Chapter 7: Consultation and Coordination" describes agency coordination and consultation associated with specific laws and the public involvement process.

Specifically, this chapter includes the following:

- the regulatory background under SMCRA and the background associated with the petition from the State of Tennessee to find certain lands in the state unsuitable for surface coal mining operation
- statements of the purpose and need for taking action
- a description of the petition area
- the scope of the evaluation of the draft PED/EIS
- the scoping process
- a discussion of issues and impact topics considered in preparation of this draft PED/EIS, as well as issues and impact topics dismissed from further analysis

PROJECT BACKGROUND

REGULATORY BACKGROUND

SMCRA requires the Secretary of the Interior to implement a federal program for a state if "such state … fails to implement, enforce, or maintain its approved state program. Implementation of a federal program vests the Secretary with jurisdiction for surface coal mining and reclamation operations on lands within the federal program state…" (30 USC § 1254(a)(3)). After implementation of a federal program, the Secretary, acting through the federal OSMRE, is the regulatory authority. Prior to 1984, the State of Tennessee implemented the program but relinquished that program to the OSMRE on October 1, 1984. The OSMRE then implemented a federal regulatory program under SMCRA for the State of Tennessee.

As allowed under SMCRA, section 522, “any person having an interest which is or may be adversely affected shall have the right to petition the regulatory authority to have an area designated as unsuitable for surface coal mining operations, or to have such a designation terminated” (30 USC § 1254(c)). See “Chapter 2: Petition Evaluation” for more detail. Prior to making a determination, the OSMRE must prepare a detailed statement that includes the potential coal resources of the area, the demand for coal resources, and the impact of a designation on the environment, economy, and the supply of coal (30 USC § 1254(d)). See “Chapter 5: Evaluation of Coal Resources” for more detail.

Any decision that the OSMRE may make on the State’s unsuitability petition must be considered a federal action and as such is subject to the requirements of NEPA. As a decision by the Secretary could result in the designation of the entire petition area as unsuitable for surface coal mining operations, the OSMRE must consider the evaluation of this petition and any subsequent decision to be a major federal action with potentially significant effects to the quality of the human environment. In accordance with NEPA, section 102(2)(C) (42 USC § 4332(2)(C)), this EIS is being prepared. In adherence to 40 CFR § 1506.4, the OSMRE has combined the petition evaluation with the EIS to improve efficiencies.

PETITION BACKGROUND

On September 30, 2010, the State of Tennessee filed a petition with the OSMRE to designate certain lands in the State as unsuitable for surface coal mining operations. These lands include the area within 600 feet of all ridgelines lying within the NCWMA—comprised of the Royal Blue Wildlife Management Area, the Sundquist Wildlife Management Area, and the New River Wildlife Management Area (also known as the Brimstone Tract Conservation Easement)—and the Emory River Tracts Conservation Easement (ERTCE), encompassing approximately 67,326 acres. The State noted two statutory criteria under section 522(a)(3) of SMCRA as the basis of its petition. Under the first criterion, the State asserted that surface mining operations are “incompatible with existing State or local land use plans or programs.” Under the second criterion, the State asserted that surface mining operations “affect fragile or historic lands in which such operations could result in significant damage to important historic, cultural, scientific, and esthetic values and natural systems.”

On November 23, 2010, the OSMRE determined the petition to be complete and initiated evaluation of the petition allegations. The OSMRE assembled an interdisciplinary team to evaluate existing information, collect new information, and conduct the technical studies needed to process the petition. In accordance with its responsibility for administering the federal program for Tennessee, the OSMRE must first determine if coal resources are present in the petition area and determine that the petition is complete (30 CFR §§ 764.15(a)(2)-(3)). The OSMRE can process and make decisions on all petitions submitted to designate areas in the state as unsuitable for surface coal mining operations. In this document, the OSMRE evaluates the State of Tennessee petition to designate portions of the NCWMA and ERTCE in Anderson, Campbell, Morgan, and Scott Counties as unsuitable for surface coal mining operations. As required by section 522(d) of the SMCRA, this document evaluates coal resources. See “Chapter 5: Evaluation of Coal Resources” for further detail. The Office of Surface Mining Directive OPM-5 identifies the director of the OSMRE as the person responsible for making decisions on lands unsuitable for mining (LUM).

By letter dated October 5, 2010, the State responded to an OSMRE request for clarification regarding certain aspects of the State petition. These are briefly summarized here. The State reaffirmed its position that certain mines would be excluded from the petition area, so that those mines could be remined to resolve environmental problems. Remining is engaging in “surface coal mining and reclamation operations which affect previously mined areas” (30 CFR § 701.5). It asserted its preference for a thorough case-by-case evaluation of remining proposals that would impact undisturbed areas. The State indicated it did not object to haul roads. Further, the State indicated that following the natural contours of the land allows for "practical determination" of corridors using standard methodology. The State also indicated that it would provide additional information regarding mapping.

The State letter contained several paragraphs regarding the justification for the 1,200-foot terrestrial habitat corridor. The State cited Tennessee law and noted the "Connecting the Cumberlands" project, Tennessee's Comprehensive Wildlife Conservation Strategy, and the state management plans for the Royal Blue and Sundquist Wildlife Management Areas as precedent for its petition. It stated the critical nature of the petition, noting that the 1,200-foot terrestrial corridor furthers existing goals. The State mentioned its ardent support of the draft Northern Cumberlands Forest Resources Habitat Conservation Plan.

In response to the OSMRE review of the petition, the State, by letter dated November 5, 2010, amended the petition by submitting various documents referenced in the petition. These materials included the following: an executed conservation easement for the Brimstone Tract; Schedules A and B (legal description and excepted encumbrances) supporting the Brimstone conversation easement; a 2007 Special Warranty Deed for timber rights to Sundquist Wildlife Management Area; an executed conservation easement for the Emory Tract; exhibits to the conservation easement for the Emory Tract; a PowerPoint presentation by The Nature Conservancy; Attachment 1 to the Management Plan for the Sundquist Wildlife Management Area (Vol. I, II, and III); and a hard copy of "Connecting the Cumberlands" by The Tennessee Conservationist.

On January 12, 2012, representatives of the OSMRE Knoxville Field Office met with representatives of the State (petitioner). As a result of that meeting, on February 23, 2012, the State sent a letter to the OSMRE further clarifying certain issues related to their petition. In their correspondence, the State agreed that petition boundaries as revised by the OSMRE were more accurate than the boundaries the State had used for mapping and that the revised boundaries should be used. However, this also effectively revised the petition area from 67,326 acres to 45,123 acres and from an estimated 505 miles to 332 miles of ridgeline. Correspondence from the State further clarified their petition by indicating that it was not their intent to preclude remining of previously mined areas. The State recognized that with remining there would be the potential for significant improvement to public safety or environmental benefit.

On April 16, 2012, the State wrote a letter to the OSMRE acknowledging both a letter from the OSMRE dated March 15, 2012, and a meeting between the two parties that was held on April 10, 2012. In the April 16, 2012, letter, the State claimed it more clearly understood how the figures for the ridge mileage and the acreage of the petition boundary on the OSMRE map were derived. The State noted that OSMRE methodology defines ridges as those dividing third order streams, from the highest point down to the point that is the average elevation from the beginning of the first order streams in the watershed, or 300 feet above the valley floor, whichever is higher. The State noted that its petition intends the ridge corridors to extend down to the point of intersection with the streams in the valley.

By letter dated June 26, 2012, the State of Tennessee wrote to the OSMRE, stating that its petition intends to include all of the ridges down to the valley floor, which the OSMRE-Knoxville Field Office revised boundary would significantly reduce. In this regard, the State affirmed its original position that the appropriate designation should be 67,326 acres, not 45,123 acres. The State explained that the OSMRE-Knoxville Field Office revision would result in harm to habitats, especially for the "greatest conservation need" species as described in Tennessee's Comprehensive Wildlife Conservation Strategy. It also reiterated the need to protect ridge corridors down to the valley floor as "fragile lands," as defined by OSMRE regulations. Finally, the letter stated that surface mining in the petition area would be incompatible with the "Connecting the Cumberlands" project. On August 6, 2012, the State sent a follow-up letter to the OSMRE. The State asserted that it believed that the OSMRE would give full consideration to the 67,326-acre petition area because the OSMRE did not comment on the matter.

By letter dated July 16, 2013, the State requested that the OSMRE render a decision regarding its petition to designate certain lands as unsuitable for coal mining. The State referenced a meeting held in Knoxville, Tennessee, on August 29, 2012, wherein State representatives met with former Acting Assistant Secretary Marcilynn Burke. During this meeting, the parties discussed the scope and justification for the ridgeline corridors in the State's proposed petition area of 67,326 acres. The State indicated that, per OSMRE request, it provided written clarification on certain aspects of the petition. The letter noted the State's objection to the extended delay both in processing the petition and issuing a draft EIS.

On September 25, 2015, the State wrote a letter to the OSMRE to provide additional support for their petition. The letter and corresponding documents and data included updated draft plans, such as the State Wildlife Action Plan and North Cumberlands Forest Resources Habitat Conservation Plan, cerulean warbler white papers and habitat data, rare plant data, and information on cultural resources. In addition to the supplemental information, the letter reaffirmed the State's position that the State had no opposition to remining or deep mining within the NCWMA or the proposed petition area.

As allowed under federal regulations (30 CFR § 764.15(c)), a number of parties have intervened in the lands unsuitable petition process. By letter dated November 24, 2010, the Southern Environmental Law Center submitted a statement of intervention on behalf of the National Parks Conservation Association, the Warioto Chapter of the National Audubon Society, the Tennessee Ornithological Society, Tennessee Environmental Council, Natural Resources Defense Council, Defenders of Wildlife, and the Sierra Club requesting intervener status in support of the petition. By letter dated January 7, 2011, the National Mining Association, Tennessee Mining Association, and Campbell County requested intervener status in opposition to the petition. By letters dated January 21, 2011, the OSMRE granted the requests for intervention. By a letter dated April 13, 2011, National Coal, LLC, requested intervention status in opposition of the petition. By a letter dated April 20, 2011, the OSMRE granted the request for intervention.

This draft PED/EIS evaluates the petition and the potential environmental impacts associated with denying the petition or recommending the petition in whole or in part for designation as lands unsuitable for surface coal mining operations.

PURPOSE AND NEED FOR ACTION

The purpose of the agency action is to process the petition in accordance with SMCRA and other applicable federal laws. The proposed action is necessary because the OSMRE is responsible for evaluating the merits of the petitioner's allegations and determining whether the petition area is entirely or partially eligible for designation as unsuitable for surface coal mining operations based on the criteria in section 522(a)(3) of SMCRA. This action is also needed to accommodate the OSMRE mission as the regulatory authority for surface coal mining operations in Tennessee.

DESCRIPTION OF PETITION AREA

As submitted by the State, the petition area includes 505 miles of ridgelines with a 1,200-foot corridor (600 feet on both sides of the ridgetop) that would be designated as unsuitable for surface coal mining. The petition area covers approximately 67,326 acres. These ridgelines are found within the NCWMA and ERTCE area (see figure 1-1). The NCWMA is made up of three management units: New River Unit, Royal Blue Unit, and Sundquist Unit. This area is also traversed by a portion of the Cumberland Trail. Because the NCWMA is the predominant feature of the petition area, the petition is herein identified as the North Cumberland petition (or the petition). The North Cumberland petition area begins approximately 3 miles north of Wartburg, Tennessee, and extends 40 miles to the northeast ending some 8 miles north northeast of LaFollette, Tennessee. The petition area lies in a rural area of northeast

Tennessee dominated by mountains and valleys. Elevations within the State's petition area range from 1,100 feet above mean sea level to approximately 3,200 feet above mean sea level. Over 830 miles of streams lie within the boundaries of the NCWMA and ERTCE area. The vast majority of these streams flow north into the Cumberland River watershed. The principal streams draining this portion of the petition area are New River and Clear Fork. The remaining streams flow south into the Clinch River watershed. The principal streams draining this portion of the petition area are the Emory River and Cove Creek. For more detail about the petition area see "Chapter 4: Affected Environment."

SCOPE OF EVALUATION

The scope of the analysis for this draft PED/EIS focuses on the State's petition, reasonable alternatives to the petition, and the no-action alternative. The ultimate decision will not result in the approval of any specific surface coal mining operation. Approval or denial of a specific surface coal mining operation can be issued only after an applicant has submitted to the OSMRE a permit application with site-specific data that meets all the requirements of SMCRA and the implementing regulatory program. As a part of reviewing any such application for compliance with SMCRA regulations, the OSMRE would provide an opportunity for public comment and would undertake an appropriate environmental review in compliance with NEPA and other environmental laws such as the Endangered Species Act, Clean Water Act, and National Historic Preservation Act, among others (see "Chapter 7: Consultation and Coordination").

The scope of the evaluation of the petition is defined based on several criteria. As described in SMCRA, section 522 (a)(3), an area may be found unsuitable for surface coal mining operations if certain criteria are met (30 USC § 1272(a)(3)). The State's petition lists the following two criteria, asserting that surface coal mining operations in the petition area would

- "be incompatible with existing federal, state, and local land use plans or programs; or
- affect fragile or historic lands in which such operations could result in significant damage to important historic, cultural, scientific, or esthetic values and natural systems…" (30 USC § 1272(a)(3)(A)(B)

To adequately evaluate the petition, the OSMRE must describe the areas where the alternatives and affected coal resources occur within those alternatives. This includes both the coal resource in the petition area as well as coal resources in adjacent areas. Figure 1-2 shows the evaluation area of the alternatives being considered and the area of coal resources. This area encompasses the NCWMA and ERTCE area and adjacent areas. The evaluation area is defined more broadly than the petition area in order to fully inform the decision maker as to the impacts of the alternatives being considered. Although it generally follows the boundary of the NCWMA and ERTCE, the evaluation area is specific to each potentially affected resource to ensure that all direct, indirect, and cumulative impacts are assessed; this includes impacts that extend beyond the petition area boundary. Although the ERTCE is evaluated in this draft PED/EIS, based on a review of existing property rights and the language of the conservation easement for the Emory River Tract, the OSMRE believes that surface coal mining operations are not authorized in the ERTCE. In addition, there are no commercial mineable coal resources in the ERTCE.

SCOPING PROCESS AND PARTICIPATION

Regulations implementing NEPA require an "early and open process for determining the scope of issues to be addressed and for identifying the significant issues related to a proposed action" (40 CFR § 1501.7). To determine the scope of issues to be analyzed in depth in this draft PED/EIS, the OSMRE conducted internal and agency scoping as well as formal public scoping. The OSMRE used the scoping process to inform the development of alternatives and to identify the issues and impact topics carried forward for analysis in this draft PED/EIS.

INTERNAL AND AGENCY SCOPING

The OSMRE identified seven federal agencies that may have either jurisdiction by law or special expertise with respect to environmental issues related to the State's petition. On March 30, 2011, these agencies were invited to participate as cooperating agencies in the development of this draft PED/EIS. Three agencies, the US Fish and Wildlife Service (USFWS); National Park Service (NPS), specifically the Big South Fork National River and Recreation Area and the Obed Wild and Scenic River; and US Environmental Protection Agency (EPA), accepted this invitation. One agency, the US Army Corps of Engineers, chose not to participate. The US Geological Survey chose not to be a formal cooperating agency but did agree to provide technical expertise as needed. The US Department of Agriculture, National Resource Conservation Service, and the US Forest Service did not respond.

Since the petition was filed, the OSMRE has held many internal meetings as well as meetings with the cooperating agency partners to establish the purpose and need of this draft PED/EIS, discuss the development of alternatives to be evaluated, and identify specific issues of concern. The internal and agency scoping process is documented in reports that are available in the administrative record and is further described in "Chapter 7: Consultation and Coordination."

PUBLIC SCOPING

The public scoping period for this draft PED/EIS began on February 8, 2011, with publication of the Notice of Intent in the *Federal Register* (76 FR 6826) and continued until April 14, 2011. In this notice, the OSMRE sought public comments on the scope of issues that should be addressed in this draft PED/EIS, including impacts and alternatives, and announced three public meetings. The State also posted a notice in the *Tennessee Administrative Record* on February 3, 2011. On February 23, 2011, the OSMRE mailed 794 notices to the petitioners, interested state and federal agencies, landowners, intervenors, and other interested parties to announce the date, time, and place of the scoping meetings. Newspaper advertisements announcing the intent to prepare a PED/EIS and hold public scoping meetings were published in several newspapers: *Clinton Courier News* on February 27 and March 6, 2011; *Knoxville News Sentinel* on February 27 and March 6, 2011; *Lafollette Press* on February 24 and March 3, 2011; *Morgan County News* on February 23 and March 2, 2011; and *Scott County News* on February 24 and March 3, 2011.

In addition, several special-interest groups and organizations published announcements in their newsletters, websites, and through social networking services. Statewide newspapers in Nashville, Knoxville, and Chattanooga, Tennessee, published articles related to the meetings. In addition, WVLT Channel 8, in Knoxville, Tennessee, provided news coverage.

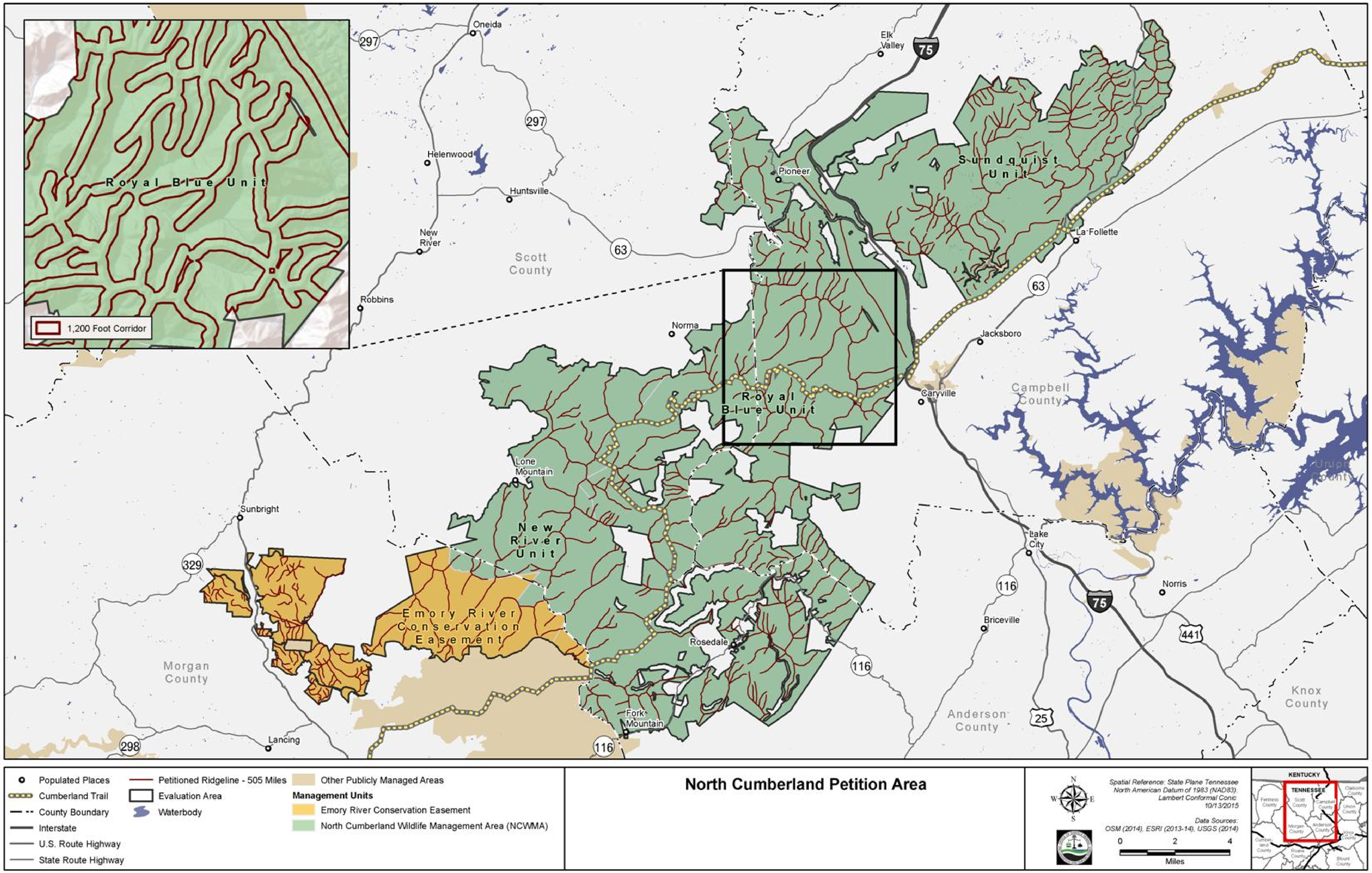


FIGURE 1-1: NORTH CUMBERLAND PETITION AREA

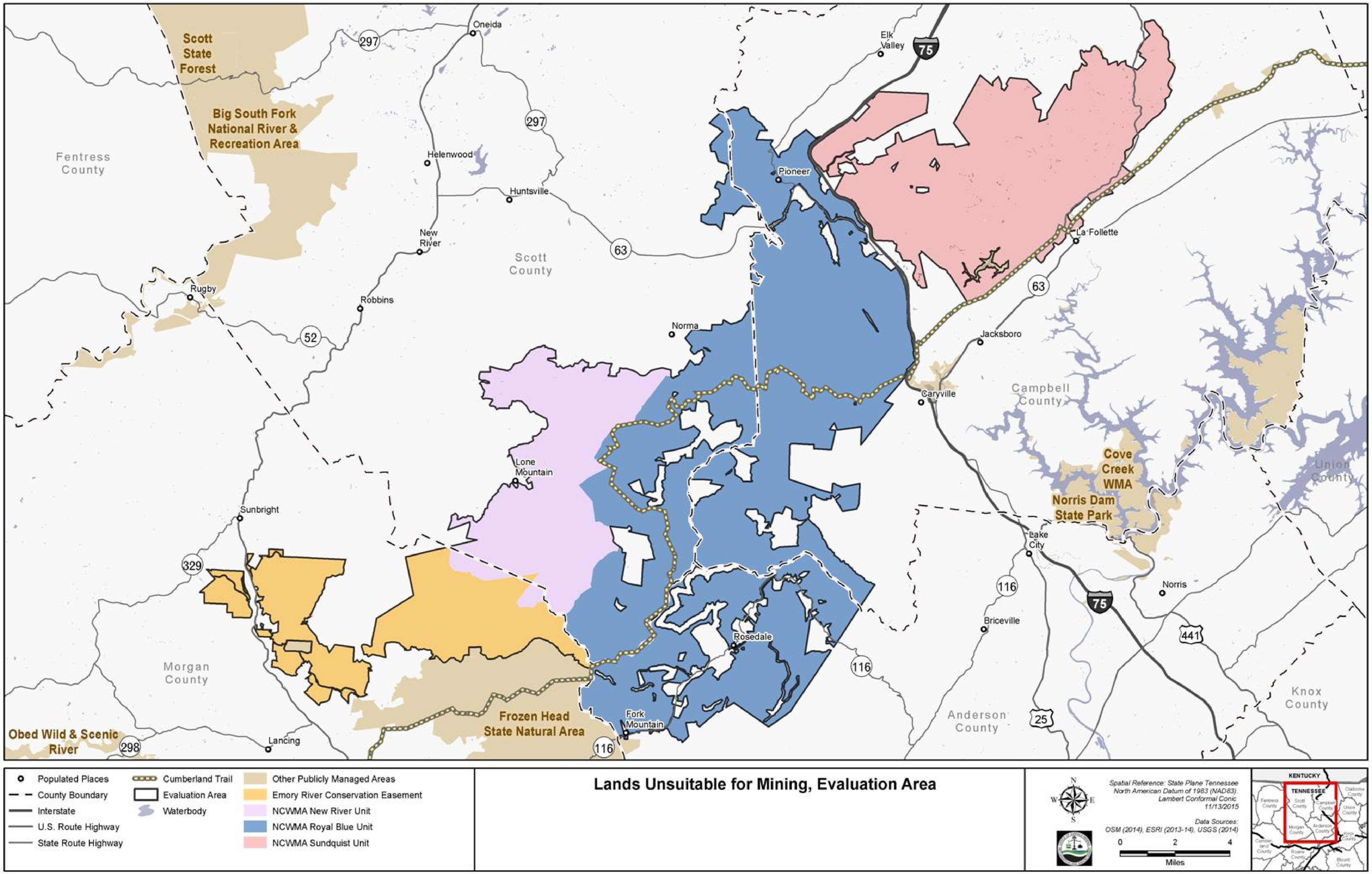


FIGURE 1-2: LAND UNSUITABLE FOR MINING EVALUATION AREA

During the public scoping period, three public scoping meetings were held in Scott, Campbell, and Anderson Counties (in Tennessee) as shown in table 1-1.

TABLE 1-1: PUBLIC SCOPING MEETINGS

Meeting Locations	Date	Speakers	Attendees
Huntsville Middle School	March 8, 2011	17	66
Lafollette Middle School	March 10, 2011	40	164
Oak Ridge Middle School	March 15, 2011	24	81

In all, 311 people attended the meetings, and 81 spoke for the record. In addition to oral comments received at the public meetings, at the close of the comment period on April 14, 2011, the OSMRE had received a total of 25,639 e-mail and 36 other written comment submissions. The text of 25,116 of the e-mail messages was the same. The text focused on threatened and endangered species, air and water quality, public health, recreation and tourism, and socioeconomics, among other topics.

In an effort to become more familiar with the petition area and the concerns and issues of the people most likely to be affected by any decision on the petition, the director of the OSMRE spent three days in the four counties associated with the petition area. From April 26 through 28, 2011, the director toured much of the actual petition area, including various points along the Cumberland Trail as well as both active and reclaimed coal mining operations. During this time, the director met with local citizens, representatives of local environmental organizations and the Tennessee coal mining industry, local and state officials, and representatives of the petitioner and the interveners.

Issues and concerns identified during the public scoping period included those pertaining to acquired property (the amount of property owned by the state compared to conservation easements and surface compared to mineral estates), air quality and visibility, biology, ecology, ecosystem, economics, environmental justice, aesthetics and viewshed, forestland, fragile lands, geology, historic and cultural resources, hydrology, land use, mining and reclamation, mountaintop mining, noise and ground vibration, public health and safety, sedimentology, socioeconomics, soils, streams, drinking water, threatened and endangered species, tourism, wetlands, and wildlife protection. These concerns and other issues were considered during the development of this draft PED/EIS. The scoping summary report is included as appendix A.

ISSUES AND IMPACT TOPICS

This section briefly describes resource impact topics and associated issues carried forward for detailed analysis in this draft PED/EIS and the topics that are not carried forward with a rationale for dismissal. See “Chapter 4: Affected Environment” for a description of each resource impact topic carried forward for detailed analysis.

IMPACT TOPICS ANALYZED IN THIS ENVIRONMENTAL IMPACT STATEMENT

The following issues and resource impact topics were identified based on scoping results and assertions in the State petition document. As discussed above in the “Scope of Evaluation” section, the two unsuitability criteria specified in SMCRA, section 522, being considered in this draft PED/EIS focus on fragile or historic lands, and compatibility of existing federal, state, and local land use plans or programs.

The OSMRE identified a range of issues and impact topics for evaluation in this draft PED/EIS in order to

- determine whether fragile or historic lands exist and to evaluate the importance of these lands;
- assess federal, state, and local land use plans, and assess whether surface coal mining operations would be incompatible with any of those plans; and
- ensure public and agency scoping comments are adequately considered in the development of the draft PED/EIS.

Within the context of the unsuitability criteria identified in the “Scope of Evaluation” section, this draft PED/EIS discusses “fragile lands” within the impact topics of vegetation, fish and wildlife, special-status species, land use and recreation, and aesthetics. “Historic lands” are discussed in the context of aesthetics and cultural resources.

Following is a brief discussion explaining why specific issues and impact topics are carried forward for detailed analysis followed by a separate section on why other issues and impact topics have been dismissed from further consideration in this draft PED/EIS.

Earth Resources (Geology, Topography and Physiographic Setting, Soils)

Surface and underground mining activities can affect the underlying geologic resources of an area, result in changes to the existing topography, and cause an increase in soil erosion. Therefore, making a determination on the LUM petition has the potential to affect earth resources. If all or a portion of the petition area is designated as unsuitable for mining, there could be beneficial impacts on earth resources from a reduction in mining activities in the petition area. In areas where remining and reclamation are allowed, beneficial impacts could result as areas are restored closer to their original topography and state of vegetation coverage. If mining activities within the petition area continue, there would continue to be impacts on geology, topography, and soils from coal extraction and related mining activities. Public scoping also identified geology as an issue of concern. Therefore, the topic of earth resources is carried forward for detailed analysis in this draft PED/EIS. The topic of soils is evaluated with the vegetation topic in “Chapter 6: Environmental Consequences.”

Air Quality and Greenhouse Gases

Congress passed the Clean Air Act in 1970, establishing the national policy for preserving, protecting, and enhancing air quality. Also under the act, Congress mandates the federal land manager to “protect air-quality related values,” including visibility, flora, fauna, surface water, ecosystems, and historic resources from adverse pollution impacts. Impacts on air quality are anticipated to be minor and no changes to regional air quality are expected; however, air quality was identified as an issue of concern during the public scoping process. Air quality is therefore carried forward for detailed analysis in this draft PED/EIS.

On a national scale, federal agencies are addressing emissions of greenhouse gases by reductions mandated in federal laws and executive orders. Therefore, the potential contribution of the alternatives to greenhouse gas emissions will be evaluated. Climate change and the effects climate change could have on potentially affected resources are also discussed.

Water Resources

For the purpose of this draft PED/EIS, the analysis of water resources includes groundwater, surface water, wetlands, and floodplains.

Groundwater (Quantity and Quality): Mining and mining-related activities have the potential to affect groundwater resources by altering groundwater flow patterns and removing small perched aquifers and shallow stress-relief fracture systems, which can affect groundwater recharge and groundwater flow. Mining and mining-related activities may also have an effect on the chemistry of groundwater resources. Setting aside lands as unsuitable for mining would result in either no impacts or beneficial impacts on groundwater. Therefore, making a determination on the LUM petition has the potential to result in beneficial and adverse impacts on groundwater resources, depending on whether mining activities would take place within the petition area. Issues pertaining to groundwater and subsurface hydrology were identified as areas of potential concern during the public scoping process. Therefore, groundwater is carried forward for detailed analysis in this draft PED/EIS.

Surface Water (Quantity and Quality): Numerous streams and tributaries within and draining from the NCWMA and the ERTCE provide scenic value and provide habitat for a variety of aquatic and terrestrial species. The public scoping process identified numerous concerns about the potential impacts of mining and mining-related activities on water quality, particularly from sedimentation and contaminants entering the watershed. The public scoping process also identified concerns about the potential downstream impacts on watersheds containing critical habitat for protected species. In addition, failure to conduct remining of pre-SMCRA mine sites and its associated reclamation would continue to have adverse impacts on surface water quality, especially related to acid mine drainage. Making a determination on the LUM petition has the potential to result in beneficial or adverse impacts on surface water, depending on the mining activities that would be allowed. Therefore, surface water is considered for detailed analysis in this draft PED/EIS.

Wetlands: Federal activities must comply with Executive Order 11990, "Protection of Wetlands." The purpose of Executive Order 11990 is to "minimize the destruction, loss or degradation of wetlands and to preserve and enhance the natural and beneficial values of wetlands." To meet these objectives, the order requires federal agencies, in planning their actions, to consider alternatives to wetland sites and limit potential damage if an activity affecting a wetland cannot be avoided. Wetlands occur within the petition area vicinity, although not along any of the ridgelines. Based on the National Wetlands Inventory, there are approximately 2,700 acres of wetlands in the NCWMA and the ERTCE and some of the wetland areas are considered environmentally sensitive. Environmentally sensitive wetlands are those that provide functions and benefits that would be difficult or impossible to replace or recreate. Wetlands are considered environmentally sensitive if they provide habitat for rare species or rare natural communities (plant and animal species assemblages), or contain other irreplaceable or irretrievable ecological features such as vernal pools, extensive sphagnum mats, mature forests, springs and seeps, caves, sinkholes, cliffs, waterfalls, headwaters, perched water tables, or slope wetlands, among other characteristics.

Environmentally sensitive wetlands are located in the Koppers Coal Reserve, which is part of the Royal Blue Unit that is entirely included in the lands from which petition area ridgelines were selected. Within the coal reserve, the highest concentrations of sensitive wetlands are found east of Interstate 75, particularly in the Meadow Creek, Stinking Creek, and Ollis Creek watersheds. Designating all or a portion of the petition area ridgelines as unsuitable for mining would result in potential beneficial impacts on wetlands, due to a reduction in potential runoff associated with mining activities. Allowing surface mining operations may affect wetlands through runoff and habitat loss if mining is allowed in these areas. Therefore, the topic of wetlands is carried forward for detailed analysis in this draft PED/EIS.

Vegetation

The proposed petition area primarily includes forests and grasslands, with smaller amounts of woody wetlands and scrub shrub. Plant types include vascular plants, mosses, and woody plants such as trees and shrubs. Designating all or a portion of the petition area as unsuitable for mining would result in beneficial impacts on vegetation because mining activities would no longer be allowed along the ridgeline corridors, thus allowing vegetation to regenerate in these areas. In areas where remining and reclamation are allowed, vegetation may be affected in a beneficial manner over time as the areas are restored closer to their original condition. If surface mining were to continue within the proposed petition area, vegetation would be adversely affected due to removal from coal mining activities, which would increase the loss of vegetation and result in the potential for increased fragmentation. Therefore, vegetation is carried forward for detailed analysis in this draft PED/EIS.

Fish and Wildlife (Aquatic and Terrestrial Species, Including Migratory Birds)

Fish and wildlife, including aquatic and terrestrial species, have the potential to be affected by making a determination on the LUM petition. Designating all or a portion of the petition area as unsuitable for mining would result in beneficial impacts on fish and wildlife due to less habitat disturbance. There would be fewer impacts on aquatic species within the NCWMA and the ERTCE from a reduction in ground disturbing activities within the ridgetop areas that result in increased erosion and potential sedimentation of streams. Mining and mining-related activities could result in increased habitat loss and disturbance, increased erosion, and local noise-generating activities that would affect fish and wildlife. Wildlife protection was identified as a potential issue of concern during the public scoping process. In addition, failure to conduct remining of pre-SMCRA mine sites and its associated reclamation would continue to have adverse impacts on fish and wildlife habitat, especially related to acid mine drainage. Therefore, the fish and wildlife topic is carried forward for detailed analysis in this draft PED/EIS.

Special-Status Species

The NCWMA and the ERTCE are home to numerous special-status species such as the golden winged warbler, blackside dace, and long-eared bat, and areas downstream contain critical habitat for the spotfin chub. The Tennessee Cumberland Mountains are an important breeding area for migratory birds such as the cerulean warbler. Designating lands as unsuitable for mining would result in less habitat modification or removal, less potential for erosion, and less impact on surface water resources, resulting in beneficial impacts on special-status species residing in and around the proposed petition area. Conversely, mining and mining-related activities within the proposed petition area may result in adverse impacts on special-status species from habitat loss and fragmentation, increased erosion, and potential contamination of surface waters. In addition, failure to conduct remining of pre-SMCRA mine sites and its associated reclamation would continue to have adverse impacts on special-status species and their habitat, especially related to acid mine drainage. The topic of special-status species was identified as an area of concern during the public scoping process. Therefore, the special-status species topic is carried forward for detailed analysis in this draft PED/EIS.

Land Use

Current primary land uses in the petition area include recreation, logging, oil and gas, mining, and undeveloped areas. In its petition, the State of Tennessee alleges that the petition area should be designated unsuitable for surface coal mining operations because mining in the area would be incompatible with existing state or local land use plans or programs within the meaning of 30 USC § 1272(a)(3)(A), including the State’s “Connecting the Cumberlands” initiative and Tennessee’s Comprehensive Wildlife Conservation Strategy, the management plan for the Royal Blue Wildlife Management Area, the management plan for the Sundquist Unit, and the Tennessee state recreation plan. Land use and recreation have the potential to be affected by making a determination on the LUM petition. If mining activities continue and new permits are issued, additional undeveloped land would be converted to mined areas. Conversely, if lands are designated unsuitable for mining, there may be greater opportunities to maintain the areas as undeveloped or use the lands for other purposes, which may result in an increase in recreation and tourism. Land use, tourism, and recreation were all identified as topics of interest during the public scoping process. The land use, including recreation, is therefore carried forward for detailed analysis in this draft PED/EIS.

Aesthetics (including Visual Resources and Soundscapes)

Making a determination on the LUM petition has the potential to affect visual resources and soundscapes within the petition area. If the OSMRE designated all or a portion of the proposed petition area as unsuitable for mining, there would be beneficial impacts on visual resources and the soundscape environment, because fewer mining activities would be conducted in the NCWMA and the ERTCE. The visual environment of the petition area typifies the eastern Cumberland Mountains with rolling mountains, ridges, and scenic vantage points. Beneficial impacts on the visual environment would result from fewer surface mining operations and the results of reclamation activities over time in areas where remining and reclamation would be allowed. In areas that are reclaimed, restoring the topography and vegetation to a state similar to prior conditions would improve the overall aesthetics of the locations where prior mining activities occurred.

Noise from coal mining activities generally originates from active coal preparation facilities, blasting, additional traffic from coal trucks and heavy equipment associated with active mining, coal removal, and other activities. These activities can affect background noise levels while the activities are occurring. Designating lands as unsuitable for mining would result in fewer noise-generating activities from mining in the petition area. Due to the potential impacts on visual resources and soundscapes, aesthetics is carried forward for detailed analysis in this draft PED/EIS.

Socioeconomics and Environmental Justice

In the context of this draft PED/EIS, the socioeconomics and environmental justice impact topic includes the following: demographics, employment and income, and tax revenue; mining; recreation; logging; oil and gas; and environmental justice. Each of the four counties within the petition area is included as part of the federally designated Appalachian Region. In determining this designation, the 1965 Appalachian Regional Development Act noted (40 USC § 143) that “Congress finds and declares that the Appalachian region of the United States, while abundant in natural resources and rich in potential, lags behind the rest of the Nation in its economic growth and that its people have not shared properly in the Nation’s prosperity. The region’s uneven past development, with its historical reliance on a few basic industries and a marginal agriculture, has failed to provide the economic base that is a vital prerequisite for vigorous, self-sustaining growth.” Making a determination on the LUM petition has the potential to result in socioeconomic effects within the proposed petition area and socioeconomics and environmental justice were identified as potential concerns during the public scoping process. Therefore, the topic of socioeconomics and environmental justice is carried forward for detailed analysis in this draft PED/EIS.

Cultural Resources (Archaeological, Historic, Ethnographic Resources)

Cultural resources include archaeological resources, historic structures and districts, cultural landscapes, ethnographic resources (sometimes referred to as traditional cultural properties), and museum objects. Only archaeological resources, historic structures and districts, and ethnographic resources are carried forward for analysis in this document. Although there has been little archaeological or architectural investigation of the petition area, studies in nearby areas indicate that there is the potential for these resources to be present and that further investigation may be required. Seven federally recognized Tribes may have an interest in the proposed petition area, and the OSMRE is consulting with these seven Tribes. Therefore, the cultural resources topic is carried forward for detailed analysis in this draft PED/EIS.

Public Health and Safety

Mining operations and reclamation activities can present potential public health and safety concerns from hazards such as open pits, coal processing and extraction, and highwalls. The petition area is frequented by recreational users that may come into contact with potential hazards associated with mining activities. Making a determination on the LUM petition has the potential to increase or decrease potential public health and safety hazards in the petition area; therefore, this resource is carried forward for detailed analysis in this draft PED/EIS.

IMPACT TOPICS DISMISSED FROM FULL ANALYSIS

The following issues were reviewed and subsequently eliminated from further discussion because the proposed action would cause few changes, if any, to these resources.

Prime and Unique Farmlands

The Farmland Protection Policy Act was passed to minimize the amount of land irreversibly converted from farmland due to federal actions. Prime farmland, as defined by the US Department of Agriculture, Natural Resources Conservation Service, is land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops and is available for these uses. It could be cultivated land, pastureland, forestland, or other land, but it is not urban or built-up land or water areas. The petition area contains nine soil groups identified as prime farmland soils; however, these soils are not in agricultural production. The alternatives considered in this draft PED/EIS would not involve the conversion of areas of prime farmland soils to a new use. Therefore, this topic was dismissed from further analysis in this draft PED/EIS.

Transportation and Traffic

Traffic is defined as the movement of people or vehicles through a transportation system. The amount of people or vehicles moving through a transportation system has an effect on the amount of time spent traveling from one point to another. Making a determination on whether to designate lands as unsuitable for mining in the proposed petition area would have no impact or only negligible impacts on the public roadway system within the petition area. The number of trucks hauling coal could change depending on the level of mining that would occur. However, the impacts to transportation would likely be lower from the alternatives being considered compared to the no-action alternative. Therefore, this resource was dismissed from detailed analysis in this draft PED/EIS.

Community Facilities (Schools, Hospitals, Fire and Rescue)

Community facilities include service facilities such as schools, hospitals, and fire and rescue. These facilities do not exist within the proposed petition area and would not be affected by making a determination on the LUM petition. Therefore, this resource was dismissed from detailed analysis in this draft PED/EIS.

Floodplains

Federal activities within floodplains must comply with Executive Order 11988, “Floodplain Management.” Per Executive Order 11988, federal agencies are required to avoid adverse effects associated with the occupancy and modification of floodplains to the extent possible, thereby minimizing flood risk and risks to human safety. Because there are no floodplains within the mountain ridgetops within the petition area, and all mining would occur closer to the mountain ridgetops, there would be little disturbance that would affect the floodplains. Impacts would not be significant, and therefore, this resource was dismissed from detailed analysis.

Wilderness Areas

There are no designated wilderness areas or areas that qualify for the wilderness preservation system within the petition area. Therefore, this resource was dismissed from further analysis in this draft PED/EIS.

National Natural Landmarks

There are no national natural landmarks within the petition area; therefore, this resource was not carried forward for detailed analysis in this draft PED/EIS.

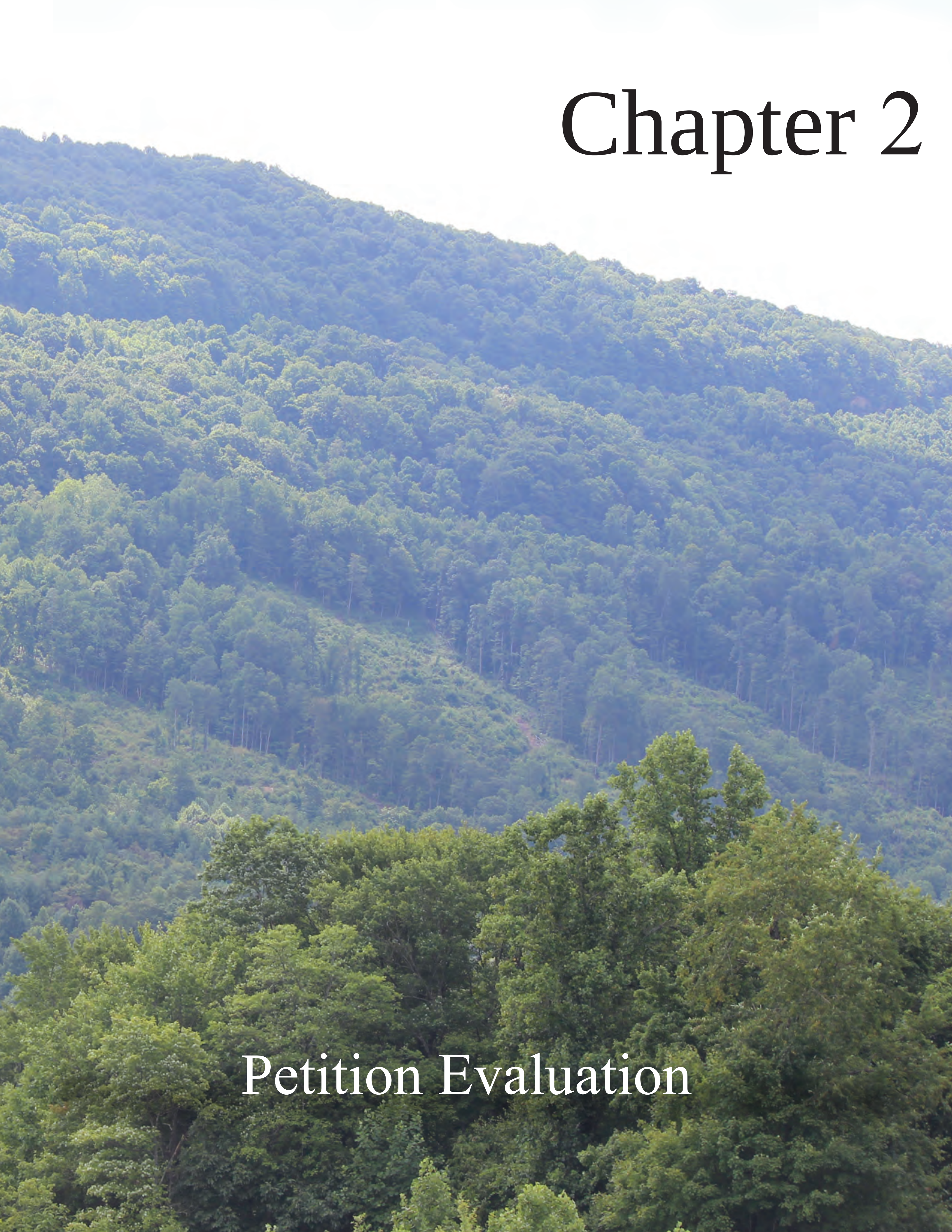
Sole or Principal Drinking Water Aquifers

The EPA defines a sole or principal source aquifer as an aquifer that supplies at least 50% of the drinking water consumed in the area overlying the aquifer. These areas may have no alternative drinking water sources that could physically, legally, and economically supply all those who depend on the aquifer for drinking water. There are no designated sole or principal drinking water aquifers in Tennessee; therefore, this resource was dismissed from further analysis in this draft PED/EIS (EPA 2015c).

National Monuments

There are no national monuments within the petition area; therefore, this resource was dismissed from further analysis in this draft PED/EIS.

Chapter 2



Petition Evaluation

CHAPTER 2: PETITION EVALUATION

INTRODUCTION

On September 30, 2010, pursuant to the Surface Mining Control and Reclamation Act, (30 USC § 1272(c)) (SMCRA), the State of Tennessee filed a petition to designate certain lands as unsuitable for surface coal mining operations (appendix B). In accordance with its responsibility for administering the federal program in Tennessee, the Office of Surface Mining and Reclamation and Enforcement (OSMRE) must process and make decisions on all petitions to designate areas in the state as unsuitable for surface coal mining operations.

In this chapter, the OSMRE addresses the petition by the State of Tennessee to designate portions of the North Cumberland Wildlife Management Area (NCWMA) and Emory River Tracts Conservation Easement (ERTCE) in Anderson, Campbell, Morgan, and Scott Counties as unsuitable for surface coal mining operations.

This chapter includes the following:

- regulatory background for the petition
- the unsuitability criteria specified in SMCRA section 522 (30 USC § 1272 (a)(3)) and the requirements for evaluating the petitioner's allegations
- the petitioner's allegations
- the intervenors' responses to each allegation
- an analysis of the petitioner's allegations
- the OSMRE conclusions with respect to the petitioner's allegations and intervenors' responses

REGULATORY BACKGROUND

PURPOSES OF THE SURFACE MINING CONTROL AND RECLAMATION ACT OF 1977

Congress passed SMCRA in 1977 to "establish a nationwide program to protect society and the environment from the adverse effects of surface coal mining operations" (SMCRA 102(a), 30 USC § 1202(a)). SMCRA balances this goal with the goal of "assur[ing] that the coal supply [meets] the Nation's energy requirements" (30 USC § 1202(f)).

To achieve these purposes, SMCRA establishes a program of cooperative federalism that allows the states to enact and administer their own regulatory programs within limits established by federal minimum standards and with backup authority exercised by the OSMRE. Primacy status under SMCRA affords the state "exclusive jurisdiction to regulate surface coal mining within its borders" 30 USC § 1252(e). However, if a state has not assumed primacy status, SMCRA gives the OSMRE exclusive regulatory authority over surface mining and reclamation (30 USC § 1254). The State of Tennessee has not assumed primacy status under SMCRA, therefore the OSMRE is the exclusive regulatory authority for surface mining and reclamation in Tennessee.

ABILITY TO PETITION

Section 522(c) of SMCRA allows "any person having an interest which is or may be adversely affected … to petition the regulatory authority to have an area designated as unsuitable for surface coal mining operations, or to have such a designation terminated" (30 USC § 1272(c)). The petition process is the chief process by which the OSMRE reviews lands to assess whether there are areas unsuitable for all or certain types of surface coal mining operations under section 522(b) of SMCRA.

The regulatory authority, the OSMRE in this case, may designate an area unsuitable for certain types of surface coal mining operations (30 USC § 1272 (a)(2)). The unsuitability designation would limit new permits, but not existing permits—the OSMRE cannot designate as unsuitable for surface coal mining operations lands that are covered by a permit issued under SMCRA (30 USC § 1256 (c)).

DESCRIPTION OF UNSUITABILITY CRITERIA

The intent of SMCRA section 522 is to provide a higher degree of protection to specific public and environmental values from surface coal mining operations where it is determined that these values could be compromised.

Even when operators fully comply with SMCRA, its implementing regulations, and other applicable laws and regulations, coal mining operations may have significant adverse impacts on streams, fish, and wildlife. Those impacts include loss of headwater streams, long-term degradation of water quality in streams downstream of a mine, displacement of pollution-sensitive species of fish and insects by pollution-tolerant species, fragmentation of large blocks of mature hardwood forests, replacement of native species by highly competitive nonnative species that inhibit reestablishment of native plant communities, and compaction and improper construction of postmining soils that result in a reduction of site productivity and adverse impacts on watershed hydrology.

In order to protect valuable lands from these impacts, Congress expressly prohibited and limited surface coal mining operations, with certain exceptions, within specific areas such as national parks, national wildlife refuges and wilderness areas, and other areas (30 USC § 1272 (e)).

Congress also created a process through which regulatory authorities could designate lands unsuitable for mining (LUM). In providing for this process, Congress recognized that "[w]hile coal surface mining may be an important and productive use of land, it also involves certain hazards and is but one of many alternative land uses. In some circumstances, therefore, coal surface mining should give away to competing uses of higher benefit" (H.R. Rep. No. 95-218, at 94 (1977)). The unsuitability process gives regulatory authorities the ability to designate certain lands unsuitable for mining when the significance or value of these areas outweighs the benefits derived from mining.

Under SMCRA section 522(a)(3), OSMRE, as the regulatory agency in Tennessee, has the discretion to designate an area as unsuitable for all or for certain types of surface coal mining operations if such operations would

1. be incompatible with existing state or local land use plans or programs (30 USC § 1272(a)(3)(A));
2. affect fragile or historic lands in which such operations could result in significant damage to important historic, cultural, scientific, and aesthetic values and natural systems (30 USC § 1272(a)(3)(B));

3. possibly result in a substantial loss or reduction of long-range productivity of water supply or of food or fiber products in renewable resource lands, including lands on which aquifers or aquifer recharge areas are found (30 USC § 1272(a)(3)(C)); or
4. possibly endanger life and property substantially on natural hazard lands, including areas subject to frequent flooding and areas of unstable geology (30 USC § 1272(a)(3)(D)).

PETITION

As stated above, on September 30, 2010, the State of Tennessee filed a petition with the OSMRE to designate portions of the NCWMA and ERTCE in Anderson, Campbell, Morgan, and Scott Counties as unsuitable for surface coal mining operations. Specifically the State petitioned that the area within 600 feet of all ridgelines lying within the NCWMA—comprised of the Royal Blue Wildlife Management Area, the Sundquist Wildlife Management Area, and the New River Wildlife Management Area (also known as the Brimstone Tract Conservation Easement)—and alleged that the ERTCE should be declared unsuitable for surface coal mining operations under criteria 1 and 2 as described above.

In accordance with its responsibility for administering the federal program for Tennessee, the OSMRE must determine whether the petition is complete (30 CFR § 764.15). If so, then the OSMRE must process, evaluate, and make a decision on the petition itself (30 CFR §§ 764.15-764.19). The OSMRE must also determine whether a coal resource exists in the area covered by the petition (30 USC § 1272(d); 30 CFR § 764.15(a)(2)). The OSMRE Directive OPM-5 identifies the Director of the OSMRE as the official responsible for making decisions on lands unsuitable for surface coal mining operations in the State of Tennessee.

In response to the review of the petition by the OSMRE, the State, by letter dated November 5, 2010, amended the petition by submitting various documents referenced in the petition. On November 23, 2010, the OSMRE determined the petition to be complete and initiated evaluation of the petition allegations. Opposing intervenors assert that the petition is incomplete in that it fails to meet the requirements of SMCRA (30 CFR § 764.13). However, the OSMRE has determined that the petition meets the minimum requirements set forth by the regulations and reconsideration is outside the scope of the current process. The OSMRE assembled an interdisciplinary team to evaluate existing information, collect new information, and review the technical studies needed to process the petition.

Petition Area

The State of Tennessee has petitioned the OSMRE to designate as unsuitable for surface coal mining operations 505 miles of ridgelines with a 1,200-foot corridor (600 feet on both sides of the ridgetop). The proposed area covers approximately 67,326 acres. Permitted mines would be excluded from this acreage pursuant to SMCRA section 522 (a)(6) (30 USC § 1272(a)(6)). As submitted by the State, the petition area encompasses much of the ridgeline areas found within the NCWMA and ERTCE. The North Cumberland petition area begins approximately 3 miles north of Wartburg, Tennessee, and extends 40 miles to the northeast ending some 8 miles north-northeast of LaFollette, Tennessee. The petition area lies in a rural area of northeast Tennessee dominated by mountains and valleys (figure 2-1).

Parties to the Petition

As allowed under SMCRA section 522, “any person having an interest which is or may be adversely affected shall have their right to petition the regulatory authority to have an area designated as unsuitable for surface coal mining operations, or to have such a designation terminated” (30 USC § 1254(c)). The

State of Tennessee is the petitioner in this case. In petitioning the OSMRE to designate lands unsuitable for surface coal mining operations, the petitioner is required under 30 CFR § 764.13(b)(1)(v) to

1. provide allegations of fact and supporting evidence which cover the entire petition area, and which tend to establish that the area is unsuitable for all or certain types of surface coal mining operations pursuant to the specific criteria of SMCRA section 522(a)(2) and (a)(3), assuming that contemporary mining practices required under the regulatory program will be followed; and
2. provide allegations of fact that are specific as to the portions of the petition area and petitioner's interests to which the allegation applies and that are supported by evidence that tends to establish the validity of the allegations for the portion of the petition area.

In addition, 30 CFR § 764.15(c) provides that "any person may intervene in the proceeding by filing allegations of facts describing how the designation determination directly affects the intervenor … [and] supporting evidence." A number of parties have formally intervened in the petition process. The following parties support the petition:

- The National Parks Conservation Association
- The National Audubon Society, Warioto Chapter
- The Tennessee Ornithological Society
- The Tennessee Environmental Council
- The Natural Resources Defense Council
- Defenders of Wildlife
- The Sierra Club

The following parties oppose the petition:

- The National Mining Association
- The Tennessee Mining Association
- Campbell County
- National Coal, LLC

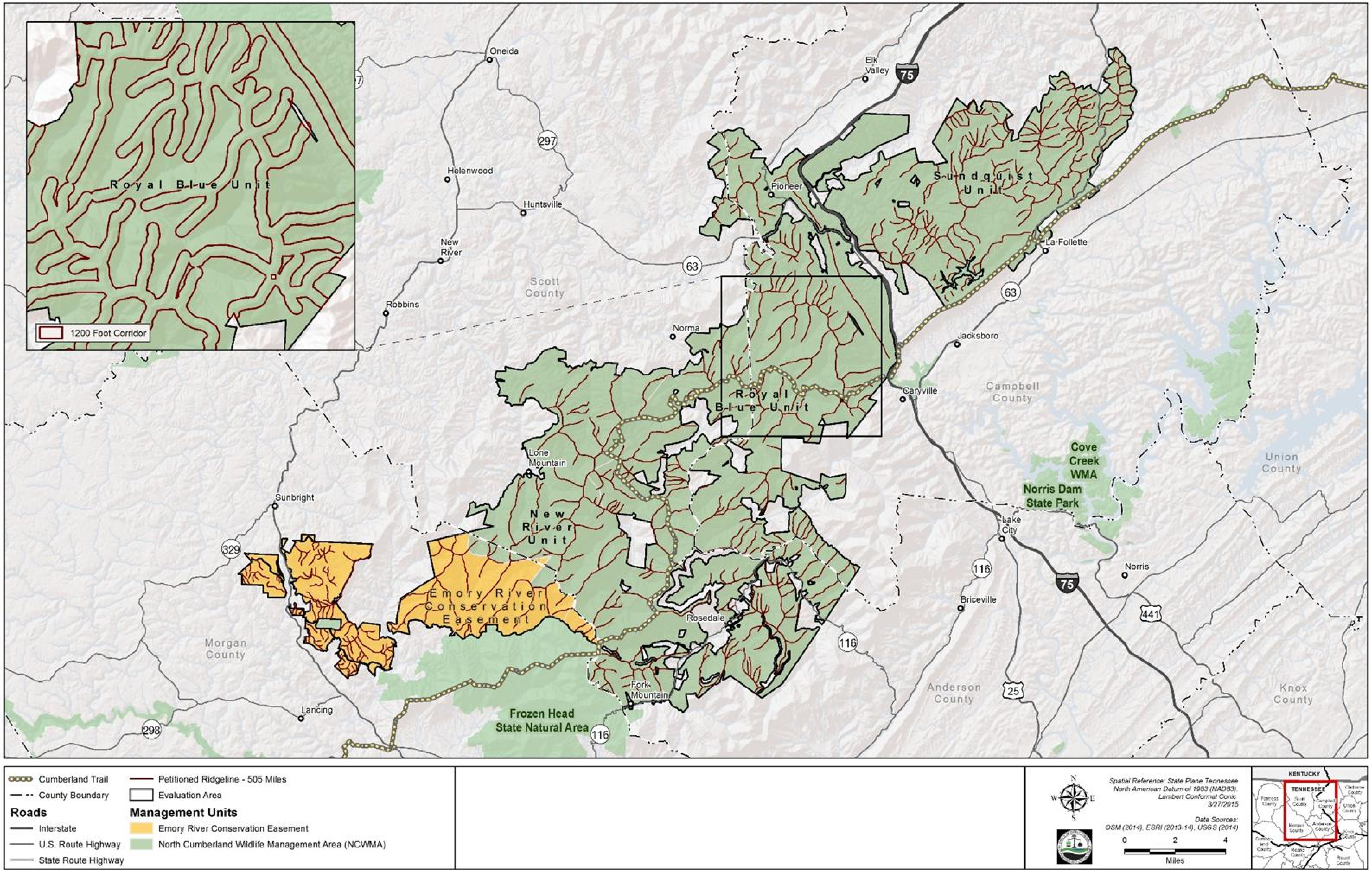


FIGURE 2-1: STATE PETITION AREA

OSMRE DESCRIPTION OF THE EVALUATION PROCESS

The OSMRE is responsible for evaluating the merits of the petitioner's allegations and determining whether the petition area is entirely or partially eligible for designation as unsuitable for surface coal mining operations based on the criteria in section 522(a)(3) of SMCRA (30 USC § 1272 (a)(3)) and 30 CFR § 764.13 (ii)-(iv). Under the above-mentioned discretionary criteria invoked by the State, the OSMRE must determine if the record supports a determination that surface coal mining operations would be incompatible with existing state or local land use plans or programs, or whether or not there are fragile or historic lands present, and if so, whether surface coal mining operations in the petition area would affect such lands.

The OSMRE reviewed the petition allegations in accordance with SMCRA section 522 and 30 CFR § 764, which specifies the process by which the OSMRE determines whether or not to prohibit or limit all or certain types of surface coal mining operations.

This chapter includes the OSMRE evaluation of the petitioner's allegations, based on the available information, and a determination relative to each of the petitioner's allegations. Under 30 CFR § 764.19, the OSMRE must use the following information to make a decision:

1. The [surface mining and reclamation] information contained in the [OSMRE permit] database and inventory system;
2. Information provided by other governmental agencies;
3. A detailed statement prepared under 30 CFR § 764.17(e) on the potential coal resources of the area, the demand for coal resources, and the impact of a designation on the environment, economy , and the supply of coal; and
4. Any other relevant information submitted during the comment period (30 CFR § 764.19 – Decision).

ANALYSIS OF THE ALLEGATIONS

The unsuitability criteria specified in section 522(a)(3)(A) and (B) of SMCRA and 30 CFR §§ 762.ll (b)(1) and (2) are the base of the North Cumberland petition. The petitioner made several allegations of fact and provided supporting statements under each primary allegation. In reviewing the petition, the OSMRE concluded there were allegations of fact and supporting statements that were to some extent redundant or so similar in nature such that some restructuring was necessary to minimize redundancy of analysis and provide a more logical flow to the document.

The North Cumberland petition includes two primary allegations with numerous allegations of fact and supporting statements.

- In primary allegation (1), the petitioner contends that the petition area should be designated unsuitable for surface coal mining operations because mining in the area would be incompatible with existing state or local land use plans or programs.
- In primary allegation (2), the petitioner contends that the OSMRE should designate the petition area as unsuitable for surface coal mining operations because such operations would affect fragile or historic lands, resulting in significant damage to important historic, cultural, scientific, and aesthetic values and natural systems.

Fragile and historic lands are defined by regulations. Fragile lands are those “areas containing natural, ecologic, scientific, or esthetic resources that could be significantly damaged by surface coal mining operations” (30 CFR § 762.10). “Examples of fragile lands include valuable habitats for fish or wildlife, critical habitats for endangered or threatened species of animals or plants, uncommon geologic formations, paleontological sites, national natural landmarks, areas where mining may result in flooding, environmental corridors containing a concentration of ecologic and esthetic features, and areas of recreational value due to high environmental quality.”

Historic lands are those “areas containing historic, cultural, or scientific resources” (30 CFR § 762.10). “Examples of historic lands include archeological sites, properties listed on or eligible for listing on a state register or the National Register of Historic Places, national historic landmarks, properties having religious or cultural significance to Native Americans or religious groups, and properties for which historic designation is pending.”

If surface coal mining operations “affect fragile or historic lands in which the operations could result in significant damage to important historic, cultural, scientific, or esthetic values or natural systems” (30 CFR § 762.11(b)(2)), the OSMRE may designate an area as unsuitable for mining. For the purposes of evaluating the petitioner’s fragile and historic lands allegations, the OSMRE focused on whether those types of lands exist in or near the petition area and whether or not they could be significantly damaged as a result of surface coal mining operations in the petition area. “Chapter 6: Environmental Consequences” provides a more focused, resource-specific analysis—as required by the National Environmental Policy Act (42 USC § 4321-4370(h)) (NEPA)—to describe the degree or intensity of the impacts that could occur as a result of surface coal mining.

This chapter contains the OSMRE analyses of the two primary allegations in the order listed above. In each of the two following sections, the OSMRE summarizes one of the primary allegations and allegations of fact in support of that primary allegation. It then summarizes intervenors’ responses to both the primary allegation and the supporting allegations of fact. Finally, each subsection concludes with the OSMRE analysis of the allegation and its assessment of the supporting facts. As previously indicated, because some of the allegations and supporting statements are similar, restructuring and regrouping of the statements helped minimize redundancy in the analyses and provide a more logical flow to this document.

INCOMPATIBLE WITH EXISTING STATE AND LOCAL LAND USE PLANS AND PROGRAMS

PETITIONER’S ALLEGATIONS: PRIMARY ALLEGATION (1)

Allegation 1 is that the petition area should be designated unsuitable for surface coal mining operations because mining in the area would be incompatible with existing state or local land use plans or programs.

ALLEGATION OF FACT (1)

The petitioner alleges that surface mining in the petition area would be incompatible with the state’s conservation plan for this area as reflected in the 2007 “Connecting the Cumberlands” conservation project. The petitioner submitted a number of statements in support of this allegation of fact as follows.

Supporting Statements – Allegation of Fact (1)

1. The petitioner states that the purpose and vision of the “Connecting the Cumberlands” conservation project is to ensure the integrity and protection of public lands on a landscape scale

by preserving large blocks of land to avoid landscape fragmentation. The petitioner contends that surface mining and the associated clearcutting that precedes such mining directly damages wildlife and wildlife habitat within, surrounding, and downstream of mined areas and fragments forests in direct conflict with State goals. The petitioner further contends that these impacts occur even when coal mining is conducted in full compliance with SMCRA.

2. The petitioner states that the "Connecting the Cumberlands" acquisition not only preserves valuable natural lands but also provides long-term support for local economies. The petitioner indicates that the keys to the State's long-term, sustainable economic development plans are preservation of the land's natural and ecological values that attract tourism and management of forest for the permanent provision of valuable products and local jobs. The petitioner further states that, unlike tourism and sustainable forestry, surface mining provides only short-term benefits, siphons the majority of profits out of the area, and leaves local communities with very few, if any, postmining economic opportunities. The petitioner contends that, as surface mining damages the natural and scenic values that attract tourism and destroys forest that would provide a sustainable timber harvest, such mining undermines state plans for sustainable economic development.
3. The petitioner indicates that one of the primary purposes of the conservation easements that are part of the recent property acquisition is to protect the "conservation values" of the land. The petitioner goes on to state that these values include protection of native flora and fauna and the ecological processes that support them; threatened and endangered animal species and other animals; neotropical migrant songbirds; wetland, riparian, and aquatic habitat; and biological diversity. The petitioner concludes that these values would be negatively impacted by surface coal mining.
4. The petitioner states that the "Connecting the Cumberlands" property acquisition advances the State's strategy as set forth in the Tennessee State Recreation Plan and Tennessee 2020, a 10-year plan for creating a recreation development corridor in the Cumberland Plateau. The petitioner further indicates that the State has an interest in promoting recreational uses for Royal Blue and Sundquist Wildlife Management Areas for hunting and wildlife watching. The petitioner concludes that surface mining causes impacts such as damage to scenic resources, noise, dust, and vibration; and that surface mining activities are inconsistent with State goals of creating and enhancing recreational opportunities and protecting the area for public recreation.

Intervenors' Response – Allegation of Fact (1)

Supporting Interveners: The intervenors that support the petition generally reaffirm the allegation and statements of support made by the petitioner. The intervenors provide no new information relevant to this allegation of fact.

Opposing Interveners: The intervenors in opposition to the petition contend that the petition fails to specify how surface mining operations in the petition area would be "incompatible with the conservation goals of Tennessee's 'Connecting the Cumberlands' project." The intervenors further state that the petitioner's admission that "no comprehensive management plan has yet been developed for the new North Cumberland Wildlife Management Area" indicates that "it is quite possible—if not likely—that surface mining operations, and in particular certain reclamation plans developed for specific habitats or that would reclaim abandoned mine lands, could be entirely compatible and consistent with the same goals as the state." The intervenors conclude that the "… petitioner fails to present any basis, facts, or evidence supporting this allegation."

PETITIONER'S ALLEGATIONS: ALLEGATION OF FACT (2)

Allegation of fact (2) is that surface mining in the petition area would be incompatible with state management plans for wildlife management areas. The petitioner submitted a number of statements in support of this allegation of fact as follows.

Supporting Statements – Allegation of Fact (2)

1. The petitioner states that, although a comprehensive management plan for the NCWMA has not yet been developed, the Royal Blue management plan currently provides guidance for a large portion the NCWMA. The list of goals for the wildlife management area in the Royal Blue plan includes providing opportunities for "wildlife enjoyment," "plant and animal restoration," "nonwildlife associated recreation," and protection and management of "threatened and endangered flora and fauna" (TWRA 1992). The petitioner continues by stating that, while the Royal Blue and Sundquist plans include timber harvest, neither plan allows clearcutting on the massive scale associated with surface mining. The petitioner contends that surface mining in the petition area will impair human recreational and wildlife viewing opportunities in the NCWMA and in so doing, conflicts with the NCWMA plans. The petitioner further states that scenic resources of the NCWMA will be degraded by surface mining while noise and dust will further lower the recreational value of the area. The petitioner concludes by stating that the OSMRE acknowledged the impacts of dust and noise on recreational values in the Flat Fork unsuitability petition statement of reasons. In the Flat Fork Watershed petition, petitioners sought to have designated a 5,250-acre parcel in the Flat Fork watershed in Morgan County Tennessee.
2. The petitioner acknowledges that the Royal Blue management plan notes that mining has occurred and is likely to continue into the future. However, the petitioner indicates that the plan makes clear that such mining must be environmentally sound and compatible with the wildlife-centered uses for the NCWMA. The petitioner states that the plan further notes that mining should be limited to situations where it is possible to ensure wildlife habitat and water quality are not adversely impacted. The petitioner concludes that mining in the NCWMA cannot meet these requirements because of its effect on wildlife enjoyment and viewing, scenic resources, and recreational satisfaction.

Intervenors' Response – Allegation of Fact (2)

Supporting Intervenors: The intervenors that support the petition reaffirm the allegation and supporting statements made by the petitioner. The intervenors further contend that inherent impacts of surface mining identified in the "statement of reasons" for the Fall Creek Falls petition evaluation document / environmental impact statement, including elevated total dissolved solids, increased sedimentation, increased alkalinity, and increased pH "…would further impair aquatic habitat within the Wildlife Management Area, contrary to the habitat recovery and watershed restoration goals set forth in the Royal Blue Plan." In the Fall Creek Falls petition, petitioners sought to have approximately 85,500 acres designated as unsuitable for surface coal mining operations. The intervenors contend that, in that petition evaluation, the OSMRE found that "SMCRA provides significant environmental protections from inherent impacts through its permitting requirements and performance standards."

Opposing Intervenors: The intervenors that oppose the petition contend that in the text of the Royal Blue Wildlife Management Area management plan, there are numerous examples of how coal mining and management of the wildlife management area are compatible. The intervenors note that the Royal Blue Wildlife Management Area plan indicates the following:

1. The State of Tennessee intends to work with post-1977 coal leases.
2. The Tennessee Department of Environment & Conservation (TDEC) and Tennessee Wildlife Resources Agency (TWRA) were among the agencies "that would evaluate permits for surface coal mining under criteria set out in the agreement," and these State agencies never indicated that any surface mining operation in the Royal Blue Wildlife Management Area ever failed to meet the criteria the State had established.
3. The TWRA would have a role in the development of mine reclamation plans such that "these mine sites [would] be left with better overall habitat than existed before the coal harvest began."
4. Roads were "to be left in usable states" and "in a manner to separate game population from public activities."

PETITIONER'S ALLEGATIONS: ALLEGATION OF FACT (3)

Allegation of fact (3) is that surface mining in the petition area would be incompatible with state plans for the Cumberland Trail, the Tennessee Greenways and Trails Plan, and the Tennessee state park plans.

Supporting Statements – Allegation of Fact (3)

The petitioner submitted a number of statements in support of this allegation of fact as follows:

1. The petitioner states that continued development and eventual completion of the Cumberland Trail is a priority of the Greenways and Trails advisory committee and that surface mining would frustrate the goals of the greenways and trails plan and the management objectives for Tennessee state parks.
2. The petitioner states that Tennessee law requires that as a state park, the trail will "be preserved in a natural condition so far as may be consistent with its human use and safety, and all improvements shall be of such character as not to lessen its inherent recreational value." The petitioner contends that as surface mining would harm scenic, historic, natural, cultural, and ecological qualities of the area through which the trail passes, these impacts would directly conflict with the mission of the state park to preserve and protect in perpetuity the trail as well as the recreational uses of the NCWMA.

Intervenors' Response – Allegation of Fact (3)

Supporting Interveners: The intervenors that support the petition generally reaffirm the allegation and statements of support made by the petitioner. The intervenors provide no new information relevant to this allegation of fact.

Opposing Interveners: The intervenors in opposition to the petition provide no new information relevant to the petitioner's allegation of fact.

PETITIONER'S ALLEGATIONS: ALLEGATION OF FACT (4)

The petitioner alleges that surface mining in the petition area would be incompatible with Tennessee's Comprehensive Wildlife Conservation Strategy (TWRA 2005), a statewide plan that addresses all activities that could impact state terrestrial, aquatic, and subterranean species. The plan discusses the different habitat areas of the state, identifies activities that would threaten species within these areas, and lists a number of proposed alternatives to address those activities and their related impacts.

In a follow-up letter to the OSMRE, dated September 25, 2015, the petitioner alleges that new surface mining is inconsistent with its 2015 State Wildlife Action Plan (TWRA 2015c).

Supporting Statements – Allegation of Fact (4)

The petitioner states that the primary goal of Tennessee's Comprehensive Wildlife Conservation Strategy is to prevent nongame wildlife from declining to the point of endangerment. To accomplish this, the petitioner indicates that Tennessee's Comprehensive Wildlife Conservation Strategy establishes a process that includes categorizing habitats for state-designated species of greatest conservation need, assessing priority problems for those species and identifying conservation actions that are likely to be most effective in addressing priority problems across the state. The petitioner states that Tennessee's Comprehensive Wildlife Conservation Strategy identifies coal mining as a particularly problematic source of habitat destruction in the Cumberland region which encompasses the petition area. The petitioner contends that continued surface mining in the petition area would be incompatible with several priority conservation actions of Tennessee's Comprehensive Wildlife Conservation Strategy (TWRA 2005).

With respect to the 2015 State Wildlife Action Plan, the petitioner states that "new contour, cross-ridge, or mountain top removal coal mining is incompatible with agency management and restoration goals for the NCWMA." The plan acknowledges that surface coal mining activities "permanently disrupt and degrade the hydrologic and ecologic function of surrounding forests, springs seeps, streams, and riparian zones. These activities also disrupt and degrade the ecological function and connectivity of ridgeline habitat corridors." The petitioner points to an appendix to the 2015 State Wildlife Action Plan which contains a "detailed list of [greatest conservation need (GCN)] species associated with ridgeline areas in the NCWMA and potentially affected by the stresses of surface mining activities in that area." The petitioner specifically points out that green salamanders, Allegheny woodrats, and Indiana and gray bats are found in the ridgeline corridors. The petitioner also states that a "variety of aquatic GCN species, including the emerald darter and the blackside dace," are supported by "the more pristine streams in the area." The petitioner further identifies several greatest conservation needed plant species as "potentially affected by incompatible mining in the NCWMA, including the Ozark bunchflower…Canada lily…and pale corydalis." The petitioner states that the Ozark bunchflower, which is state-listed as endangered, occurs in the Royal Blue Wildlife Management Area. According to the petitioner, this occurrence "represents one of only nine known occurrences in Tennessee."

In the 2015 State Wildlife Action Plan, the petitioner states that remining, when properly done, is not incompatible with its management of the area, as it resolves "outstanding water quality and slope stability problems."

Intervenors' Response – Allegation of Fact (4)

Supporting Intervenors: The intervenors that support the petition generally reaffirm the allegation and statements of support made by the petitioner. The intervenors provide no new information relevant to this allegation of fact.

Opposing Intervenors: The intervenors in opposition to the petition contend that in filing the petition, the state fails to show how surface coal mining operations conducted pursuant to established regulations would negatively impact land uses. To the contrary, the intervenors contend that surface coal mining in the petition area provides an opportunity to improve the area. The intervenors note that reclamation in the petition area is accomplished in cooperation with the TWRA to improve the area for wildlife habitat. The intervenors indicate that the petitioner relies heavily on Tennessee's Comprehensive Wildlife Conservation Strategy (TWRA 2005). The intervenors contend that this TWRA document "makes it a priority to reclaim pre-law mining sites." The intervenors note that pre-SMCRA mine problems such as highwalls are prevalent throughout the petition area and that remining "will be the best, and quite possibly the only opportunity to reclaim the pre-law sites." The intervenors conclude that "surface coal mining in the petition area is not only compatible with the area, it will enhance the habitat through remining and restoration of pre-Surface Mining Control and Reclamation Act sites."

OSMRE ANALYSIS OF PRIMARY ALLEGATION (1)

Primary Allegation (1)

Allegation 1 is that the petition area should be designated unsuitable for surface coal mining operations because mining in the area would be incompatible with existing state or local land use plans or programs (30 CFR § 762.11(b)(1)).

Background

The NCWMA and ERTCE cover an area of approximately 172,000 acres (269 square miles) located in three distinct ecoregions: the Cumberland Plateau, the Cumberland Mountain Thrust Block, and the Dissected Appalachian (EPA 2012b).

Neither SMCRA nor its implementing regulations define "existing state or local land use plans or programs." The Federal Lands Policy Management Act provides some guidance. The Federal Lands Policy Management Act, which was enacted in 1976, one year before SMCRA, called for comprehensive federal plans for the public lands (43 USC § 1712). The Supreme Court has characterized the federal "land use plan" as a "document which generally describes, for a particular area, allowable uses, goals for the land's future condition, and next steps" (*Norton v. S. Utah Wilderness Alliance*, 542 U.S. 55 (2004)). In *Norton*, the court emphasized that "FLPMA [the Federal Lands Policy Management Act] describes land use plans as tools by which 'present and future use is projected" (citing 43 USC § 1701(a)(2)).

The Federal Lands Policy Management Act also requires consideration of "State, local, and tribal plans that are germane in the development of land use plans for public lands" (43 USC § 1712(c)(9)). Federal Lands Policy Management Act regulations mandate consideration of "officially adopted and approved resource related plans," defined as "plans, policies, programs and processes prepared and approved pursuant to and in accordance with authorization provided by Federal, State or local constitutions, legislation, or charters which have the force and effect of State law" (43 CFR § 1601.0-5(j)).

Regulations promulgated by the Council on Environmental Quality also provide guidance. These regulations instruct agencies to consider "[p]ossible conflicts between the proposed action and the objectives of Federal, regional, State, and local (and in the case of a reservation, Indian tribe) land use plans, policies and controls for the area concerned" when analyzing the environmental consequences of a proposed federal action (40 CFR § 1502.16). The Council on Environmental Quality addresses what kind of plans constitute such "plans, policies and controls" in its "Forty Most Asked Questions Concerning CEQ's National Environmental Policy Act Regulations." In this guidance document, the Council on Environmental Quality states, "The term 'land use plans,' includes all types of formally adopted documents for land use planning, zoning and related regulatory requirements. Local general plans are included, even though they are subject to future change. Proposed plans should also be addressed if they have been formally proposed by the appropriate government body in a written form, and are being actively pursued by officials of the jurisdiction."

Using these sources as guidance, for the purposes of this analysis, the OSMRE will consider any officially adopted or formally proposed draft guidance document that describes allowable uses, sets future goals, and projects present and future use of a particular area. In order to be officially adopted, state, or local land use plans or programs should be prepared and approved pursuant to a public decision-making process and in accordance with authorization provided by federal, state, or local constitutions, legislation, or charters which have the force and effect of state law. In order to be formally proposed, a draft plan must be being actively considered for official adoption by officials of the jurisdiction.

The OSMRE was unable to identify any written and adopted (i.e., finalized) comprehensive land use plan or program that provides guidance in managing the NCWMA and the ERTCE as a single management unit. However, there are several statewide plans which impact the petition area.

In 2007, the Tennessee legislature passed the 2007–2008 state budget, which contained funding set aside for the acquisition of lands in the North Cumberland Mountains (Tennessee 2007). As part of this budget, $82 million was set aside for continuing the state initiative to "preserve wilderness acreages for future generations" (Tennessee 2007). This acquisition of lands in the petition area also called the North Cumberlands Conservation Acquisition is typically referred to as the "Connecting the Cumberlands" project.

Other relevant state plans that will be evaluated under this allegation include the 2008 Tennessee Greenways and Trails Plan, Tennessee 2020, Tennessee's Comprehensive Wildlife Conservation Strategy (TWRA 2005), and the Tennessee State Wildlife Action Plan (TWRA 2015c).

There are also two draft plans regarding management activities within the Royal Blue Wildlife Management Area and the Sundquist Wildlife Management Area.

Finally, two conservation easements apply to lands within the NCWMA—the Brimstone Property Conservation Easement and the ERTCE.

Connecting the Cumberlands

The petitioner alleges that surface coal mining operations in the petition area would be incompatible with state plans as articulated in the 2007 "Connecting the Cumberlands" conservation project. The petitioner states that the vision of the "Connecting the Cumberlands" project is to ensure the integrity and protection of public lands on a landscape scale by preserving large blocks of land to avoid landscape fragmentation. Further, the petitioner states that the "Connecting the Cumberlands" project benefits the economy, the tourism sector, recreation, and wildlife habitats.

In 2002, TWRA issued the "Southern Cumberland Mountains, Tennessee: A TWRA Acquisition Priority" (TWRA 2002). Described as a "comprehensive land acquisition and habitat management plan," TWRA intended to address four primary needs: conserve and enhance biodiversity; enhance species restoration efforts; restore fish and wildlife habitat; and provide strategic public access for outdoor recreation, including wildlife viewing, hunting, fishing, and hiking (TWRA 2002). The acquisition goal was to purchase approximately 74,900 acres. This plan and the corresponding initiative were developed in response to changes in the timber industry and the concern that the area would experience the loss of large forest tracts and habitat fragmentation. The plan recognizes that some coal mining occurs in the area, but suggests that “the coal industry is no longer as important economically in the region as in past decades” (TWRA 2002). Although the plan focuses on the protection of habitat, it does not describe how surface coal mining operations would be incompatible with implementation of the acquisition strategy.

In 2007, the State of Tennessee partnered with The Nature Conservancy and two timber companies, Conservation Forestry and Lyme Timber, to successfully complete a massive acquisition, which encompasses contiguous land tracts in Anderson, Campbell, Morgan, and Scott Counties. The State contributed $82 million to the $135 million total investment through a one-time appropriation supported by the General Assembly (Tennessee 2007). Conservation Forestry and Lyme Timber contributed approximately $40 million, and The Nature Conservancy added $13 million. The project, referred to as “Connecting the Cumberlands,” resulted in the protection of new public lands that connect to existing public lands of the Royal Blue Wildlife Management Area, Sundquist Wildlife Management Area, and Frozen Head State Park and Natural Area. The project provides public access rights on approximately 127,000 acres. It is important to note that the petitioner manages only the use of the surface estate for much of this area.

The petitioner states that the “Connecting the Cumberlands” property acquisition advances the state strategy as set forth in Tennessee 2020, a 10-year plan for creating a recreation development corridor in the Cumberland Plateau. Tennessee 2020 documents the most critical needs facing conservation and recreation infrastructure over the next 10 years (TDEC 2009). This plan outlines a number of initiatives, including strategic management of parks, meeting the recreational and informational needs of the public, and conserving vital recreational resources and using them to benefit economic development in rural communities in Tennessee. It does not discuss surface mining; rather, it discusses the need to protect landscapes for recreational purposes. The petitioner does not provide specific evidence to support its assertion that surface mining is incompatible with goals and priorities outlined in Tennessee 2020. OSMRE could not independently find such evidence in the Tennessee 2020 Plan.

The petitioner also fails to provide specific evidence to support its assertion that surface coal mining would conflict with the “Connecting the Cumberlands” conservation project. Instead, the petitioner alleges that surface mining in the petition area would be in conflict with the purpose and vision of the project. As described above, the 2007 state budget clearly describes the acquisition project as the “[c]ontinuation of the state’s on-going effort to preserve wilderness acreage for future generations of Tennesseans” (Tennessee 2007). Both the budget and acquisition project are silent as it relates to surface coal mining operation compatibility. OSMRE was unable to find supporting evidence that mining is inconsistent with the purposes and goals of the acquisition project.

Related to the “Connecting the Cumberlands” land acquisition project and management of the surface estate is a November 1, 2010, easement between the State of Tennessee and National Coal, LLC. OSMRE finds the timing of this easement relevant to the issue of incompatibility with the land acquisition projects.

The lands subject to this easement were part of 85,000 acres that were conveyed in a 1994 asset purchase and sale agreement between Tennessee Mining, Inc., and Champion International Corporation. In the 1994 agreement, Tennessee Mining, Inc., sold the surface estate and reserved the coal mineral estate. These conveyances set the stage for all future conveyances and conservation easements of these 85,000 acres. In 2003, the petitioner acquired 74,900 acres of these surface rights, but it did not acquire the right to the coal mineral estate. These lands became part of the Sundquist Unit of the NCWMA. This agreement is discussed in the Surface Use Plan for the Sundquist Wildlife Management Area.

The easement between National Coal, LLC, and the petitioner acknowledged that National Coal, LLC, owns the coal resources. This easement has several provisions related to the use of the surface rights as well as the coal mineral estate. The easement explicitly states that the surface owner, the petitioner, “will not use the Surface Estate in any manner, including recreation and conservation uses, which would not detrimentally and materially affect the Coal Mineral Owner's rights in the Coal Mineral Estate." The easement further states that the coal mineral owner would not operate in a way that would "detrimentally or materially affect" the surface owner's interests. The easement states that surface coal mining operations conducted in compliance with local, state, and federal requirements would be "deemed to not be detrimentally and materially affecting such Surface Owner's right." On January 14, 2011, the Governor of Tennessee provided a letter to the OSMRE stating that, in granting the easement, the State of Tennessee did not concede that surface mining was compatible with land use plans in the petition area. This letter was mistakenly dated January 14, 2010, but the "date received" stamp indicates that it was actually sent on January 14, 2011. The governor noted, in particular, that the easement expressly reflects that, pursuant to previous agreements, National Coal, LLC, can only mine on 11,250 acres of the 74,900 acres. However, the OSMRE finds that the timing of the granting of this easement—less than a month after the petitioner submitted its petition to the OSMRE—suggests that surface coal mining operations, however small in scale, that are undertaken pursuant to local, state, and federal requirements would not be incompatible with the land acquisition project. See "Chapter 5: Evaluation of Coal Resources" for additional discussion concerning the ability of National Coal, LLC, to mine in the evaluation area.

A Management Plan for the Royal Blue Wildlife Management Area and Surface Use Plan Sundquist Wildlife Management Area

In support of its petition, the State provided the OSMRE copies of two documents: "A Management Plan for the Royal Blue Wildlife Management Area (Draft), April, 1992" and "Surface Use Plan Sundquist Wildlife Management Area." Both documents were unsigned, and the Sundquist document was not dated. These documents were apparently developed by the State of Tennessee after these properties came under its ownership (1991 for Royal Blue and 2003 for Sundquist). The petitioner states that although a comprehensive management plan for the NCWMA has not yet been developed, the Royal Blue management plan currently provides guidance for a large portion of the NCWMA. The Royal Blue Wildlife Management Area consists of 50,000 acres, while the Sundquist Wildlife Management Area consists of approximately 74,900 acres.

The petitioner alleges that surface mining in the petition area would be incompatible with these state management plans. Specifically, petitioner notes that neither the Royal Blue Wildlife Management Plan nor the Surface Use Plan for the Sundquist Wildlife Management Area allows clearcutting on the massive scale associated with surface mining. However, the petitioner does not provide direct evidence to support its assertion that surface mining is incompatible with either the Royal Blue plan or the Sundquist plan.

OSMRE does not consider these draft plans "existing state or local land use plans." Neither plan has been officially adopted. Nor are they being actively considered for official adoption. The Royal Blue plan has been in draft form for 23 years, and the Sundquist plan has been in draft form for as many as 12 years.

Although these two draft plans are not being actively considered for adoption, in an attempt to provide thorough analysis, the OSMRE examined both plans and, for the reasons explained below, it has concluded that surface mining is not incompatible with either of them.

Royal Blue Unit: In its statement of goals, the Royal Blue plan calls for the "the extraction of non-renewable resources and site reclamation [to be] performed in an environmentally sound manner." This suggests that surface mining and timber harvesting can coexist in the wildlife management area. The document states that "ongoing mining operations will be monitored by the OSMRE, TWRA managers and aquatic habitat protection biologists, and [personnel from the] Tennessee Department of Environment and Conservation."

The Royal Blue plan asserts that the Tennessee Valley Authority (TVA) owns the mineral rights on the Royal Blue Wildlife Management Area. The plan states that multiple agencies—the OSMRE, TDEC, TVA, and TWRA—review permits and determine if mining proposals are adequate. The Royal Blue plan states that proposals will “generally be considered adequate if the harvest of coal and the return of the surface of the land back to its original contours are performed by safe and environmentally sound methods.” The plan further states that “the site must not be left in a condition that will cause adverse modification or destruction of any habitats.”

The petitioner acknowledges that the Royal Blue management plan notes mining has occurred and is envisioned to continue into the future. However, the petitioner indicates that the plan makes clear that such mining must be environmentally sound and compatible with the wildlife-centered uses for the wildlife management area. The petitioner states that the plan further notes that mining should be limited to situations where it is possible to ensure wildlife habitat and water quality are not adversely impacted. The petitioner concludes that mining in the NCWMA cannot meet these requirements. As discussed by the intervenors opposed to the petition, it is unclear how the petitioner reached this conclusion. In fact, the Royal Blue plan suggests that mining and reclamation which meet all of the requirements of SMCRA are compatible with the wildlife management goals of the Royal Blue Wildlife Management Area. The plan also allows approval of future surface coal mining operations if proposals are “adequate” as described above. The federal law requires that surface coal mining operations restore lands to the original land use or a higher and better land use, and that mining is performed using safe, environmentally sound methods. Therefore, if a surface coal mine operation is operated in a safe and environmentally sound manner and the site is reclaimed as required by SMCRA and the TWRA-approved reclamation plan, the plan suggests that it would be compatible with the management of the unit.

The petitioner and the intervenors in support of the petition allege that surface mining is incompatible with the Royal Blue Plan goal of maintaining and/or improving water quality. Intervenors note that surface mining can lead to “significant increase in alkalinity, total dissolved solids, [and] pH, re-suspension of iron from previously weathered overburdens or spoils, and generation of manganese.” SMCRA section 515 (30 USC §§ 1265 (b)(9-14)), section 516 (30 USC § 1266), and other sections discuss general environmental protection performance standards applicable to water resources and surface and underground coal mining and reclamation operations. The Clean Water Act and the Tennessee Water Quality Control Act of 1977 (TCA 69-3-101, et seq.) detail water quality standards for waters of the state through the determination or classification of stream uses; setting appropriate water quality criteria needed to maintain those uses; and establishing anti-degradation plans or policies to protect the streams and water bodies from pollution sources. The intervenors do not explain why currently existing regulations and performance standards are not enough to protect water resources in the petition area. This issue is discussed further under allegation 2.

Sundquist Unit: The Surface Use Plan for the Sundquist Wildlife Management Area, in the section titled “Mining Repurchase,” states that under a private agreement with the surface owner (now the State), the owners of the mineral estate have the right to purchase 11,250 acres of surface estate for surface and underground mining. Under this agreement, the right to mine is limited by the right to repurchase.

The plan also suggests that:

> The Tennessee Wildlife Resources Agency should pursue through the State, the ability to license or provide an easement for the needed land for such activities in lieu of outright purchase of the surface rights. A license would allow the TWRA to retain surface rights, while *still allowing the mining interest to pursue their activities* without land purchase taking place [*emphasis added*] (TWRA 1992).

This indicates that mining is not incompatible with the management of the area. If mining was incompatible with the State's management of the area, the State—as surface owner—would not seek to enter into voluntary agreements allowing mining in the area. In fact, the Sundquist plan notes the ability of the State to purchase portions of the mineral estate. The State could thus prevent mining activity from interfering with its management of the area.

The petitioner also asserts that surface mining is incompatible with the Royal Blue plan and the Sundquist plan because "neither plan allows clear-cutting on the massive scale that occurs with surface mining." Neither the Royal Blue plan nor the Sundquist plan makes specific reference to clear-cutting. Rather, both plans require that timber harvest activities adhere to the State of Tennessee forestry best management practices, which outline practices to minimize the environmental impacts of timber harvest but do not prescribe or prohibit specific timber harvest methods. The Sundquist plan further states that timber harvest shall comply with Sustainable Forestry Initiative guidelines, which support clear-cutting where appropriate (SFI 2015). Additionally, the Sundquist plan states the intent of the TWRA to "work with the owners of the timber estate to create wildlife openings on areas of non-timber (strip or deep mines)" (TWRA 1992). The Surface Use Plan for the Sundquist Unit therefore does not appear to indicate that the authors considered surface coal mining to be incompatible with management goals, but rather a component of the different uses in the area.

Conservation Easements

The State holds two conservation easements in the petition area: the New River Wildlife Management Area (also known as the Brimstone Tract Conservation Easement) and the ERTCE. Fund 7 Domestic, LLC (as the grantor) and the State of Tennessee (as the grantee) entered into the Sustainable Forestry Conservation Easement for the Brimstone Property. The Nature Conservancy (as the grantor) and the State of Tennessee (as the grantee) entered into a conservation easement for the 18,800-acre Emory River tract. Both easements were acquired in 2007 in association with the "Connecting the Cumberlands" initiative. The petitioner argues that the primary purpose of these easements was to "protect the land's Conservation Values" and that mining conflicts with this purpose.

The Tennessee definition of a conservation easement is

> a nonpossessory interest of a holder in real property imposing limitations or affirmative obligations on the owner of the servient estate, the owner's heirs, and assigns with respect to the use and management of the servient land, structures or features thereon, and/or activities conducted thereon, which limitations and affirmative obligations are intended to preserve, maintain or enhance the present condition, use or natural beauty of the land, the open-space value, the air or water quality, the agricultural, forest, recreational, geological, biological, historic, architectural, archaeological, cultural or scenic resources of the servient estate and is recorded in the register's office of the county in which the easement is located (TCA 66-9-303(1)(B)).

OSMRE does not consider these conservation easements existing state or local land use plans. While the State holds a nonpossessory conservation interest in the properties, this interest was acquired through private negotiation with the grantors, who are both private entities. It was not subject to a public decision-making process. While the easement restricts the grantor's land use, it does not bind outside parties. In fact, with respect to the Brimstone property, on which the mineral and surface estates are split, surface coal mining continues even though the easement states that "[t]he Grantor shall not commence mining or mineral extraction of any nature whatsoever." This is because the grantor of the easement—the owner of the surface estate—does not own the mineral interests. The Brimstone easement does not bind the owners of the mineral interests because they were not a party to it. In contrast, the Emory River Tract

Conservation Easement does prohibit mining. It states that the “[g]rantor shall not surface or deep mine for coal … on the Protected Property” (section 6.6.1). Because the grantor, The Nature Conservancy, owns the land in fee, it is bound by this restriction.

Because these conservation easements are not existing state or local land use plans, OSMRE will not examine them further.

The Cumberland Trail, the Tennessee Greenways and Trails Plan, and the Tennessee State Park Plans

The petitioner states that continued development and eventual completion of the Cumberland Trail is a priority of the Greenways and Trails Advisory Committee and that surface mining would frustrate the goals of the greenways and trails plan and the management objectives for Tennessee state parks. The petitioner indicates that the purpose of the Greenways and Trails Plan is to create an interconnected, accessible network of greenways and trails across Tennessee. The petition goes on to state that in 2008, the Greenways and Trails Advisory Council reiterated the national significance of the Cumberland Trail and emphasized that the continued development and eventual completion of the trail is a priority of the plan.

As indicated in the State petition, the Cumberland Trail was recognized as a state scenic trail in 1971 and as a state park in 1998. The record shows that the state acquired property interests in the present NCWMA with the knowledge that it did not own the coal interests in this property and that the owners of the coal mineral interests could exercise their rights to extract the coal resource at any time. The State nonetheless proceeded to plan and construct the trail through the present day NCWMA. To date, an estimated 36 miles of the trail have been constructed in the NCWMA (Cumberland Trail Conference 2014).

SMCRA establishes mining exclusion zones, which include the provision that mining cannot occur within 300 feet of a public park (30 CFR § 761.11). Therefore, no surface coal mining would be permitted within a distance of 300 feet on either side of the trail’s 300-foot right-of-way. While recreational users of the trail could experience some noise and visual impacts as a result of nearby surface coal mining operations, these impacts would be localized and would diminish with distance from the mining area. For additional discussion on the potential impacts to the Cumberland Trail, see the analysis of allegation 2 below.

In the many years that the State has been involved in the development of the trail in the petition area, the State has never contacted the OSMRE to attempt to determine where mining is proposed or is likely to occur in an effort to minimize potential conflicts between trail construction locations and future mining activity. Prior to filing this petition in late 2010, the State had never contacted the OSMRE to express concerns about conflicts or concerns with ongoing mining and impacts that mining may have on the trail or the hikers that use the trail.

The record does not support a broad-based conclusion that all mining within the petition area would result in inherent conflict with the Cumberland Trail State Park. Given the size of the NCWMA / ERTCE (172,000 acres) in relation to the size of the trail (1,320 acres), the topographic variations of the petition area, the vegetation present in the petition area, and the requirement under SMCRA for a 300-foot mining exclusion area on either side of the park, surface coal mining in the vast majority of the petition area would have no impact on the Cumberland Trail State Park. Thus, the OSMRE finds that mining is not incompatible with the state trail and park plans.

Tennessee's 2005 Comprehensive Wildlife Conservation Strategy and 2015 State Wildlife Action Plan

The OSMRE reviewed Tennessee's Comprehensive Wildlife Conservation Strategy (2005), paying particular attention to the references cited by the petitioner and the sections of the document that pertained specifically to the Cumberland Plateau and Mountains Region (TWRA 2005). Although the document does not discuss mining at length, it discusses wildlife values that may be significantly affected by altered land use. The petitioner alleges that species of greatest conservation need would be harmed as a result of surface mining in the petition area. In particular, the petitioner alleges that the ridgeline of the petition area unites the North Cumberland Mountains and provides a contiguous corridor for these species. The petitioner alleges that much of the habitat within the petition area is of high or very high importance to the terrestrial and aquatic greatest conservation need species. Appendix E of Tennessee's Comprehensive Wildlife Conservation Strategy, "Stress Rankings and Problems Affecting GCN Species," identifies "incompatible mining practices" as a source of stress for a number of greatest conservation need species, including some in the NCWMA.

The petitioner states that Tennessee's Comprehensive Wildlife Conservation Strategy identifies coal mining as a particularly problematic source of habitat destruction in the Cumberland region, which encompasses the petition area. Table 13 in Tennessee's Comprehensive Wildlife Conservation Strategy describes incompatible mining practices as the "[d]estruction or degradation of soil [and] water quality and habitat structure of an area due to inappropriate removal of soil and minerals or disposal of overburden or waste materials during various mining activities." Table 14 in the report indicates that incompatible mining practices are linked to three stress categories: altered physical structure, altered physical environment, and altered chemical environment.

Regarding strip mining operations, the report states, "[l]ess destructive means of removing soil and rock overburden in priority areas of terrestrial habitats remains a key challenge. Similarly, construction of roads and other infrastructure necessary for access to coal mines and oil/natural gas wells can be very damaging to terrestrial habitats." Tennessee's Comprehensive Wildlife Conservation Strategy contends, "Much of the damage to the region has come from historic mining and from abandoned mines that are leaching acidic water into streams. Another problem from mining comes from the improper disposal of overburden during strip mining."

Table 62 in Tennessee's Comprehensive Wildlife Conservation Strategy offers four specific actions that could be taken to mitigate the effects of incompatible mining practices on terrestrial habitats. These actions include

1. Propose legislation to designate priority habitats as unsuitable for mining.
2. Encourage the OSMRE to designate priority habitats as LUM.
3. Reclaim abandoned coal mines within priority habitats.
4. Participate in environmental review procedures for mining or drilling projects.

As described above, Tennessee's Comprehensive Wildlife Conservation Strategy characterizes incompatible mining practices as those that destroy or degrade soil and water quality through the inappropriate removal of soil or minerals or disposal of overburden and waste. OSMRE recognizes that mining practices, even when performed in compliance with SMCRA requirements, may, in fact, be incompatible with the protection and management of certain sensitive species and habitat.

The petitioner expands on these findings in the 2015 State Wildlife Action Plan, which, although still in draft form, is being actively pursued by the State and reviewed by the US Fish and Wildlife Service (USFWS) for approval. The 2015 State Wildlife Action Plan goes further than the 2005 plan, which it seeks to replace, in stating explicitly that "new contour, cross-ridge, or mountain top removal coal mining is incompatible with agency management and restoration goals for the NCWMA." The plan defines "incompatible management practices" as those that "modify habitat composition, type, and/or ecological process in a way that is not compatible with the needs of target wildlife or plant species."

The plan also states:

> Another important approach to ensuring compatible resource use is the advance designation of sites and areas for which particular land or resource utilization would not advance habitat and species conservation goals. An example of this type of determination has been conducted for the North Cumberland Wildlife Management Area (NCWMA) and lands in its vicinity in the Cumberland Plateau and Mountains region. The NCWMA offers one of Tennessee's premier opportunities to protect, manage, conserve, and restore GCN species and their habitats, with special emphasis on aquatic, riparian zone, and ridgeline hydrological and ecological function. Over 150 wildlife and plant GCN species are dependent upon adequate protection of these habitat features and their ecological function in the landscape.

Appendix C, table 5 of the 2015 State Wildlife Action Plan specifically lists "GCN wildlife and plant species closely associated with ridgeline areas in the North Cumberland Wildlife Management Area and Lands Unsuitable for Mining Petition boundary [including] GCN species located downstream of ridgeline areas."

Additionally, the plan includes a map of the North Cumberland Plateau and Mountains Conservation Opportunity Area, which shows much of the petition area as "high" or "very high" aquatic and terrestrial habitat.

In support of its conclusion that new mining is incompatible with the conservation goals for the NCWMA, appendix I of the 2015 State Wildlife Action Plan states:

> The North Cumberland Plateau and Mountains Conservation Opportunity Area (COA) contains the highest elevations on the Cumberland Plateau and some of the largest tracts of contiguous forest in Tennessee. Over 300,000 acres of the area are publicly owned and provide outdoor recreation to an array of user groups, including the North Cumberland Wildlife Management Area (NCWMA).
>
> The Cumberland Mountains contain the highest concentration of breeding Cerulean Warblers in the world. Other unique terrestrial GCN species include Green Salamanders, Allegheny Woodrats, and Northern Long-eared Bats. The more pristine streams in the area support a variety of aquatic GCN species, including the Emerald Darter, Blackside Dace, and the Cumberland Elktoe mussel. The major ecological threats to the area are fossil fuel extraction activities, acid mine runoff from legacy mines, incompatible forestry practices, and invasive Wild Hogs. TWRA has determined that new contour, cross-ridge, or mountain top removal coal mining is incompatible with agency management and restoration goals for the NCWMA. Re-mining to resolve outstanding water quality and slope stability problems from previous mining and deep mining, when properly done, are not considered incompatible with TWRA management plans for the NCWMA.

Due to its explicit statement that "new contour, cross-ridge, or mountain top removal coal mining is incompatible with agency management and restoration goals for the NCWMA," and supporting maps and appendices, OSMRE finds that new surface mining operations in the NCWMA would be inconsistent with the 2015 State Wildlife Action Plan.

Draft Habitat Conservation Plan

The petitioner also points to the draft Northern Cumberlands Forest Resources Habitat Conservation Plan being developed with the USFWS and the State pursuant to the Endangered Species Act. The plan is being developed to meet the permit application requirements for issuance of an incidental take permit pursuant to section 10(a)(1)(B) of the Endangered Species Act (16 USC § 1539 (a)(1)(B)). The permit will cover the incidental take for two listed species: Indiana bat and blackside dace. The habitat conservation plan also includes 18 species that are not listed in furtherance of species conservation. The goal of the habitat conservation plan is to "avoid, minimize, and mitigate the take of the 20 covered species, assure their survival, and contribute to the recovery of those that are federally listed." The draft plan covers four wildlife management areas: Catoosa Wildlife Management Area, Lupper Mountain Wildlife Management Area, Mount Roosevelt Wildlife Management Area, and the NCWMA.

The latest draft of the plan is from 2014. Although the petitioner discussed the 2011 draft extensively in its September 25, 2015, letter to the OSMRE, OSMRE will analyze the 2014 draft rather than the 2011 draft. Because this draft plan is being actively considered, the OSMRE will consider it for the purposes of analysis under 30 CFR § 762.11(b)(1). However, OSMRE notes that because the northern long-eared bat has been listed since the 2014 version of the plan was drafted, the plan will likely change before final adoption. OSMRE also notes that although there is no formal schedule for finalizing the plan, it is being actively pursued by the State and the USFWS.

The draft habitat conservation plan and associated permit would provide coverage for "activities associated with forest management that affect aquatic and terrestrial habitats on these [wildlife management areas] WMAs, including 1) timber harvests, 2) road construction, and 3) silvicultural prescribed burns [and] is intended to ensure that forest management activities on WMAs are most compatible with protection of terrestrial and aquatic species." The habitat conservation plan mentions that coal mining, particularly strip mining, occurs in the NCWMA, but it does not specifically address the impacts of mining activities on species or limit mining activities, other than a reference to habitat fragmentation caused by mineral extraction activities.

As currently written, the draft habitat conservation plan would set aside 18,979 acres as Forest and Woodland Reserves, in which forest management activities would be limited to invasive plant and animal control; disease, parasite and pathogen control; fire management; and other forest health concerns. All other forest management activities would be prohibited from these Reserves. These same Forest and Woodland Reserves would be intended to protect core areas of cerulean warbler habitat. The cerulean warbler is a species that has been identified by the petitioner as particularly vulnerable to mining activity. In addition, the draft habitat conservation plan would establish 8,181 acres of high elevation conservation areas above 1,800 feet in modeled cerulean warbler habitat. Specifically, TWRA would design silvicultural treatments above 1,800 feet consistent with its High Elevation Conservation Area Flow Chart. Silvicultural treatments would be limited in these areas. In addition, TWRA would limit silvicultural treatments to less than 10% of cerulean warbler habitat above 2,100 feet over 30 years.

As mentioned previously, mining is only peripherally discussed in the habitat conservation plan. However, the inability to clear cut areas necessary for surface coal mining operations, specifically in forest and woodland reserves, would suggest that the activities and operations necessary to conduct surface coal mining, especially at altitudes above 1,800 feet, would be incompatible with the draft habitat conservation plan.

Local Land Use Plans

The evaluation area consists of approximately 172,000 acres of publicly accessed lands lying within the NCWMA and the ERTCE (NLCD 2011). This area spans four counties in northeast Tennessee: Scott, Anderson, Campbell, and Morgan. Only Anderson County has a local land use plan—the Anderson County Zoning Resolution. However, its only mention of mining is that mining must be conducted in adherence to federal and state law. There is no mention in the land use plan of natural resource conservation, nor is there any discussion of whether or not surface coal mining operations are an incompatible use.

CONCLUSION— PRIMARY ALLEGATION (1)

After reviewing all information available relevant to primary allegation (1), the OSMRE has concluded that surface coal mining operations would be incompatible with the 2015 Tennessee State Wildlife Action Plan and the associated Comprehensive Wildlife Conservation Strategy. Surface coal mining is also incompatible with the 2014 draft Northern Cumberlands Forest Resources Habitat Conservation Plan's limitations on silvicultural treatments in high elevation areas within the NCWMA. The OSMRE concludes that surface coal mining is not inherently inconsistent with other statewide plans, including the "Connecting the Cumberlands" project, Tennessee 2020, and the 2008 Tennessee Greenways and Trails Plan,. Finally, the OSMRE concludes that the draft plans for the Royal Blue Wildlife Management Area and the Sundquist Wildlife Management Area, as well as the Brimstone and ERTCE, are not existing state or local land use plans for the purposes of 30 CFR § 762.11(b)(1).

FRAGILE AND HISTORIC LANDS

PETITIONER'S ALLEGATIONS: PRIMARY ALLEGATION (2)

Allegation 2 is that "the petition area should be designated unsuitable for surface coal mining operations because such operations would affect fragile or historic lands, resulting in significant damage to important historic, cultural, scientific, and aesthetic values and natural systems, within the meaning of section 522(a)(3)" of SMCRA.

ALLEGATION OF FACT (1)

Citing the definition of "fragile lands" in 30 CFR § 762.5, the petitioner alleges that "surface mining in the petition area would damage important environmental corridors and areas that are of recreational value due to high environmental quality."

Supporting Statements – Allegation of Fact (1)

The petitioner submits a number of statements in support of this allegation of fact as follows:

1. The petitioner states that lands within the petition area have a concentration of ecologic and aesthetic features such as corridors of unfragmented forest, scenic vistas, and superb biological diversity. As an example, the petitioner states that Royal Blue and Sundquist Wildlife Management Areas serve as a corridor of vital habitat for priority songbirds. The petitioner points out that the American Bird Conservancy has designated the Royal Blue Wildlife Management

Area as a Globally Important Bird Area in Tennessee. The petitioner states that surface mining would destroy valuable wildlife habitat. The petitioner also identifies three rare floral species—the Canada lily, the Ozark bunchflower, and the leatherleaf meadowrue—that are present in the NCWMA. The petitioner contends that mining under SMCRA does not provide sufficient protection for these species.

2. The petitioner states that the public lands of the petition area are popular outdoor recreation destinations. Recreational activities that take place in the petition area include hiking, fishing, biking, camping, hunting, and wildlife viewing. The petitioner contends that this area offers unique opportunities for bird watching and that the Royal Blue and Sundquist Wildlife Management Areas are popular destinations among birdwatchers. The petitioner contends that surface mining in the petition area would interfere with these recreational opportunities. Visual impacts and noise impacts would deplete the scenic quality of the petition area, reducing its appeal for these activities. Further, rock and debris from blasting, and potential landslides from mining sites and haul roads, could present significant hazards to recreational users. The petitioner states that surface mining conflicts with recreational activities because public safety considerations will require closing areas near mining operations to recreational uses. Finally, the petitioner states that the negative impacts of surface mining on water quality of streams in the petition area would further deter hikers and campers, who use the waters for drinking water and fishing.

3. The petitioner states that the recreational value of the Cumberland Trail State Park would be adversely impacted by surface mining. The petitioner states that the Cumberland Trail provides opportunities to “explore and enjoy the unique natural, scenic, and cultural qualities of the Cumberland Plateau.” The petitioner contends that “potential noise, water, and air pollution from surface mining in the petition area would significantly diminish the aesthetic and recreational values of the Cumberland Trail, obscuring scenic vistas and impairing water quality within the nearby rivers and streams that are used by hikers and campers as a supply of potable water.” The petitioner states that normal SMCRA permitting procedures “do not provide sufficient protection for the unique resources of the Cumberland Trail.” The petitioner contends that in past unsuitability designations for Fall Creek Falls State Park and Flat Fork, the OSMRE recognized that the 300-foot buffer requirement in SMCRA section 522(e)(5) was insufficient to protect recreational values from the impacts of surface coal mining.

4. The petitioner states that the public lands of the petition area have a concentration of aesthetic features such as scenic vistas. The petitioner contends that mining within portions of the Royal Blue Wildlife Management Area would also detract from the recreational value of the Interstate 75 corridor, “a popular scenic drive for tourists.” The petitioner further contends that in the statement of reasons for the Flat Fork LUM petition, the OSMRE recognized scenic overlooks from outside and within a petition area as aesthetic values that qualify as fragile lands. The petitioner states that just as in the Flat Fork petition, the recreational values provided by the views from overlooks along Interstate 75 constitute fragile lands that could be significantly damaged by surface mining in the petition area. The petitioner concludes that the visual and noise impacts of surface mining operations would deplete the scenic quality of the petition area.

5. On September 25, 2015, the petitioner provided the OSMRE with additional data regarding the presence of sensitive plant species the petition area. Specifically, the petitioner noted that the 2015 State Wildlife Action Plan lists a number of greatest conservation need plant species which the petitioner states are “potentially affected by incompatible mining in the NCWMA, including the Ozark bunchflower and Canada Lily.” The petitioner also states that the Ozark bunchflower and the pale corydalis are “within the ridgeline buffer of the State’s petition area.” The petitioner further states that the Ozark bunchflower, which is state-listed as endangered, occurs within the

Royal Blue Wildlife Management Area and that this occurrence is one of only nine in the State of Tennessee.

Intervenors' Responses – Allegation of Fact (1)

Supporting Intervenors: The intervenors who support the petition reaffirm the allegations and supporting statements made by the petitioner. The intervenors largely focus their support of this allegation on four areas: (1) surface mining in the petition area would significantly damage important habitat for the cerulean warbler and other migratory songbirds; (2) surface mining in the petition area would damage important environmental corridors and areas of recreational value due to high environmental quality; (3) surface mining in the petition area could significantly damage water quality and important aquatic habitat for threatened and endangered mussel and fish species; and (4) recent studies further document the adverse environmental impacts from surface mining on aquatic systems.

Relevant to the intervenors' concern about important songbird habitat, the intervenors identify the presence of numerous songbird species in this area of the Northern Cumberland Plateau that are designated by Partners in Flight as "priority species for conservation." Discussion of these species of concern is largely limited to information on the cerulean warbler. The intervenors contend that "designation of the ridgelines in the Petition Area is essential to protect the habitat" of the cerulean warbler. The intervenors cite data and a number of studies that they contend confirm the imperiled status of this bird and that directly or indirectly demonstrate the importance of the petition area in protecting this species. The intervenors conclude by stating that "the Surface Mining Control and Reclamation Act regulations do not require reforestation" and "the [approximate original contour] provision cannot and does not recreate the ridges, steep slopes, and mature forest habitat that existed prior to mining, the serious long-term impacts of coal mining on the large blocks of mountain forests that Cerulean warblers and other wildlife require for survival" are not addressed and "mining in the Petition Area would be devastating for the Cerulean warbler and other vulnerable bird species…" Intervenors suggest 80% of the cerulean warblers in the NCWMA fall within the State petition area and 85% of the high-density areas occur within the petition area. When this area is expanded by a 100-foot buffer, those numbers increase to 91% and 95%, respectively.

In the intervenors' second statement of support for the petitioner's allegation, the intervenors focus their discussion on the presence of Big South Fork National River and Recreation Area downstream of the petition area, identifying it as a fragile land and expounding on the alleged impacts that surface mining within the petition area would have on the recreation area.

In their third statement of support for the petitioner's allegation, the intervenors conclude that surface mining in the petition area could significantly damage water quality and important aquatic habitat for threatened and endangered mussel and fish species. They state that streams in and downstream of the petition area provide valuable habitat for a number of threatened and endangered mussel and fish species, including federally designated critical habitat for endangered mussels, and as such, these streams qualify as fragile lands under SMCRA criteria. The intervenors conclude that surface mining in the petition area could result in significant harm to these species and their habitat. The intervenors cite data from a number of sources and references from various studies and reports that they contend confirm the imperiled status of these threatened and endangered species and directly or indirectly demonstrate the importance of the petition area in protecting these species.

In the intervenors' final statement of support for the petition, they cite or reference numerous recent studies that they contend further document the adverse environmental impacts from surface mining on aquatic systems. They conclude that "…the extensive evidence cited in this and the previous section

(Part II.B.3) overwhelmingly shows, the Surface Mining Control and Reclamation Act permitting and performance requirements are not sufficiently protective of water quality or aquatic species and habitat."

Opposing Intervenors: The intervenors who oppose the petition make a number of statements relevant to the petitioner's assertion that the petition area should be designated as unsuitable for mining because such operations would affect fragile or historic lands, resulting in significant damage to important historic, cultural, scientific, and aesthetic values and natural systems. The intervenors conclude that the "state apparently makes an inconsistent illogical leap that the ridgelines…" in the petition area "…are ecologically different from other lands in the affected wildlife management areas." The intervenors assert that "the state submitted no scientific evidence or basis that any of the so-called fragile features will be significantly damaged."

Relevant to the petitioner's concern about important songbird habitat, the intervenors opposing the petition state that the petitioner does not show that such habitat is restricted to the petition area and, assuming mining is properly conducted, does not explain how the temporary nature of the mining activity will significantly impact such habitat. To the contrary, the intervenors contend that mining-related "reclamation and reforestation efforts should significantly enhance" songbird habitat.

The intervenors opposing the petition contend that while the petitioner alleges that recreational activities including hiking, biking, fishing, camping, and wildlife viewing would be significantly affected by surface mining activities, the petitioner offers no evidence or supporting documentation. The intervenors state that the petitioner "provides no source of information to support their allegations that wildlife viewing opportunities would be destroyed, visual and noise impacts would deplete the scenic quality, or that the water quality would be impacted." Instead, the intervenors contend that "these same recreational activities have actually been enhanced in the area through surface coal mining." The petitioner links alleged impacts to the above identified recreational activities in the petition area to adverse impacts to the tourism potential of the petition area. The intervenors state that the petitioner cited no studies or other information that the current ability to develop these lands for tourism has been impacted by surface mining and instead concludes that the area is used successfully for tourism.

The intervenors opposing the petition note that the petition discusses a number of alleged impacts to the Cumberland Trail State Park. However, the intervenors argue that the state developed the trail / park "…knowing that surface coal mining operations were being conducted and would continue to be conducted in the foreseeable future." The intervenors conclude that "the state, therefore, believed the trail would be compatible with surface coal mining." The intervenors also state that the petitioner "does not even know if coal exists under portions of the Cumberland Trail in the Petition area." The intervenors state that if contemporary mining practices are complied with, "any disturbance to the viewshed would be temporary at best, and any physical impact to the trail would be restored." The intervenors go on to note that much of the ridgeline in the petition area shows scarred remnants of previously mined and unreclaimed areas and that in petitioning that these areas be declared unsuitable for surface mining, the petitioner is advocating a position that is "…contrary to the SMCRA's policy to reclaim these pre-law sites…." Finally, intervenors contend that the petitioner's reference to the "so-called Smoky Mountain segment" of the Cumberland Trail State Park is a "misnomer" and that "the name of that segment is the New River segment not Smoky Mountain."

The intervenors opposing the petition observe that the state is relying on the OSMRE decision on the Fall Creek Falls petition to support its argument that the Cumberland Trail is fragile land, that mining-related impacts are significant, and that therefore the petition area should be declared unsuitable for such mining. However, the intervenors state that the contrast between the two situations is significant. The intervenors note that land for Fall Creek Falls Park and surrounding areas was acquired in the 1930s, well before coal mining operations had commenced in the area. In contrast, "all of the surface rights to the petition area were acquired by the state with written documents acknowledging that surface coal mining operations were being conducted in the area and would be conducted in the foreseeable future." The intervenors contend that the OSMRE decision for Fall Creek Falls "was based on the fact that the park was designed for the purpose of keeping the park in its natural, un-mined condition. Such cannot be said for the petition area."

The intervenors opposing the petition make two general assertions concerning the petition. First, the intervenors state that "much of the state's public statements and filings of intervenors in support of the petition focus on the need to grant the petition to prevent mountaintop removal mining associated with valley fills." The intervenors opposed to the petition note that as "the state does not permit overburden from mining to be placed within 100 feet of a stream" (TCA 69-3 -108(f)(1)), this effectively precludes the mountaintop removal mining method in Tennessee. The intervenors conclude by stating that "the ridgelines will remain intact following reclamation, contrary to the state's assertions and/or concerns that they wish to preserve unbroken ridgelines." Second, the intervenors assert that in evaluating the petition, the OSMRE must assume that the coal mining will be conducted using contemporary mining practices (and thus in compliance with applicable law). For example, the intervenors assert that the OSMRE "must assume that the mining will comply with the state's water quality laws" and that these laws impose "strict effluent limitations and standards in its water quality related permits." The intervenors point out that the state's definition of pollution includes any alteration of the waters of the state that would: "…result or will likely result in harm, potential harm or detriment to the health of animals, birds, fish, or aquatic life" or would "render or will likely render the waters substantially less useful for domestic, municipal, industrial, agricultural, recreational, or other reasonable uses." The intervenors state that, as "no permit can be issued that would cause a condition of pollution as defined by the state, the state's allegations related to concerns over water-based recreation and other such uses are groundless" (TCA 69-3-108(g)). The intervenors conclude that if the state can issue a water quality permit, the OSMRE "must assume that no discharges from the surface coal mining operations in the petition area will cause the harms that petitioner claims will occur." The intervenors assert that "while the petition addresses destruction of habitat and other resources, there are no facts that would show that the habitat would not be restored even if temporarily impacted," and the OSMRE "must assume that the Surface Mining Control and Reclamation Act permit, the state permits, and the reclamation plans will be designed to offset any temporary impacts during the active mining phase."

PETITIONER'S ALLEGATIONS: ALLEGATION OF FACT (2)

Citing the definition of "historic lands" in 30 CFR § 762.5, the petitioner alleges that "surface mining in the petition area would damage important historic and cultural values."

Supporting Statements – Allegation of Fact (2)

1. The petitioner states that the Cumberland Trail has gained national significance as the lynchpin of the Great Eastern Trail, a new long-distance hiking trail that will run from the Alabama / Florida state line to New York, furthering a network of trails across the entire Appalachian region. The petitioner contends that, for reasons previously identified, SMCRA and its regulations are not sufficient to protect the trail from the negative impacts of mining.
2. The petitioner states that the value of the petition area as a place of historic, scientific, and cultural resources is further evidenced by the proposal to congressionally designate the Cumberland Plateau region as a National Heritage Corridor. The petitioner alleges that surface mining in the petition area would damage important historic and cultural resources.
3. The petition asserts that "the State of Tennessee has recognized lands within the petition area as containing important historic, cultural, and scientific values, as a result of the Cumberlands

acquisition, the largest of its kind in Tennessee since the creation of the Great Smoky Mountains National Park."

4. In its September 25, 2015 follow-up letter, petitioner identifies "eight recorded archeological sites completely or partially within the State's Petition area." Petitioner states that these areas are of archaeological significance and that mining could damage them. Petitioner also states that these sites enhance the recreational experience within the NCWMA and Cumberland Trail State Park.

Intervenors' Response – Allegation of Fact (2)

Supporting Intervenors: The intervenors who support the petition reaffirm the allegation and supporting statements made by the petitioner. The intervenors provide no new information relevant to this allegation of fact.

Opposing Intervenors: The intervenors who oppose the petition contend that "the petition itself is devoid of any reference to any of the examples provided in the definition" of "historic lands" as defined in the OSMRE regulations. The intervenors conclude that "the state has not provided any specific findings that would show that it (the petition area) meets the definition of historic lands." Intervenors state that while "[m]ost of the State's concerns lie with the Cumberland Trail … there are no allegations that coal deposits are even located in areas that might affect the Cumberland Trail." The intervenors conclude that the petitioner has provided "no support whatsoever" for the assertion that "the State of Tennessee has recognized lands within the petition area as containing important historic, cultural, and scientific values, as result of the Cumberlands acquisition…"

OSMRE Analysis of Primary Allegation (2)

In this allegation, the petitioner contends that the petition area should be designated unsuitable for surface coal mining because such operations could affect fragile or historic lands (30 CFR § 762.11(b)(2)).

Fragile lands are defined at 30 CFR § 762.5 as "areas containing natural, ecologic, scientific, or aesthetic resources that could be significantly damaged by surface coal mining operations." These regulations state, "[e]xamples of fragile lands include valuable habitats for fish and wildlife, critical habitats for endangered or threatened species of animals or plants, uncommon geologic formations, paleontological sites, national natural landmarks, areas where mining may result in flooding, environmental corridors containing a concentration of ecologic and aesthetic features, and areas of recreational value due to high environmental quality."

Historic lands are defined at 30 CFR § 762.5 as "areas containing historic, cultural, or scientific resources." These regulations state, "Examples of historic lands include: archaeological sites, properties listed on or eligible for listing on a state or National Register of Historic Places, national historic landmarks, properties having religious or cultural significance to Native Americans or religious groups, and properties for which historic designation is pending."

As previously discussed, the OSMRE may designate lands unsuitable for surface coal mining as long as significant damage to fragile or historic lands *could* occur as a result of surface coal mining operations within the designated area, even if contemporary mining practices are followed. (30 CFR § 762.11(b)(2)).

Fragile Lands: Valuable Fish and Wildlife Habitat

Because the petition area serves as a valuable habitat for fish and wildlife and plants that could be significantly damaged, the petitioner alleges that it should be considered a fragile land.

Tennessee is one of the most biologically diverse states in the United States, with over 300 species of fish, at least 80 mammal species, 60 reptile species, approximately 70 amphibian taxa, over 340 species of birds, over 225 land snail taxa, 100 aquatic snail species, at least 120 mussel species, 70 crayfish species, and thousands of insect taxa (TNHP 2009).

A majority of the petition area has been rated as 'very high' for terrestrial habitat prioritization and species conservation by Tennessee's Comprehensive Wildlife Conservation Strategy (TWRA 2005). The Cumberland Plateau and Cumberland Mountains are considered a conservation priority under Tennessee's Comprehensive Wildlife Conservation Strategy based on the following:

- high degree of endemism (species only found there) due to the rugged terrain
- abundance of diverse habitat types (approximately 17 natural systems, 10 seminatural systems, and 1 nonnatural system)
- 101 terrestrial species in need of conservation inhabit the plateau (TWRA 2005)

The TWRA acquisition priority for the Southern Cumberland Mountains established a number of project objectives specific to fish and wildlife and their habitats. These objectives include protecting large forested tracts for cover for the cerulean warbler and other forest-dependent species; restoring early successional habitats on existing surface mining sites for the golden-winged warbler, elk, ruffed grouse, and other early successional forest species; restoring extirpated and endangered species including elk, fisher, common raven, blackside dace, rosyface shiner, and arrow darter; and restoring ecological function across habitats (TWRA 2002). Biological diversity is a key component of the plan, which proposes maintaining 90% forest cover for species such as the cerulean warbler while maintaining and managing disturbed mine sites and benches for early successional species, such as the golden-winged warbler. Aquatic resource protection is also a focus of the plan to further the improvements that have been observed in the area.

The value of the fish and wildlife in the petition area is evidenced by the goals and objectives of the Royal Blue and Sundquist Wildlife Management Area plans. The Royal Blue Wildlife Management Area management plan goals include "improv[ing] the quality and quantity wildlife; … provid[ing] opportunities for plant and animal restoration … [and] protect[ing] and manag[ing] threatened and endangered flora and fauna" among other goals. More specific goals of the wildlife management area include maintaining or improving the quality and quantity of wildlife habitat including threatened and endangered species, and improving or maintaining water quality to support a cool water fishery. The surface use plan mission statement for the Sundquist Wildlife Management Area directs the area to be managed for four primary purposes. One of these purposes is "sustaining a natural hardwood forest through time…which will conserve biological diversity and provide habitat for historically native plant and animal populations including any rare, threatened, or endangered species." The plan also calls for the "maintaining and improving watershed quality over time." Similarly, the sustainable forestry conservation easement for the Brimstone property, also known as the New River Unit of the NCWMA, identifies six purposes of the easement. These purposes include among others, preventing forest fragmentation; conserving natural resource values including native flora and fauna and the ecological processes that support them, biological diversity, water quality, and aquatic habitats; and implementing the Forest Legacy Program which protects important fish, wildlife and other ecological values. Finally, the Emory River Tract Forest Management Plan goals call for maintaining "adequate and appropriate wildlife habitat" and sustaining or recreating "the biological characteristics of the Cumberland Mountains site type by site type while earning acceptable returns for investors."

Aquatic Species: Tennessee has among the highest diversity of fish fauna of any state in the United States (Carter et al. 2012). A number of federal and state-listed species are known to occur in the four

Tennessee counties which encompass the NCWMA and ERTCE (Anderson, Campbell, Morgan, and Scott) and thus, may be present in the petition area. Aquatic special-status species known to occur within the four affected counties, potentially including the petition area, include six federally listed fish species: blackside dace, Cumberland darter, duskytail darter, slender chub, spotfin chub, and yellowfin madtom (USFWS 2014a). Critical habitat has been designated for three of the six federally listed species, but only one species (spotfin chub) has designated critical habitat within the evaluation area and adjacent to the petition area. Five additional fish species listed as threatened or endangered at the state level in Tennessee may also be present in or near the petition area: ashy darter, blue sucker, sickle darter, silverjaw minnow, and redlips darter (TDEC 2014c). The affected four-county region is also known to house 23 species of federally listed mollusks. Twenty of these species are listed as endangered at the state level in Tennessee, in addition to their federal classifications. Critical habitat has been designated for seven of the listed mussel species known to occur within the four affected counties. However, no listed mussels have designated critical habitat within the petition area. One state level endangered crustacean (valley flame crayfish) is known to occur in the Clinch and Emory drainages in Anderson and Campbell Counties, and may be present in the petition area. For additional information, see “Chapter 4: Affected Environment” and “Appendix C: Special-Status Species.”

Headwater streams, which include intermittent streams, play an important role for aquatic biodiversity by providing habitat for a variety of species and connectivity with the larger stream system (Meyer et al. 2007). Some headwater streams provide important habitat for special-status aquatic species. Specifically, headwaters provide “unique and highly diverse physio-chemical habitats”; native species refuge from predators, competitors, and nonnative species; genetic linkages; spawning and rearing habitat; feeding areas; thermal refuges; movement corridors and population sources for downstream colonization (Meyer et al. 2007). These streams typically have small catchments and can be affected by small-scale changes; however, their degradation can lead to the loss of biological integrity of the entire river (Meyer et al. 2007). Surface coal mining operations, although restricted from occurring 100 feet from any stream, can still lead to impacts as a result of changes in riparian habitat and sediment loading; especially as it relates to road construction (Petty et al. 2010; Tsunokawa and Hoban 1997). Other activities that contribute to impacts to headwater streams include timber harvest, oil and gas development and light agriculture (Pond 2004).

Impacts to aquatic special-status fish and mollusk species include habitat loss and degradation. Impacts to streams and other water resources as a result of surface coal mining operations could translate directly to the aquatic species that inhabit those water bodies. Aquatic species impacts could primarily occur as a result of increased runoff and sedimentation, creating high turbidity conditions in rivers and streams due to the removal of soils and vegetation for surface mining and associated activities including the use and maintenance of access and haul roads. This reduction of water quality could adversely impact special-status aquatic species found within the area and their critical habitats where designated. Coal mining is listed as a primary cause of decline for 33 of the 34 aquatic special-status species, populations of which are known to occur in the evaluation area (NatureServe 2014). For more discussion about the rivers and creeks that have documented occurrences of listed fish and mollusks, see “Chapter 6: Environmental Consequences.”

Terrestrial Species: The NCWMA and ERTCE are known to have a number of rare, threatened, and endangered wildlife and plant species. According to the USFWS list of threatened and endangered species (USFWS 2014a), three federally listed bat species (gray bat, Indiana bat, and northern long-eared bat) occur in the four counties. In addition, the northern pinesnake, a state threatened species, occurs in two of the four counties (Anderson and Morgan) associated with the petition area. The area is also known to have one state-listed species of bird, Bewick’s wren.

As described by the petitioner, the American Bird Conservancy designated the Frozen Head State Park and Royal Blue Unit of the NCWMA as a globally important bird area (ABC 2010) due to several breeding neotropical migrant bird species. Partners in Flight published conservation priorities and objectives for terrestrial bird species that breed in the United States (Partners in Flight 2004). The USFWS (2014a) listed 22 birds of conservation concern for the four counties. Birds of conservation concern (USFWS 2014b) are the highest conservation species (apart from those already listed under the Endangered Species Act) identified by the USFWS that could be listed under the Endangered Species Act without additional conservation actions.

Nine bird species that inhabit eastern deciduous forests have been identified as priority species for conservation by Partners in Flight (2004). Although the petitioner refers merely to priority migratory songbirds, the intervenors in support of the petition identify six of these species that are known to occur within the petition area: cerulean warbler, Louisiana water thrush, worm-eating warbler, wood thrush, Acadian flycatcher, and Kentucky warbler. The intervenors focus on the cerulean warbler, which can be considered a surrogate species for other forest-dependent bird species, meaning that impacts to the cerulean warbler would be similarly experienced by other forest-dependent species that require similar habitat conditions.

Cerulean Warbler: The cerulean warbler is a USFWS bird of conservation concern species and a state species deemed In Need of Management. This species has faced extensive habitat loss over the last century (Robbins, Fitzpatrick, and Hamel 1989). The cerulean warbler is a small neotropical migrant songbird that feeds primarily on insects (USFWS 2007a). It breeds in mature deciduous forests in the eastern United States, primarily in the Ohio and Mississippi River Valleys and areas of the Appalachians, New England and Southern Canada, and the Great Lakes region (USFWS 2007a). The core breeding range of the warbler is primarily in the Ohio Hills and Northern Cumberland Plateau (Wood, Bosworth, and Dettmers 2006). This species population has experienced a negative trend with an overall 3–4% decline in the last 30 years (USFWS 2007a). The cerulean warbler was proposed for listing as threatened under the Endangered Species Act. However, the USFWS determined that the listing was not warranted (USFWS 2007a). As part of the review of the species status, the USFWS identified four primary mechanisms contributing to the species decline. Each of these contributors is caused by habitat loss.

1. Reduction in available nesting sites and suitable breeding territory characteristics because of loss or degradation of habitat.
2. Reduction in foraging success resulting from decreased prey abundance, primarily on the wintering grounds in South America.
3. Increased predation throughout the species annual range and nest parasitism of cerulean warblers in their breeding grounds, resulting from habitat fragmentation.
4. Loss of migration habitat (USFWS 2007a).

In Tennessee, the cerulean warbler requires large tracts of mature deciduous forests (Robbins, Fitzpatrick, and Hamel 1989). In addition, in Tennessee these warblers are more apt to occur higher up slopes along ridgelines rather than in bottomlands (Wood, Bosworth, and Dettmers 2006) and on north- to east-facing slopes. Buehler and others (2006) found when comparing five breeding areas that three out of five areas were population sinks—areas that contain no or low populations with little increase due to poor quality habitat. In this study, the petition area was found to be one of two areas in the Cumberland Mountains capable of sustaining a stable population in good years (Buehler et al. 2006). The authors suggested that in order to allow for a stable population, habitat loss should be minimized.

Edge effect and forest fragmentation limit cerulean warbler abundance and distribution (Wood, Bosworth, and Dettmers 2006). In a review of the literature, Wood and others (2006) found that cerulean warblers were tolerant of forest gaps such as roads, trails, and minimal silvicultural treatments, whereas they were negatively affected by “extensive hard edge of reclaimed mines.”

The presence of a forest edge can result in increased predation, brood parasitism, and species competitions and the effect can extend up to 150 feet into the forest (Wood, Bosworth, and Dettmers 2006). In 2005, Wood and others documented lower cerulean warbler territory density adjacent to reclaimed mine edges (Wood, Bosworth, and Dettmers 2006). Wood, Bosworth, and Dettmers (2006) found that the edge effect of reclaimed mines extended over 1,000 feet into the forest. The USFWS made a similar conclusion, stating that the “introduction of hard edges may result in greater local population declines” and that the continued “degradation or removal of suitable mature and old-growth hardwood forestland will result in reductions in nesting opportunities, and that accumulation of habitat losses is likely to result” in overall species decline (USFWS 2007a). USFWS cautioned that “[e]ffects in a relatively small portion of the species range… could contribute disproportionately to the population decline” (USFWS 2007a).

The USFWS stated that large-scale habitat losses in the Kentucky and West Virginia from surface coal mining was predicted to occur through 2012 resulting in a 10–20% loss of the warbler population occurring in that part of its core area. Although reclamation of surface coal mining operations is required for SMCRA-permitted sites, Welton (2014) suggests that the methods would be “insufficient to replace [the] habitat in a biologically relevant timeframe.” Threats to cerulean warbler habitat include forest timber activities and land clearing for other activities. The TWRA has been developing a habitat conservation plan that establishes reserves of core breeding and foraging habitat and sets management strategies above elevations of 1,800 feet, such as no harvesting more than 10% of the habitat above 2,100 feet (Welton 2014).

In 2005, Buehler, Welton, and Beach (2006) estimated that the Cumberland Mountains in Tennessee provide over 80,000 hectares of potential cerulean warbler habitat. Buehler and others studied potential warbler habitat for the Royal Blue Unit Wildlife Management Area and Sundquist Unit Wildlife Management Area, and predicted that 59% of the Royal Blue Unit was suitable habitat and that the unit could support approximately 1/3 of the Cumberland Mountains cerulean warbler populations (approximately 13,000 breeding pairs). Similarly, the study found that 50.5% of the Sundquist Unit was suitable cerulean warbler habitat that could support approximately 3,500 breeding pairs (Buehler, Welton, and Beach 2006). The study also found that the coal reserves on the Royal Blue Unit generally overlap the same area as warbler habitat. A recent study documented that of 365 cerulean warblers detected in the NCWMA, 91% of the birds and 95% of the high-density sites were located in the petition area or within 100 feet of the petition area boundary (Welton 2014).

Buehler, Welton, and Beach (2006) found that the 2005 Cumberland Mountain population “may compose >20% of the range-wide population.” Buehler and others predict that surface coal mining could displace upwards of 8,000 breeding pairs in the NCWMA or roughly 4% of the overall species population.

The presence of this species and the importance of this particular area (breeding habitat) to the life cycle of the species in part prompted the state to identify in its draft habitat conservation plan an area of approximately 6,300 acres within the NCWMA as a high elevation conservation area, intended to reduce or prevent the adverse impacts associated with logging from adversely affecting species of concern to the state including the cerulean warbler (Welton et al. 2012). The state also designated forest and woodland reserves encompassing almost 12,000 acres. Management in these reserves and conservation areas would be limited to “invasive plant and animal control; disease, parasite and pathogen control; fire management; or other forest health concerns.” The OSMRE has determined that approximately 2,800 acres of the 1,200-foot petition boundary corridors would fall within the forest high elevation conservation area.

Rare Plants: The NCWMA and ERTCE are known to have occurrences of two federally threatened plant species, the Cumberland rosemary and Virginia spiraea; and one federally endangered plant species, the Cumberland sandwort. The rare plant list issued by the Tennessee Natural Heritage Program includes 20 plant species found in the Cumberland Mountains physiographic province within Tennessee. Five state-listed plant species are found within the 172,000-acre area of the NCWMA and ERTCE. State endangered species include pale corydalis and Ozark bunchflower. State threatened species include tubercled rein-orchid. State special-concern species include the commercially exploited American ginseng and pink lady's slipper.

The Ozark bunchflower occurs primarily on lower slopes and stream terraces in moist, hardwood forests, usually over basic soils. Similar to other interior-forest species, threats include logging and clearing of hardwood forests, among others (NatureServe 2014). Found in 13 states from Iowa and Missouri to Georgia and Florida, the bunchflower is only considered "apparently secure" in Missouri (NatureServe 2014). In Tennessee, the plant is considered "critically imperiled." As described in the petitioner's letter, there are only nine known populations in Tennessee and two of those are within the NCWMA. These two documented populations occur above 1,800 feet within or adjacent to cerulean warbler core areas and within the State's petition area.

In contrast to the Ozark bunchflower, the pale corydalis is found in two habitat types: rocky sites on dry to dry-mesic, well-drained, often acidic soils; and recently disturbed sites, including burned areas. Pale corydalis occurs on exposed rocky areas, ledges, and cliffs from the Carolinas to Canada and Alaska, and is a rock outcrop obligate in the Appalachians. Pale corydalis has a limited distribution and occurs in restricted, infrequent habitat (NatureServe 2014). Similar to the bunchflower, there are only two documented occurrences of this plant within the NCWMA. These plants are also found above 1,800 feet in the State's petition area. Given the record related to the cerulean warbler, Ozark bunchflower, and pale corydalis, the OSMRE has concluded that the petition area provides valuable habitat for fish and wildlife. In addition, this habitat could be significantly damaged by surface coal mining operations, thus qualifying it as fragile lands.

Fragile Lands: Recreational Values

As discussed in prior sections, the petitioner alleges that recreational activities including hiking, biking, fishing, camping, and wildlife viewing could be significantly affected by surface mining activities. Specifically, the petitioner contends that potential noise, water, and air pollution from surface mining in the petition area could significantly diminish the recreational values of the petition area. The petitioner also claims that surface mining will impair water quality within the nearby rivers and streams used by hikers and campers as a supply of potable water. The petitioner alleges that surface mining could result in significant damage to areas within the petition area of high recreational value, which qualify as fragile lands.

In order for a recreational value to fall within the "fragile lands" definition, the recreational value must occur in an area as a result of the high environmental quality of that area. For the purpose of this analysis high environmental quality is defined as those properties or characteristics of the environment that are present or occur to a greater degree, amount, cost, value, or content than would be considered above average, usual, or expected. Under 30 CFR § 762.11(b)(2), if surface mining could result in significant damage to areas of "high recreational value due to high environmental quality," the fragile lands criterion has been met.

In 2002, the TWRA laid out its acquisition strategy for the Southern Cumberland Mountains. This strategy states the Southern Cumberland Mountains project "is a comprehensive land acquisition and habitat management plan designed to address Tennessee's needs to … provide strategic public access for outdoor recreation, including wildlife viewing, hunting, fishing, and hiking" (TWRA 2002). The different management plans that govern the petition area also provide indications of the value of recreation. The management plan for the Royal Blue Wildlife Management Area sets goals "to provide opportunity for wildlife enjoyment [and] to provide for compatible forms of non-wildlife associated recreation." In addition, it sets an objective "to maintain the quality of non-consumptive wildlife and forest associated recreation," among others. The surface use plan for the Sundquist Wildlife Management Area incorporates as part of its mission statement to provide "public recreational opportunities including hiking on the newly established Cumberland Trail, hunting, fishing, wildlife viewing and other activities." Similarly, the conservation easement for the New River Unit (Brimstone property) identifies providing recreation as one of the primary purposes of the easement. Although the ERTCE does not specifically call out recreation as a purpose, it does identify scenic resources as a resource the easement is meant to protect. However, the petitioner fails to provide sufficient evidence that the area is one of high recreational value due to high environmental quality.

The OSMRE analyses indicate that the only one area would provide high recreational value as a result of high environmental quality. The reintroduction of elk into the NCWMA has created an area of high recreational value providing additional visitation to the area. The Cumberland Plateau was chosen for elk reintroduction because it has habitat suitable for supporting elk herds and because it contains few farm crops and people (TWRA 1992). This area is the only place in Tennessee where elk can be viewed. The Hatfield Knob Elk Viewing Tower was constructed in 2005 on the Sundquist Unit of the NCWMA. In 2006, 468 people visited the viewing area, over 90% of which were from Tennessee (Rocky Mountain Elk Foundation 2007). According to a recent study funded by the Rocky Mountain Elk Foundation visitation has continued to increase: 2010 = 11,935 visitors; 2011 = 13,810 visitors; 2012 = 16,086 visitors; and 2013 = 14,370 visitors (Elkins pers. comm. 2015).

It is likely that as the elk herd in Tennessee grows in numbers, it will draw additional visitors. In addition, more elk in the future would likely bring more permits for elk hunting in the NCWMA. The Tennessee sixth annual elk hunt took place in 2014, with six permits issued. Based on the rarity of elk in Tennessee and the ability for the public to have opportunities to view and hunt them, the area surrounding the elk viewing tower would provide the high recreational value that would qualify it as a fragile land. However, the recreation afforded by the NCWMA and ERTCE at large is not special in nature or characteristic, nor is it different than other Cumberland Plateau areas outside the LUM evaluation area. As such, it does not have the requisite high environmental quality to qualify as fragile land.

The OSMRE has found in previous petitions that the noise from mining equipment, blasting, and vehicular traffic, along with dust from coal haulage and mining activities could degrade the quality of outdoor recreation. Similarly, the impact analysis described in "Chapter 6: Environmental Consequences," confirms that there would likely be adverse impacts to recreation as a result of surface coal mining operations. Recognizing that the area provides recreational opportunities, it is likely that public recreational access to specific areas would be restricted as surface coal mines are developed, resulting in near-term adverse impacts to recreation. Similar to that described above, the presence of mining personnel, vehicles and equipment, noise, and dust could cause near-term adverse impacts for visitors who are seeking a park-like or natural experience. Displacement of wildlife due to noise and habitat disturbance from mining activities would also diminish wildlife viewing opportunities, resulting in additional near-term adverse impacts near surface coal mining operations. It should be noted that coal mining disturbance of this nature is not different than other allowable industrial activities in the region (e.g., logging or oil and gas exploration).

In addition to noise and dust, water quality impacts to recreation are also raised by the petitioner. Petitioner claims that mining would impair water quality within the nearby rivers and streams that are used by hikers and campers as a supply of potable water. However, OSMRE notes that, based on the biennial assessments, portions of seven streams within the NCWMA are on the 303(d) list and considered impaired. Pursuant to section 303 of the Clean Water Act, 33 USC § 1313, each state establishes water quality standards for all navigable waters within the state. These water quality standards are based on a certain amount of allowable pollutant calculated as the total maximum daily loads allowed to be discharged into impaired streams. Each navigable water on the 303(d) list has established total maximum daily loads for specific pollutants. Exceedances of the total maximum daily load results in a navigable water being listed as not in attainment for that pollutant. This list is often referred to as 303(d) list. These impaired streams include Elk Fork Creek, Joe Branch, an unnamed tributary to Joe Branch, Smoky Creek, Hickory Creek, Davis Creek, and Thompson Creek. These streams are impaired for certain designated uses (i.e., recreation or fish and aquatic life) due to violations of specific water quality criteria. Tributaries to Joe Branch carry low-pH water from abandoned Big Mary seam underground mine workings to Indian Fork of the New River. Thompson Creek is impacted largely by abandoned surface mines in the Kent and Murray seam that predate SMCRA. Other streams in the NCWMA are listed under section 303(d) for reasons related to siltation from both abandoned mining and logging activities within the watershed or for pathogens not related to mining (TDEC 2014d). OSMRE is unable to conclude that proper implementation of both SMCRA and the Clean Water Act would result in more impaired streams or ultimately in other streams that cannot be used for potable water.

The record clearly documents that the NCWMA and ERTCE provide a great deal of recreational opportunities in this area. However, only the Hatfield Knob Elk Viewing Tower area provides high recreational value that would qualify it as a fragile land. Based on the preceding analysis, the OSMRE finds that the dust, noise, and water quality impacts associated with surface coal mining operations could significantly damage areas of recreational value some of which could occur near the Hatfield Knob Elk Viewing Tower.

The Cumberland Trail: The petitioner alleges that the Cumberland Trail is an area of recreational value due to high environmental quality. The petitioner states that the Cumberland Trail has gained national significance as the lynchpin of the Great Eastern Trail, a new long-distance hiking trail that will run from the Alabama/Florida state line to New York, expanding a network of trails across the entire Appalachian region. The petitioner contends that for reasons previously identified, SMCRA and its regulations are not sufficient to protect the trail from the negative impacts of mining.

The Cumberland Trail is recognized as a state park and hence must be afforded the protections of a public park under SMCRA and its implementing regulations. Specifically, no surface coal mining operations could occur within 300 feet of a public park (30 USC § 1272 (e)(5); 30 CFR § 761.11(f)). With respect to the Cumberland Trail State Park, the 300-foot buffer begins at the outermost limit of the park footprint, which is in addition to the existing buffer established during park designation.

Petitioner argues that the statements of reason for the Fall Creek Falls and Flat Fork LUM designations support its argument that the NCWMA qualifies as a fragile land because of its high environmental quality. Specifically, petitioner argues that “The area surrounding the Smoky Mountain segment of the Cumberland Trail contains the very same threats that led to the Fall Creek Falls and Flat Fork designations. Any one of the variety of impacts that have been shown to occur despite full compliance with SMCRA could damage the ‘scenic, historic, natural, ecological, geological or cultural qualities,’ which the designation as a state scenic trail and state park seeks to maximize.”

The OSMRE did not make a blanket statement in either the Fall Creek Falls or the Flat Fork statement of reason that all state parks qualify as fragile lands. In fact, these statements of reason support the conclusion that *some* state parks, because of their rare or unique esthetic and natural features, qualify as fragile lands. Thus, the OSMRE must evaluate the segments of the Cumberland Trail which run through the petition area in order to determine whether it possesses such characteristics.

Unlike the park areas designated in the Fall Creek Falls and Flat Fork LUM decisions, the portion of the Cumberland Trail that the petitioner argues is fragile land runs through the NCWMA, a multi-use area in which mining and logging has occurred over the past century or more. The recreational values and scenic resources that exist in the NCWMA today exist in spite of this past mining. Furthermore, when the petitioner acquired the properties which make up the NCWMA, it did so with the expectation that multi-use activities, including mining, would continue in the NCWMA. In contrast, the Flat Fork designation protected “the last unmined views of the Cumberland Mountains” from various trails and overlooks within the park and natural area. As opposing intervenors point out, the Fall Creek Falls designation protected state park lands that were set aside for the purpose of preserving unique esthetic resources, including the highest waterfall east of the Mississippi River, as well as other falls, cascades, and visual resources which exist solely due to the watersheds that flow to them from both within and upstream of the park. Unlike the state park lands which were found to be fragile lands in the Fall Creek Falls and Flat Fork, the Cumberland Trail was not created to protect specific rare or unique recreational or esthetic resources. The portions of the petition area through which the Cumberland Trail runs have supported multi-use activities, including hiking, off-highway vehicle use, hunting, logging and mining, for many decades.

The Fall Creek Falls and Flat Fork statements of reason do not support a finding that the Cumberland Trail, through its very nature as a state park, is a fragile land. The OSMRE finds that the available information, in its totality, does not support a broad-based conclusion that mining within the petition area would result in a significant reduction in the recreational value of the Cumberland Trail State Park. It is also unclear how the petition area is specifically related to the trail since much of the trail that passes through the NCWMA and ERTCE is outside the boundaries of the petition area. Therefore, surface coal mining operations outside the petition area would have impacts on the trail similar to those that could occur within the petition area. If the recreational value of the trail were paramount, the State would have proposed to protect the entire trail in its petition.

Big South Fork National River and Recreation Area: Located to the northwest of the petition area, the Big South Fork National River and Recreation Area “encompasses approximately 125,000 acres in northeastern Tennessee and southeastern Kentucky” (NPS 1997a). Congress designated the area in 1974, recognizing the “unique cultural, historic, geologic, fish and wildlife, archeological, scenic, and recreational values” (NPS 1997a). The OSMRE does not read its regulations as requiring that the fragile lands sought to be protected be within the petition area. The regulations only require that surface mining operations are within the petition area and affect fragile lands, regardless of whether those fragile lands are within the petition area. However, the park is approximately 20 river miles away from the petition area. A study in West Virginia documented that impacts from mining diminished as the distance to upstream mining activities increased (Petty et al. 2010). For additional analysis, see “Chapter 6: Environmental Consequences.” Because of these geographic limitations, mining in the petition area would not likely significantly damage resources within Big South Fork National River and Recreation Area. Therefore, in this petition, the OSMRE will not make a determination on whether the park unit is fragile land within the meaning of SMCRA section 522(a)(3) or 30 CFR § 762.11(b)(2).

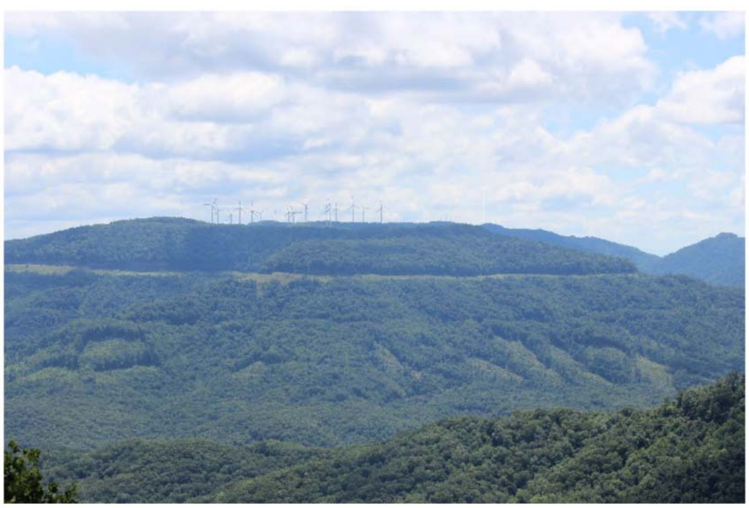
Fragile Lands: Scenic Values

View of Petition Area

A discussion of the scenic values present within the NCWMA and ERTCE area is found in the “Aesthetics” section of “Chapter 4: Affected Environment,” and a discussion of impacts to those values is provided in “Chapter 6: Environmental Consequences.”

The scenic quality of the NCWMA, which is located almost entirely within the Cumberland Mountains, is similar to other watersheds in the Tennessee Cumberland Mountains. The aesthetic character of the area appears relatively natural. However, considerable portions of the area have been affected by past land use practices. Some of the reclaimed strip and deep mines in the area have resulted in a disturbed, forest-covered, mountainous terrain (TWRA 1992). The views within this area are common to the Cumberland Mountains where coal mining, logging, and oil and gas well production have routinely occurred.

Impacts to the visual aesthetic quality of the area could result from surface coal mine development and operation activities. However, given the ability of the landscape to screen these disturbances from view due to topography and vegetative cover, these impacts would likely be localized. The impacts would affect only those individuals in the presence or proximity of a particular mine or equipment, and the extent of the intrusion would be highly dependent on the type of equipment used, the number of personnel present, and the size and location of the mine. Impacts would persist in the near term during development of the mines and as reclamation is initiated.



View of Land Use Practices South from the Petition Area

Scenic landform features contained in the Cumberland Trail State Park and within the evaluation area include two waterfalls (Adkins Branch and Duncan Branch), one spring (Tank Springs), one rock formation (Overhang Rock), and six highpoints (Bear Knob, Cross Highpoint, Gibson Knob, Guinea Hill Knob, Lick Creek Mountain, and Salting Knob). Scenic landform features in the NCWMA and ERTCE area include nine waterfalls (Asher Branch, Hickory Creek, Jennings Creek, Meadow Creek, Rock Creek, Small Hollow, Thirteen Hollow, Waterfall Branch, and Wheeler Creek) and two rock formations (Cumberland Trail Rock Window and Titus Arch). Approximately half of the scenic landform features are within the 1,200-foot-wide ridgeline corridor petition area submitted by the State of Tennessee. Views of landscapes at most locations within the area have Class B (Typical) scenic attractiveness because they have generally positive, yet common, attributes of variety, unity, vividness, mystery, intactness, order, harmony, uniqueness, pattern, and balance. Some areas deemed Class C (Indistinctive) scenic attractiveness have low scenic qualities, lack any consequential water or rockforms, and have weak or missing attributes of the scenic attractiveness elements described above. For additional information see the section "Impacts of the Alternatives on Visual Resources" in "Chapter 6: Environmental Consequences."

Geologic information available to the OSMRE indicates that the majority of the mineable coal seams in this area are located on the upper portions of the mountains (see "Chapter 5: Evaluation of Coal Resources"). As the petition area boundaries generally follow the higher ridgelines within the NCWMA and ERTCE, this places the majority of the mineable coal seams in or in the proximity of the petition area corridors. Thus the visual impacts associated with previous mining and the potential for impacts to scenic resources associated with any future mining are most likely to occur in or near the petition corridors. Mining along the highest elevations of these corridors has the greatest potential to significantly damage the scenic values of the NCWMA in the near term until reclamation of surface mines is fully realized.

Based on this analysis, the OSMRE has determined that surface coal mining operations could significantly damage the elk viewing tower, an area of high esthetic recreational value due to high environmental quality.

Historic Lands

The petitioner contends that the petition area includes "areas containing historic, cultural, or scientific resources" and that mining would damage these resources. The petitioner does not, however, provide specific examples of historic resources within the petition area or how coal mining could affect any existing historic structures. The petitioner has provided information related to known archeological sites with the NCWMA, specifically "eight recorded archeological sites completely or partially within the State's Petition area." The petitioner states that these areas are of archaeological significance and that mining could damage them.

Prior to permit authorization for surface coal mining, the OSMRE must comply with section 106 of the National Historic Preservation Act (NHPA). The NHPA requires federal agencies to take into account the effects of their undertakings on historic properties, and to afford the Advisory Council on Historic Preservation a reasonable opportunity to comment (36 CFR § 800.1(a)). Historic properties as defined under the NHPA are any prehistoric or historic district, site, building, structure, or object included in or eligible for inclusion on the National Register of Historic Places (36 CFR § 800.16(l)). Historic properties under the NHPA may also include traditional cultural properties listed on the National Register of Historic Places. This term "historic properties" corresponds to the phrase used in SMCRA and the implementing regulations (30 CFR § 779.12(b)(1)) "historic or archaeological resources listed or eligible for listing."

Similar to NHPA, SMCRA would require the identification of cultural resources (30 CFR §§ 779.12(b) and § 783.12(b)) and the preparation of a plan to prevent or minimize adverse effects to resources that are eligible or listed in the national register before the mining permit could be approved under 30 CFR § 780.31(a) or § 784.17(a). If a plan cannot be agreed upon by both the SMCRA regulatory authority and the agency with jurisdiction for the historic site, then a mining permit is denied. Before issuing a permit, OSMRE must make a finding that the application review process has taken into account the effect of the proposed permitting action on properties listed on and eligible for listing on the National Register of Historic Places (30 CFR § 773.15(k)). OSMRE and the Tennessee State Historic Preservation Office have entered into a programmatic agreement in order to meet the requirements of SMCRA, as well as the NHPA.

According to the Tennessee Historical Commission, 30 properties on the National Register of Historic Places exist within the four counties that make up the NCWMA and ERTCE: 18 in Anderson County, 6 in Campbell County, 2 in Morgan County, and 4 in Scott County (NPS 2014a). None of the properties appear to be within the petition area. There are 11 known archaeological sites within the evaluation area that are potentially eligible for the national register. Of these, 7 sites are within 100 feet of coal seams and could be impacted by mining activities, regardless of the type of mining undertaken.

As part of the NHPA consultation process, the OSMRE would consult with the state historic preservation office on the potential to adversely affect archeological resources and how project impacts could be limited through avoidance, minimization, or mitigation. Since these resources are already protected under both SMCRA and the NHPA, they do not qualify as historic lands that could be significantly damaged from surface coal mining operations because sufficient protection currently exists to minimize the potential for impacts.

The Cumberland Plateau Region as a National Heritage Corridor

The petitioner states that the value of the petition area as a place of historic, scientific, and cultural resources is further evidenced by the proposal to federally designate the Cumberland Plateau region as a national heritage corridor. The petitioner alleges that surface mining in the petition area would damage important historic and cultural resources. If designated, the Cumberland Plateau corridor would be one of the largest national heritage areas, covering a total of 22,919 square miles and encompassing 21 counties. The petition area would comprise a very small percentage of the overall size of proposed corridor and would be one of 31 wildlife management areas located within the corridor.

As part of this analysis, the OSMRE reviewed the reference document supplied by the petitioner: *The Cumberland Plateau Heritage Corridor: Feasibility Study and Assessment of Impact for National Heritage Corridor Designation* (Alliance for the Cumberlands 2006). The feasibility study was prepared by the Alliance for the Cumberlands, a regional nonprofit organization, and was submitted by the State of Tennessee to the National Park Service (NPS) on May 10, 2006. The Alliance for the Cumberlands is the sponsoring organization for the initiative in partnership with the State of Tennessee. According to the executive summary of the feasibility study, “the primary purpose of the study was to determine whether the Cumberland Plateau region of Tennessee meets the Federal criteria for designation as a National Heritage Corridor.” The study concluded that the plateau region meets the federal criteria for designation and found that local residents are in favor of such a designation and were prepared to support its implementation if the state is successful in achieving it.

The NPS has a list of ten interim criteria for evaluation of candidate areas. The first and third criteria seem most relevant to this assertion. Under these criteria the area must

- have an assemblage of natural, historic, or cultural resources that together represent distinctive aspects of American heritage worthy of recognition, conservation, interpretation, and continuing use, and are best managed as such an assemblage through partnerships among public and private entities, and by combining diverse and sometimes noncontiguous resources and active communities
- provide outstanding opportunities to conserve natural, cultural, historic, and /or scenic features

The OSMRE reviewed the Cumberland Plateau National Heritage Corridor Feasibility Study and NPS criteria to determine if there are specific restrictions regarding surface mining operations on lands that fall within a recognized national heritage area. The feasibility study mentions surface mining in a number of places, both in a historical context and as a negative impact to species and habitats in the region. A review of the national heritage area program found no restrictions regarding surface mining operations that apply to land within a recognized national heritage area.

The feasibility study also makes two specific references to mining that recognize that multiple-use activities within the Cumberland Plateau area would continue even in the presence of a national heritage area designation. In discussing natural resource initiatives within in region, the study notes that the TWRA and the Cookeville Department of Fish and Wildlife Resources are developing habitat conservation plans that are intended to help protect "…rare species while allowing authorized activities such as mining, forestry, and water supply to proceed." In a discussion of local conservation initiatives, the study notes that two former wildlife management areas that now make up a significant part of the NCWMA and subsequently the petition area, the Royal Blue Wildlife Management Area and the Sundquist Wildlife Management Area are each "… jointly managed for coal mining and recreational use."

As of February 2015, the OSMRE had no record of a federal designation having been made. In addition, the NPS has not made any recommendation regarding the study (Berry pers. comm. 2015). Therefore, although informative, the feasibility study has not led to a designation or produced additional documentation that suggests a national heritage corridor could be significantly damaged by surface coal mining operations.

After reviewing all information available relevant to this allegation, the OSMRE concluded that the record does not support a determination that the petitioner's assertion that the value of the area as a place of historic, scientific, and cultural resources would be significantly damaged by surface coal mining operations.

Connecting the Cumberlands: The petitioner points to its own acquisition of lands associated with the "Connecting the Cumberlands" project, as evidence that the petition area has important historic, cultural, and scientific value. The petitioner alleges that surface mining would damage important historic and cultural resources located within this area. However, the petitioner fails to provide any specific evidence in furtherance of this assertion. OSMRE was unable to independently locate such evidence.

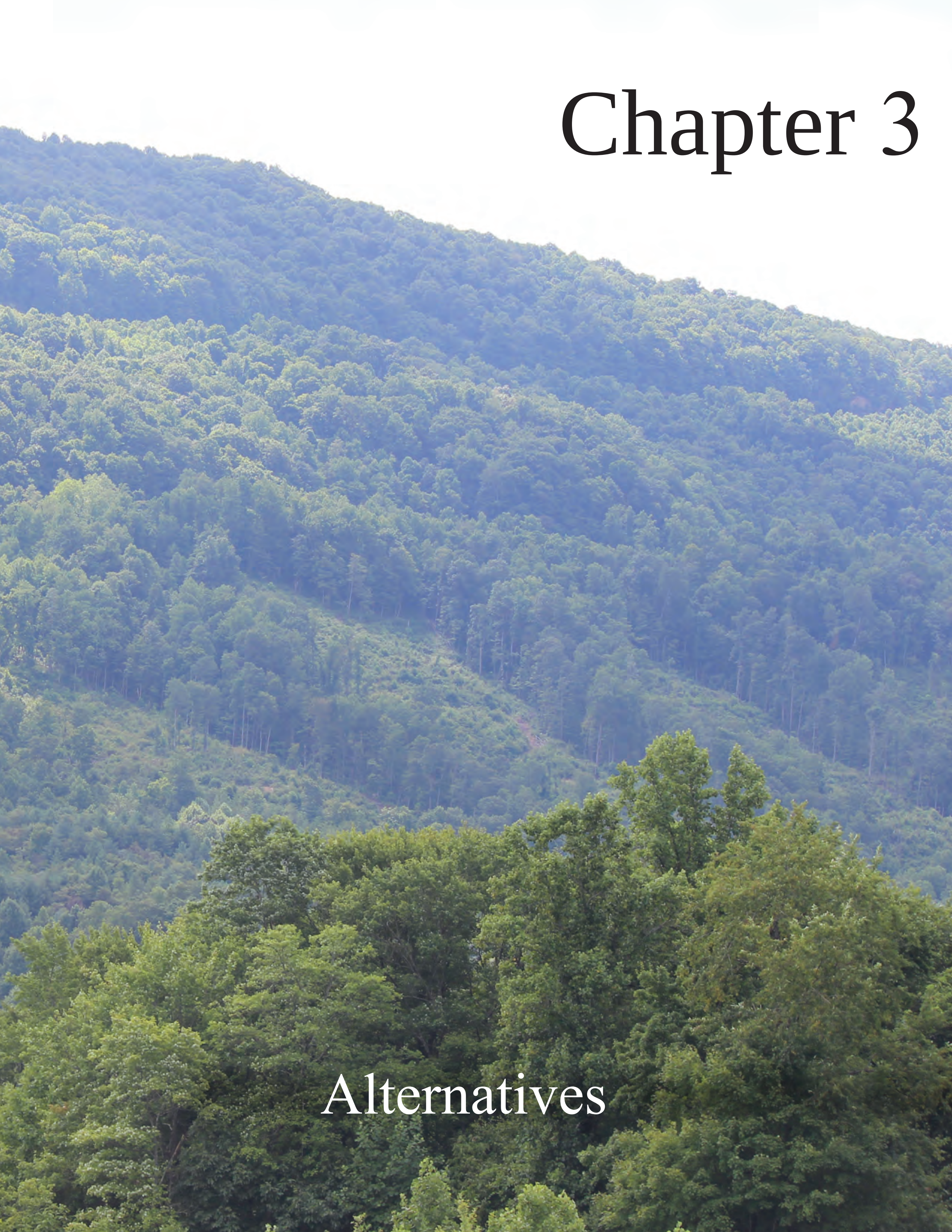
After reviewing all information available relevant to this allegation, the OSMRE concluded that the record does not support a determination that the petitioner's assertion that the value of the area as a place of historic and cultural resources could be significantly damaged by surface coal mining operations.

CONCLUSION

After reviewing all information available relevant to primary allegation (2), the OSMRE has determined that the record supports a conclusion that the petition area or areas adjacent to it contain valuable fish and wildlife habitat that could be significantly damaged by surface coal mining operations in the petition area, specifically as it relates to forest-dependent birds such as a the cerulean warbler and plants such as the Ozark bunchflower and pale corydalis. Thus, portions of the area meet the definition of fragile lands as described by 30 CFR § 762.5. The OSMRE has also determined that the elk viewing tower is fragile land because it provides recreational value due to high environmental quality and could be significantly damaged as a result of surface coal mining operations.

However, the OSMRE rejects the assertion that surface coal mining could significantly damage the Cumberland State Trail, as SMCRA protections are already in place and intended to afford parks sufficient protection from surface coal mining operations. Finally, the OSMRE rejects the assertion that there are historic resources in the NCWMA or ERTCE and the petition area that could be significantly damaged as a result of surface coal mining operations. The OSMRE finds that this assertion lacks merit because these resources, though present, would be adequately protected by current regulations. Therefore, the area does not qualify as either historic or fragile lands as defined by 30 CFR § 762.10.

Chapter 3



Alternatives

CHAPTER 3: ALTERNATIVES

The National Environmental Policy Act (NEPA) requires federal agencies to consider a range of alternatives and to fully evaluate all reasonable alternatives that address the purpose of and need for taking action (43 CFR § 46.420). Alternatives under consideration must include a "no-action" alternative in accordance with Council on Environmental Quality regulations (40 CFR § 1502.14). Action alternatives may originate from the proponent agency, applicant or petitioner, local government officials, or members of the public at public meetings or during the early stages of project development. Alternatives may be developed in response to comments from coordinating or cooperating agencies. Alternatives that do not address the purpose and need can be dismissed from detailed consideration.

In this draft petition evaluation document / environmental impact statement (draft PED/EIS), the Office of Surface Mining Reclamation and Enforcement (OSMRE) evaluates the State of Tennessee petition to designate portions of the North Cumberland Wildlife Management Area (NCWMA) and Emory River Tracts Conservation Easement (ERTCE) in Anderson, Campbell, Morgan, and Scott Counties as unsuitable for surface coal mining operations. This chapter describes the alternatives being considered in this draft PED/EIS, ranging from designating all lands in the petition area unsuitable for all or certain types of surface mining operations, recommending approval of the petition in part or in whole; recommending other areas for designating as unsuitable for surface coal mining operations; or not designating any of the lands in the area as unsuitable (the "no-action" alternative). The OSMRE may decide to designate the petition area if it finds the assertions made by the petitioners to be valid. However, the OSMRE has the discretion to deny the petition in whole or in part or to designate an alternative area to the petition. Even if OSMRE finds the petitioner's assertions to be valid, it may also choose to protect impacted resources in other ways such as requiring actions to ensure impacts are reduced.

Specifically, this chapter includes the following:

- a discussion of the process by which the proposed alternatives were developed
- a description of the proposed alternatives and their associated actions, including the State of Tennessee petition and the no-action alternative
- a discussion of alternatives or actions considered but dismissed from detailed evaluation
- a comparison of the alternatives in terms of their elements and expected environmental impacts
- the identification of the preferred alternative
- the identification of the environmentally preferred alternative
- a summary of the proposed mitigation, as described in "Chapter 6: Environmental Consequences"

DEVELOPMENT OF THE ALTERNATIVES

Since project inception, the OSMRE has worked in close partnership with the cooperating agencies in developing the draft alternatives and the current suite of options presented in this draft PED/EIS. The OSMRE initially proposed to consider six alternatives in the draft PED/EIS. After review of the initial set of alternatives, the OSMRE refined, revised, and replaced several of the initial alternatives to ensure consistency with the intent of the petitioner and to develop a reasonable range of alternatives as required under NEPA. The resulting set of six draft alternatives was developed after considering the intent of the petitioners on the ridgelines within the NCWMA, additional ridges not considered in the original petition, impacts of roads and remining, and evaluation of unique and sensitive areas within the NCWMA.

In developing the final six draft alternatives, the OSMRE used the petitioner's ridgeline boundaries for alternative 2, and then considered the impacts of roads and remining (alternative 3), additional ridgelines (alternative 4), and narrower ridgeline buffers (alternative 6). For alternative 5, the OSMRE considered the intent of the petition and sought to protect sensitive and unique features within the NCWMA.

To arrive at alternatives 3 through 6, the OSMRE used a geographic information system (GIS) approach to identifying ridgelines, roads, remining areas, and identified sensitive and unique areas within the NCWMA. The use of the GIS and evaluation criteria allowed the analysis to exclude manually digitizing or relying on operator interpretation of visible data. In addition, the GIS allowed petition boundaries to consistently follow watershed boundaries of a designated size.

Following these criteria, the OSMRE developed alternatives 3 through 6 using the petitioner's original petition boundary (alternative 2) as a reference model. This reference model was then modified using GIS techniques to develop the remaining alternatives, except alternative 4. The footprint of each alternative captures the essence of each alternative's environmental protection objectives.

For alternative 4 (incorporating additional ridgelines), the OSMRE did not use the original State petition boundaries (alternative 2). Alternative 4 was developed by independently identifying ridgelines within the NCWMA using spatial analysis methods and digital elevation data. The OSMRE determined that using Strahler third order watersheds provided a pattern most closely resembling the ridgeline pattern of the State petition boundary (alternative 2). A 600-foot plan-view width corridor was calculated around the resulting ridgelines and became the footprint of alternative 4. In addition, areas within 100 feet of stream channels were deleted from the OSMRE identified ridgeline corridors in alternative 4, because those areas are already protected under the Surface Mining Control and Reclamation Act (SMCRA). The OSMRE-identified ridgelines were then compared to the State petition area ridgeline corridors for consistency. Any additional ridgelines not found on the State petition were subsequently added to the footprint of alternative 2 and became alternative 4.

DESCRIPTION OF PROPOSED ALTERNATIVES

Below is a summary of the alternatives carried forward for detailed analysis in the draft PED/EIS. "Chapter 6: Environmental Consequences" discusses the potential impacts to the human environment of implementing each alternative.

In considering the alternatives described below, it is important to note that the OSMRE cannot designate as unsuitable for surface coal mining operations lands that are covered by an existing permit issued under SMCRA (30 CFR § 762.13(b)). As such, any designation made by the OSMRE to declare any portion of the petition area unsuitable for mining would not include areas under permit at the time of the designation. As of March 15, 2012, OSMRE records indicated 12 permitted areas that were at least partly within the petition boundary. These included four surface mines, eight underground mines, one refuse area, and two haul roads (table 3-1).

TABLE 3-1: CURRENTLY PERMITTED AREAS EXCLUDED FROM DESIGNATION

Currently Permitted Areas	Number	Acres in Alternatives 2 and 3	Number	Acres in Alternative 4	Number	Acres in Alternative 5	Number	Acres in Alternative 6
Surface mines	4	801	4	904	2	278	4	457
Underground mines	8	132	8	151	4	12	8	65
Refuse areas	1	5	2	26	0	0	1	5
Haul road	2	68	2	75	1	11	2	43
Tipple	1	9	1	9	0	0	1	2
Total		**1015**		**1165**		**301**		**572**

All of the alternatives being evaluated are examined in context with the 172,000-acre area that makes up the NCWMA and ERTCE. OSMRE cannot predict with certainty where new mining applications could be sited; however, it can determine the number of areas available to surface coal mining or remining activities within the 172,000-acre area. For example, under alternative 1, a maximum of approximately 65,830 acres of unmined areas and 16,925 acres of previously surface mined areas would be available for surface mining and remining, respectively (see table 3-2). Alternative 1 is therefore considered to have the largest available coal mining resource of all of the alternatives considered.

TABLE 3-2: MAXIMUM POTENTIAL ACREAGE AVAILABLE FOR SURFACE MINING AND REMINING WITHIN THE EVALUATION AREA BY ALTERNATIVE

Alternative	Potential Surface Mineable Acreage	Previously Surface Mined (Remining) Acreage
Alternative 1 (No Action)	65,830.3	16,924.9
Alternative 2	31,736.5	8,146.6
Alternative 3 (Preferred Alternative)	31,736.5	16,924.9
Alternative 4	28,463.4	16,924.9
Alternative 5	56,954.5	15,399.9
Alternative 6	46,664.2	12,075.2

ALTERNATIVE 1: NO DESIGNATION OF AN AREA AS UNSUITABLE FOR SURFACE COAL MINING OPERATIONS (NO-ACTION ALTERNATIVE)

As set forth in 40 CFR § 1502.14(d), the Council on Environmental Quality regulations for implementing NEPA require that an EIS “include the alternative of no action.” The no-action alternative can be defined in two ways. It can be defined as no change from current management direction or level of management intensity, or no action can mean “no project” where a new project is being proposed (43 CFR § 46.30). In this draft PED/EIS, the no-action alternative is a combination of both definitions, and would require the OSMRE to

- deny the State petition and
- continue authorizing, where appropriate, surface coal mining within the petition area.

Denial of the State Petition: The OSMRE determined the petitioners fulfilled the requirements of the federal regulations and filed a complete petition to designate the subject lands as "unsuitable for surface coal mining operations" (30 CFR § 764.13). Therefore, choosing the no-action alternative would have the same effect as deciding not to designate any of the petition area as unsuitable for surface coal mining operations. As described above, the OSMRE must make a decision relevant to the petition (30 CFR § 764.19). The no-action alternative, for the purpose of this analysis, includes the OSMRE decision to deny the petition due to a failure to meet the criteria for a determination set out in SMCRA (30 USC § 1272 (a)(3)). The impacts of the no-action alternative discussed in "Chapter 6: Environmental Consequences" include the assumption of a level of future surface coal mining operations based on historic activity.

Continuation of Current Regulation of Coal Resources in the Petition Area: The selection of this alternative would not result in the approval of any specific surface coal mining operations within the petition area. Approval or denial of a specific surface coal mining operation can be issued only after an applicant has submitted to the OSMRE a permit application with site-specific data that meet all the requirements of SMCRA and the implementing regulatory program. As a part of reviewing any such application for compliance with SMCRA regulations, the OSMRE would provide an opportunity for public comment and would undertake an appropriate environmental review in compliance with NEPA. Prior to starting a surface coal mining operation, an applicant must also obtain the appropriate permits and authorizations from other federal, state, and local agencies including but not limited to the Mine Safety and Health Administration, the US Army Corps of Engineers, and the Tennessee Department of Environment & Conservation (TDEC).

The OSMRE calculated an average annual surface coal mining rate based on approximately 30 years of data (1984–2014) for the greater NCWMA and ERTCE area. During this period, 74 individual permits were issued. Calculations used for each of these 74 permits were based on estimated disturbed acreage as submitted in the permit application. The OSMRE found the average annual rate of surface coal mining to be approximately 112 acres per year. As described in "Chapter 6: Environmental Consequences," the OSMRE expects this rate to reflect future mining impacts.

ALTERNATIVE 2: STATE PETITION DESIGNATION

Under alternative 2, the OSMRE would designate as unsuitable for surface coal mining operations all public access lands proposed in the State petition and petition area map (figure 3-1). Under this alternative, 505 miles of ridgelines with a 1,200-foot corridor (600 feet on both sides of the ridgeline) would be designated as unsuitable for surface coal mining.

The proposed area covers approximately 67,326 acres. The OSMRE cannot designate as unsuitable for surface coal mining operations lands already permitted under SMCRA (30 CFR § 762.13(b)), and that acreage amounts to 1,015 acres (refer to table 3-1). The total area designated as unsuitable for mining would be approximately 66,311 acres, effectively precluding from the State petition area all lands already permitted.

Underground mining and auger mining from outside the petition area resulting in no surface disturbance within the petition area would be allowed. Auger mining is defined as "a method of mining coal at a highwall by drilling holes into an exposed coal seam from the highwall and transporting the coal along an auger bit to the surface" (30 CFR § 701.5). A highwall is "the face of exposed overburden and coal in an open cut of a surface coal mining activity or for entry to underground mining activities" (30 CFR § 701.5). These mining activities would likely result in access and haul road development outside the petition area.

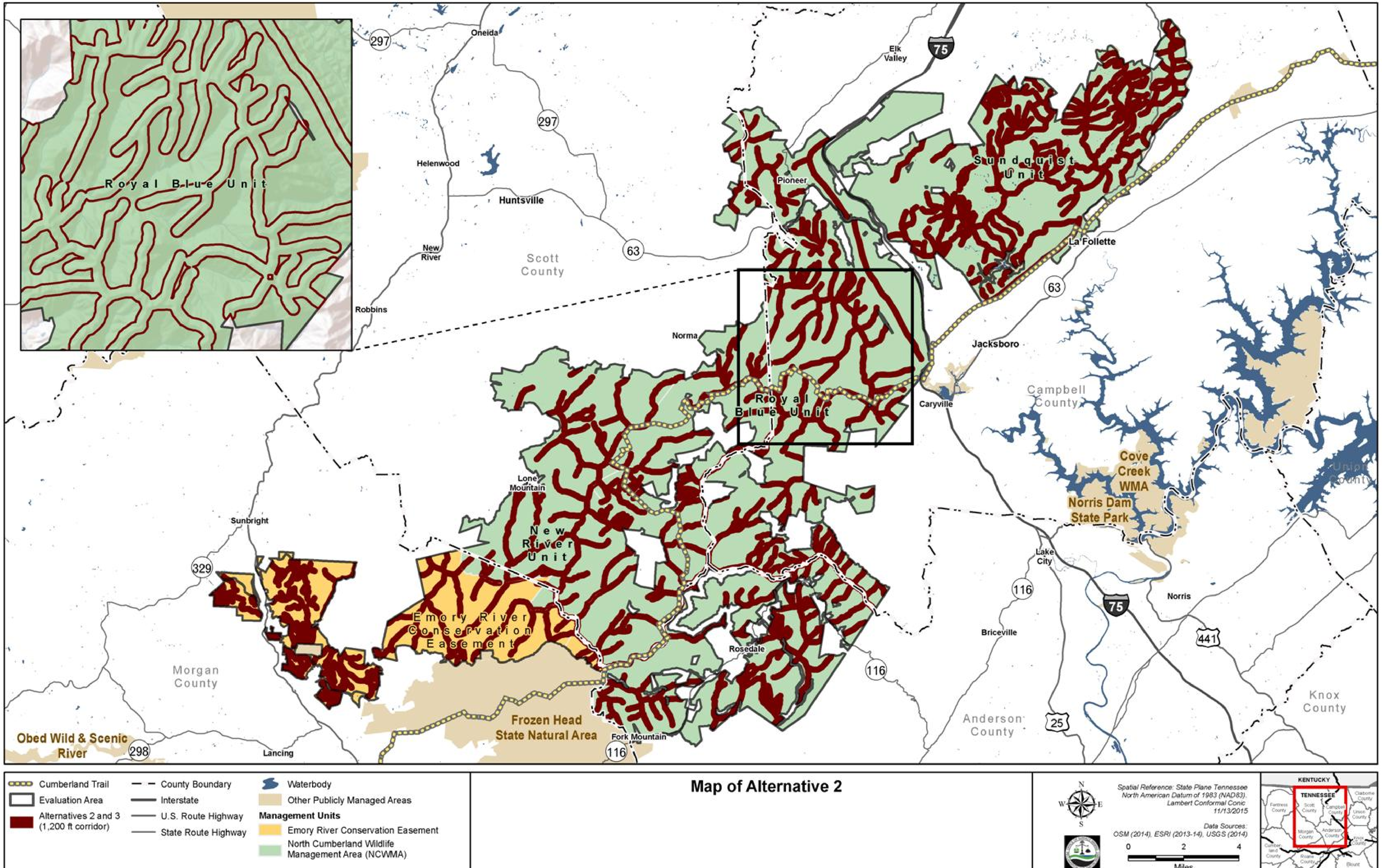


FIGURE 3-1: MAP OF ALTERNATIVE 2

ALTERNATIVE 3: STATE PETITION DESIGNATION WITH REMINING AND ROAD ACCESS (PREFERRED ALTERNATIVE)

Under alternative 3, the OSMRE would designate as unsuitable for surface coal mining operations all public access lands proposed in the State's petition and petition area map, as described under alternative 2. Similarly it would allow underground mining and auger mining from outside the petition area that resulted in no surface disturbance within the petition area. However, the OSMRE would also allow remining (pursuant to 30 CFR § 785.25) to reclaim previously mined areas. In addition, the development and use of access and haul roads through the designated area, as described for alternative 2, would be allowed to facilitate remining efforts.

Access and haul roads are roads developed for the purposes of travel by vehicles used in surface coal mining and reclamation operations. The road consists of the entire area within the right-of-way, including the roadbed, shoulders, parking and side areas, approaches, structures, ditches, and surface (30 CFR § 701.5). These roads are used for travel by coal hauling vehicles to and from transfer, processing, or storage areas (30 CFR § 701.5). The haul roads would vary in width based on the vehicle used, but based on an 18-foot-wide vehicle (necessary for operations at a mine site), a two-lane haul road would be approximately 63 feet wide (US Department of Labor 1999) to ensure passage of all vehicles necessary for surface coal mining operations. Road construction would include clearing land and associated timber and other vegetation in the right-of-way for the road. Heavy equipment would be used to grade and gravel the roadbed to allow for safe travel. Most coal mining in Tennessee is remining where existing access roads are available for use with little improvement required.

Remining is engaging in "surface coal mining and reclamation operations which affect previously mined areas" (30 CFR § 701.5). Previously mined areas are those areas affected by surface coal mining prior to the enactment of SMCRA. Remining allows for the restoration of previously unreclaimed areas back to their original condition. For example, spoil (a mixture of rocks, rock fragments, soil, and other natural materials) generated during active remining would be used as fill during reclamation to eliminate all highwalls and depressions, to the extent that sufficient spoil is available. Remining in streams can occur if the stream has been adversely impacted by surface mining operations at some point prior to the passage of SMCRA (in 1977).

> *Highwall: The cliff-like excavated face of exposed overburden and coal in surface mining* (*http://www.wrcc.osmre.gov/resources/glossary.shtm*).

The OSMRE has created incentives to encourage coal companies to remine areas mined prior to passage of SMCRA (August 3, 1977) to address public safety or environmental problems. The OSMRE identified approximately 4,516 acres of lands within the petition area mined prior to passage of SMCRA. Although not all previously mined areas were left inadequately reclaimed, pre-SMCRA abandoned mine problems (e.g., highwalls, eroded areas, poor quality mine drainage, etc.) are present at various locations throughout the petition area. For example, the OSMRE identified 390.7 miles of highwalls within the NCWMA / ERTCE. There are 201.6 miles of highwalls for alternatives 2 and 3, whereas there are 219.5 miles of highwalls for alternative 4.

As with alternative 2, alternative 3 would designate 505 miles of ridgelines with a 1,200-foot corridor (600 feet on both sides of the ridgeline) as unsuitable for surface coal mining operations. The proposed area covers approximately 67,326 acres. Since the OSMRE cannot designate as unsuitable for surface coal mining operations lands covered by a permit under SMCRA (30 CFR § 762.13(b)), and that acreage amounts to approximately 1,015 acres, which would therefore not be considered as part of this alternative, see table 3-1 above. Alternative 3 would designate approximately 66,311 acres as unsuitable for surface mining.

The OSMRE cannot identify all specific locations or state with certainty the extent of all remining-eligible areas that are present in the petition area. However, using all available tools, including aerial imagery, existing permit record information, TDEC abandoned mined land inventory records, topographic map information, and aerial photography, the OSMRE has approximated the amount of remining that could occur within the petition area boundaries. As the presence of highwalls on previously mined areas is likely to be the most pervasive environmental or safety problem present within the petition area, the OSMRE has used available LiDAR and aerial imagery to estimate the amount of highwall present. Approximately 201.6 miles of highwalls are present in the petition area. To estimate the amount of disturbance that may occur on remining-eligible areas within the petition boundaries, the OSMRE reviewed permitting records that reflect surface mining activities within the petition area over the last 30 years. The OSMRE concludes that under this alternative, as much as 183.7 miles of highwall within the petition area may be subject to future remining (figure 3-2).

The OSMRE would evaluate any proposed surface mining activities within the petition area and decide whether to consider the area unsuitable for surface mining activity based on the effects previous mining had on the proposed site. With the exception of the subsurface effects of auger mining, surface mining activities would not be permitted within the petition area (i.e., the area would be considered unsuitable for mining) except where said activities would reclaim or eliminate, to the standards of 30 CFR § 785.25, actual or potential environmental or safety problems related to the previously mined areas. In addition to the previously affected area, an undisturbed area may be deemed suitable for surface mining activities if this area is necessary to facilitate reclamation that alleviates the actual or potential environmental and safety problems related to the proposed remining of previously mined areas.

ALTERNATIVE 4: EXPANDED CORRIDOR DESIGNATION WITH REMINING AND ROAD ACCESS

Under alternative 4, the OSMRE would designate as unsuitable for surface coal mining operations 569 miles of ridgeline (with a 1,200-foot corridor; 600 feet on both sides of the ridgeline) covering 76,133 acres. Alternative 4 includes the ridgelines proposed in the State's petition and petition area map, as described under alternative 2, plus additional ridgelines identified by OSMRE. Since the OSMRE cannot designate as unsuitable for surface coal mining operations lands covered by a permit issued under SMCRA (30 CFR § 762.13(b)), 1,165 acres of the 76,133 acres would not be considered as part of this alternative, see table 3-1 above. Alternative 4 would designate approximately 74,968 acres as unsuitable for surface coal mining operations (figure 3-3).

Access and haul roads as described under alternative 2, as well as remining and reclamation activities as described under alternative 3 would be allowed. Using the same methodology as alternative 3 for estimating the amount of land that would be appropriate for remining, the OSMRE concludes that under this alternative, as much as 219.5 miles might be subject to future remining.

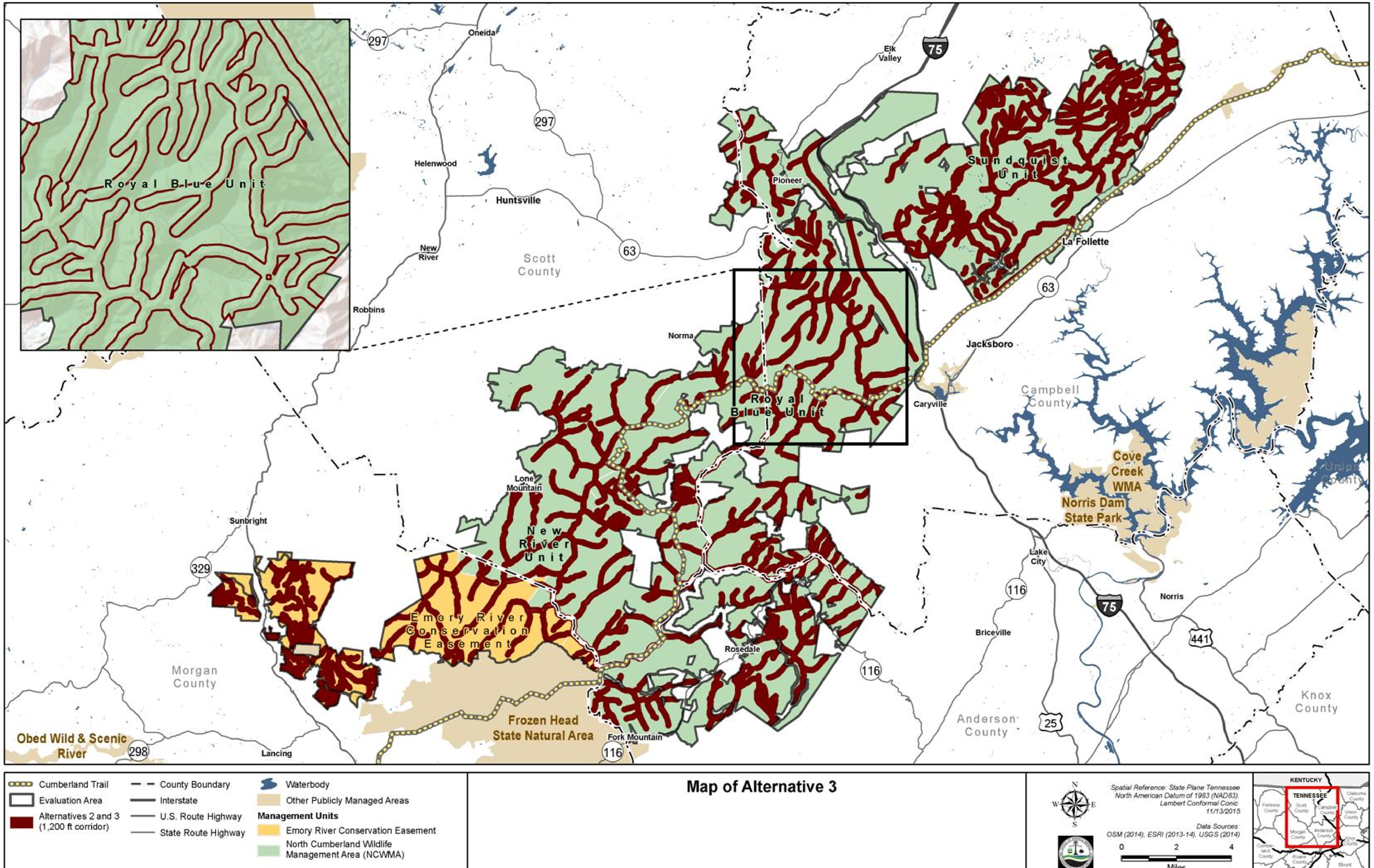


FIGURE 3-2: MAP OF ALTERNATIVE 3 (PREFERRED ALTERNATIVE)

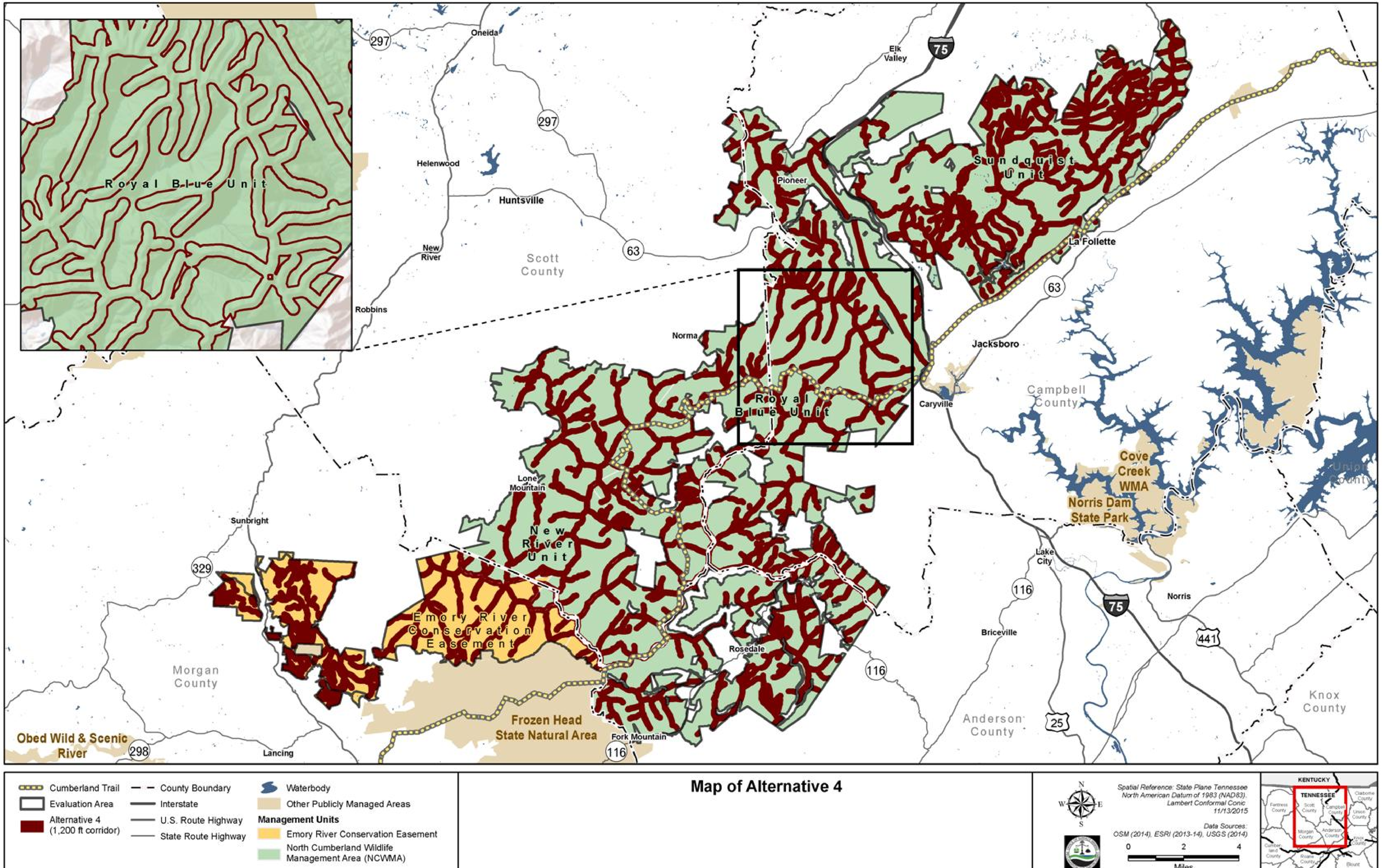


FIGURE 3-3: MAP OF ALTERNATIVE 4

ALTERNATIVE 5: TARGETED RESOURCE PROTECTION DESIGNATION

Under alternative 5, the OSMRE would designate 12,331 acres of public access lands within the NCWMA as unsuitable for surface coal mining operations. This alternative focuses on designating lands based on the presence of sensitive resources within the ridgelines proposed in the State petition. The 1,200-foot corridor designation applies only to portions of the state-defined petition area with or adjacent to sensitive resources. Sensitive resources were identified based on the location, prevalence, and type of resource.

Ambient noise was identified as a sensitive resource for the public. Specifically, the potential for surface coal mining-related noise to significantly affect the use of the area by the public (noise levels greater than 55 dBA). In contrast to the 1,200-foot corridor described above, this alternative would designate as unsuitable a 1,500-foot wide corridor centered on the Cumberland Trail State Park (3,678 acres) including any associated park campgrounds (55 dBA acoustic impact area; 329 acres).

Natural resource areas were also identified as sensitive, such as sensitive wetlands, the elk viewing tower area, and cerulean warbler core breeding habitat. Areas with associated environmentally sensitive wetlands located in Campbell County on Stinking Creek just downstream of Stell Branch, on Meadow Creek, and on Thompson Creek (3,068 acres) would be designated. Environmentally sensitive wetlands are those that provide functions and benefits that would be difficult or impossible to replace or recreate. Wetlands are considered environmentally sensitive if they provide habitat for rare species or rare natural communities (plant and animal species assemblages), or contain other irreplaceable or irretrievable ecological features such as vernal pools, extensive sphagnum mats, mature forests, springs and seeps, caves, sinkholes, cliffs, waterfalls, headwaters, perched water tables, or slope wetlands, among other characteristics.

Rare or uncommon plant species identified in these wetlands include pale green orchid (*Platanthera flava* var. *herbiola*), hairy willowherb (*Epilobium ciliatum*), halberdleaf tearthumb (*Polygonum arifolium*), netted chain fern (*Woodwardia areolata*), and eastern mannagrass (*Glyceria septentrionalis*). Certain types of wetlands have been identified as potential habitat for rare animals. For example, vernal pools (a type of forested wetland) and sphagnum wetlands (also called “bogs” and “fens”) are vital to certain amphibians. Four-toed salamanders have been found in the Flat Woods (Thompson Creek watershed), Stinking Creek, and Meadow Creek, in shallow or sphagnum-lined ponds, and also in the margins of a beaver pond.

Alternative 5 would also designate 1,327 acres surrounding the Hatfield Knob elk viewing tower area (45 dBA acoustic impact area associated with the noise level that could significantly affect wildlife). In addition, core cerulean warbler breeding habitat (4,545 acres) would be protected (Welton 2014). This area would protect habitat necessary for a variety of other forest-dependent species. Finally, areas with documented occurrences of state-listed species including Ozark bunchflower, Canada lily, American ginseng, pink lady’s slipper, pale corydalis, and leatherleaf meadowrue (500 acres), would be protected (TDEC 2015b). As described above, this would result in a total of 12,331 acres designated as unsuitable for surface coal mining operations (figure 3-4). For a discussion of acoustic impact area identification (including a literature review of noise effects on humans and wildlife) see “Appendix D: Acoustic Resources.”

Since the OSMRE cannot designate as unsuitable for surface coal mining operations lands covered by a permit issued under SMCRA (30 CFR § 762.13(b)), 301 acres of the 12,331 acres would not be considered as part of this alternative, see table 3-1 above. Therefore, alternative 5 would designate approximately 12,030 acres of land as unsuitable for surface coal mining operations.

Implementation of this alternative would effectively preclude (with the exception of the areas that are already covered by a permit) all mining activities conducted on the surface of lands in connection with a surface coal mine, as well as surface operations and surface impacts incident to an underground coal mine. Remining would not be allowed under this alternative. However, underground mining and auger mining from outside the petition area that resulted in no surface disturbance within the designation area would be allowed as described in alternative 2.

ALTERNATIVE 6: REDUCED CORRIDOR DESIGNATION

Under alternative 6, the OSMRE would designate as unsuitable for surface coal mining operations all public access lands proposed in the State petition as discussed under alternative 2, but with a narrower corridor along the ridgelines (figure 3-5). This corridor on each side of the ridgeline would be comparable to the 300 foot buffer indicated in 30 CFR § 761.11(f), which provides that there can be no surface coal mining operations within 300 feet of “any public building, school, church, community or institutional building or public park.” Under this alternative, 505 miles of ridgelines with a 600-foot corridor (300 feet on both sides of the ridgeline) would be designated as unsuitable for surface coal mining operations. The proposed area covers approximately 39,106 acres. Since the OSMRE cannot designate as unsuitable for surface coal mining operations lands covered by a permit issued under SMCRA (30 CFR § 762.13(b)), and that acreage amounts to approximately 572 acres, see table 3-1 above. Therefore, alternative 6 would designate approximately 38,534 acres of land as unsuitable for surface mining.

As with alternative 2, implementation of this alternative would effectively preclude (with the exception of the areas that are already covered by a permit) all mining activities conducted on the surface of lands in connection with a surface coal mine, as well as surface operations and surface impacts incident to an underground coal mine. Remining would not be allowed under this alternative. However, underground mining and auger mining from outside the petition area that resulted in no surface disturbance within the petition area would be allowed. In addition, the development of access and haul roads outside the designated area would likely occur as described in alternative 2.

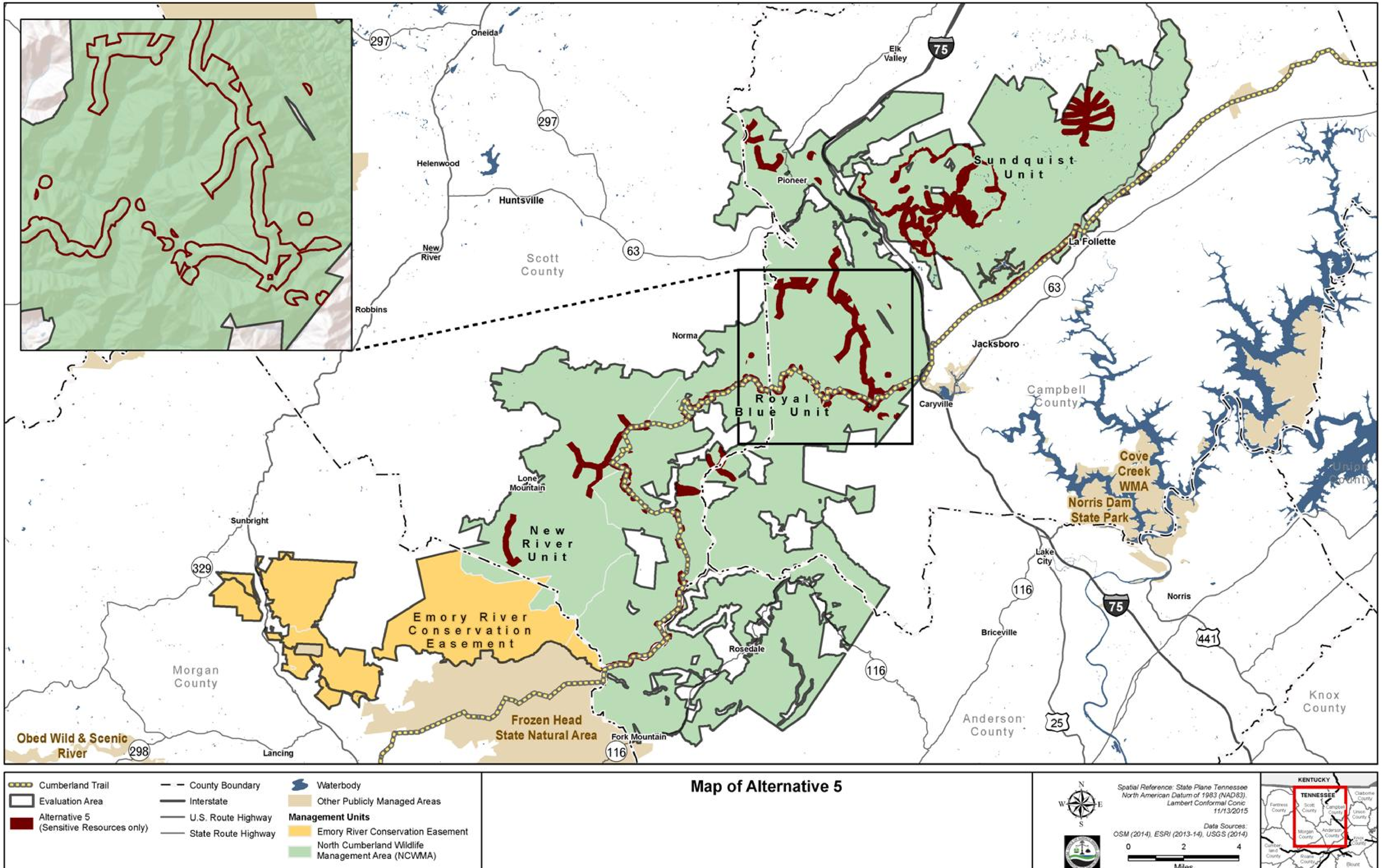


FIGURE 3-4: MAP OF ALTERNATIVE 5

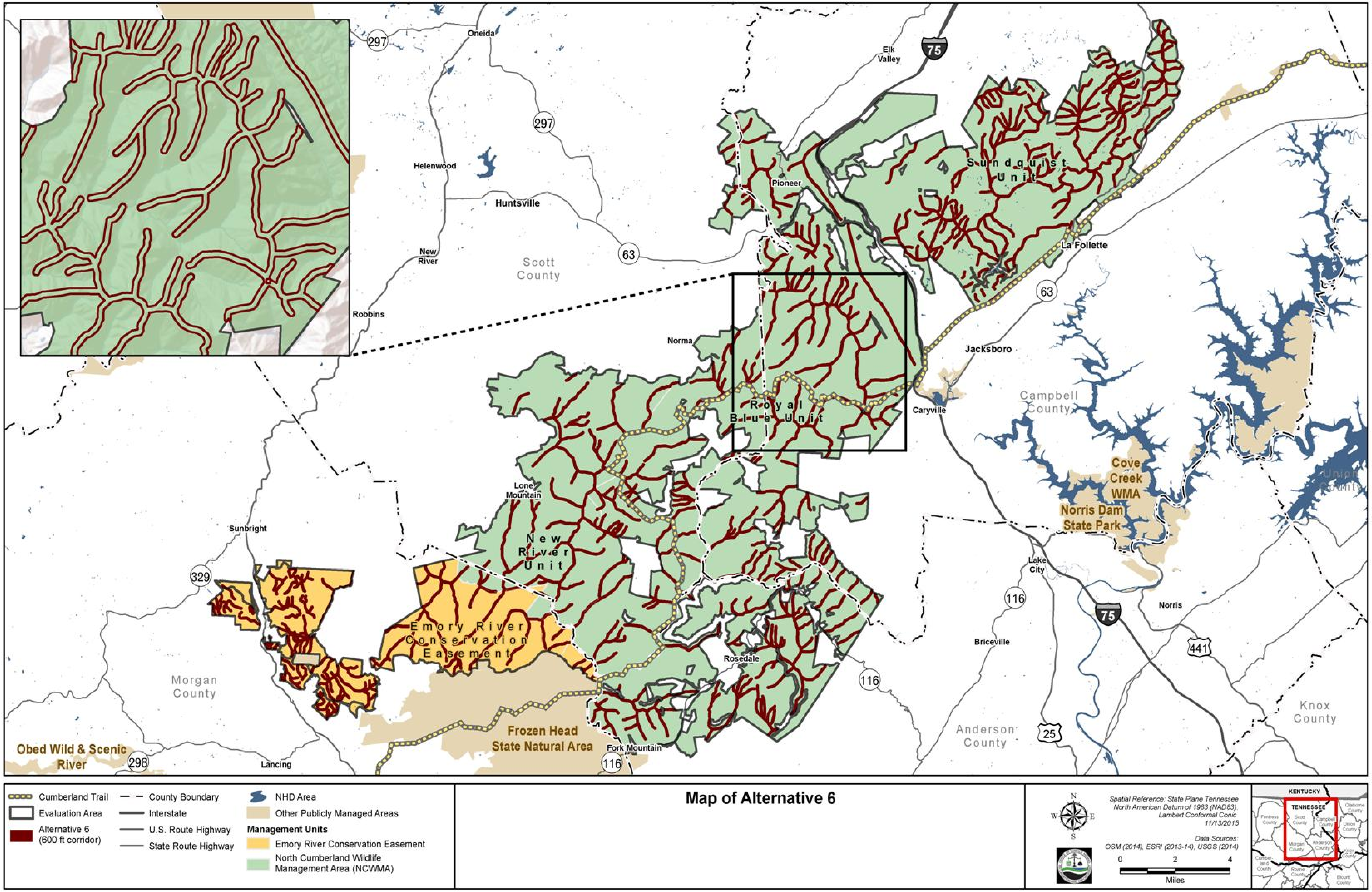


FIGURE 3-5: MAP OF ALTERNATIVE 6

Table 3-3 provides a summary of elements specific to each alternative considered in this draft PED/EIS.

TABLE 3-3: COMPARISON OF ALTERNATIVES

	Total Area Evaluated for Designation	Type of Coal Mining Allowed	Development of Access and Haul Roads Allowed	Remining	Currently Permitted Acreage for Mining Operations
Alternative 1: No–Action Alternative	No acres designated as unsuitable	All types allowed: surface, underground, augering, and remining	Yes	Yes	12,975
Alternative 2: State Petition Designation	1,200-foot corridor, 600 feet on both sides of 505 miles of ridgeline designating 67,326 acres	No surface or remining allowed. Underground and auger mining allowed from outside designation area	No	No	1,015
Alternative 3: State Petition Designation with Remining and Road Access (Preferred Alternative)	Same as alternative 2	Underground and auger mining allowed from outside unsuitable area. Remining allowed in designation area	Yes	Yes	1,015
Alternative 4: Expanded Corridor Designation with Remining and Road Access	1,200-foot corridor, 600 feet on both sides of 569 miles of ridgeline designating 76,133 acres	Same as alternative 3	Yes	Yes	1,165
Alternative 5: Targeted Resource Protection Designation	Designate 12,331 acres associated with the occurrence of sensitive resources	Same as alternative 2	No	No	301
Alternative 6: Reduced Corridor Designation	600-foot corridor, 300 feet on both sides of 505 miles of ridgeline designating 39,106 acres	Same as alternative 2	No	No	572

ALTERNATIVES OR ALTERNATIVE ELEMENTS CONSIDERED BUT DISMISSED

For various reasons, some alternatives or actions were initially considered but eliminated from detailed evaluation. Those alternatives and actions dismissed from further consideration did not meet the definition of a reasonable alternative, as defined by the Council on Environmental Quality and the Department of the Interior. The Council on Environmental Quality defines reasonable alternatives as those that “are practical or feasible from the technical and economic standpoint and using common sense, rather than simply desirable from the standpoint of the applicant.” In addition, the Department of the Interior requires all reasonable alternatives to meet the stated purpose of and need for action. Alternatives found to not be reasonable can be eliminated from detailed consideration. The following discussion describes the rationales for dismissing certain alternatives (40 CFR § 1502.14(a)). These dismissed alternatives, when combined with the alternatives fully evaluated above, constitute a reasonable range of alternatives the OSMRE is required to consider under the NEPA.

Do not designate any of the petition area as unsuitable for surface coal mining operations but restrict the amount of surface mining disturbance that could occur at any one time.

Under this alternative, the OSMRE would specify a maximum acreage of surface mining disturbance that could occur at any one time and discuss the rationale for setting this maximum. Such a designation would minimize the potential impacts on the wildlife corridors and overall environmental quality while controlling the amount and distribution of mining within the ridgeline corridors. When the maximum acreage is reached, permitting of additional surface mining activities would be not be approved until previous disturbances are reclaimed and revegetated to a productivity level acceptable for a phase III bond release.

This alternative presumes that

- some undetermined level of mining could occur within the petition area without triggering the impacts alleged by the petition
- once a mine site has been reclaimed to the point where a bond is released, potential impacts related to the petitioner’s allegations (e.g., that mining is incompatible with state land use plans or programs or will affect fragile lands in a manner that could result in significant damage to important values or natural systems that may exist within the petition area) would no longer exist

This alternative approach would be inconsistent with requirements under SMCRA, where surface mining is allowed in any area subject to specific prohibitions. In addition, there is no standard approach for establishing a total mineable acreage, as the decision to mine a certain area is based on a number of variables, some of which are subjective in nature. As such, choosing a maximum number that could be mined at one time would be arbitrary.

Do not designate any of the petition area unsuitable for surface coal mining operations. For all the OSMRE mining permits on lands within the petition area, obtain concurrence from the Tennessee Wildlife Resources Agency (TWRA) and, if the action is determined to have potential impact on the Cumberland Trail State Park, obtain concurrence from the TDEC before the OSMRE issues permits.

Obtaining the concurrences of the two state agencies responsible for managing the state’s property interest for public access lands within much of the petition area prior to issuance of permits would ensure that surface coal mining operations were compatible with state land use plans and would not adversely affect fragile lands (the two concerns raised in the petition).

Because Tennessee is a federal program state, the decision as to whether to designate an area in Tennessee unsuitable for mining falls to the Secretary of the Department of the Interior acting through the director of the OSMRE. Contrary to this requirement, on a case-by-case basis, this alternative would improperly delegate decision-making authority on issues of mining unsuitability petitions to a non-SMCRA primacy entity; the State of Tennessee in this instance. The OSMRE does not currently have regulatory authority to enact a concurrence process with TWRA. To establish the joint approval concept with the TWRA as per this alternative, the OSMRE must codify this requirement, a long and involved process that may or may not ultimately be allowed under the administrative procedures process. Furthermore, under existing regulations, if the OSMRE determines there is an adverse effect on Cumberland Trail State Park, the proposed mine operation must be jointly approved by both the OSMRE and the TDEC or the site cannot be permitted (30 CFR § 761.11(c)). For these reasons, this alternative will not be further evaluated.

Do not designate any of the petition area as unsuitable for surface coal mining operations. In all OSMRE permits for lands within the petition area, require a wildlife enhancement plan that includes reclamation using the forestry reclamation approach.

Because of the importance of forested ridgelines to terrestrial and aquatic species deemed by the State to have the greatest conservation need, the OSMRE would require the application of the forestry reclamation approach as an enhancement measure for all mined land within the petition area. Such an approach would help to restore the visual quality and aesthetic values associated with the Cumberland Trail. The long-term impacts of the disturbance within the petition area (ridgelines) would be mitigated by restoration of the ridgelines to approximate original contour and implementation of the forestry reclamation approach.

Under the existing regulatory program (30 CFR §§ 780.23(b), 784.15(b), and 816/817.133(c)), the OSMRE requires the applicant for a coal mine permit to consider and coordinate the reclamation revegetation plan with the surface owners of the property and to make all reasonable efforts to accommodate those landowner plans in the permit application reclamation plan. Thus the existing regulatory framework already provides the opportunity for the surface owner of a property that is to be mined to have activities like wildlife enhancement and forest reclamation incorporated into the mine reclamation plan.

This alternative would also fail to recognize the short-term impacts to terrestrial and aquatic habitat and the time it takes for full reclamation of a site to occur. Given some of the forest and aquatic special status species, these short-term impacts may have long-term effects on species population, distribution, and overall survival.

As the type of consultation and coordination contemplated in this alternative already occurs, this alternative essentially provides no additional regulatory benefit while ignoring potential short term impacts. Therefore this alternative will not be included for detailed analysis in this draft PED/EIS.

Designate as unsuitable for surface coal mining operations those parts of the petition area that will have a significant impact on the aesthetic values of the Cumberland Trail.

Under this alternative, certain areas of the Cumberland Trail would be protected by the preclusion of surface coal mining activities in those parts of the petition area directly visible from primary vistas and designated overlooks along the trail. Likewise, no surface coal mining would be allowed in the petition area adjacent to the Cumberland Trail where surface coal mining activities could affect the sound quality or create noise pollution beyond natural background conditions.

To designate lands as unsuitable for surface coal mining operations, the alternative must be based on the analysis of the four unsuitability criteria outlined in SMCRA (30 USC § 1272 (a)(3)). The two criteria to be analyzed based on the State petition are whether surface coal mining operations would be (1) incompatible with existing federal, state, and local land use plans or programs; or (2) affect fragile or historic lands in which such operations could result in significant damage to important historic, cultural, scientific, or [a]esthetic values and natural system. This alternative would not address the suggested incompatibility with existing land use plans or programs or result in effects to fragile or historic lands, but rather is intended to maintain a viewshed and soundscape devoid of surface mining-related disturbances solely for the benefit of the recreational user. Therefore this alternative provides no disposition for or analysis of the contention that coal mining is unsuitable based on the allegations set forth in the petition. Consequently, this alternative was not carried forward for further analysis.

Designate the petition area as unsuitable for mountaintop removal in all situations and cross-ridge mining in previously undisturbed areas.

As described in 30 CFR § 716.3(a), mountaintop removal "surface coal mining and reclamation operations are those that remove entire coal seams running through the upper fraction of a mountain, ridge, or hill by removing all of the overburden and creating a level plateau or gently rolling contour with no highwalls remaining." Under federal regulations, such operations are exempt from the requirements to restore approximate original premining contours during reclamation (30 CFR § 785.14). The term "cross-ridge mining," which is not recognized under SMCRA regulations, refers to a method of mining whereby mountain tops are mined and spoil is placed back on the top of the mountain to restore approximate original premining contours. It also differs from mountaintop removal in that there is significantly less excess spoil material requiring disposal in downslope valley or hollow-fills.

This alternative was dismissed from further consideration for three reasons. First, both mountaintop removal and cross-ridge mining are types of surface mining and as such are already included in this draft PED/EIS for analysis under all alternatives. Second, as a stand-alone alternative, this alternative would ignore the analysis of any potential impacts that could occur as a result of other types of surface mining such as contour mining or area mining. Ignoring impacts from these other types of surface mining could affect the decision-making process. Finally, because the State of Tennessee currently applies the requirements of the Clean Water Act and state counterpart rules and regulations, due to difficulties in disposing of excess spoil generated by this type of mining, it is extremely unlikely that mountaintop removal mining could be approved under the State's current water quality regulatory programs. Therefore, preclusion of mountaintop removal and cross-ridge mining was not carried forward as a stand-alone alternative.

Designate as unsuitable for surface coal mining operations OSMRE-defined ridgelines.

After reviewing the petition, the OSMRE created an alternative reflecting the petitioner's request. Using Strahler third order watershed boundaries, the OSMRE developed a boundary that closely resembled the ridgeline pattern of the State's petition boundary. Within each watershed, any ridgelines lower than the average stream origin elevation were removed, as were ridgelines with elevations having less than 500 feet of topographic relief. A variable-width corridor with a constant slope length of 600 feet was calculated around the resulting ridgelines to create new boundaries. Finally, areas within 100 feet of stream channels were deleted from the petition boundaries. Using this methodology for developing petition area boundaries reduced the total petition area from 67,326 acres (as proposed by the State) to 45,123 acres.

On January 12, 2012, representatives of the OSMRE Knoxville Field Office met with representatives of the State. As a result of that meeting, on February 23, 2012, the State further clarified certain issues related to their petition. In their correspondence, the State agreed that petition boundaries as revised by the OSMRE were more accurate than the boundaries the State had used in their mapping and that the revised boundaries should be used. State correspondence further clarified their petition by indicating that it was not the intent of the State to preclude remining of previously mined areas. The State recognized that with remining there would be the potential for improvement to public safety or environmental benefit. By letter dated June 26, 2012, the State of Tennessee wrote to the OSMRE, stating that its petition intends to include all of the ridges down to the valley floor, which the OSMRE-Knoxville Field Office revised boundary would significantly reduce. In this regard, the State affirmed its original position that the appropriate designation should be 65,469 acres, not 45,131 acres. The State explained that the OSMRE-Knoxville Field Office revision would result in harm to habitats, especially for the "greatest conservation need" species as described in Tennessee's Comprehensive Wildlife Conservation Strategy. It also reiterated the need to protect ridge corridors down to the valley floor as "fragile lands," as defined by OSMRE regulations.

Since these variations of the State's alternative would not meet the intent of the State's petition (because the variations would not protect lands to the valley floor) these variations of an alternative were dismissed from detailed evaluation. However, remining was incorporated into alternative 4 for analysis. For a complete discussion of the correspondences between the OSMRE and the State, see "Chapter 1: Purpose and Need."

COMPARISON OF THE IMPACTS OF THE ALTERNATIVES

Table 3-4 at the end of this chapter provides a summary of the potential environmental impacts of each alternative. Additional details and definitions of terms used are contained in chapter 6.

PREFERRED ALTERNATIVE

The "agency's preferred alternative" is the alternative the agency believes would best accomplish the purpose of and need for action, and fulfill its statutory mission and responsibilities, giving consideration to economic, environmental, technical, and other factors. "It may or may not be the same as the bureau's proposed action, the non-Federal entity's proposal or the environmentally preferable alternative" (43 CFR § 46.420).

The agency has identified alternative 3 as its preferred alternative because it is the most consistent with the State's request. Although alternative 2 reflects the State's original request, in subsequent communications with OSMRE, the State indicated that it would support an alternative that included remining because of its long-term environmental benefits. The State also indicated that remining would allow for the balancing of mining and conservation interests.

In addition, the State indicated through subsequent communications with OSMRE that it disagreed with the agency's methodology for independently identifying ridgelines. Thus, even though alternative 4 would designate a larger area than the State's proposal, OSMRE has determined that alternative 3 is the most consistent alternative with the State's petition.

ENVIRONMENTALLY PREFERABLE ALTERNATIVE

The OSMRE must identify the environmentally preferable alternative in its NEPA documents for public review and comment. The Department of the Interior NEPA regulations (43 CFR § 46.30) and the

Council on Environmental Quality Forty Questions (46 Fed. Reg. 18026) define the environmentally preferable alternative (or alternatives) as follows:

> the alternative required by 40 CFR 1505.2(b) … that causes the least damage to the biological and physical environment and best protects, preserves, and enhances historical, cultural, and natural resources. The environmentally preferable alternative is identified upon consideration and weighing by the Responsible Official of long-term environmental impacts against short-term impacts in evaluating what is the best protection of these resources. In some situations, such as when different alternatives impact different resources to different degrees, there may be more than one environmentally preferable alternative.

The OSMRE has identified two environmentally preferable alternatives. Alternative 2, the short-term environmentally preferable alternative, would designate the largest area of land while avoiding the impacts of remining and access road development, as described in “Chapter 6: Environmental Consequences.” However, the long-term impacts associated with acid mine drainage and sedimentation from pre-SMCRA mine sites would continue. Alternative 4 would be considered the long-term environmentally preferable alternative because it would designate the largest area and would reduce the impacts of acid mine drainage, although there would be short-term impacts as a result of remining. Therefore, alternatives 2 and 4 are considered to best protect, preserve, and enhance historic, cultural, and natural resources.

TABLE 3-4: COMPARISON OF POTENTIAL ENVIRONMENTAL IMPACTS ASSOCIATED WITH EACH ALTERNATIVE

These impacts are described in detail in "Chapter 6: Environmental Consequences." In order to better understand the context and intensity of potential impacts, OSMRE assumes mining could impact on average 112 acres per year (totaling 3,360 acres over the 30-year planning timeframe). OSMRE developed this average rate based on the historic trend; however, the rate could fluctuate over time depending on engineering and economic factors and/or other free market conditions.

Earth Resources (including) • Geology • Topography	Impacts from surface, underground, and auger mining would be permanent, localized, yet comparatively minor because any area subject to surface mining would be reclaimed to the approximate original contour. There would be benefits from remining and restoration of highwalls, and there is a limited amount of surface mining expected (assumed at an average of 112 acres per year). Alternative 1 would not have significant impacts on topography or geology.	Impacts to geology from underground and auger mining underneath the petition area would be permanent, localized, yet comparatively minor, and there would be a benefit since surface geology would remain undisturbed in the petition area. Impacts on topography would be mainly long-term beneficial from the protection of ridgelines in the petition area, but with the ongoing adverse impacts from the inability to remine and reclaim existing highwalls. Impacts would not be significant.	Impacts to geology would be permanent and localized, yet comparatively minor. The overall impacts to geology would be minor and there would be a benefit since surface geology would remain undisturbed in the designation area and reclamation would occur in remined areas. Alternative 3 would have mostly beneficial impacts on topography from the protection of ridgelines within the designation area and the overall beneficial effect on remined areas that are reclaimed. Impacts would not be significant.	Impacts to geology would be permanent and localized, yet comparatively minor, with a benefit since surface geology would remain undisturbed in the designation area and reclamation would occur in remined areas. Impacts on topography under alternative 4 would be mainly beneficial from the protection of ridgelines within the designation area and the overall beneficial effect on remined areas that are reclaimed. Impacts would not be significant.	Impacts to topography and geology from underground and auger mining underneath the petition area would be permanent, localized, yet comparatively minor, and there would be a benefit since surface geology would remain undisturbed in the designation area. Past adverse effects would remain where highwalls exist and cannot be reclaimed since no remining would be permitted. Overall, impacts on topography under alternative 5 would not be significant.	Impacts to geology from underground and auger mining underneath the petition area would be permanent, localized, yet comparatively minor. There would be beneficial impacts because topography and subsurface geology would remain undisturbed in the designation area. Past adverse effects would remain where highwalls exist and cannot be reclaimed since no remining would be permitted. Impacts would not be considered significant.
Air Quality and Greenhouse Gases	Alternative 1 would have near-term adverse impacts to air quality relative to existing ambient conditions for areas in the immediate vicinity of surface mining. Best management practices and compliance with applicable regulations and permit conditions would minimize impacts to this resource, but impacts related to particulate emissions would likely remain unchanged as a result of continued mining in the NCWMA. Greenhouse gas emissions would be less than significant.	Areas within the petition area would potentially experience fewer air quality impacts, but overall emissions in the evaluation area would remain the same as alternative 1. Best management practices and compliance with applicable regulations and permit conditions would minimize impacts to this resource, but impacts related to particulate matter emissions would likely remain unchanged as a result of continued mining in the NCWMA; however, based on the low level of annual production it is unlikely that impacts would be significant. Greenhouse gas emissions from coal extraction would be less than significant.	Areas within the designation area would be less likely to experience localized air quality impacts, because impacts in the designation area would result mainly from remining operations and associated haul roads, which would be a small portion of overall production and would result in periodic and overall minor emissions. Overall emissions in the evaluation area would remain the same as alternative 1. Best management practices and compliance with applicable regulations and permit conditions would minimize impacts to this resource, but impacts related to particulate matter emissions would likely remain unchanged as a result of continued mining in the NCWMA. Greenhouse gas emissions from coal extraction would be less than significant.	Areas within the designation area would be less likely to experience localized air quality impacts, because impacts in the designation area would result mainly from remining operations and associated haul roads, which would be a small portion of overall production and would result in periodic and overall minor emissions. Overall emissions in the evaluation area would remain the same as alternative 1. Best management practices and compliance with applicable regulations and permit conditions would minimize impacts to this resource, but impacts related to particulate matter emissions would likely remain unchanged as a result of continued mining in the NCWMA. Greenhouse gas emissions from coal extraction would be less than significant.	Areas within the designation area would experience few or minor localized air quality impacts from auger or underground mining only, because no surface mining would occur in the designation area. Overall emissions in the evaluation area would remain the same as alternative 1. Best management practices and compliance with applicable regulations and permit conditions would minimize impacts to this resource, but impacts related to particulate matter emissions would likely remain unchanged as a result of continued mining in the NCWMA. Greenhouse gas emissions from coal extraction would be less than significant.	Areas within the designation area would experience few or minor localized air quality impacts from auger or underground mining only, because no surface mining would occur in the designation area. Overall emissions in the evaluation area would remain the same as alternative 1. Best management practices and compliance with applicable regulations and permit conditions would minimize impacts to this resource, but impacts related to particulate matter emissions would likely remain unchanged as a result of continued mining in the NCWMA. Greenhouse gas emissions from coal extraction would be less than significant.

	Alternative 1: No-Action Alternative	Alternative 2: State Petition Designation (67,326 acres)	Alternative 3: State Petition Designation with Remining and Road Access (Preferred Alternative) (67,326 acres)	Alternative 4: Expanded Corridor Designation with Remining and Road Access (74,968 acres)	Alternative 5: Targeted Resource Protection Designation (12,331 acres)	Alternative 6: Reduced Corridor Designation (39,106 acres)
Water Resources (including) • Groundwater • Surface water • Wetlands	Alternative 1 would have short-term and long-term potentially widespread adverse impacts on surface water resources, but this is limited because the expected mining rate is assumed at an average of 112 acres per year. Remining would result in localized short-term adverse impacts to surface water and groundwater, but reclamation would result in localized long-term beneficial impacts to surface water and groundwater. Surface mining could result in widespread short-term and long-term adverse impacts on groundwater resources. Alternative 1 would not result in significant adverse impacts to surface water or groundwater. Both near- and long-term adverse impacts to wetlands could result from mining activities. Best management practices and compliance with applicable regulations and permit conditions would minimize impacts to wetlands and only a small percentage of the evaluation area would be mined based on the expected level of future surface coal mining operations. However, alternative 1 could result in site-specific localized significant impacts to a wetland depending on proximity to a mining operation.	Alternative 2 would reduce the potential for future adverse impacts from surface coal mining operations to surface water and groundwater resources, resulting in widespread long-term beneficial impacts, especially to source water protection and management zones, headwater streams and wells, and wellhead protection zones in the petition area. The continued existence of unreclaimed previously mined land would result in localized long-term adverse impacts to surface water and groundwater. Alternative 2 would not result in significant adverse impacts on surface water or groundwater resources. The designation of the petition area under alternative 2 would have long-term, widespread beneficial impacts on wetland resources in the petition area, but could also have some adverse effects because of underground mining activity and issues related to unreclaimed mines. Alternative 2 would not result in significant impacts to wetlands.	Alternative 3 would reduce the potential for future adverse impacts from surface coal mining operations to surface water and groundwater resources, resulting in widespread long-term beneficial impacts, especially to source water protection and management zones, headwater streams and wells, wellhead protection zones in the designation area. It would contribute localized short-term adverse impacts to surface water and groundwater during remining, but would provide long-term beneficial impacts in the designation area due to reclamation activities. It would not result in significant adverse impacts on surface water and surface water. Alternative 3 would have long-term beneficial impacts to wetlands protected in the designation area. Remining and reclamation activities and haul roads could have near-term adverse impacts and long-term benefits from improved water quality. Alternative 3 would not have significant impacts on wetlands.	Alternative 4 would reduce the potential for future adverse impacts from surface coal mining operations to surface water and groundwater resources, especially to source water protection and management zones, headwater streams and wells, and wellhead protection zones in the designation area. It would contribute localized short-term adverse impacts to surface water and groundwater during remining operations, but would provide long-term beneficial impacts in the designation area due to reclamation activities. Alternative 4 would not result in significant adverse impacts on surface water and groundwater resources. Impacts to wetlands would be similar to alternative 3, with no significant impacts expected.	Alternative 5 would reduce the overall adverse impacts from potential future mining. It would result in localized and relatively limited long-term beneficial impacts to surface water and groundwater resources, especially to source water protection and management zones, headwater streams and wells, and wellhead protection zones in the designation area The continued existence of unreclaimed previously mined land would result in long-term, localized adverse impacts to surface water and groundwater resources. Alternative 5 would not result in significant adverse impacts on surface water and groundwater resources. Similar to alternative 2, alternative 5 would have mainly long-term, widespread beneficial impacts on wetland resources in the designation area, with some adverse effects because of issues related to unreclaimed mines. Impacts would not be significant.	Alternative 6 would reduce the potential for future adverse impacts from surface coal mining operations to surface water and groundwater resources, resulting in widespread long-term beneficial impacts, especially to source water protection and management zones, headwater streams and wells, and wellhead protection zones in the designation area. The continued existence of unreclaimed previously mined land would result in long-term, localized adverse impacts to surface water and groundwater resources. Alternative 6 would not result in significant adverse impacts on surface water and groundwater resources. Similar to alternative 2, alternative 6 would have long-term, widespread beneficial impacts on wetland resources in the designation area, with some adverse effects. Impacts would not be significant.
Soils and Vegetation	Alternative 1 would have both near- and long-term adverse impacts, which would be limited because only a small percentage of the evaluation area would be mined based on the expected level of future surface coal mining operations. Long-term beneficial impacts would be realized once a remined site is reclaimed. Impacts would not be significant.	Alternative 2 would have both near- and long-term beneficial impacts from protection of vegetation and soils in the petition area. Minor adverse impacts would occur because remining and associated reclamation would not be permitted. Impacts would not be at a large or landscape scale, and it is unlikely that impacts would be significant.	Alternative 3 would have long-term beneficial impacts from protection of the designation area and reclamation of remined area, with near-term adverse effects during early stages of remining. It is unlikely that the impacts would be significant.	Alternative 4 would have greater long-term beneficial impacts from protection of the designation area and reclamation of remined area, with near-term adverse effects during early stages of remining. It would result in direct or indirect adverse impacts, but could result in substantial benefits. It is unlikely that the impacts would be significant.	Alternative 5 would have both near- and long-term direct and indirect beneficial impacts from protection of vegetation and soils in the designation area, but the beneficial impacts of reclamation on the potential vegetation acres protected from remining would not occur. It is unlikely that the impacts would be significant.	Alternative 6 would result in both near- and long-term direct and indirect beneficial impacts in the designated area, with adverse effects continuing on lands that have not been reclaimed. It is unlikely that the impacts would be significant.

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Fish and Wildlife	Alternative 1 would have near- and long-term adverse impacts to aquatic and terrestrial species. Alternative 1 would potentially impact up to approximately 945 miles of aquatic habitat. Remining may contribute to short-term impacts, but associated reclamation could improve water quality and aquatic habitat conditions in the long term. Based on an assumed average mining rate of 112 acres per year throughout the evaluation area, it is unlikely that widely distributed common species would be significantly impacted. In the event that small, isolated populations are adversely impacted, significant impacts to those populations could occur.	Alternative 2 would result in near- and long-term beneficial impacts to aquatic and terrestrial species. It would result in the protection of approximately 356 miles of aquatic habitat and 18,436 acres of terrestrial tier 1 priority habitat, although any areas that have water quality issues from pre-SMCRA mining would not be remined or reclaimed, resulting in continued adverse effects on aquatic species. Alternative 2 would not result in significant adverse impacts.	Alternative 3 would result in near- and long-term adverse and beneficial impacts to aquatic and terrestrial species. It would result in the protection of approximately 356 miles of aquatic habitat and approximately 18,436 acres of terrestrial tier 1 priority habitat. Remining and reclamation activities along with haul road construction and maintenance within the designation area and adjacent to protected ridgelines would result in near- and long-term adverse impacts to aquatic and terrestrial species. However, protection of lands within the designation area from future surface coal mining operations would result in long-term beneficial impacts by limiting further injury and potentially facilitating ecosystem recovery. Alternative 3 would not likely result in significant adverse impacts.	Alternative 4 would result in near- and long-term adverse and beneficial impacts to aquatic and terrestrial species. Protection of lands within the designation area from future mining activities would also result in long-term beneficial impacts. Alternative 4 would result in the protection of approximately 354 miles of aquatic habitat and approximately 19,728 acres of terrestrial tier 1 priority habitat. Remining and reclamation activities along with haul road construction and maintenance within the designation area and adjacent to protected ridgelines would result in near- and long-term adverse impacts to aquatic and terrestrial species. Protection of lands within the designation area from future mining activities would also result in long-term beneficial impacts by limiting further injury and potentially facilitating ecosystem recovery. Alternative 4 would not result in significant adverse impacts.	Alternative 5 would result in near- and long-term beneficial impacts to aquatic species. Alternative 5 would result in the protection of approximately 381 miles of aquatic habitat and approximately 4,409 acres of tier 1 priority habitat. Any areas that have water quality issues from pre-SMCRA mining would not be remined or reclaimed, resulting in continued adverse effects on aquatic species. Alternative 5 would not result in significant adverse impacts.	Alternative 6 would result in near- and long-term beneficial impacts to aquatic and terrestrial species. Alternative 6 would result in the protection of approximately 356 miles of aquatic habitat and approximately 10,065 acres of terrestrial tier 1 priority habitat. Any areas that have water quality issues from pre-SMCRA mining would not be remined or reclaimed, resulting in continued adverse effects on aquatic species. Alternative 6 would not result in significant adverse impacts.
Special-Status Species (for species-specific analyses, see chapter 6)	Alternative 1 would have near- and long-term adverse impacts to aquatic and terrestrial special-status species. Some species may benefit from active reclamation of mine sites. Depending on where surface coal mining operations occur, some species could experience significant adverse impact to important habitat areas. Alternative 1 would have a potential to adversely affect undetected plant special-status species and their habitat and would have long-term adverse impacts to plant special-status species due to habitat loss.	Alternative 2 would result in near- and long-term beneficial impacts to aquatic and terrestrial special-status species. The protection of lands within the petition area from future mining activities would result in long-term beneficial impacts to special-status species and habitats by limiting the potential for further injury and potentially facilitating ecosystem recovery. It would have long-term direct and indirect beneficial impacts to plant special-status species. Alternative 2 would not result in significant adverse impacts.	Alternative 3 would result in near- and long-term adverse and beneficial impacts to special-status species. Activities under alternative 3 would cause long-term direct adverse impacts due to the loss of individual undetected plant special-status species or their habitat. Protection of lands within the designation area from future mining activities would result in long-term beneficial impacts to special-status species and habitats. Alternative 3 would not result in significant adverse impacts.	Alternative 4 would result in near- and long-term adverse and beneficial impacts to special-status species. Activities under alternative 4 would cause long-term direct adverse impacts due to the loss of individual undetected plant special-status species or their habitat. Protection of lands within the designation area from future mining activities would result in long-term beneficial impacts to special-status species and habitats. Alternative 4 would not result in significant adverse impacts.	Alternative 5 would result in near- and long-term beneficial impacts to special-status species. It would result in the least amount of terrestrial habitat protection compared to the other action alternatives. Alternative 5 would not result in significant adverse impacts.	Alternative 6 would result in near- and long-term beneficial impacts to special-status species. Similar to alternative 2, but over a smaller area, the protection of lands within the designation area from future mining activities would result in long-term beneficial impacts to special-status species and habitats by limiting further loss, degradation, or injury. Alternative 6 would potentially facilitate ecosystem and species recovery by preventing the loss of undetected plant special-status species and their habitat. Alternative 6 would not result in significant adverse impacts.

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Land Use and Recreation	Alternative 1 would have near- and long-term adverse impacts to land use and recreation. Surface mining would result in potential conflicts with existing forestry and oil and gas production uses; potential impacts to dispersed recreation related to noise, traffic, fugitive dust, emissions, area closures, and access restrictions; and potential impacts to designated recreational resources that result primarily from noise impacts. Depending on the location of surface coal mining operations, these impacts would occur to greater or lesser degrees.	Under alternative 2, beneficial impacts would occur from increased potential for implementation of existing surface management plans, reduced impacts to dispersed recreation, and reduced impacts to designated recreational resources. Long-term adverse impacts would result from the continued presence of unreclaimed mine sites. Overall, greater beneficial impacts and fewer adverse impacts would be expected relative to alternative 1, with no significant impacts expected.	Under alternative 3, near-term adverse impacts would result from the remining of unreclaimed, previously mined areas and associated access and haul road construction. Long-term beneficial impacts would result from the reclamation of previously unreclaimed mine sites. Beneficial impacts would occur from reduced potential for land use conflicts, increased potential for implementation of existing surface management plans, reduced impacts to dispersed recreation, and reduced impacts to designated recreational resources. Overall, greater beneficial impacts and fewer adverse impacts would be expected relative to alternative 1, with no significant impacts expected.	Under alternative 4 Impacts would be the same as described for alternative 3, with slightly more benefits related to the larger area designated. Overall, greater beneficial impacts and fewer adverse impacts would be expected relative to alternative 1, with no significant impacts expected.	Under alternative 5, limited beneficial impacts would occur from reduced potential for land use conflicts, increased potential for implementation of existing surface management plans, reduced impacts to dispersed recreation, and reduced impacts to designated recreational resources. Long-term adverse impacts would result from the continued presence of unreclaimed mine sites. Overall impacts would be slightly beneficial compared to alternative 1 and would not be significant.	Under alternative 6, beneficial impacts would occur from reduced potential for land use conflicts, reduced impacts to dispersed recreation, and reduced impacts to designated recreational resources. Long-term adverse impacts would result from the continued presence of unreclaimed mine sites. Impacts would not be significant.
Aesthetics (including) • Visual Resources • Soundscapes	Alternative 1 could have substantial near-term adverse impacts to visual resources. However, given the topography, dense vegetative cover, and the rural nature of the evaluation area, impacts are anticipated to be localized. Impacts from alternative 1 would not likely result in significant impacts to visual resources. Alternative 1 would have near-term localized significant adverse effects on soundscapes. Thresholds for human annoyance and disturbance of wildlife would be exceeded in the vicinity of coal mining areas and along roadways used by coal haul trucks. Following reclamation, these mining-related sources would cease. Therefore, there would be no long-term impact on soundscapes at any one mine site, although mining could continue at varying locations.	Alternative 2 would have long-term beneficial impacts as a result of prohibiting surface coal mining activities allowing lands to remain in their natural condition. Similarly, beneficial impacts would remain predominantly localized based on the topography and dense vegetation within the petition area. Individuals who directly view mining operations could experience adverse impacts; however, based on the relatively small scale of these operations, adverse impacts are anticipated to be infrequent. Alternative 2 would not have significant impacts to visual resources. Alternative 2 would have fewer impacts to soundscapes than alternative 1, but would still result in near-term significant adverse impacts in the vicinity of potential coal mine locations outside the petition area that could affect soundscapes in the petition area.	Alternative 3 would have near-term adverse impacts to visual resources as a result of remining operations. Visual impacts under alternative 3 would offset past impacts and could provide beneficially significant impacts to visual resources. Impacts would not be significant. Alternative 3 would have fewer impacts to soundscapes and would be more beneficial than alternative 1, but would still result in near-term significant adverse impacts in the vicinity of new coal mine locations adjacent to the designation area and previously mined areas undergoing remining.	Alternative 4 would have near-term adverse impacts to visual resources as a result of remining operations and associated road development similar to alternative 2. It would not result in significant adverse impacts to visual resources. Alternative 4 would have fewer noise-related impacts than alternative 1, but would still result in near-term significant adverse impacts in the vicinity of surface coal mining operations and remining areas.	Alternative 5 would have impacts similar to alternative 2, but those impacts would occur in areas with high recreational use providing localized benefits. Alternative 5 would not allow for remining and reclamation and therefore would not reduce existing negative visual impacts. Beneficial impacts from alternative 5 could potentially be significant as the areas identified under alternative 5 are sensitive and more frequently visited. Alternative 5 would have fewer impacts than alternative 1 and would avoid impacts to specific noise-sensitive areas, but would still result in near-term significant adverse impacts in the vicinity of allowable coal mine locations. Following reclamation outside the designation area, these mining-related sources would cease. Therefore, there would be no long-term impact on soundscapes at any one mine site.	Alternative 6 would have impacts similar to alternative 2, but those impacts would occur over a smaller area. Impacts from alternative 6 would not be significant. Alternative 6 would have fewer impacts to soundscapes than alternative 1, but would still result in near-term significant adverse impacts in the designation area from surface coal mining operations in the vicinity. Thresholds for human annoyance and disturbance of wildlife would be exceeded in the vicinity of coal mining areas and along roadways used by coal haul trucks. Following reclamation of mine sites outside the designation area, these mining-related sources would cease. Therefore, there would be no long-term impact on soundscapes at any one mine site.

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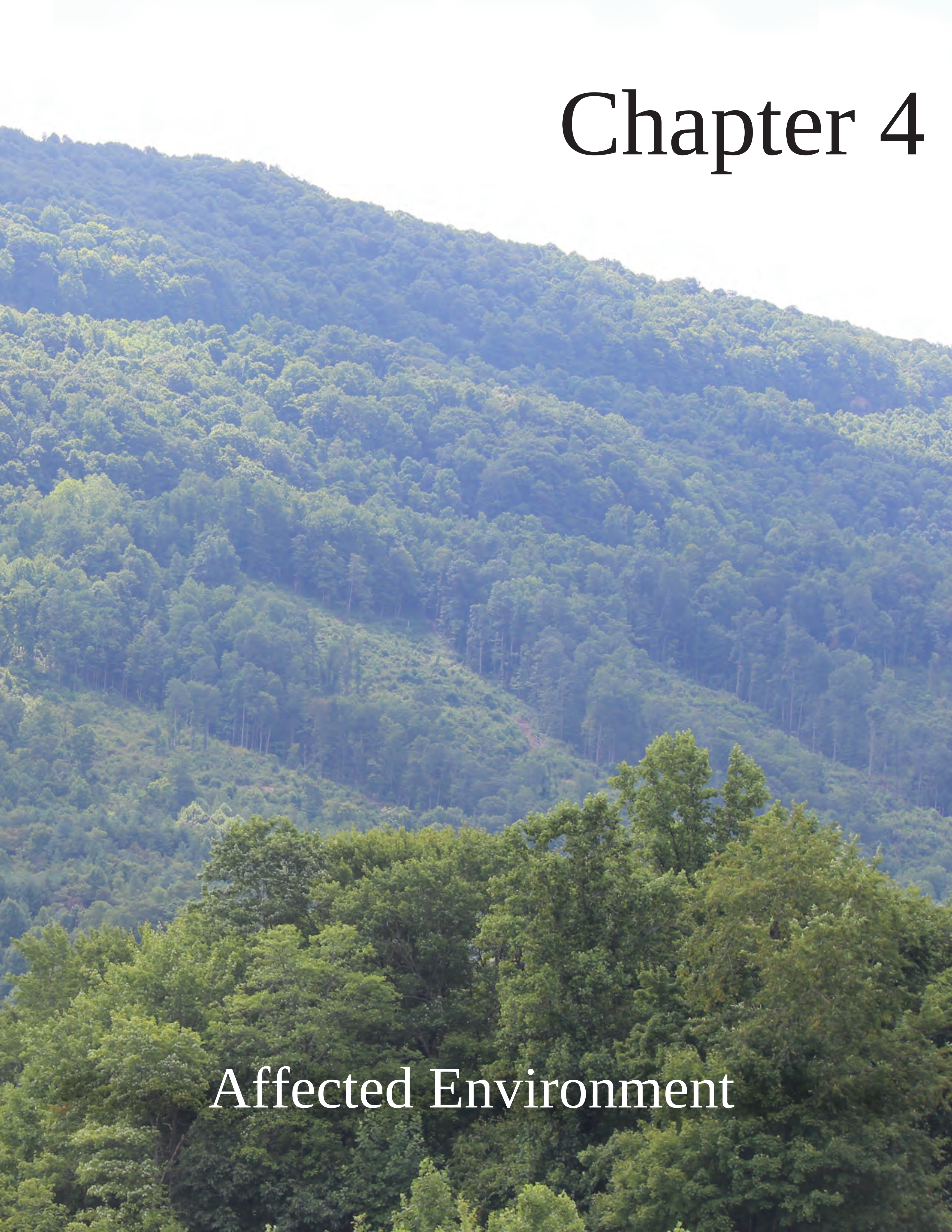
Socioeconomics and Environmental Justice (including) • Mining • Recreation • Logging • Oil and Gas	Implementing the no-action alternative would have no new impact on the regional economy. Existing contributions to the local and regional economy would continue to benefit the region's economy because coal would continue to be mined from the petition and evaluation areas. There would be no significant disproportionate impact on environmental justice communities.	Alternative 2 is expected to continue to benefit the region's economy because coal mining would continue to be produced from the evaluation area. Under alternative 2, there would be long-term beneficial impacts to recreation and tourism spending because recreational experience in the petition area would be better than under alternative 1. Continued surface coal mining operations within the evaluation area would not likely change under the action alternatives, although the location of the operations would change. Therefore, alternative 2 (or any action alternative) would not result in significant disproportionate adverse impacts to environmental justice communities.	Alternative 3 is expected to continue to benefit the region's economy because coal would continue to be mined from the evaluation area, and remining would be allowed in the designation area. Under alternative 3, there would be long-term beneficial impacts to recreation and tourism spending because recreational experience in the designation area would be better than under alternative 1. Impacts on environmental justice communities would be the same as alternative 2.	Alternative 4 is expected to continue to benefit the region's economy because coal would continue to be mined from the evaluation area and remining would be allowed in the designation area. Under alternative 4, there would be long-term beneficial impacts to recreation and tourism spending because recreational experience in the designation area would be better than under alternative 1. Impacts on environmental justice communities would be the same as alternative 2.	Alternative 5 is expected to continue to benefit the region's economy because coal would continue to be mined from the evaluation area. Impacts to visitation and associated visitor spending, jobs, and income would be beneficial compared to alternative 1. However, out of all action alternatives, alternative 5 would have the least potential to minimize adverse noise-related impacts to visitors and wildlife, with potential adverse impacts to wildlife viewing opportunities, visitor spending, and associated jobs and income. Impacts on environmental justice communities would be the same as alternative 2.	Alternative 6 is expected to continue to benefit the region's economy because coal would continue to be mined from the evaluation area. Under alternative 6, there would be long-term beneficial impacts to recreation and tourism spending because recreational experience in the designation area would be better than under alternative 1. Impacts on environmental justice communities would be the same as alternative 2.
Cultural Resources	Alternative 1 would have the potential to adversely impact cultural resources, primarily through the continuation of mining, ground-disturbing activities, and inadvertent damage that could occur. Based on an assumed mining rate of on average 112 acres per year and regulatory requirements to avoid or mitigate impacts, no significant impacts under NEPA are expected.	Under alternative 2, land within the petition area would be protected from mining activities, which would be a benefit. No significant impacts under NEPA are expected.	Under alternative 3, land within the designation area would be protected from mining activities, but remining and road construction would have the potential to adversely impact cultural resources, primarily through ground-disturbing activities. However, based on the expected mining rate and regulatory requirements, no significant impacts under NEPA are expected.	Under alternative 4, land within the designation area would be protected from mining activities, but remining and road construction would have the potential to adversely impact cultural resources, primarily through ground-disturbing activities. However, based on the expected mining rate and regulatory requirements, no significant impacts under NEPA are expected.	Under alternative 5, only a small area within the designation area would be protected from mining and related activities, but there would be no remining. Similar to alternative 2, no significant impacts under NEPA are expected.	Under alternative 6, land within the designation area would be protected from mining activities, and there would be no remining. Similar to alternative 2, no significant impacts under NEPA are expected.
Public Health and Safety	There would be near-term adverse localized impacts to public health and safety due to surface mining, underground mining, auger mining, logging operations, oil and gas extraction, road building, and associated transportation. Overall, impacts would be minor and not significant.	Alternative 2 would reduce near-term localized hazards associated with surface mining operations in the petition area, a small benefit to recreational users in that area. However, barring remining from the petition area would allow continued adverse impacts from localized terrain hazards and water quality issues. Overall, impacts would be minor and not significant.	Alternative 3 would reduce near-term localized hazards associated with surface mining operations in the designation area. Remining within the designation area would have near-term localized adverse impacts, but could have localized long-term beneficial impacts if the reclamation reduces the existing terrain hazards and improves water quality. Impacts would be minor and not significant.	Impacts would be the similar to alternative 3, with near-term localized adverse impacts but long-term beneficial impacts. Overall, impacts would be minor and not significant.	Alternative 5 would reduce near-term localized hazards associated with surface mining operations in the designation area. Barring remining from the designation area would allow terrain hazards and water quality issues from pre-SMCRA mines to persist. Impacts would be very minor and not significant.	Alternative 6 would reduce near-term localized hazards associated with surface mining operations in the designation area. Barring remining from the designation area would allow terrain hazards and water quality issues from pre-SMCRA mines to persist. Impacts would be minor and not significant.

Chapter 4



Affected Environment

CHAPTER 4: AFFECTED ENVIRONMENT

INTRODUCTION

The “Affected Environment” describes the current condition of the resources that would be affected by the implementation of the proposed alternatives. The resource topics presented in this chapter, and the organization of the topics, correspond to the resource impact discussions in “Chapter 6: Environmental Consequences.” As required by the Surface Mining Control and Reclamation Act (SMCRA), the Office of Surface Mining Reclamation and Enforcement (OSMRE) must describe the potential coal resources of an area being petitioned for designation as lands unsuitable for surface coal mining operations (30 USC § 1271(d)). Coal resources are described in “Chapter 5: Evaluation of Coal Resources.” Unless otherwise described, the evaluation area for both the affected environment and the coal resource evaluation is comprised of the North Cumberland Wildlife Management Area (NCWMA) and the Emory River Tracts Conservation Easement (ERTCE).

EARTH RESOURCES

This section provides an overview of the existing topography and physiographic setting, geology, and soil composition conditions within the evaluation area. The evaluation area encompasses approximately 172,000 acres making up the NCWMA and ERTCE.

TOPOGRAPHY AND PHYSIOGRAPHIC SETTING

Cumberland Plateau

The evaluation area is located within portions of the Cumberland Plateau and the Cumberland Mountains region, which are a physiographic subsection of the larger Appalachian Plateau province, which in turn is part of the larger Appalachian Mountains physiographic division. The US Geological Survey categorizes physiographic divisions based on Fenneman and Johnson’s (1946) Physical Divisions of the United States. Categories include 8 major divisions, 25 provinces, and 86 sections representing distinctive areas having common topography, rock types and structure, and geologic and geomorphic history. Within this classification system, the Cumberland Plateau is a physiographic section of the larger Appalachian Plateau province, which is part of the larger Appalachian physiographic division (USGS 2009). Throughout Tennessee and Kentucky, the Appalachian Plateau is generally referred to as the Cumberland Plateau (NPS n.d.a). The NCWMA and ERTCE lay in primarily three US Environmental Protection Agency (EPA)-designated Level IV ecoregions: the Cumberland Plateau, the Cumberland Mountain Thrust Block, and the Dissected Appalachian (EPA 2012b). Figure 4-1 shows the ecoregions of the area.

The Cumberland Plateau ecoregion is a smooth, rolling tableland with some low, open, weakly dissected mountains and elevations ranging from 1,200 to 2,000 feet. This western portion of the evaluation area serves as a transitional area from the steep, high elevations of the Cumberland Mountains in the east to weakly dissected plateaus to the west (EPA 2012b). The Cumberland Mountains Thrust Block ecoregion is forest covered and contains high, steep ridges, hills, coves, and narrow valleys (KYDFW 2013). The Dissected Appalachian Plateau is covered with rugged forest and is composed of narrow ridges, deep coves, and narrow valleys (KYDFW 2013). The highest point of elevation in the evaluation area is 3,340 feet above sea level and the lowest is 1,000 feet above sea level. Average elevation of the entire area is 1,900 feet above sea level. Surface coal mining has altered the topography in and adjacent to the evaluation area over time due to contour mining.

GEOLOGY

There are three predominant geologic structural features identified near and within the evaluation area: the North Cumberland Plateau, Wartburg Basin, and the Cumberland Block (OSMRE 1984). The evaluation area lies predominantly within two of these distinct structural features: the North Cumberland Plateau/Wartburg Basin and the Cumberland Block. The North Cumberland Plateau dips towards the Wartburg Basin. The majority of the evaluation area is located within the Wartburg Basin, which is a structural low. The basin represents a highly eroded and deeply dissected plateau surface, which bears little resemblance to the original physiography because of the lack of major resistant sandstones in these higher Pennsylvanian strata. The Cumberland Block is separated from the North Cumberland Plateau by the Pine Mountain overthrust, which is composed of the Pine Mountain and Jacksboro faults (Wilson, Jewell, and Luther 1956). The Cumberland Block is a rectangular shaped physiographic province that has been shifted along the two fault systems: horizontally, a distance of approximately 11 miles along the southwest end and approximately 2 miles at the northeast end (Englund 1968) and uplifted vertically by nearly 500 feet. For more information on geologic structure in the evaluation area, refer to “Chapter 5: Evaluation of Coal Resources.”

Coal Mining Effect to Topograph adjacent to the Evaluation Area

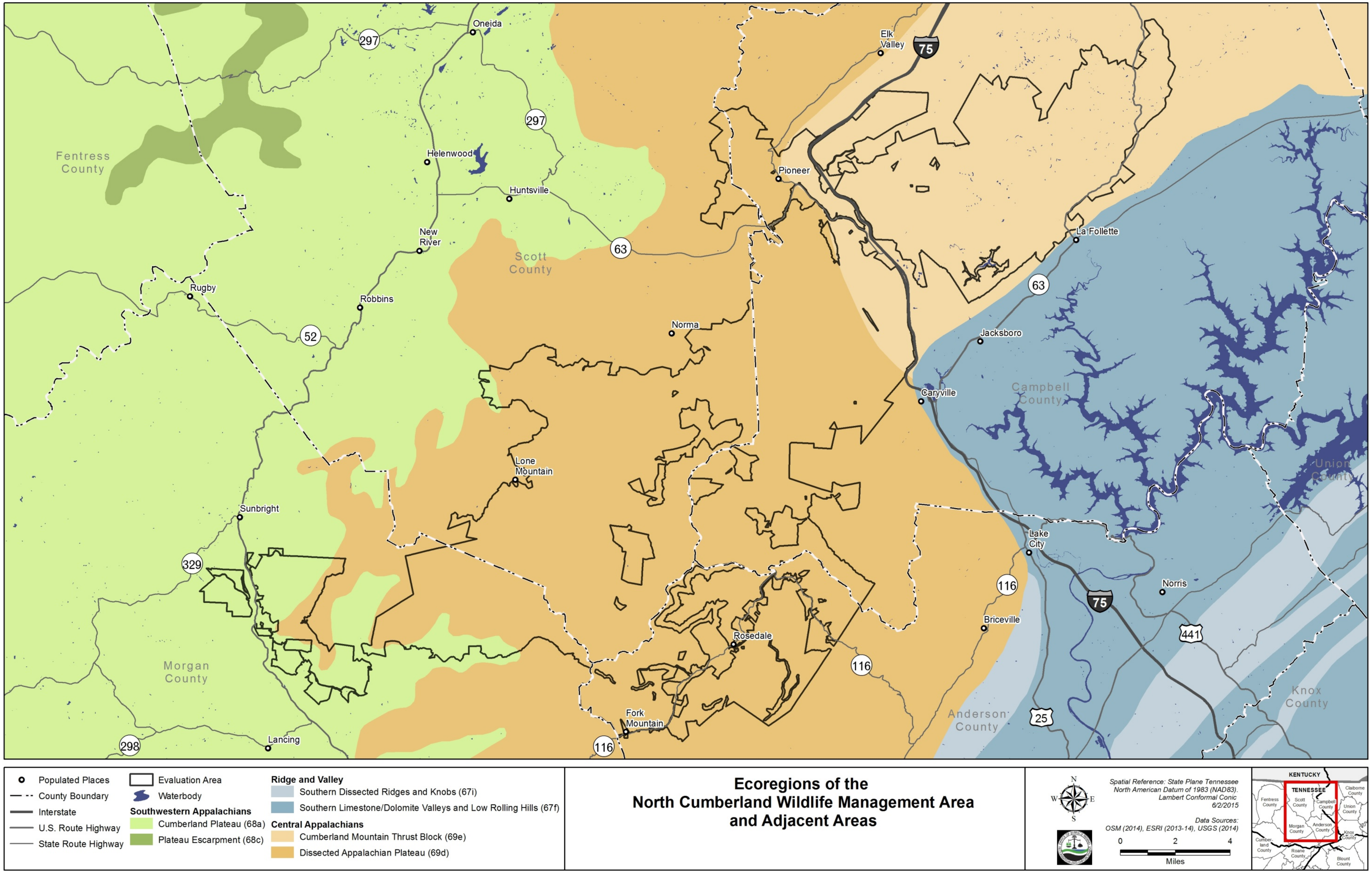


FIGURE 4-1: ECOREGIONS OF THE NORTH CUMBERLAND WILDLIFE MANAGEMENT AREA AND ADJACENT AREAS

The rocks that form the cap of the Cumberland Plateau were laid down in a shallow sea over 350 million years ago, during the Mississippian (360–320 million years ago) and the Pennsylvanian (320–296 million years ago) periods of geologic time. These sediments thousands of feet thick were deposited in horizontal layers. The resulting pressure hardened these sediments into layers of limestone, shale, coal, and sandstone. Beginning about 285 million years ago, the entire area was slowly lifted over 2,000 feet above sea level and erosion immediately began to shape the landscape (NPS 2009).

Most surficial rocks in the Cumberland Plateau are of Pennsylvanian age, 320 to 284 million years old (USGS 2002). The majority of Pennsylvanian sedimentary rocks in Tennessee were deposited by water transport and marine processes. They are primarily sandstones and shales; coals, siltstones, limestone, and siderite are also present (Wilson, Jewell, and Luther 1956). Two types of shale dominate the Cumberland Plateau: a sandy/silty shale and a clay shale. Sandy/silty shales are much more common with irregular laminations. The clay shales come in two varieties: a white to gray color shale lacking structure usually associated with coal beds, and a dark gray to black shale that can be associated with thin beds of limestone and siderite. Sandstones found in the Cumberland Plateau region range from conglomerates with pebbles to very fine grained (Wilson, Jewell, and Luther 1956).

The surface geology within the evaluation area is primarily Pennsylvanian and Mississippian (360 to 320 million years old) (USGS 2002) age sedimentary rock sequences, with the vast majority being of Pennsylvanian age and only a few small areas in the northeast section being of Mississippian age or older. Shale and sandstone are the most abundant rock types found within the area. Sandstone can be found in some areas to the south and to the north along Interstate 75 (Interstate 75). Some limestone can be found in the northern portion of the evaluation area (figure 4-2).

Surface Geology within the Evaluation Area

The geology of the evaluation area is of interest because of the coal deposits available for mining. Coal is a readily combustible sedimentary rock formed from the decomposition of organic materials subjected to geologic heat and pressure over millions of years (EPA 2014f). Coal is typically found in rock strata in layers or veins called coal beds or coal seams. There are three types of coal: lignite, bituminous, and anthracite. The hardest of the three, anthracite coal, is considered a low-grade metamorphic rock because of exposure to elevated temperature and pressure (Bates and Jackson 1984). The entire evaluation area is within a coal field of Pennsylvanian age containing medium and high volatile bituminous coal. See “Chapter 5: Evaluation of Coal Resources” for a complete discussion of the coal resource within the evaluation area.

Geologic Hazards

A significant portion of the evaluation area consists of a steep mountainous region with slope gradients equal to or in excess of 20 degrees (36.4%). Steep slopes are susceptible to land movement or mass wasting. The process of mass wasting is a generic term for the movement of soil and rock downhill in response to the pull of gravity (Bates and Jackson 1984). Mass wasting, which includes such things as landslides, rockslides, slumps, debris flows, and creep, frequently occurs in mountainous and hilly terrain throughout the world. Slope movement mainly occurs when forces acting downslope (gravity) exceed the strength of the earth materials (rocks and soils) that compose the slope (Ruhe 1975). Most of these movements are triggered by the specific geological, geomorphological, and climatological conditions as well as anthropological activities. Landslides occur throughout mountainous areas and can be initiated by gravitational forces, rainfall, snowmelt, freeze thaw activity, changes in water level, stream erosion, changes in groundwater, earthquakes, volcanic activity, disturbance by human activities, such as road building, blasting, placement of fill material or any combination of both natural and human factors.

The geology and soils play an important part in slope stability. The slopes within the evaluation area are mantled with colluvium and fresh or slightly weathered bedrock. Many of the soils in the evaluation area formed in colluvial material on slide slopes in the more mountainous areas (NRCS 2006). Colluvium over time moves from the ridges and higher slopes where it is deposited on the lower slopes. Some colluvium is a mixture of material weathered from more than one source of parent rock. Slope movements, including landslides, slumps, and debris flows, take place in the colluvium or at the contact between the colluvium and the underlying weathered mudstone or shale in the Cumberland Plateau (Pomeroy and Thomas 1985). Colluvial soils cover the majority of the evaluation area where designated slope gradients are equal to or in excess of 20 degrees (36.4%).

Landslides events have occurred throughout the evaluation area. The area to the southwest falls in a high susceptibility area (USGS 2014b). Development activity such as mining on steep slope areas can increase the risk of disturbance-caused landslides. For interim program permits, SMCRA includes specific requirements such as prohibiting the disposal of overburden on slopes steeper than 20 degrees to prevent landslides (30 CFR § 716.2). Rule 816.107 prohibits the disposal of spoil materials and wastes downslope of the mining operation and includes provisions about burying woody materials in the backfill. Figure 4-3 shows landslide hazard areas.

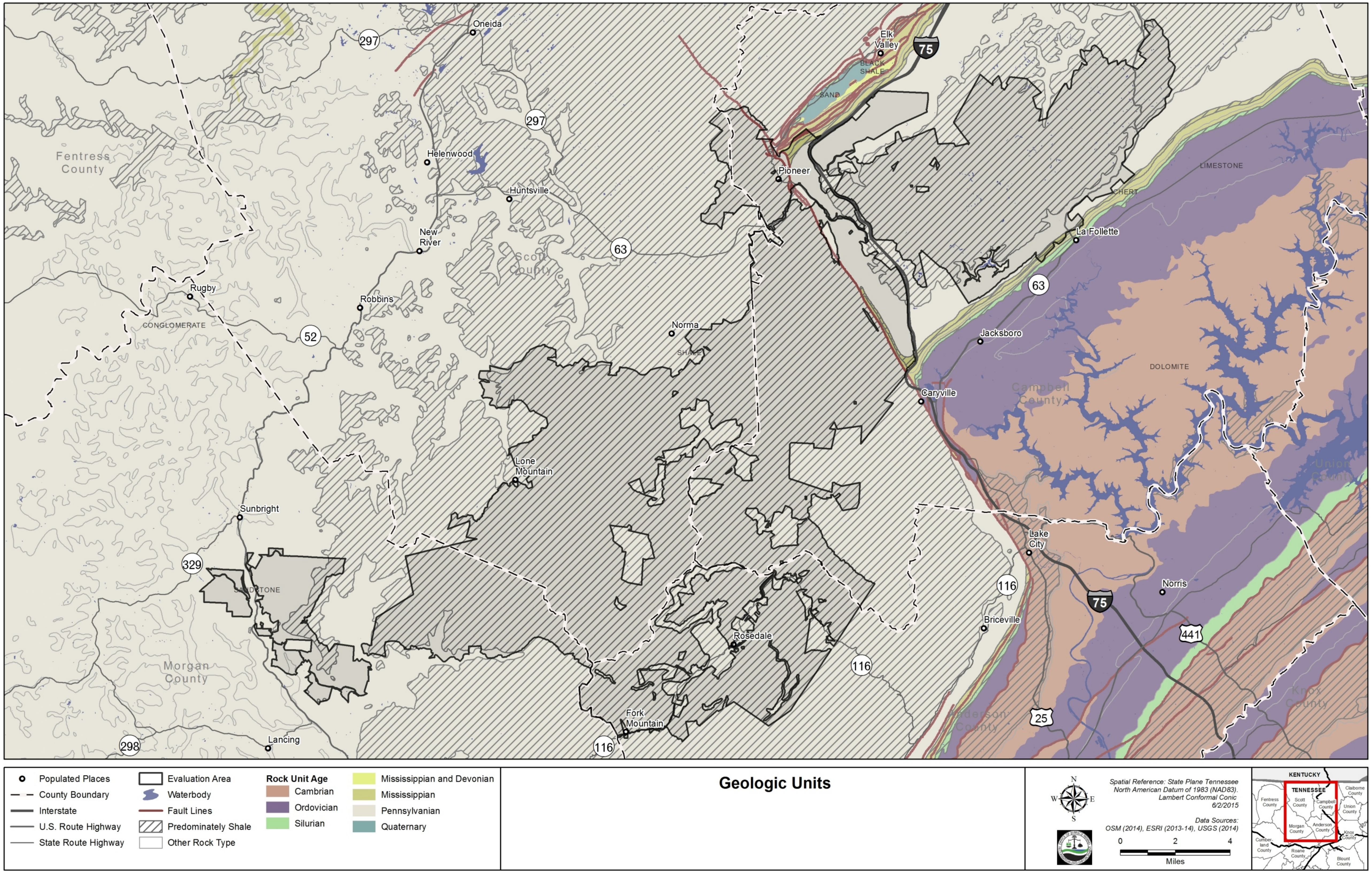


FIGURE 4-2: GEOLOGIC UNITS WITHIN THE EVALUATION AREA

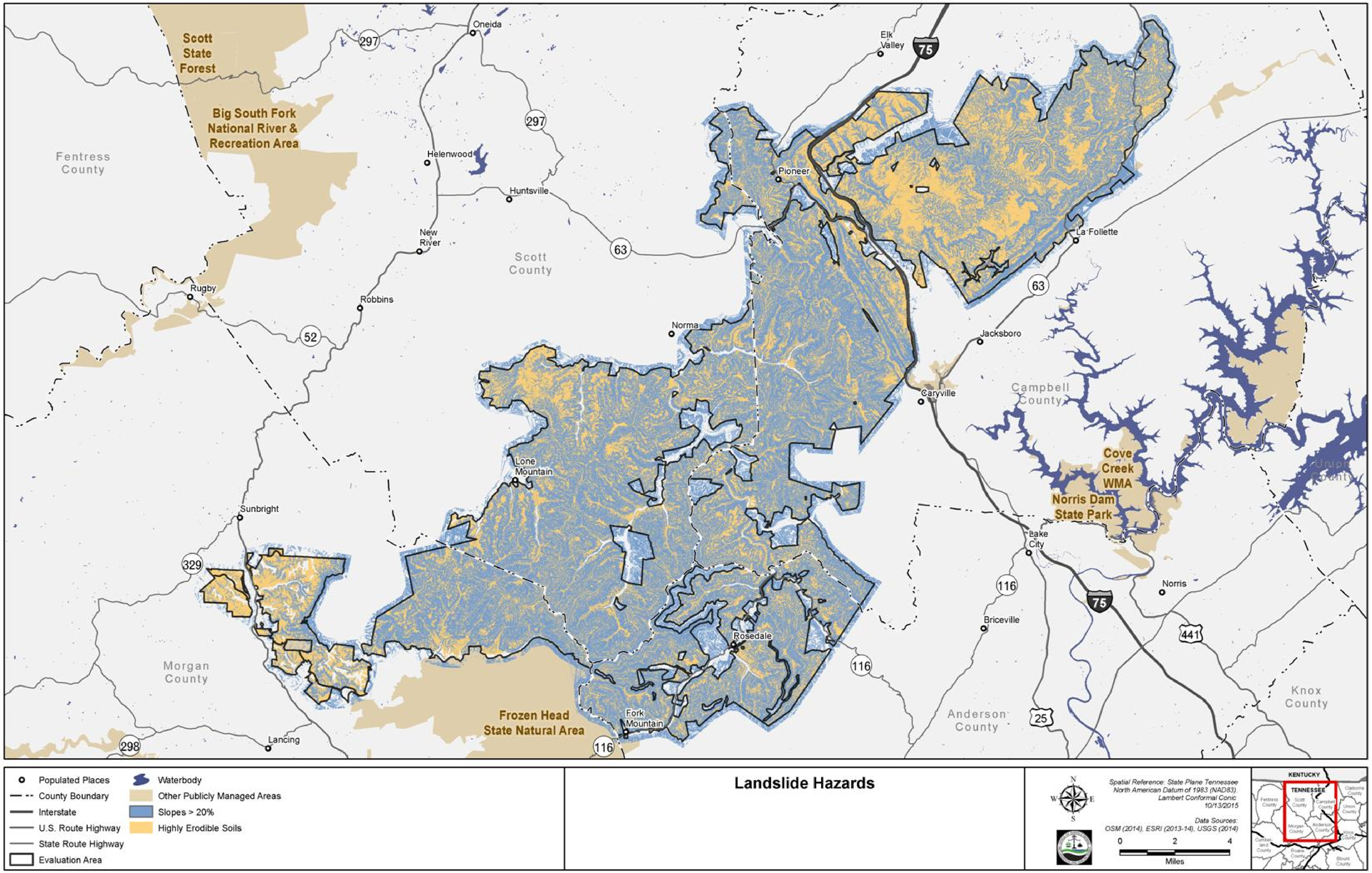


FIGURE 4-3: LANDSLIDE HAZARDS

SOILS

The primary environmental factors influencing soil development within the evaluation area are bedrock and surface geology, slope, climate, aspect and vegetation. The soils of the Cumberland Plateau are predominantly loamy and sandy in character, weathered from the broad area of sandstone caprock (NPS 2005). Some soils are formed with additions from acidic shales and siltstone, or combinations of these rock types. The depth of the soil to bedrock ranges from about one foot on steep hillsides to about four to five feet on broad, smooth interstream divides (NPS 2005). Thicker stony soils are found on the lower slopes of the mountains and escarpments.

The evaluation area is located within the Tennessee counties of Anderson, Cumberland, Morgan, and Scott. Soil information obtained from the Natural Resources Conservation Survey identified 54 separate soil units within the approximate 172,000 acres. Of these 54 soils, 21 soils accounted for approximately 165,800 acres of the approximately 172,000 acres within the evaluation area. Table 4-1 lists and describes soils with greater than 5,000 acres in the evaluation area. Table 4-2 lists those remaining soils with greater than 1,000 acres in the evaluation area. Note: the topic of soils is evaluated with the vegetation topic in “Chapter 6: Environmental Consequences.”

TABLE 4-1: SOILS GREATER THAN 5,000 ACRES IN SIZE WITHIN THE EVALUATION AREA

Soil Type	Acres	Percent of Evaluation Area	Soil Type Description
Gilpin-Bouldin-Petros complex, 25-80% slopes	40,187	23	The most represented soil type in the evaluation area (Tennessee Geographic Information Council 2014). Due to the stony nature of this soil cover, it is unsuitable for cropland, pasture and hayland, building site development, and septic tank absorption fields (NRCS 2002). It is a well drained to excessively drained soil. This series is moderately suited for woodland with hardwoods being common vegetation found on this soil type, but logging equipment use is limited due to the slope (NRCS 2002).
Muskingum-Sequoia-Petros complex, 30-60% slopes	38,787	23	This soil complex has moderately slow to moderately rapid drainage. This soil is not suitable for cropland due to slopes and depth to bedrock (NRCS 1992). It is moderately suited for woodland, with trees suitable for planting being upland oaks, Virginia pine, shortleaf pine, and eastern white pine. However, steep slopes require special equipment and erosion is a concern (NRCS 1992).
Jefferson-Grimsley complex, 30-60% slopes	20,438	12	This unit is a well-drained, deep soil. This soil is moderately suited for woodland and primarily used as such, with trees suitable for the area including yellow-poplar, northern red oak, shortleaf pine, and eastern white pine. However, erosion is a concern on logging roads and skid trails, and landslides are a hazard when cuts are made on the lower portion of slopes (NRCS 1992). This soil type is not suited for farming or residential/commercial development due to cobbles, stones, and steep slopes (NRCS 1992).
Bethesda channery silt loam, benches and outslopes	9,379	5	This soil type has moderately slow permeability and has a deep profile until the underlying bedrock. This soil type is not suited for farming, commercial, and residential development, or woodland use due to the steep slopes, large rock fragments, and high acidity (NRCS 1992).
Muskingum-Gilpin-Petros complex, 15-60% slopes	6,676	4	This complex is well drained to excessively drained. It is not suited for farming or commercial and residential development (USDA 1978). The complex is high in acidity and low in organic matter (NRCS 1978).

Soil Type	Acres	Percent of Evaluation Area	Soil Type Description
Bethesda-Mines pit complex, 10-80% slopes	6,142	4	This complex is well drained with high acidity (USDA 2002). This soil type is unsuitable for cropland, pasture and hayland, woodland, building site development, and septic tank absorption fields, mostly due to steep slopes (NRCS 2002).
Gilpin-Petros complex, 35-80% slopes	6,008	3	This soil complex is well drained to excessively drained and has high acidity (NRCS 2002). It is primarily used for woodland, which it is moderately suited for, and the most common vegetation being oak and pine type trees. However, equipment use is limited due to steep slopes. This complex is not suitable for pasture and hayland, woodland, building site development, and septic tank absorption fields due to steep slopes (NRCS 2002).
Jefferson Soils, 20-50% slopes	5,148	3	These soils have a wide range of stone content and moderately rapid permeability (NRCS 1978). They have high acidity and high water content for non-gravelly and non-cobbly soils. These soils are not suitable for cropland or commercial and residential development due to the cobbles and stones found within the complex (NRCS 1978).

Source: Tennessee Geographic Information Council 2014; NRCS 2014.

TABLE 4-2: SOIL UNITS GREATER THAN 1,000 ACRES IN SIZE WITHIN THE EVALUATION AREA

Soil Type	Acres	Percent of Evaluation Area
Gilpin-Bouldin-Petros complex, 25-80% slopes	40,187	23
Muskingum-Sequoia-Petros complex, 30-60% slopes	38,787	23
Jefferson-Grimsley complex, 30-60% slopes	20,438	12
Bethesda channery silt loam, benches and outslopes	9,379	5
Muskingum-Gilpin-Petros complex, 15-60% slopes	6,676	4
Bethesda-Mines pit complex, 10-80% slopes	6,142	4
Gilpin-Petros complex, 35-80% slopes	6,008	3
Jefferson Soils, 20-50% slopes	5,148	3
Ramsey-Rock outcrop complex, 20-50% slopes	4,998	3
Muskingum-Petros complex, 30-60% slopes	4,675	3
Udorthents, steep	4,134	2
Gilpin-Petros complex, 20-35% slopes	3,479	2
Lily-Gilpin complex, 20-35% slopes	3,173	2
Muskingum-Petros complex, 15-60% slopes	2,490	1
Shelocta silt loam, 20-35% slopes	1,879	1
Gilpin silt loam, 12-20% slopes	1,556	1
Lily loam, 3-10% slopes	1,460	1
Lily-Gilpin complex, 12-20% slopes	1,444	1
Sequoia silt loam, 5-12% slopes	1,370	1
Grimsley stony loam, 15-50% slopes	1,200	1
Pope-Philo complex	1,176	1

Source: Tennessee Geographic Information Council 2014; NRCS 2014.

AIR QUALITY AND GREENHOUSE GASES

In passing the Clean Air Act, congress declared that protecting and enhancing the nation's air resources were critical to the promotion of public health and welfare (42 USC § 7401(b)(1)). This section focuses on existing ambient air quality within and surrounding the evaluation area: the NCWMA and the ERTCE.

The Clean Air Act, enacted in 1970, set regulations that affected stationary and mobile sources of air pollution. The EPA is the regulatory authority that oversees the implementation and enforcement of all air pollution programs, including the Clean Air Act. In order to protect public health and welfare and regulate emissions of hazardous air pollutants, the EPA amended the Clean Air Act in 1990 to establish the National Ambient Air Quality Standards (NAAQS). This amendment instituted two types of national air quality standards:

1. Primary standards set limits to protect public health, including the health of "sensitive" populations, such as asthmatics, children, and the elderly.
2. Secondary standards set limits to protect public welfare against decreased visibility and damage to animals, crops, vegetation, and buildings.

The NAAQS set standards for following six criteria pollutants:

- carbon monoxide
- lead
- nitrogen dioxide
- ozone
- sulfur dioxide
- particulate matter for which the particles are less than 10 micrometers but greater than 2.5 micrometers in diameter, and particles that are 2.5 micrometers or smaller in diameter

The EPA classifies geographic areas as attainment or nonattainment areas based on levels of air pollutants. A geographic area that meets or has pollution levels below the NAAQS is called an attainment area for that pollutant, while an area that does not meet the NAAQS is designated a nonattainment area for that pollutant. Former nonattainment areas currently meeting the NAAQS are designated maintenance areas. State implementation plans are designed to bring nonattainment areas into compliance with the NAAQS. Table 4-3 lists the NAAQS.

Campbell, Morgan, and Scott Counties meet all the requirements for the NAAQS; therefore, the designation for these counties is attainment for all criteria pollutants (EPA 2014a). Anderson County is in marginal nonattainment for ozone and moderate nonattainment for particulate matter less than or equal to 2.5 micrometers in diameter ($PM_{2.5}$).

TABLE 4-3: NATIONAL AMBIENT AIR QUALITY STANDARDS

Pollutant	Averaging Time	Primary National Standard
Ozone	8 hour	0.075 ppm
Carbon monoxide	8 hours	9 ppm
	1 hour	35 ppm
Nitrogen dioxide	Annual	53 ppb
	1-hour	100 ppb
Sulfur dioxide	1-hour	75 ppb
PM_{10}	24 hours	150 μg/m^3
$PM_{2.5}$	Annual	12 μg/m^3
	24 hours	35 μg/m^3
Lead	Quarter	0.15 μg/m^3

Source: EPA 2012c.

Ambient air quality is monitored in Anderson County by a station meeting EPA design criteria for state and local air monitoring stations and NAAQS. One monitoring station for Anderson County is located at the Freels Bend Study Area at Melton Lake Oak Ridge National Lab Reservation and has been in operation for measuring ozone and meteorological conditions in the county. Table 4-4 shows the highest and second highest values recorded at the station during the period 2009 through 2013. There are no $PM_{2.5}$ monitors in Anderson County. $PM_{2.5}$ monitors for the Knoxville $PM_{2.5}$ nonattainment area that Anderson County is part of are located within the City of Knoxville where the highest concentrations would be expected.

TABLE 4-4: HIGHEST AND SECOND HIGHEST OZONE VALUES BETWEEN 2009 AND 2013

Monitoring Station #470010101 Ozone (8-hour)	Year				
	2009	2010	2011	2012	2013
Highest ozone value	0.068	0.078	0.077	0.09	0.063
Second highest ozone value	0.068	0.077	0.076	0.084	0.063

Source: EPA 2014b.

Note: Units are in parts per million (ppm).

In furtherance of achieving NAAQS, the Clean Air Act requires that federal activities do not:

- "cause or contribute to any new violation of any standard in any area
- increase the frequency or severity of any existing violation of any standard in any area; or
- delay timely attainment of any standard or any required interim emission reductions or other milestones in any area" (42 USC § 7506 (c)(1)(B)).

Regulations promulgated in 1993 require federal agencies to conduct analyses of proposed actions to ensure that they conform with state implementation plans (40 CFR § 93.150). "Chapter 6: Environmental Consequences" includes the general conformity analysis.

The Tennessee Department of Environment & Conservation (TDEC), Division of Air Pollution Control monitors major industrial sources for air pollutants. Any facility that emits 250 tons or more per year of any pollutant may require a prevention of significant deterioration review as a major stationary source. Coal mining-related fugitive dust and mobile source emissions do not count toward the 250-ton threshold. The prevention of significant deterioration threshold is high; therefore, coal mining facilities are unlikely to qualify as a major pollution source requiring this type of review. However, some coal mining processing facilities, such as tipples, may require minor source air permits because they have the potential to emit greater volumes of air contaminants.

Under the prevention of significant deterioration regulations, the Clean Air Act established special goals for the protection of visibility of national parks and wilderness areas. The Clean Air Act established Class I, II, and III areas for which emissions of particulate matter and sulfur dioxide are restricted. Class I is the most restricted area. In Tennessee, Class I areas include Great Smoky Mountains National Park, Joyce Kilmer Slickrock National Wilderness Area, and the Cohutta Wilderness Area. The remainder of the state, including the evaluation area, has Class II protection.

GREENHOUSE GAS EMISSIONS

Greenhouse gases are chemical compounds found in the earth’s atmosphere that absorb and trap infrared radiation as heat. Global atmospheric greenhouse gas concentrations are a product of continuous emission (release) and removal (storage) of greenhouse gases over time. In the natural environment, this release and storage is largely cyclical. For instance, through the process of photosynthesis, plants capture atmospheric carbon as they grow and store it in the form of sugars. When plants decay or are burned, the stored carbon is released back to the atmosphere, available to be taken up by new plants (Ecological Society of America 2008). In forests, the carbon can be stored for long periods. Because they are so productive and long-lived, forests have an important role in carbon capture and storage and can be thought of as temporary carbon reservoirs. Large amounts of greenhouse gases are stored deep underground in the form of fossil fuels, and soils store carbon in the form of decomposing plant material and serve as the largest carbon reservoir on land.

Human activities such as deforestation, soil disturbance, and burning of fossil fuels disrupt the natural cycle by increasing the greenhouse gas emission rate over the storage rate, which results in a net increase of greenhouse gases in the atmosphere. When forests are permanently converted to cropland, for instance, or when new buildings or roads displace vegetation, the greenhouse gas storage capacity of the disturbed area is diminished. Carbon dioxide, nitrous oxide, and methane emissions increase when soils are disturbed (Kessavalou et al. 1998), and burning fossil fuels releases greenhouse gases that have been stored underground for thousands of years and cannot be readily replaced. The resulting buildup of heat in the atmosphere due to increased greenhouse gas levels increases temperatures, which causes warming of the planet through a greenhouse-like effect (EIA 2009a). Increasing levels of greenhouse gases could increase the earth’s average temperature by up to 7.2°F by the end of the 21st century (EPA 2010b). For Tennessee, increases in average temperature on the order of 4 to 7°F are projected (SCIPP n.d.).

The principal greenhouse gases emitted into the atmosphere through human activities are carbon dioxide, methane, nitrous oxide, and fluorinated gases, such as hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride (EPA 2010b). Carbon dioxide is the major greenhouse gas emitted, and the burning of fossil fuels accounts for 81% of all greenhouse gas emissions (EPA 2010b; Houghton 2010; EIA 2009b). Carbon dioxide enters the atmosphere as a result of such activities as land use changes; burning of fossil fuels including coal, natural gas, oil, and wood products; and from the manufacturing of cement. Carbon dioxide levels have increased to 379 parts per million within the last century, a 36% increase, as a result of human activities (IPCC 2007).

Currently, federal agencies address emissions of greenhouse gases by reporting and meeting reductions mandated in laws, executive orders, and policies. The most recent of these are Executive Order 13514 “Federal Leadership in Environmental, Energy, and Economic Performance” (signed on October 5, 2009) and Executive Order 13423 “Strengthening Federal Environmental, Energy, and Transportation Management” (signed on January 24, 2007).

On May 13, 2010, the EPA issued the Tailoring Rule, which establishes an approach to addressing greenhouse gas emissions from stationary sources under the Clean Air Act permitting programs. The rule includes three steps aimed at setting greenhouse gas thresholds for prevention of significant deterioration and Title V permits for new, modified, and existing sources. Prevention of significant deterioration is required for major source facilities in areas in attainment for all criteria pollutants. It requires completing a general conformity-like analysis for modifications to those facilities so that air quality does not deteriorate. Steps 1 and 2 set thresholds for these major stationary sources. Step 3, finalized on June 29, 2012, did not revise the thresholds established under Steps 1 and 2, but opted not to apply prevention of significant deterioration or Title V greenhouse gas permitting thresholds to smaller stationary sources at this time (EPA 2010a). Under Steps 1 and 2, prevention of significant deterioration requirements are applied to new sources with the potential to emit at least 100,000 tons per year carbon dioxide equivalent or existing sources that emit 100,000 tons per year carbon dioxide equivalent and undertake modifications that increase emissions by at least 75,000 tons per year carbon dioxide equivalent. Title V greenhouse gas requirements apply to new or existing sources with the potential to emit 100,000 tons per year carbon dioxide equivalent (EPA 2010a).

For federal agencies, Executive Orders 13423 and 13514 require agencies to measure, manage, and reduce greenhouse gas emissions by agency-defined target amounts and dates. Specific to the National Environmental Policy Act (NEPA) process, the Council on Environmental Quality issued “Revised Draft NEPA Guidance on the Consideration of the Effects of Climate Change and Greenhouse Gas Emissions” in 2014. Key greenhouse gas and climate change considerations for NEPA documents contained in this draft guidance include the following:

- Recommendation to consider both the effect of the project on climate change (as measured through greenhouse gas emissions) and the effect of climate change on the project (e.g., sea level rise, extreme weather events, ecosystem effects) to the extent they are “reasonably foreseeable.”
- Recommendation using 25,000 metric tons carbon dioxide equivalent emissions annual as a level warranting detailed assessment—the same level as the greenhouse gas reporting rule discussed above.

Surface mining produces fugitive emissions, or emissions that do not pass through a stack, chimney, vent, or other functionally equivalent opening. As a result, greenhouse gas emissions from surface mining are not subject to prevention of significant deterioration review. Methane emissions from coal mining caused 64.6 million metric tons of carbon dioxide-equivalent emissions in 2013 (EPA 2015a).

Coal combustion resulted in 1,658.7 million metric tons of carbon dioxide in 2013, 95% of which was from the generation of electricity (EPA 2015b). According to the EPA, coal combustion is generally more carbon intensive than burning natural gas or petroleum for electricity. Although coal accounts for about 75% of carbon dioxide emissions from the energy sector, it represents about 39% of the electricity generated in the United States (EPA 2015b).

In 2011, Tennessee ranked 18th in terms of annual carbon dioxide emissions totaling 103 million metric tons. This was only 1.9% of the total emissions for the United States (EIA 2014e). However, the forests of Tennessee also provide carbon sequestration services that result in the net sequestration of 921,810 metric tons of carbon per year (EPA 2014b). Tennessee does not currently have any state-level regulations for greenhouse gas emissions. While there are baseline greenhouse gas inventories for Chattanooga and Nashville, there is no available emissions data for the four counties within the evaluation area.

WATER RESOURCES

The NCWMA and ERTCE cover an area of approximately 172,000 acres (269 square miles) and are located in three distinct physiographic subprovinces or ecoregions. The differences in the topography, land slopes, stream slope, elevation, land use, soils, climate, and watershed size of these ecoregions all play a role in ultimately determining the quality and quantity of surface waters and groundwater in these areas.

SURFACE WATER

The Cumberland River and Tennessee River basin watersheds both drain the NCWMA and ERTCE. The Tennessee Valley Divide separates these two basins and follows a general southwest to northeast direction around and through the evaluation area. These large basin watersheds can be divided into smaller subwatersheds or assessment areas using hydrologic unit codes developed by the US Geological Survey (Seaber, Kapinos, and Knapp 1987). Table 4-5 lists five different Hydrologic Unit Code-8 cataloging units (i.e., a smaller division of surface water resources that represents all or part of a larger drainage basin or basin) that drain the evaluation area including portions of the Emory River, South Fork Cumberland River (or Big South Fork of the Cumberland River), Upper Cumberland River, Upper Clinch River, and Powell River (figure 4-4). The Upper Cumberland and South Fork Cumberland are within the larger Cumberland River drainage basin and the Emory, Powell, and Upper Clinch are within the Tennessee River drainage basin. The evaluation area constitutes portions of the headwater area for each of these river systems.

Ephemeral, intermittent, and perennial streams are prevalent throughout the evaluation area (figure 4-4). There are approximately 643 miles of streams within the NCWMA and ERTCE (USGS 2014a). Although the Big South Fork, Upper Clinch, Upper Cumberland, and Powell Rivers do not intersect the evaluation area, tributaries to these rivers drain portions of it.

TABLE 4-5: SUBWATERSHEDS IN THE NORTH CUMBERLAND WILDLIFE MANAGEMENT AREA AND EMORY RIVER TRACTS CONSERVATION EASEMENT

Subwatershed River	Total Area (mi^2)	Area (mi^2) within the evaluation area	Location County
Emory	869	29.1	Anderson, Morgan, Scott
Upper Cumberland	2,332	44.7	Campbell, Scott
Upper Clinch	1,966	40.4	Anderson, Campbell
Powell	947	0.1	Campbell
South Fork Cumberland	1,383	154.6	Anderson, Campbell, Morgan, Scott

Source: NRCS 2012a, 2012b, 2012c, 2012d.

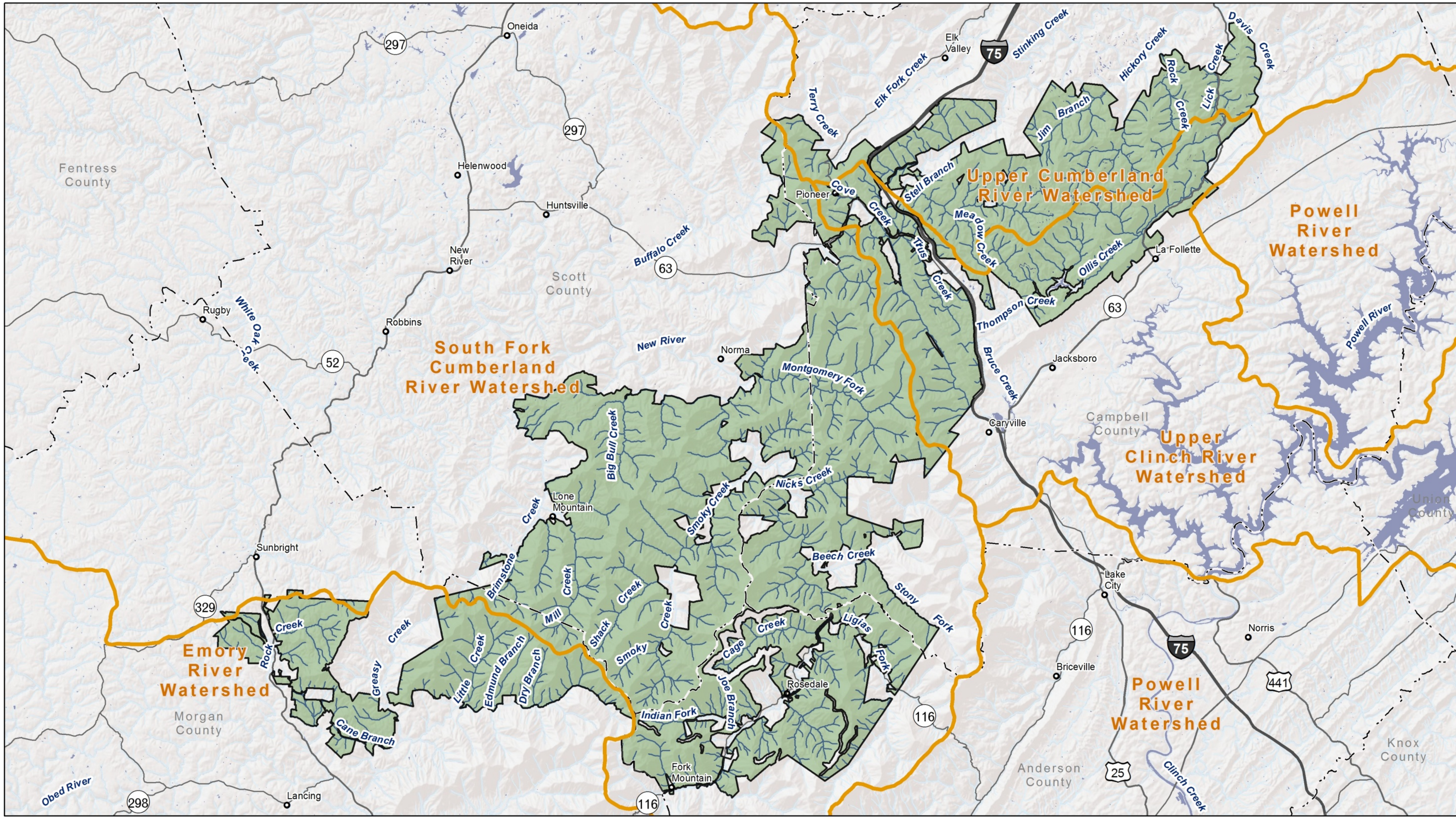
Emory River Watershed: The portion of the Emory River watershed within the evaluation area contains 25 named streams totaling approximately 68 miles of streams (figure 4-4) and draining an area of roughly 556,029 acres (869 square miles). The headwaters of the Emory River, the largest within the Tennessee River subwatershed portion of the evaluation area, are outside the evaluation area and within Frozen Head

State Park. From there, the river flows southwest until its confluence with the Obed River and then flows south eventually draining to the Clinch River embayment of Watts Bar Reservoir. The Emory River forms part of the southern boundary of the NCWMA and intersects a small portion of the ERTCE. This portion of the Emory River has a drainage area of 28.1 square miles (Law, Tasker, and Ladd 2009). Tributary streams of the Emory River with their headwaters in the southern portion of the NCWMA include Edmund Branch, Dry Branch, and Little Creek. Cane Branch is the only Emory River tributary with headwaters in the ERTCE. Rock Creek, with a drainage area of 31.3 square miles (Law, Tasker, and Ladd 2009), begins in the northern portion of the ERTCE, flows south out of the evaluation area, and then meets the Emory River approximately 3 miles downstream of the evaluation area. The Wild and Scenic Obed River system is located slightly more than 10 miles from the evaluation area at its closest point, although water draining from the southern portion of the evaluation area eventually reaches the Obed River system via the Emory River. A list of streams of the Emory River subwatershed within the evaluation area is included in appendix E.

Stream gradients for selected surface waters are included in appendix E (table E-1a). The gradient of the Emory River decreases in the downstream direction from 84 feet per mile (1.6% slope) for the Upper Emory River to 20 feet per mile (0.4% slope) on the Lower Emory River. Other gradients for Emory River watershed streams include the steeper Greasy Creek with a gradient of 250 feet per mile (4.7% slope) to Rock Creek with a low gradient of 24 feet per mile (0.4% slope).

Upper Cumberland River Watershed: The portion of the Upper Cumberland subwatershed within the evaluation area contains 29 named streams totaling approximately 105 miles of streams (figure 4-4) and draining an area of roughly 1,492,388 acres (2,332 square miles). The headwaters of Hickory Creek and Stinking Creek are in the northeastern part of the evaluation area. Hickory Creek drains north out of the evaluation area before eventually joining the Clear Fork, itself a tributary of the Cumberland River. Stinking Creek meanders to the northeast exiting the evaluation area before its confluence with Hickory Creek. Within the evaluation area Hickory Creek drains approximately 24.8 square miles and Stinking Creek approximately 19 square miles (Law, Tasker, and Ladd 2009). Smaller tributaries, which all flow in a north-northeast direction, include Rock Creek, Lick Creek, and Jim Branch which is a tributary of Hickory Creek. A list of streams of the Upper Cumberland subwatershed within the evaluation area is included in appendix E. In addition, there are numerous lakes and ponds within this subwatershed.

Stream gradients for selected surface waters are included in appendix E (table E-1a). Within the evaluation area, gradients for Upper Stinking Creek and Stinking Creek are 70 feet per mile (1.8% slope) and 95 feet per mile (1.8% slope), respectively. A lower gradient of 38 feet per mile (0.7% slope) was recorded for the Lower Stinking Creek outside of the evaluation area. The gradient of the Upper Hickory Creek is 77 feet per mile (1.5% slope).



Populated Places
County Boundary
Interstate
U.S. Route Highway
State Route Highway
Evaluation Area
Stream/River
Stream/River (outside evaluation area)
Waterbody
8 Digit Hydrologic Unit

Surface Water Resources

Spatial Reference: State Plane Tennessee North American Datum of 1983 (NAD83). Lambert Conformal Conic
6/1/2015

Data Sources:
OSM (2014), ESRI (2013-14), USGS (2014)

0 2 4
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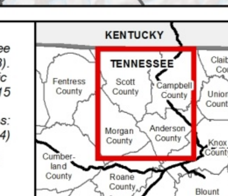


FIGURE 4-4: SURFACE WATER RESOURCES

South Fork Cumberland Watershed: The portion of the watershed within the evaluation area contains 107 named streams totaling approximately 371 miles and drains an area of roughly 884,933 acres (1,383 square miles). One of the major rivers crossing the evaluation area is the New River (figure 4-4). The New River has its headwaters outside the evaluation area in Morgan County but enters the evaluation area in Anderson County and flows generally to the north passing through Campbell and Scott Counties until its confluence with the Big South Fork of the Cumberland River outside the evaluation area in western Scott County. Within the evaluation area the New River has a drainage of approximately 200 square miles (Law, Tasker, and Ladd 2009) and flows into the Big South Fork National River and Recreation Area approximately 7 miles downstream. Prior their confluence with the New River, most of the tributaries within the evaluation area flow in an overall northerly direction. Some of the main tributaries include Smoky Creek, Ligias Fork, Beech Fork, and Nicks Creek. The drainage areas of these include 33.5 square miles for Smoky Creek, 20.4 square miles for Ligias Fork, and 28 square miles for Beech Fork (Law, Tasker, and Ladd 2009). Several streams that have their headwaters within the evaluation area but meet the New River outside the evaluation area include Brimstone Creek and Big Bull Creek draining north and Montgomery Fork draining west. Brimstone Creek drains approximately 37 square miles and Montgomery Fork drains approximately 22 square miles with the evaluation area (Law, Tasker, and Ladd 2009). A list of South Fork Cumberland subwatershed streams located within the evaluation area is included in appendix E.

Stream gradients for selected surface waters are included in appendix E (table E-1a). The gradient of the New River decreases in the downstream direction from 142 feet per mile (2.7% slope) at Braytown to 37 feet per mile (0.7% slope) at Stainville, Tennessee, and finally to 7 feet per mile (0.1% slope) at New River. Other gradients for South Fork Cumberland streams range from Brimstone Creek with a gradient of 151 feet per mile (2.9% slope), Montgomery Fork with 142 feet per mile (2.7% slope), Beech Fork with 113 feet per mile (2.1% slope), and Ligias Fork with 111 feet per mile (2.1% slope) to smaller gradients of Straight Fork with 44 feet per mile (0.8% slope) and Smoky Creek with 38 feet per mile (0.7% slope).

Upper Clinch River Watershed: Only a small portion of the Upper Clinch River subwatershed is within the evaluation area (figure 4-4). This area drains roughly 1,258,283 acres (1,966 square miles) and contains 19 named streams totaling approximately 99 miles. Although the Clinch River does not intersect the evaluation area, all the streams that have headwaters in, or drain portions of, the area either directly or indirectly drain into the Clinch River. Several streams that have their headwaters within the evaluation area but meet the Clinch River outside the area include Cove Creek which drains an area of 24 square miles in a southerly direction to the Clinch River and Ollis Creek, with a drainage area of 16.1 square miles, which meanders east and flows into a Clinch River tributary (Law, Tasker, and Ladd 2009). The stream gradients for Cove Creek and Ollis Creek are 45 feet per mile (0.85 slope) and 83 feet per mile (1.6% slope), respectively (appendix E, table E-1a). A list of streams of the Upper Clinch subwatershed located within the evaluation area is included in appendix E.

Powell River Watershed: The entire Powell River subwatershed drains roughly 605,953 acres (947 square miles) however only 0.1 square miles of the subwatershed falls within the evaluation area (NRCS 2012b). There are no defined or named streams in this portion of the evaluation area in Campbell County.

Special-Status Streams: Under various state and federal programs, several surface waters within or near the evaluation area have been given special regulatory status over the years. The special designations include Nationwide Rivers Inventory and Exceptional Tennessee Waters. Federal agencies are directed to avoid or mitigate adverse effects on rivers listed in the National Rivers Inventory as part of their normal planning and environmental review process. Additionally, agencies are required to consult with the National Park Service (NPS) Rivers, Trails and Conservation Assistance Program before taking any action that could effectively foreclose wild, scenic, or recreational river status on rivers in the inventory

(NPS 2011a). Specific actions are not restricted due to the designation of a waterbody as Exceptional Tennessee Waters; however, development must follow general water quality criteria established in TDEC Rule Chapter 0400-40-03 and narrative rules related to new or increased discharges as stated below.

Inclusion on the Nationwide Rivers Inventory requires that a river segment be free-flowing and have one or more “outstandingly remarkable values.” These values include: exceptional scenery, fishing or boating, unusual geological formations, rare plant and animal life, and cultural or historical artifacts that are of more than local or regional significance (NPS 2011a). Several streams within or immediately downstream from the evaluation area are wholly or in part included in the National Rivers Inventory. The inventory lists the Emory River, from its headwaters in Frozen Head State Park 33 miles downstream to the Roane County line. Much of the headwaters area of the Emory River is within or immediately adjacent to the evaluation area. Almost the entire length of Stinking Creek is on the inventory. The upstream 7- to 8-mile section of Stinking Creek lies within or very close to the evaluation area. Rock Creek is the last of the inventory-listed streams near the evaluation area — a 13-mile section from the confluence with the Emory River upstream to the Pilot Mountain community. This section of Rock Creek lies adjacent to or relatively close to the ERTCE (NPS 2007).

Under Tennessee water quality rules including antidegradation rules stated in TDEC Rule Chapter 0400-40-03.06, certain waters of the state may be designated as Exceptional Tennessee Waters. Criteria used to identify and classify Exceptional Tennessee Waters include the following:

- Waters within state or national parks, wildlife refuges, forests, wilderness areas, or natural areas
- State Scenic Rivers or federal Wild and Scenic Rivers
- Federally designated critical habitat or other waters with documented non-experimental populations of state or federally listed threatened or endangered aquatic or semi-aquatic plants or aquatic animals
- Waters within areas designated as lands unsuitable for mining (LUM) pursuant to the federal SMCRA for which such designation is based in whole or in part on impacts to water resource values
- Waters with naturally reproducing trout
- Waters with exceptional biological diversity as evidenced by a score of 40 or 42 on the Tennessee Macroinvertebrate Index using current TDEC protocols, provided that the sample is representative of overall stream conditions
- Other waters with outstanding ecological or recreational value as determined by the TDEC

Exceptional Tennessee Waters designations protect existing water quality. In waters identified as Exceptional Tennessee Waters, no degradation is allowed unless it can be shown that the change in water quality is necessary for economic or social development and that there is no feasible alternative that would minimize or prevent the change (TDEC 2013). Additionally, the water quality change must not interfere with the classified uses of the waterbody. Several streams within or immediately downstream of the evaluation area have wholly or in part been designated as Exceptional Tennessee Waters. The two largest designations include much of New River proper and the Emory River, both of which eventually flow through the National Park Service Units, Big South Fork National River and Recreation Area and Obed Wild and Scenic River, respectively. Sections of 11 other streams in this area have also been designated: Cove Creek/Cove Lake, Davis Creek, Louse Creek, Stinking Creek, Elk Fork Creek, Terry Creek, Montgomery Fork, Smoky Creek, Nicks Creek, Beech Fork, Ligias Fork, and Brimstone Creek (Arnwine 2011).

Surface Water Quantity: Streamflow varies throughout the evaluation area seasonally with changes in precipitation and evapotranspiration. Low flow conditions on unregulated rivers typically happen in June due to the decrease in precipitation and increase in evapotranspiration and continue through late October or early November (Leist et al. 1982). High flow conditions on unregulated rivers typically start in winter when precipitation begins to increase again and evapotranspiration rates fall and lasting until early spring (Law, Tasker, and Ladd 2009). The size of the drainage basin greatly influences average annual flow (Gaydos et al. 1982). Occasionally streams with drainage areas less than 100 square miles dry up at certain times of year (late summer and fall) (Leist et al. 1982).

As part of the Tennessee federal program, the OSMRE must assess the probable cumulative impacts of all anticipated coal mining on the hydrologic balance in the cumulative impact area before issuing any permit. To comply with these regulations, the OSMRE divided the coalfield into 11 cumulative impact areas and approximately 200 cumulative impact subareas. Data used in this analysis were collected between August 2010 and December 2011. At the outlet to each cumulative impact subarea, the OSMRE has established a trend station to monitor ambient water quality and quantity conditions along with changes through time as a result of mining and other land use activities. The subareas range in size from 2.74 square miles to over 370 square miles. These subareas also include four reference watersheds (ranging in size from 1.7 square miles to 12.45 square miles), which were used to collect water quality and quantity data from what were considered to be the least disturbed watersheds in the area. “Least disturbed” refers to the amount of mining disturbance within the watershed. Mining disturbance in the reference watersheds ranged from 0% to 3.9% of the total watershed area.

No currently active continuous stream gauging stations are available within the evaluation area; therefore flow characteristics for these watersheds were estimated using the Tennessee StreamStats (USGS 2007) GIS application program and the associated data. These programs use current and historical flow data and basin characteristics collected by the US Geological Survey (Ladd and Law 2007; Law and Tasker 2003; Law, Tasker, and Ladd 2009; Bingham 1986) to estimate the mean annual flows, mean summer flows, flow durations, peak storm flows, and critical low flows for ungauged streams in Tennessee. Appendix E includes the results in tables E-1a and E-1b.

The analyses performed with the Tennessee StreamStats model showed that the mean annual flows for each cumulative impact subarea were consistent, ranging from 1.72 cubic feet per second per square mile to 2.28 cubic feet per second per square mile with lower Stinking Creek and Upper Elk Creek having the highest discharge/unit area. The mean summer flows (June through August) ranged from 0.54 cubic feet per second per square mile to 0.84 cubic feet per second per square mile, with the two smallest watersheds showing the highest discharge/unit area.

Surface Water Use: The majority of the evaluation area is unpopulated forestland with no identified surface water or groundwater users and no surface water or groundwater intakes. A surface water or groundwater “intake” refers to the works or structures at the head of a conduit through which water is diverted from a surface water source (e.g., river, stream, or lake) or groundwater source (e.g., aquifer) into a water supply system (TDEC Rule Chapter 0400-45-01, Public Water Systems). However, there are users of both surface water and groundwater resources along the valley bottoms and on private properties within and adjacent to the area. This is especially true in the areas east of Interstate 75 in the Sundquist portion of the NCWMA. In these areas, both active residential and commercial properties are located within the 600-foot ridgeline buffer zones proposed in the state petition.

The public surface water withdrawal rates for Campbell, Morgan, and Scott Counties in 2005 ranged from 1 to 4.99 million gallons per day and from 5 to 14.99 million gallons per day for Anderson County (Robinson and Brooks 2010). Table 4-6 shows that in 2005, surface water withdrawals for the public supply was 14.89 million gallons per day in Anderson County, 3.19 million gallons per day in Campbell County, 1.35 million gallons per day in Morgan County, and 2.71 million gallons per day in Scott County (Kenny et al. 2009). Of the total amount of water withdrawn for public supply in Anderson County, the surface water withdrawals constituted approximately 98% whereas for Campbell County surface withdrawals accounted for approximately 84%. All water withdrawn for public supply in Morgan and Scott Counties was from surface water withdrawals. With the exception of Anderson County, which had a decrease in total withdrawals including surface water withdrawals, the demand for public water has increased in all counties, with surface water withdrawals increasing between 1.35% and 9.3%.

Because of the rural and residential nature of these counties, the majority of the water withdrawals from both surface water and groundwater sources were for domestic purposes. Anderson County used approximately 50.8% of all its produced public water for domestic purposes, while Scott County used approximately 83.8% of its public water for domestic purposes. The remainder of the supply was for irrigation, industrial, and other non-domestic uses. With the exception of Campbell County, which showed a 21.2% increase, groundwater withdrawals by public utilities within the four-county region either had stopped or were greatly reduced for the periods between 2000 and 2005.

Within the evaluation area, availability of public water is limited primarily to the perimeter areas, main highways, and populated valley bottom areas along the New River and its major tributaries. For example, the public drinking water source for the town of Huntsville, Tennessee, and areas to the east of the town are supplied with water from the New River, which drains the evaluation area. Outside of known service areas, users must secure domestic, agricultural, or industrial water through self-supplied sources of groundwater or surface water.

Impoundments: According to the TDEC, there are no notable impoundments in the evaluation area (TDEC 2014b). La Follette Reservoir is located in the northeastern portion of the NCWMA. Although surrounded by land considered part of the study area, this waterbody is excluded from and not considered part of the study area. There are numerous smaller lakes and ponds within the area especially in the northeastern portion of the NCWMA (USGS 2014c).

Surface Water Quality: State and federal statutory requirements are in place to protect the integrity and quality of streams including those used for drinking water. On the federal level, the Clean Water Act of 1972 as amended, SMCRA of 1977, and the Safe Drinking Water Act of 1996 provide varying levels of protection while the Tennessee Water Quality Control Act of 1977 (TCA 69-3-101, et seq.) and the Tennessee Safe Drinking Water Act provide protections on the state level. The federal Clean Water Act and the Tennessee Water Quality Control Act require the development of water quality standards for waters of the state through the determination or classification of stream uses (i.e., domestic water supply, recreation, fish and aquatic life, livestock watering and wildlife, irrigation, navigation, industrial, and trout stream); setting appropriate water quality criteria needed to maintain those uses; and establishing anti-degradation plans or policies to protect these streams and water bodies from pollution sources. Designated stream use classifications for streams within the study area are shown in appendix E (table E-2). The federal and Tennessee Safe Drinking Water Acts also manage water quality by setting standards for drinking water, establishing appropriate treatment techniques, and developing both wellhead protection plans and source water protection plans for surface water and groundwater sources used for public water supplies.

TABLE 4-6: TOTAL ESTIMATED WATER USE FOR COUNTIES INTERSECTING THE EVALUATION AREA

Parameter	Anderson County			Campbell County			Morgan County			Scott County		
	2000	2005	% Change	2000	2005	% Change	2000	2005	% Change	2000	2005	% Change
Total population	71,330	74,430	1.54	39,850	40,686	2.10	19,760	20,157	2.01	21,130	21,868	3.49
Public supply, groundwater withdrawals, fresh, in Mgal/d	0.96	0.28	−70.8	0.52	0.63	21.2	0	0	0.0	0.1	0	−100.0
Public supply, surface water withdrawals, fresh, in Mgal/d	20.62	14.89	−27.8	3.02	3.19	5.6	1.05	1.35	28.6	2.38	2.71	13.9
Public supply, total withdrawals, fresh, in Mgal/d	21.58	15.17	−29.7	3.54	3.82	7.9	1.05	1.35	28.6	2.48	2.71	9.3
Domestic, self-supplied population	—	4,449	—	—	4,362	—	—	9,863	—	—	542	—
% population on self-supply water sources	—	6.1	—	—	10.7	—	—	48.9	—	—	2.5	—
Domestic, self-supplied groundwater withdrawals, fresh, in Mgal/d	—	0.32	—	—	0.31	—	—	0.71	—	—	0.04	—
Domestic, deliveries from public supply, in Mgal/d	—	7.71	—	—	2.71	—	—	0.98	—	—	2.27	—
Domestic, total use (withdrawals + deliveries), in Mgal/d	—	8.03	—	—	3.02	—	—	1.69	—	—	2.31	—
% public supply used for domestic purposes	—	50.8	—	—	70.9	—	—	72.6	—	—	83.8	—

Source: Kenny et al. 2009.

Mgal/d=million gallons per day.

Section 305(b) of the Clean Water Act requires the state to develop a biennial assessment and inventory of the status of both surface water and groundwater resources in the state. Similarly, the Tennessee Safe Drinking Water Act requires preparation of a water quality report. Section 303(d) of the Clean Water Act requires a listing of streams and lakes that are “water quality limited” or are expected to fail to meet water quality standards in the next two years and need additional pollution controls (TDEC 2014a).

Based on the biennial assessments, portions of seven streams within the evaluation area are on the 303(d) list and considered impaired (table 4-7). These streams are impaired for certain designated uses (i.e., recreation or fish and aquatic life) due to violations of specific water quality criteria. Tributaries to Joe Branch carry low-pH water from abandoned Big Mary seam underground mine workings to Indian Fork of the New River. Thompson Creek is impacted largely by abandoned surface mines in the Kent and Murray seam that predate SMCRA. Other streams in the evaluation area are listed under section 303(d) for reasons related to siltation from both abandoned mining and logging activities within the watershed or for pathogens not related to mining.

TABLE 4-7: SECTION 303(D) IMPAIRED STREAMS IN THE NORTH CUMBERLAND WILDLIFE MANAGEMENT AREA AND EMORY RIVER TRACTS CONSERVATION EASEMENT

Stream Name (and miles)	State	Impairment	Cause	Source
Elk Fork Creek (15.14)*	TN	Recreation	Escherichia coli	Pasture grazing, septic tanks
Joe Branch (1.13)*	TN	Fish and aquatic life	Loss of biological integrity due to siltation	Abandoned mining
Unnamed tributary to Joe Branch (0.44)	TN	Fish and aquatic life	pH	Abandoned mining
Smoky Creek (34.07)*	TN	Fish and aquatic life	Loss of biological integrity due to siltation	Abandoned mining, silviculture
Hickory Creek (9.5)*	TN	Recreation	Escherichia coli	Septic tanks, pasture grazing
Davis Creek (20.53)*	TN	Recreation	Escherichia coli	Septic tanks
Thompson Creek (5.14)*	TN	Fish and aquatic life	Low pH	Abandoned mining

Source: TDEC 2014a.

* A total maximum daily load has already been completed, submitted to the EPA, and approved by the EPA.

The TDEC and OSMRE data from 29 OSMRE ambient monitoring stations (trend stations) and 14 TDEC ambient and ecoregion monitoring stations located within the Office of Surface Mining Cumulative Hydrologic Impact Assessment database were compiled and evaluated against the water quality criteria established for the various stream use classifications (see tables E-3a through E-3c in appendix E). Four additional reference watersheds were established in areas determined to be the least disturbed watersheds within the Cumberland Mountain and Cumberland Block ecoregions. These reference watersheds showed mining disturbances ranging from 0% to 3.9% whereas the OSMRE trend station watersheds showed mining disturbances ranging from 0.1% to 22.4% of the total watershed area (OSMRE n.d.). The New River watershed has experienced the most surface mining activity, with approximately 24,000 acres of previous disturbances, not including underground mine working areas. The two most heavily mined subwatersheds of New River are Beech Fork (approximately 17.5% disturbed) and Montgomery Fork (approximately 15% disturbed) as shown in appendix E (table E-4).

Examination of water quality data for domestic water supply streams within the Office of Surface Mining Cumulative Hydrologic Impact Assessment database showed exceedances of both primary and secondary regulations (see tables E-5a and E-5b in appendix E). These regulations only apply to treated water at public utilities and to streams that have been designated by the TDEC as domestic water supply streams as stated in TDEC Rule Chapter 1200-04-04. The majority of exceedances were for secondary standards of iron, aluminum, and manganese in both total and dissolved form (OSMRE n.d.). More than half of these exceedances appear to be associated with suspended sediments in the water column, since the dissolved fractions were below the thresholds. The primary maximum contaminant level values showed one exceedance of total cadmium in the Emory River, one exceedance of total lead in the New River near Huntsville, and exceedances for total and dissolved thallium at seven different monitoring sites in the New River, Ollis Creek, Cove Creek, and Upper Elk Creek. Unlike other contaminants, thallium commonly also had exceedances in its dissolved fraction.

Based on examination of OSMRE and TDEC data using criteria for the protection of fish and aquatic life, aluminum appears to be the most consistent contaminant and shows an exceedance level at all stations with the exception of the two ecoregion headwater reference streams (tables E-3a-E-3c in appendix E) (OSMRE n.d.). Of the 135 samples reviewed, 4 samples have a value above the EPA criterion maximum concentration of 0.75 milligrams per liter and 10 samples showed a level above the EPA criterion continuous concentration of 0.087 milligrams per liter in the dissolved fraction of the sample, indicating that most of the aluminum was in a suspended form.

Of the metals cadmium, chromium (III), copper, lead, nickel, silver, and zinc, only copper and cadmium commonly showed an exceedance of the criterion continuous concentration thresholds. Cadmium routinely appeared to exceed the criterion continuous concentration thresholds in both mined and reference watersheds and therefore does not appear to be directly related to mining influences. Copper often exceeded both the criterion maximum concentration and criterion continuous concentration thresholds; many of the criterion maximum concentration exceedances were in reference watersheds or watersheds with the least amount of surface mining activities. TDEC data did report three exceedances of both the zinc criterion maximum concentration and criterion continuous concentration values in Straight Fork and in one of the ecoregion headwater reference sections. Lead occasionally showed exceedances of the criterion continuous concentration thresholds; those exceedances were primarily associated with reference watersheds of other soft-water streams that had minimum mining influences. The TDEC data reported only one exceedance of the criterion continuous concentration threshold for nickel. No exceedances of either the criterion maximum concentration or criterion continuous concentration threshold were reported for silver although several of the trend stations and reference watersheds had such low hardness values that the laboratory method detection limits were higher than the calculated criteria.

Based on the current stream use classifications in the majority of the coalfield, pollutants designated under SMCRA do not typically have numeric water quality criteria. As a result the OSMRE uses EPA aquatic life criteria pursuant to the Clean Water Act and TDEC threshold values for determining material damage action levels for permitting activities and for evaluating cumulative impacts. Once a cumulative impact area approaches or exceeds these threshold values, the OSMRE works in cooperation with the TDEC to ensure that full use support is being maintained. TDEC thresholds include 250 milligrams per liter for sulfate, 500 milligrams per liter for dissolved solids, and less than 5.0 milligrams per liter for dissolved oxygen. EPA thresholds include 1 milligram per liter for total manganese and 1 milligrams per liter for total iron. The water quality parameters that exceeded these thresholds included dissolved oxygen, sulfate, iron, and pH. Dissolved oxygen and sulfate showed only one exceedance whereas iron and pH were exceeded several times. There were six exceedances for total iron, since the filtered samples typically did not show an exceedance from the dissolved fraction. None of the OSMRE data showed pH values outside of the criteria ranges. However, many of the TDEC ecoregion reference headwater streams were below the recommended pH range for fish and aquatic life.

Table 4-8 shows additional data provided by Office of Surface Mining and collected from 1984 to the present by applicants and permittees in the NCWMA and adjacent areas from streams. Many of these sampling stations are located in low-order headwater streams that are close to mine lands that were previously active or abandoned. As a result, exceedances in these areas can generally be expected. However, table 4-8 shows that much of the measured water quality parameters were below the threshold levels. Approximately 35% of the field conductivity samples were greater than the TDEC National Pollutant Discharge Elimination System permit trigger value of 500 microsiemens per centimeter for mine effluent from surface coal mining operations. Exceedances of this value initiate additional instream and effluent monitoring and implementation of adaptive management plans and a whole effluent toxicity test. Exceedances for sulfate, total manganese, total dissolved solids, dissolved iron, and pH samples were all less than 10%. Dissolved fractions of iron and manganese were typically analyzed only when the total concentrations exceeded 1 milligrams per liter and therefore are a subset of the total concentrations.

TABLE 4-8: SURFACE WATER QUALITY DATA FROM THE OFFICE OF SURFACE MINING, RECLAMATION AND ENFORCEMENT APPLICATIONS AND PERMITS AND TENNESSEE DEPARTMENT OF ENVIRONMENT & CONSERVATION IN THE NORTH CUMBERLAND WILDLIFE MANAGEMENT AREA AND ADJACENT AREAS

Constituent	OSMRE Threshold	Maximum	Minimum	Mean	Median	No. of Samples	No. Exceeding
Field pH (units)	6–9	9.5	2.4	7.2	7.3	2,580	60
Lab pH (units)	6–9	9.3	2.6	7.2	7.3	1,108	41
Iron, total (mg/L)	1	260	0	0.8	0.3	3,664	442
Iron, dissolved (mg/L)	1	19.4	0	0.4	0.1	727	58
Manganese, total (mg/L)	1	30	0	0.4	0.1	3,574	206
Manganese, dissolved (mg/L)	1	23.3	0	0.8	0.1	425	65
Sulfate (mg/L)	250	1,150	0	83.1	52.2	425	190
Field conductivity (μS/cm)	500*	3,640	13.4	368	310	772	150
Lab conductivity (μS/cm)	500*	2,900	1.6	329	254	1,938	312
Solids, total dissolved (mg/L)	500	1,693	1.5	213	166	1,547	7
Solids, total suspended (mg/L)	N/A	39,806	0	29.8	6	3,611	N/A
Acidity (mg/L as $CaCO_3$)	N/A	480.5	-593	-8.7	0	3,366	N/A
Alkalinity (mg/L as $CaCO_3$)	N/A	598.5	0	59.3	45.4	3,565	N/A

Source: OSMRE n.d.

mg/L = milligrams per liter; μS/cm = microsiemens per centimeter; N/A = not applicable.

* TDEC National Pollutant Discharge Elimination System permit trigger value.

The US Geological Survey (Gaydos et al. 1982; Hufschmidt et al. 1981) has documented that specific conductivity and associated dissolved solids concentrations are higher in mined basins than in unmined areas as well as during low-flow conditions due to the reduced dilution capabilities. The OSMRE studied the relationship between low flows, specific conductivity, surface mining disturbance, and rainfall in 50 watersheds within and adjacent to the NCWMA. Data on specific conductivity and rainfall were collected from June to November 2011. Tables E-6a and E-6b in appendix E summarize the results. The specific conductivity measurements ranged from a minimum of 26.3 microsiemens per centimeter for No Business Branch, which is an unmined reference stream, to a maximum of 1,318 microsiemens per centimeter for Neal Branch, which has the greatest percentage of mining disturbance along with heavily mineralized underground mine discharges within the watershed among those 50 watersheds analyzed. The percent of surface area that is considered to be disturbed by mining was based only on surface disturbance and did not include disturbance from undergrounding mining.

Unmined and relatively undeveloped watersheds, as shown in tables E-6a and E-6b in appendix E, did not show significant variation in specific conductivity in response to precipitation whereas heavily surface mined watersheds did show significant variation in responses to precipitation. Watersheds that had been heavily mined but are not under the influence of highly mineralized underground mine discharges showed significantly higher conductivity and variability than unmined watersheds, but had smaller responses than more recently mined watersheds. During periods of non-precipitation, specific conductivities in some mined watersheds increased by up to 50 microsiemens per centimeter per day whereas during precipitation events the conductivity measurements decreased by 100 to 200 microsiemens per centimeter.

Acid Mine Drainage: Acid mine drainage occurs when sulfide ores, such as iron pyrite, are exposed to atmospheric conditions. The exposure of these materials to both air and water leads to a series of oxidation reactions resulting in the formation of hydrogen ions, sulfate, and ferrous iron, ferric iron, and eventually iron hydroxide (EPA 1994; USFS n.d.). Although these oxidation reactions occur naturally, the mining process enhances the reactions and formation of acid rock drainage through the presence of mine tailings, wastes, surface pits, underground workings, or auger holes. Surface water contact with tailings, waste rock, and pits and groundwater contact with materials associated with underground mines and auger holes can lead to the formation of acidic drainage. Mine tailings and waste rock resulting from surface mining operations generally have a smaller grain size than undisturbed, in-place material (Reclamation Research Group 2008). Therefore the surface area of sulfur-bearing rocks is increased which in turn increases the potential for the chemical reactions that result in acid mine conditions. With mining and milling processes quickly exposing large amounts of sulfide minerals to the atmosphere, the resultant drainage creates acidic low pH conditions in the surrounding environment. Metals that are exposed by mining processes, such as copper, zinc, aluminum, iron, and magnesium often come into contact with acidic water, are solubilized and contribute to negative effects of water quality along with low pH from acid mine drainage. This acidic water with solubilized heavy metals can result in highly toxic surface waters (EPA 2013a). Acidic drainage can be neutralized through contact with alkaline carbonate materials or associated alkaline drainage (EPA 1994). A total maximum daily load for pH was submitted in 2009 for Thompson Creek in the Upper Clinch River subwatershed to address pollution caused by acid mine drainage and associated mining land uses. In this report a total maximum daily load of net alkalinity per day was used as a substitute for pH.

GROUNDWATER

Groundwater Quantity: Regional groundwater flow is through stress-relief fractures and bedding planes located horizontally along the valley floors and vertically along the valley walls (Wyrick and Borchers 1981). These fractures are connected and allow for a stair-stepping movement of groundwater along the fractures from topographic highs at ridgetops to topographic lows at valley bottoms (Leist et al. 1982; Wyrick and Borchers 1981). Local groundwater movement may be different due to topography, fracture orientation, impermeable geologic material, and anthropogenic activities (Leist et al. 1982). Groundwater discharge can occur at highwall seeps and into streams in the valley or can recharge shallow valley bottom aquifers.

The main source of groundwater is from the movement of precipitation down to the zone of saturation (Leist et al. 1982). Upper aquifers are recharged through infiltration of surface precipitation whereas lower aquifers are mainly recharged by water from the upper aquifers as well as some infiltration and stream recharge (Leist et al. 1982). Well depth, location, surrounding rock characteristics, and fractures determine how much groundwater a well yields (Leist et al. 1982). The general trend is that deeper wells provide more water however this is variable and could depend on other factors such as nearby fractures or structural disturbances (Leist et al. 1982). The occurrence of groundwater within the evaluation area is restricted primarily to the sandstone and conglomerate units distributed throughout the Pennsylvanian stratigraphic sequence of rocks (Gaydos et al. 1982). However, the major stream valleys typically provide a more reliable source of groundwater. These valley bottoms act as discharge zones for the more intermediate and regional groundwater, which forms from seepage from overlying shallower systems.

The main aquifers in the evaluation area are the Pennsylvanian sandstone and Mississippian sandstone-carbonate aquifers (USGS 2003). The Mississippian aquifer underlies a very small portion of the northern portion of the evaluation area. The Pennsylvanian sandstone aquifer typically has depths of 100–200 feet and yields of 5–50 gallons per minute. In 2000, groundwater withdrawals from the Pennsylvanian sandstone aquifer were approximately 0.48 million gallons per day, which amounts to approximately 0.1% of total statewide groundwater withdrawals (Webbers 2003).

A well inventory of the four-county region surrounding the evaluation area provided by the TDEC showed 82 wells (figure 4-5 and table E-7 in appendix E) (Ewing pers. comm. 2012). Based on these records, the median depth of wells in the vicinity of the evaluation area ranged from 79 to 193 feet with the median depth of water at 40 to 100 feet. The median well yield ranged from 8 to 20 gallons per minute for the four-county region, which is adequate for most domestic purposes. The Stony Fork well field, used by the Caryville-Huntsville Utility District, reported a maximum yield of approximately 300 gallons per minute. These wells produce from a valley-bottom aquifer system consisting of alternating sandstones and shales of the Slatestone formation. The public groundwater withdrawal rates for Anderson and Campbell Counties in 2005 ranged from 0.05 to 0.99 million gallons per day (Robinson and Brooks 2010). There were no public groundwater withdrawals in Morgan or Scott Counties.

Groundwater Quality: Multiple factors influence groundwater quality; these factors include chemical composition of the aquifer and surrounding rock, location of recharge areas, residence time of aquifer water, and groundwater circulation (Gaydos et al. 1982). Typically groundwater from deeper wells contains more minerals, dissolved solids, and chlorides than shallower wells due to the greater residence time of water in deeper aquifers (Leist et al. 1982). As a result, the groundwater quality in the NCWMA and the evaluation area is highly variable depending upon the location and depth of the wells or groundwater source.

Most waters from rocks of Pennsylvanian age in this area can be classified as calcium magnesium bicarbonate, sodium bicarbonate, or sodium sulfate types (Leist et al. 1982). Water impacted by mine drainage commonly takes on a calcium magnesium sulfate signature as a result of the oxidation of pyritic materials and the release of sulfate ions. Typically the groundwater in the NCWMA and evaluation area is moderately mineralized, slightly acidic, and soft to moderately hard (Gaydos et al. 1982).

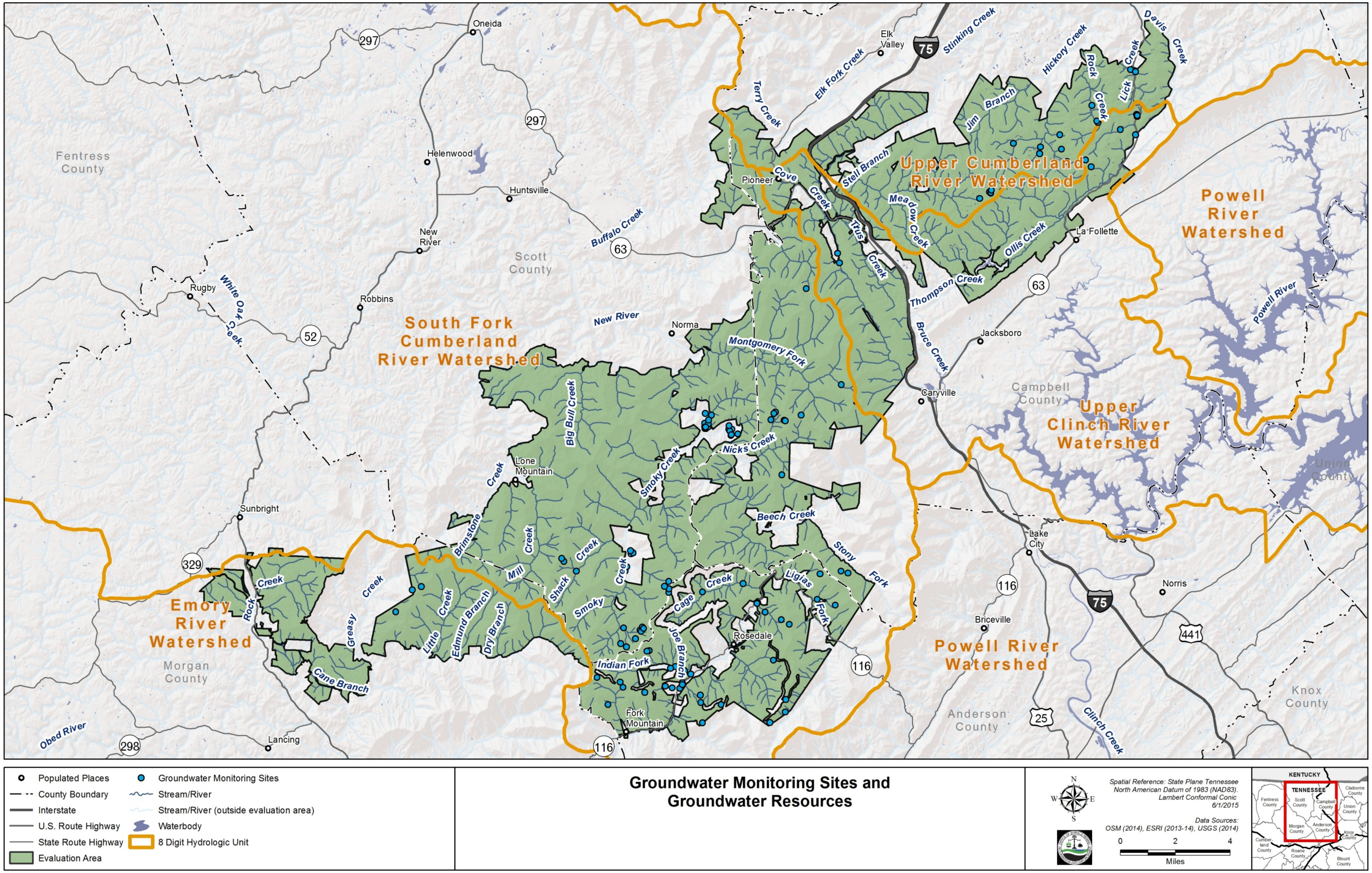


FIGURE 4-5: GROUNDWATER MONITORING SITES AND GROUNDWATER RESOURCES

Generally, groundwater within the Cumberland Mountains and Cumberland Block is adequate for most purposes, although treatment for iron and manganese is common for domestic uses. Numerous authors and researchers (Gaydos et al. 1982; Leist et al. 1982; Wilson 1967) have identified iron and manganese as undesirable water quality constituents in most waters associated with the Pennsylvanian strata of Tennessee. Both iron and manganese can result in staining of clothes and plumbing fixtures as well as creating an objectionable taste at concentrations that occur naturally in the Tennessee coalfield. The EPA has established secondary drinking water regulations levels for public water supplies of 0.3 milligrams per liter for iron and 0.05 milligrams per liter for manganese (40 CFR § 143.3). These standards apply only to public water systems and are based on aesthetic considerations such as taste, color, and odor. These are unenforceable standards and they do not apply to private groundwater or other drinking water sources. However, the EPA has issued a health advisory (EPA 2004) recommending a lifetime exposure rate of 0.3 milligrams per liter for manganese to prevent the potential for neurological effects resulting from long-term exposure.

The OSMRE evaluated groundwater quality data provided with coal mining permits in the NCWMA along with groundwater data collected by the OSMRE related to a public water line extension project in the Emory River watershed. Because many of these groundwater sources were located within or immediately adjacent to previous mining disturbances or were from underground workings located within an actual coal seam, the data represent a higher concentration of dissolved constituents and mining-impacted groundwaters than would be anticipated for most domestic water users. For instance, underground mine areas can be a major contributor to elevated specific conductivity during periods of low flow. Table 4-9 summarizes these data, including information from wells, springs, seeps, and discharging mine adits used for groundwater monitoring.

These data showed that approximately 26% of the field pH values and 38% of the lab pH values were below the recommended secondary safe drinking water regulations, while the median values were slightly above the minimum safe drinking water regulations. Only about 13% of the measured sulfate values exceeded the secondary drinking water regulation, while about 14% of the total dissolved solids exceeded this level. Most iron and manganese values exceeded the secondary drinking water regulation by approximately 74% and 82%, respectively. Iron exceedances of the secondary drinking water regulation are reduced to 39% when suspended iron particulates are removed. Aluminum was within the recommended safe drinking water regulations levels established by the EPA.

In addition to groundwater monitoring data from existing OSMRE permits, water quality data was collected from 29 spoil seeps, springs, ponds, and mine adits from the different coal seams both within and adjacent to the evaluation are. This was done to develop a general characterization of the coal seams and associated overburdens and to identify seams with potentially acid or toxic characteristics. However, because of the potential for significant variations within a given seam over such a large geographical area and because of the variation in ages of mine spoils and mine workings encountered, these data cannot be considered conclusive or universal throughout the evaluation area. Additionally, since most sites have no historical record of the materials present or how those materials were handled, these data may not be representative of current mining practices.

TABLE 4-9: GROUNDWATER QUALITY DATA FROM THE OFFICE OF SURFACE MINING, RECLAMATION, AND ENFORCEMENT PERMITS IN THE NORTH CUMBERLAND WILDLIFE MANAGEMENT AREA AND ADJACENT AREAS

Constituent	MCL[a]	WHO Guideline	Maximum	Minimum	Mean	Median	No. of samples
Depth to water (feet)	N/A	N/A	58.6	1	18.8	19	48
Field conductivity (µS/cm at 25°C)	N/A	N/A	2,842	7.1	468	325	328
Lab conductivity (µS/cm at 25°C)	N/A	N/A	2,578	14	443	260	82
Field pH (units)	6.5–8.5	N/A	8.8	3.1	6.9	6.9	565
Lab pH (units)	6.5–8.5	N/A	7.9	3.1	6.4	6.7	108
Acidity (mg/L as $CaCO_3$)	N/A	N/A	410	-822	-54	0.0	331
Alkalinity (mg/L as $CaCO_3$)	N/A	N/A	638	0.0	126	100	438
Solids, total suspended (mg/L)	N/A	N/A	1,316	0.0	39	6	279
Solids, total dissolved (mg/L)	500	—[b]	2045	3.3	280	182	369
Sulfate (mg/L)	250	—[b]	1310	0.6	121	46	494
Iron, total (mg/L)	0.3	N/A	300.44	0.0	5.56	0.98	654
Iron, dissolved (mg/L)	0.3	—[b]	33.9	0.0	1.52	0.21	185
Manganese, total (mg/L)	0.05	N/A	13.56	0.0	0.88	0.18	644
Manganese, dissolved (mg/L)	0.05	0.4	6.2	0.0	0.83	0.1	137
Aluminum, total (mg/L)	0.05–0.2	N/A	0.22	0.05	0.08	0.05	6
Aluminum, dissolved (mg/L)	0.05–0.2	0.1/0.2	0.09	0.02	0.05	0.05	6

Source: Unpublished TVA data; OSMRE n.d.; WHO 2008.

MCL = maximum contaminant level; WHO = World Health Organization; µS/cm = microsiemens per centimeter; mg/L = milligrams per liter; N/A = not applicable

[a] Based on EPA secondary drinking water regulations for public water supplies.

[b] No health-based guideline.

The results show that approximately 85% of the samples exceeded the recommended secondary drinking water regulation for pH and manganese while approximately 55% exceeded the secondary drinking water regulation for iron. Total dissolved solids, sulfate, and aluminum concentrations were exceeded approximately 20% to 40% of the time for the recommended secondary drinking water regulation. Other maximum contaminant level exceedances were identified for arsenic, zinc, beryllium, chromium, and lead resulting in less than 10% of the samples exceeding the thresholds. Cadmium had two measured exceedances of the maximum contaminant level while the remaining samples were analyzed at detection limits well above the criteria. As a result, an absolute determination of cadmium exceedances cannot be made. No exceedances of the maximum contaminant level or secondary drinking water regulation were recorded for antimony, barium, copper, selenium, or silver. Based on this information, the coal seams that demonstrated the worst water quality with respect to acid mine drainage formation or leaching of toxic materials were the Murray and Big Mary seams, with abandoned underground mine discharges being the worst contributor.

WETLANDS

Wetlands are areas of transition between aquatic and terrestrial systems where the frequent and prolonged presence of water at or near the soil surface drives the development of soil characteristics and associated biological communities. Wetlands provide many benefits to the human, biological, and hydrological environment, including habitat for fish and wildlife, water quality improvement, flood storage, and opportunities for recreation.

Wetlands within the evaluation area include both naturally occurring wetlands and wetlands created as a result of past mining activities (both through incidental creation and intentional remediation actions). Information and estimations for the types and numbers of wetlands within the evaluation area were derived from two separate sources: the US Fish and Wildlife Service (USFWS) (2014d) National Wetlands Inventory and an unpublished wetland study by the Tennessee Valley Authority (TVA) on the 53,000-acre Koppers Coal Reserve which is located within the evaluation area (figure 4-6).

The National Wetlands Inventory classifies wetlands according to Classification of Wetlands and Deepwater Habitats of the United States (Cowardin et al. 1979). To determine whether a site is a wetland, as defined by Cowardin and others (1979), one of the following criteria must be present:

1. the land supports more than 50% cover of hydrophytic (living in water-logged conditions) plant species (as listed in Reed 1996) at least periodically during the growing season,
2. the substrate is predominately undrained hydric soil, or
3. the substrate is a non-soil and is annually saturated with water or covered by shallow water at some time during the growing season.

National Wetlands Inventory maps are designed to assist in identifying potential wetlands and wet areas, however, the majority of wetlands identified have not been field verified to determine if they meet the regulatory definition of a wetland under US Army Corps jurisdiction (section 404 of the Clean Water Act). The Cowardin Classification System defines wetlands based on major classes of wetlands which include estuarine, riverine, lacustrine, and palustrine. Wetland types within the evaluation area include palustrine and riverine wetland systems. Subsystem and class provide further detail. Additionally, environmentally sensitive wetlands have been documented in the Koppers Coal Reserve, a 53,000-acre tract of land within the Royal Blue Unit of the evaluation area. The TVA owns the coal mineral rights of the entire Koppers Coal Reserve and the State of Tennessee owns most of the land surface and all of the timber and oil rights. According to the National Wetland Inventory and the unpublished TVA data, the evaluation area contains approximately 381.3 acres of palustrine wetlands of these 56.2 acres of wetlands are within or within 100 feet of areas designated as potentially available for surface coal mining. The amount of wetlands identified within the evaluation area makes up less than 1% of the evaluation area.

Palustrine wetlands of various types make up approximately 58.5% of the total wetlands in the evaluation area. Palustrine wetlands are “nontidal” wetlands dominated by trees, shrubs, emergents, mosses, or lichens, and all such wetlands that occur in tidal areas where salinity due to ocean-derived salts is below 0.5 parts per thousand (Cowardin et al. 1979). The evaluation area is a nontidal system, therefore the classification under this wetland type is based on the nature of the dominant vegetation. The evaluation area includes four different classes of palustrine wetlands.

The natural wetlands identified within the study areas from National Wetland Inventory and the unpublished TVA data include palustrine emergent, palustrine scrub-shrub, and palustrine forested wetland. In some areas, natural wetlands identified within the study areas occur as wetland complexes composed of two or more types of wetlands (i.e., palustrine scrub-shrub/forested wetland). The majority of artificial manmade or altered palustrine wetlands are identified as either palustrine unconsolidated bottom (PUB) or palustrine aquatic bed (PAB) with one of the following special modifiers: b = created or modified by beaver; d = partially drained/ditched; h = diked/impounded; r = artificial substrate; s = spoil; or x = excavated. Palustrine emergent wetlands have a dominance of erect rooted herbaceous (not woody) wetland plants (Cowardin et al. 1979). Forested palustrine wetlands have woody vegetation that is approximately 20 feet tall or more (Cowardin et al. 1979). Scrub-shrub wetlands are wetlands that have vegetation that is less than approximately 20 feet tall. Common plants might include shrubs, saplings, or stunted trees (Cowardin et al. 1979). Finally, the unconsolidated bottom wetlands group includes all wetlands and deep-water habitats that have “at least 25% cover of particles smaller than stones (less than approximately 3 inches) and a vegetative cover of less than 30%” (Cowardin et al. 1979).

Seasonally flooded wetlands are those where the surface water extends onto land for long periods, particularly during the growing season, but recedes by the end of the growing season in the majority of years (Cowardin et al. 1979). Within temporarily flooded wetlands, “surface water is present for brief periods during the growing season, but the water table usually lies well below the soil surface” (Cowardin et al. 1979). Water covers the entire land surface in permanently flooded wetlands for the entire year, in all years (Cowardin et al. 1979).

Riverine wetlands make up approximately 41.5% of the wetlands in the evaluation area. Riverine wetland systems include all wetlands and deepwater habitats contained in natural or artificial channels periodically or continuously containing flowing water or which forms a connecting link between the two bodies of standing water. Upland islands or Palustrine wetlands may occur in the channel, but they are not part of the riverine system (Cowardin et al. 1979). The area includes the following riverine wetland subsystem: riverine upper perennial (R3). Riverine upper perennial (R3) wetlands are riverine wetlands that have high gradient, fast water velocity, rocky or gravelly substrate, and little floodplain development (Cowardin et al. 1979). Within this classification the riverine upper perennial wetlands are further classified into two classes: Rock Bottom (RB) and Unconsolidated Bottom (UB). Rock Bottom includes all wetlands and deepwater habitats with substrates having an aerial cover of stones, boulders, or bedrock 75% or greater and vegetative cover of less than 30% (Cowardin et al. 1979). Unconsolidated Bottom includes all wetlands and deepwater habitats with at least 25% cover of particles smaller than stones (less than 6–7 cm), and a vegetative cover less than 30% (Cowardin et al. 1979). These are further broken down into subclasses of bedrock bottoms in which bedrock covers 75% or more of the surface and cobble-gravel which is made up of unconsolidated particles smaller than stones are predominantly cobble and gravel though finer sediments may be intermixed (Cowardin et al. 1979).

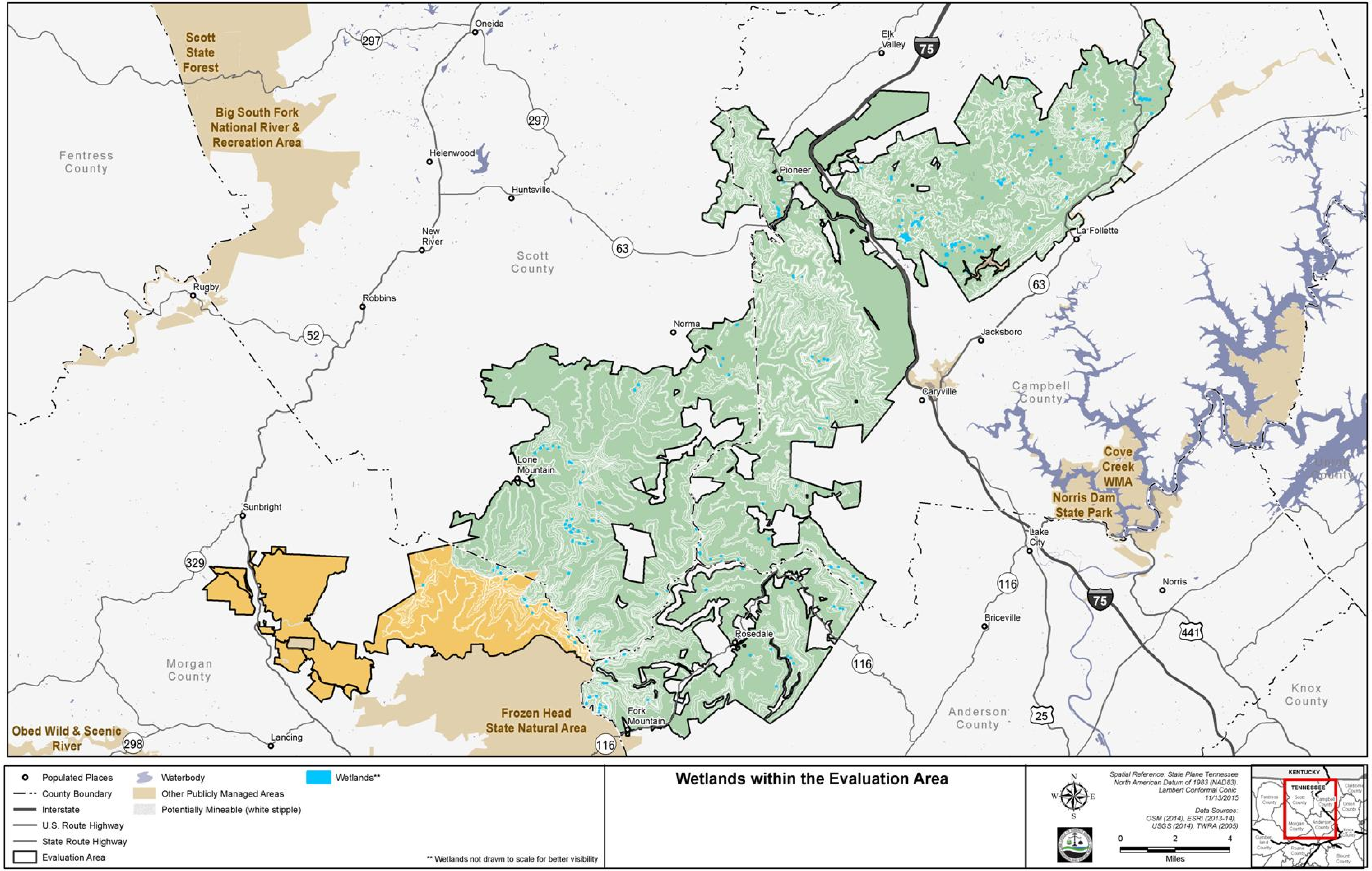


FIGURE 4-6: WETLANDS WITHIN THE EVALUATION AREA

Table 4-10 summarizes the wetland habitat types in NCWMA and their acreage based on the National Wetland Inventory.

TABLE 4-10: WETLANDS OF THE EVALUATION AREA

USFWS Mapping Code	Description	Total Acreage
PEM1A	Palustrine, Emergent, Persistent, Temporarily Flooded	8.43
PFO1A	Palustrine, Forested, Broad-leaved Deciduous, Temporarily Flooded	28.86
PFO1Ah	Palustrine, Forested, Broad-Leaved Deciduous Temporarily Flooded, Diked/Impounded	2.78
PFO5Gh	Palustrine, Forested, Dead, Intermittently Exposed Diked/Impounded	12.23
PSS1A	Palustrine, Scrub-Shrub, Broad-leaved Deciduous, Temporarily Flooded	2.20
PSS1C	Palustrine, Scrub-Shrub, Broad-leaved Deciduous, Seasonally Flooded	3.22
PUBHh	Palustrine, Unconsolidated Bottom, Permanently Flooded, Diked/Impounded	19.96
PUBHx	Palustrine, Unconsolidated Bottom, Permanently Flooded, Excavated	119.97
PUSCx	Palustrine, Unconsolidated Shore, Seasonally Flooded, Excavated	0.35
Palustrine		**198.00**
R3RB1H	Riverine, Upper Perennial, Rock Bottom, Bedrock, Permanently Flooded	1.42
R3UB1H	Riverine, Upper Perennial, Unconsolidated Bottom, Cobble/Gravel, Permanently Flooded	139.19
Riverine		**140.61**
Total		**338.61**

Source: USFWS 2014d.

Environmentally Sensitive Wetlands

An unpublished wetland study by the TVA on the 53,000-acre Koppers Coal Reserve conducted a more detailed assessment than the National Wetlands Inventory mapping within Koppers Coal Reserve and in the surrounding area (within 1 mile of the reserve boundary). The Koppers Coal Reserve underlies the Royal Blue Unit of the NCWMA. This study examined newer aerial photos taken by the TVA between 1996 and 2003 at a finer level of detail along with ground surveys to confirm air photo interpreted wetlands as well as identifying the presence of wetlands that might not be identified based on the aerial photos alone. This provided more detailed information on the natural features and ecological condition of the wetlands within the reserve. Ground surveys were conducted within a 4,057-acre area representing approximately 8% of the entire 53,000-acre Koppers Coal Reserve.

TVA identified a total of over 440 acres of wetlands within the 53,000-acre Koppers Coal Reserve area. The study assumed that based on model projections there may be as many as 1,910 acres of additional unidentified wetlands resulting in a potential total of over 2,350 acres of wetlands (actual plus projected acres) within the Koppers Coal Reserve.

The largest individual wetland identified during the study was 52 acres in size and occurs in the upper reaches of the Stinking Creek watershed. The study also identified 220 acres of wetlands that were individually over 10 acres in size, which account for 50% of the known wetland acreage. The majority of wetlands identified in the Koppers Coal Reserve were less than 1 acre in size, accounting for 16% (71 acres) of the known wetland acreage. The study noted that because of the difficulties in consistently identifying wetlands less than 1 acre in size in mountainous terrain, the actual number of wetlands may be substantially higher. Wetlands less than 1 acre include springs and groundwater seeps, small depressions, wetlands at the headwaters of ephemeral streams, and sand/gravel bars along watercourses.

The study identified riverine, slope, depressional, and flat wood wetlands within the reserve. Wetland types identified based on vegetation included forested (swamps, bottoms, riparian forests, and vernal pools), scrub-shrub (wet thickets), and emergent (marshes, wet meadows, and fens). This also included moss/lichen vegetation (mainly sphagnum wetlands also known as southern Appalachian “bogs” or “fens”) within these vegetation types.

The study found a variety of open-water areas including natural ponds and pools, ditches, potholes (off-highway vehicle wallows), beaver ponds, other diked impoundments (detention ponds, old farm ponds, flood control structures, and wildlife enhancements, etc.), and permanently or semi-permanently flooded excavations. A small amount of aquatic beds were also identified.

The approximate amounts of each wetland vegetation class found within the 4,057-acre ground survey area are shown in table 4-11.

TABLE 4-11: WETLAND VEGETATION FOUND IN THE 4,057-ACRE WETLANDS SURVEY OF THE KOPPERS COAL RESERVE

Wetland Vegetation Classes	Percent by Wetland Type	Dominant Plant Species
forested	27	Red maple, sycamore, American elm, green ash, tulip poplar, and sweet gum
scrub-shrub	24	Black willow, hazel alder, American elder, and highbush blueberry
persistent emergent (low growing)	23	Soft rush, cattail, wool-grass, shallow sedge, blunt broom sedge, deer-tongue witchgrass, arrowleaf tearthumb, reed grass, and American burreed
open-water areas	26	Varies: no vegetation to seasonal nonpersistent vegetation; may include algae, sphagnum, aquatic bed plants, grasses, sedges, rushes, and annual herbs

Source: Unpublished TVA data.

The TVA study identifies environmentally sensitive wetlands as “those that provide functions and benefits that would be difficult or impossible to replace or recreate” (Unpublished TVA data). The study notes that “Wetlands have been identified as environmentally sensitive if they provide habitat for rare species or rare natural communities (plant and animal species assemblages), or contain other irreplaceable or irretrievable ecological features such as vernal pools, extensive sphagnum mats, mature forests, springs and seeps, caves, sinkholes, cliffs, waterfalls, headwaters, perched water tables, slope wetlands, etc.” (Unpublished TVA data).

The study identifies approximately 242 acres of wetlands (about 6% of the land surface of the ground survey area) with other irreplaceable or irretrievable ecological features such as vernal pools, extensive sphagnum mats, mature forests, springs and seeps, caves, sinkholes, cliffs, waterfalls, headwaters, perched water tables, slope wetlands, etc. Table 4-12 identifies the area of sensitive wetland found within a surface coal mining operation footprint compared to aces of wetlands outside the mine area.

TABLE 4-12: SUMMARY OF IDENTIFIED SENSITIVE WETLAND ACREAGE IN THE 4,057-ACRE GROUND SURVEY AREA ON THE KOPPERS COAL RESERVE, BY MINE AREA

General Mine Area	Acres Outside Surface Coal Footprint	Acres Inside Potential Surface Coal Footprint	Total Acres
Adkins Mountain Mine Area	less than 0.1	0	less than 0.1
Braden Mountain Mine Area	0.1	1.2	1.3
Cross Mountain Mine Area	9.6	0	9.6
East of Titus Creek Mine Area	130.7	92.2	222.9
Turley Mountain Mine Area	3.7	0	3.7
No Mining: Interstate 75 Corridor	4.3	0	4.3
Total	**148.4**	**93.4**	**241.8**

Source: Unpublished TVA data.

VEGETATION

Forests and grasslands comprise more than 97% of the land area within the NCWMA and ERTCE (as listed in table 4-13). Forests alone cover more than 94% of the land area.

TABLE 4-13: EXISTING VEGETATIVE LAND COVER FOR THE NORTH CUMBERLAND WILDLIFE MANAGEMENT AREA / EMORY RIVER TRACTS CONSERVATION EASEMENT

Vegetative Land Cover	Acreage	Percent of Wildlife Management Area / Emory River Tracts Conservation Easement
Deciduous Forest	147,090.1	85.45
Mixed Forest	8,896.1	5.17
Grassland/Herbaceous	7,104.3	4.13
Developed, Open Space	4,207.0	2.44
Evergreen Forest	740.7	0.43
Shrub/Scrub	3,422.3	1.99
Developed, Low Intensity	194.7	0.11
Pasture/Hay	73.7	0.04
Open Water	80.8	0.05
Woody Wetlands	87.8	0.05
Barren Land (Rock/Sand/Clay)	206.0	0.12
Developed, Medium Intensity	25.2	0.01
Cultivated Crops	6.6	<0.01
Total	**172,135.2**	**100.00**

Table 4-13 shows data derived from the National Land Cover Database of 2011 (NLCD 2011). The database is a 16-class (with an additional four classes in Alaska only) land cover classification scheme that has been applied consistently across all 50 United States and Puerto Rico at a spatial resolution of 30 meters. The database is based primarily on the unsupervised classification of Landsat Enhanced Thematic Mapper+ circa 2001 satellite data. A cooperative project conducted by the Multi-Resolution

Land Characteristics Consortium produced the database. The Multi-Resolution Land Characteristics Consortium is a partnership of federal agencies (www.mrlc.gov), consisting of the US Geological Survey, the National Oceanic and Atmospheric Administration, the EPA, the US Department of Agriculture, the US Forest Service, the NPS, the USFWS, the Bureau of Land Management, and the US Department of Agriculture Natural Resources Conservation Service.

Figure 4-7 delineates the major vegetation types within the NCWMA and ERTCE.


Forest Canopy of the Evaluation Area

The vegetative types found in the evaluation area provide wildlife habitat, commercially valuable timber, and recreational land. Available information indicates a diverse and abundant population of plant species capable of supporting an equally diverse wildlife population. Plant species of herbaceous vascular plants, mosses, and woody plants such as trees and shrubs are present within the evaluation area.

No virgin forests exist within the North Cumberland LUM area. The entire area has been managed as a working forest for timber production for many decades. Tree species present within this area are typical of the Cumberland Mountains of Tennessee. The climax vegetation type for the LUM area is a mixed mesophytic forest.

Smalley (1984) described the vegetation in the Cumberland Mountains of Tennessee and began his *descriptions* with findings from an earlier work by Dr. Lucy Braun (1950), who studied this area in the 1930s and 1940s:

> According to Braun, the mixed mesophytic forest reaches its best development in the Cumberland Mountains. The dominant climax species of American beech [*Fagus grandifolia*], yellow-poplar [*Liriodendron tulipifera*], white basswood [*Tilia americana* var. *heterophylla*], sugar maple [*Acer saccharum*], American chestnut [*Casatanea dentata*], yellow buckeye [*Aesculus flava*], northern red oak [*Quercus rubra*], white oak [*Quercus alba*], and eastern hemlock [*Tsuga canadensis*] are not universally present. Physiographic climaxes are numerous and add to the diversity of the region. Other locally important species are yellow birch [*Betula alleghaniensis*], river birch [*Betula nigra*], black cherry [*Prunus serotina*], cucumbertree [*Magnolia acuminata*], white ash [*Fraxinus americana*], red maple [*Acer rubrum*], blackgum [*Nyssa sylvatica*], black walnut [*Juglans nigra*], shagbark hickory [*Carya ovata*], and bitternut hickory [*Carya cordiformus*]. Composition and relative abundance vary greatly from place to place because of the large number of dominants in the climax. A dozen or more additional tree species seldom or never attain canopy position. The shrub and herbaceous vegetation is rich and varied.

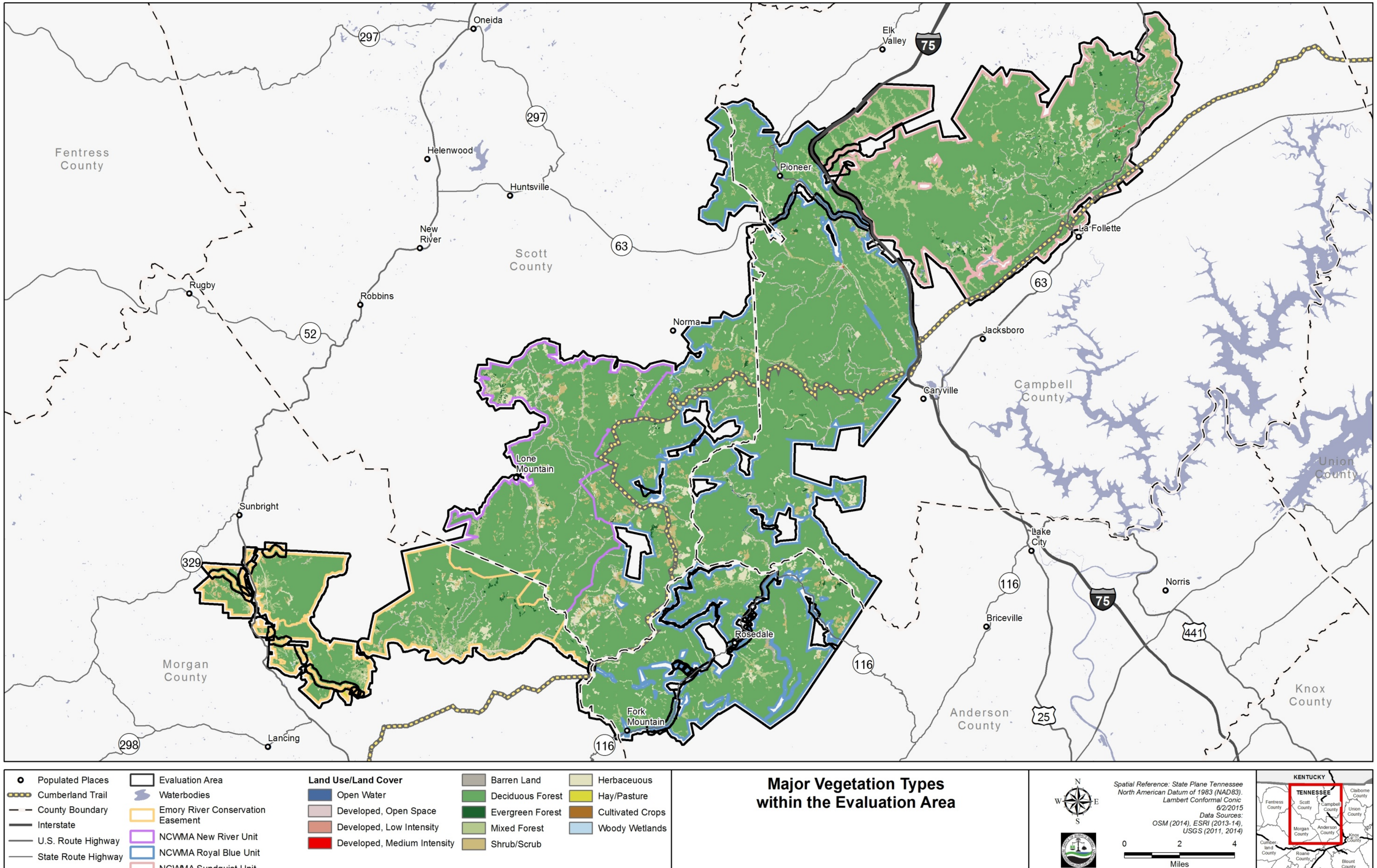


FIGURE 4-7: MAJOR VEGETATION TYPES WITHIN THE NORTH CUMBERLAND WILDLIFE MANAGEMENT AREA / EMORY RIVER TRACTS CONSERVATION EASEMENT

> The primary forest is a mosaic of climax and subclimax communities. Diversity in topography, soils, and microclimate is largely responsible for the complexity of the mixed mesophytic forest. American beech and white oak dominate southerly slopes at elevations below 2,000 ft. Beech seldom occurs above 2,000 ft, but white oak occurs at higher elevations and on cool aspects. Sugar maple-basswood-buckeye or sugar maple-basswood-buckeye-yellow poplar communities are prominent at middle elevations. Shortleaf [*Pinus echinata*], pitch [*Pinus rigida*], and Virginia pines [*Pinus virginiana*] are common on the shallow sandstone-derived soils of the back slopes of Pine, Cumberland, Stone, and Powell Mountains. The mixed mesophytic forest prevails throughout the Wartburg Basin except on sandstone derived soils and ridge crests where subclimax oak-hickory stands occur [Braun 1950].

Smalley (1984) explained how changes have occurred in the vegetation in the Cumberland Mountains of Tennessee since Dr. Braun conducted her studies decades earlier:

> Current forests bear little or no resemblance to those that Braun described 40 to 50 years ago. American chestnut is gone, and extensive logging, coal mining, and wildfire have all caused drastic changes in tree size and composition of Cumberland Mountain forests. Selectively logged stands have similar composition but lack the large trees seen in photos illustrating Braun's book [Braun 1950]. A few scattered old-growth remnants of the mixed mesophytic forest remain (Hinkle 1975). Recent studies characterize the existing forests.
>
> DeSelm and others (1978) studied the forest vegetation of Wilson Mountain, the west end of Little Brushy Mountain in Morgan County, Tenn. Wilson Mountain, located at the southern end of the Wartburg Basin, rises to an elevation of 2,260 ft, which is 800 to 900 ft above the adjacent valleys. Sporadic timber harvesting occurred from early 1800 to 1948 by various owners; three seams of coal were mined between 1953 [and] 1957, and evidence of fires was found on lower slopes. Five communities were recognized: shortleaf pine on southern spur ridges, yellow-poplar in most north drainages, northern red oak on upper north slopes, white oak on most lower slopes (but also dominating some upper slopes), and chestnut oak [*Quercus prinus*] on most mid-north and upper south slopes.

Additionally, Smalley cited two other descriptive botanical studies to help identify and classify existing forest communities in the Cumberland Mountains:

> Cabrera (1969) described an old-growth deciduous forest on Ash Log Mountain about 20 mi northeast of Wilson Mountain. Ash Log Mountain rises to 3,240 ft with local relief of about 1,400 ft. Slopes ranged from 10 to 140 percent, but most were 40 to 60 percent. North slopes typically had mull types of humus while west and southwest slopes had mor types [of humus]. Three communities were recognized: sugar maple-yellow poplar-basswood-buckeye in north coves, sugar maple-northern red oak-yellow poplar-black locust on north and west spur ridges and on west and northwest slopes and coves, and chestnut oak-black locust [*Robinia pseudoacacia*] on west and southwest spur ridges and coves. American beech occurred only below 2,000 ft elevation, where most sampled slopes had west and southwest exposures.
>
> In a study of the relationship of soils and vegetation to topography and elevation in the Cumberland Mountains near Caryville in Campbell County, Tenn., Knight (1979) observed that mixed oak forests dominated warm slopes and ridges, and mesophytic

> forests dominated cool slopes. Chestnut oak and black oak occurred most frequently on soils developed from residuum, and American beech and hickories occurred on colluvial soils. It can be inferred that chestnut oak and black oak were common on upper slopes and ridges, and that American beech and hickories were common on mid and lower positions of long, steep slopes. Stands on cool aspects were denser than those on warm aspects, and, as expected, fire damage was greatest on warm aspects.

The mull type of humus is biologically richer and is characterized by a rich herbaceous flora and has a more diversified fauna than the mor type of humus. Mull humus is more fertile and generally more efficient that mor humus in the reproduction and growth of several tree species and is typically consists of organic matter mixed with the mineral soil to a depth of 2 or 3 feet. Mor humus typically lies on top of the mineral soil mostly unmixed. Smalley also provides timber productivity estimates for land types within the Cumberland Mountains. For those land types typical of lands contained within the 600-feet and 300-feet wide buffer zone petition boundaries, tree species common to Smalley's land types were reviewed for site index and average annual growth. Table 4-14 compares the productivity of tree species commercially valuable for timber production within these land types.

TABLE 4-14: PRODUCTIVITY ESTIMATES FOR SELECTED LAND TYPES WITHIN THE CUMBERLAND MOUNTAINS PHYSIOGRAPHIC PROVINCE TYPICAL OF LANDS CONTAINED WITHIN EVALUATION BOUNDARIES.

Land Type	Site Index[a]			Average Annual[b] Growth (cubic feet per acre)		
	Shortleaf pine	Virginia pine	Northern red oak	Shortleaf pine	Virginia pine	Northern red oak
Upper Mountain Slopes – North Aspect[c]	80	70	80	148	92	62
Upper Mountain Slopes – South Aspect[d]	60	60	65	102	53	48
Narrow Shale Ridges, Points, and Convex Upper Slopes[e]	(55)	55	60	90	41	43
Broad Shale Ridges and Convex Upper Slopes[f]	65	70	70	113	92	52

[a] Smalley used site indices which were mean values from soil surveys sometimes adjusted for slope and aspect. Estimated site indices are in parentheses. Base age is 50 years for naturally grown species. Site index is a tool to determine the relative productivity of a particular site or location. Site index is the height of a "free to grow" tree of a given species at a base age on the site of interest. Common base ages include 25, 50, and 100, depending on the lifespan and common management practices for that species.

[b] Smalley used annual growth of natural stands calculated from published yields at 50 years.

[c-f] Excerpted from Smalley (1984), tables 26, 27, 31, and 32, respectively.

Two federally threatened and one federally endangered plant species are known to occur within the evaluation area. Twenty plant species listed on the rare plant list by the Tennessee Heritage Program are also found within the evaluation area. For a detailed discussion of federal and state-listed plant species see the "Special-Status Species" section.

Nonnative Plants

Typically forests along rivers and streams are the most susceptible to invasion by nonnative plants, including Japanese spiraea (*Spiraea japonica*) and Nepalese browntop (*Microstegium vimineum*). In addition, tree-of-heaven (*Ailanthus altissima*), multiflora rose (*Rosa multiflora*), garlic mustard (*Alliaria petiolata*), and Japanese knotweed (*Polygonum cuspidatum*) may also be present. Tennessee has two official state-listed noxious weeds: purple loosestrife (*Lythrum salicaria*) and tropical soda apple (*Solanum viarum Dunal*) (USDA 2014a).

FISH AND WILDLIFE

Tennessee is one of the most biologically diverse states in the United States, with over 300 species of fish, at least 80 mammal species, 60 reptile species, approximately 70 amphibian taxa, over 340 species of birds, over 225 land snail taxa, 100 aquatic snail species, at least 120 mussel species, 70 crayfish species, and thousands of insect taxa (TNHP 2009). The following section describes the aquatic and terrestrial species likely present in the evaluation area, while the next main section discusses special status species.

AQUATIC SPECIES

The following discussion of aquatic resources describes aquatic communities in the NCWMA and ERTCE. A comprehensive survey of aquatic species across all aquatic resources within the project area does not currently exist. The information is presented by the following watersheds:

- South Fork of the Cumberland River
- Cumberland River
- Clinch River
- Emory River

The majority of the evaluation area lies in the South Fork of the Cumberland River Watershed (table 4-15), specifically the New River drainage and the Headwaters of the Cumberland River Watershed in the Clear Fork drainage. The streams within the area are moderate to highly dissected, and range from low to high gradient with bedrock and cobble substrates.

TABLE 4-15: WATERSHED TRIBUTARIES IN EVALUATION AREA

Watershed	Major Tributaries
Big South Fork of the Cumberland River	New River, Smoky Creek, Straight Fork, and Montgomery Creek
Cumberland River	Clear Fork, Elk Creek, and Stinking Creek
Clinch River	Cove Creek, Ollis Creek, and Big Creek
Emory River	Little Creek and Laurel Branch

Common fishes in streams draining the NCWMA include minnows, suckers, catfishes, sunfishes, and perches (primarily darters) (Etnier and Starnes 1994). Common game fishes include longear sunfish, rock bass, bluegill, spotted bass, and smallmouth bass. Aquatic species listed by the State of Tennessee or the federal government are discussed in the "Aquatic Special-Status Species" section and table 4-17, later in this chapter.

Crayfishes that have been collected in and near streams draining the NCWMA, include the boxclaw crayfish (*Cambarus distans*), longclaw crayfish (*C. buntingi*), Cumberland crayfish (*C. cumberlandensis*), upland burrowing crayfish (*C. dubius*), spiny stream crayfish (*Orconectes cristavarias*), phallic crayfish (*O. putnami*), and surgeon crayfish (*O. forceps/placidus*) (Bivens, Carter, and Williams 1995, 1997).

Amphibians in and around streams draining the NCWMA include the southern two-lined salamander (*Eurycea cirrigera*), northern spring salamander (*Gyrinophilus p. porphyriticus*), northern dusky salamander (*Desmognathus fuscus*), eastern newt (*Notopthalmus viridescens*), spotted salamander (*Ambystoma maculatum*), black mountain salamander (*D. welteri*), four-toed salamander (*Hemidactylum scutatum*), upland chorus frog (*Pseudacris ferarium*), mountain chorus frog (*P. brachyphona*), spring peeper (*P. crucifer*) and green frog (*Rana clamitans*) (TWRA 2015a, 2015b).

Common benthic macroinvertebrates in streams draining the NCWMA include mayflies, stoneflies, caddisflies, beetles, true flies, dobsonflies, and dragonflies. Benthic macroinvertebrates (aquatic insects, mussels, crayfish, etc.) are important indicators of water quality. They are a more sensitive indicator of stream health than the fish community. They also recover from disturbance more quickly.

Fisheries reports prepared by the TWRA have included Index of Biotic Integrity assessments for streams and rivers in eastern Tennessee, including several streams and rivers in or near the NCWMA (Carter et al. 2009, 2012). Indices of Biotic Integrity are a method of assessing the overall health of a stream or aquatic environment using invertebrate assemblages as a proxy (Wittman and Mundahl 2003). Index of Biotic Integrity surveys conducted by TWRA covered portions of the Clinch, Powell, and Cumberland River watersheds including portions of Stinking Creek, Lick Fork, and Titus Creek (Carter et al. 2009, 2012). Index of Biotic Integrity assessments use multiple metrics to rate and monitor stream health over time. The Index of Biotic Integrity assessments conducted by TWRA assign a numerical value which corresponds to a stream health category ranging from “very poor” to “excellent.” Results of the 2009 and 2012 surveys indicate that stream health of all sampled locations in and around the NCWMA has improved slightly since 1994, when the stream monitoring program was initiated (Carter et al. 2009, 2012). Index of Biotic Integrity assessment results are summarized in appendix H.

Similarly, a 2011 study by Gangloff and others surveyed 30 headwater streams in and around the evaluation area to assess impacts of coal mining and other environmental disturbances on stream invertebrate communities and habitats (Gangloff et al. 2015). Sampling sites were located in all four watersheds within the evaluation area and many sites were located within the evaluation area boundaries. Results of this study indicated that impacts of historical and current coal mining remain a source of water quality and macroinvertebrate community impairment throughout the region, but effects were relatively subtle. However, it is likely that surface mining may have chronic and systemwide effects on habitat conditions and invertebrate communities throughout the affected area (Gangloff et al. 2014).

Nonnative aquatic species potentially occurring in the NCWMA include round goby, New Zealand mud snail, rudd, ruffe, silver carp, and snakehead (TWRA 2014b).

Figure 4-8 shows priority habitat for Tier 1 aquatic species. Tennessee Code Annotated 70-8-101 identifies Tier 1 species. TWRA defines Tier 1 priority habitat as habitat necessary for a group of species in greatest conservation need. The classifications are based on species rarity and viability and provide the relative biological conditions of the area. Tier 1 species are not federally listed.

Big South Fork of the Cumberland River Watershed

Fish Communities: The Big South Fork is home to at least 79 species of fish, including 2 federally listed species: the endangered duskytail darter (*Etheostoma percnurum*) and the threatened blackside dace (*Chrosomus cumberlandensis*). It also contains several state-listed fish including the ashy darter (*E. cinereum*), emerald darter (*E. baileyi*), Tippecanoe darter (*E. tippecanoe*), and olive darter (*Percina squamata*) (Carter et al. 2003, 2012).

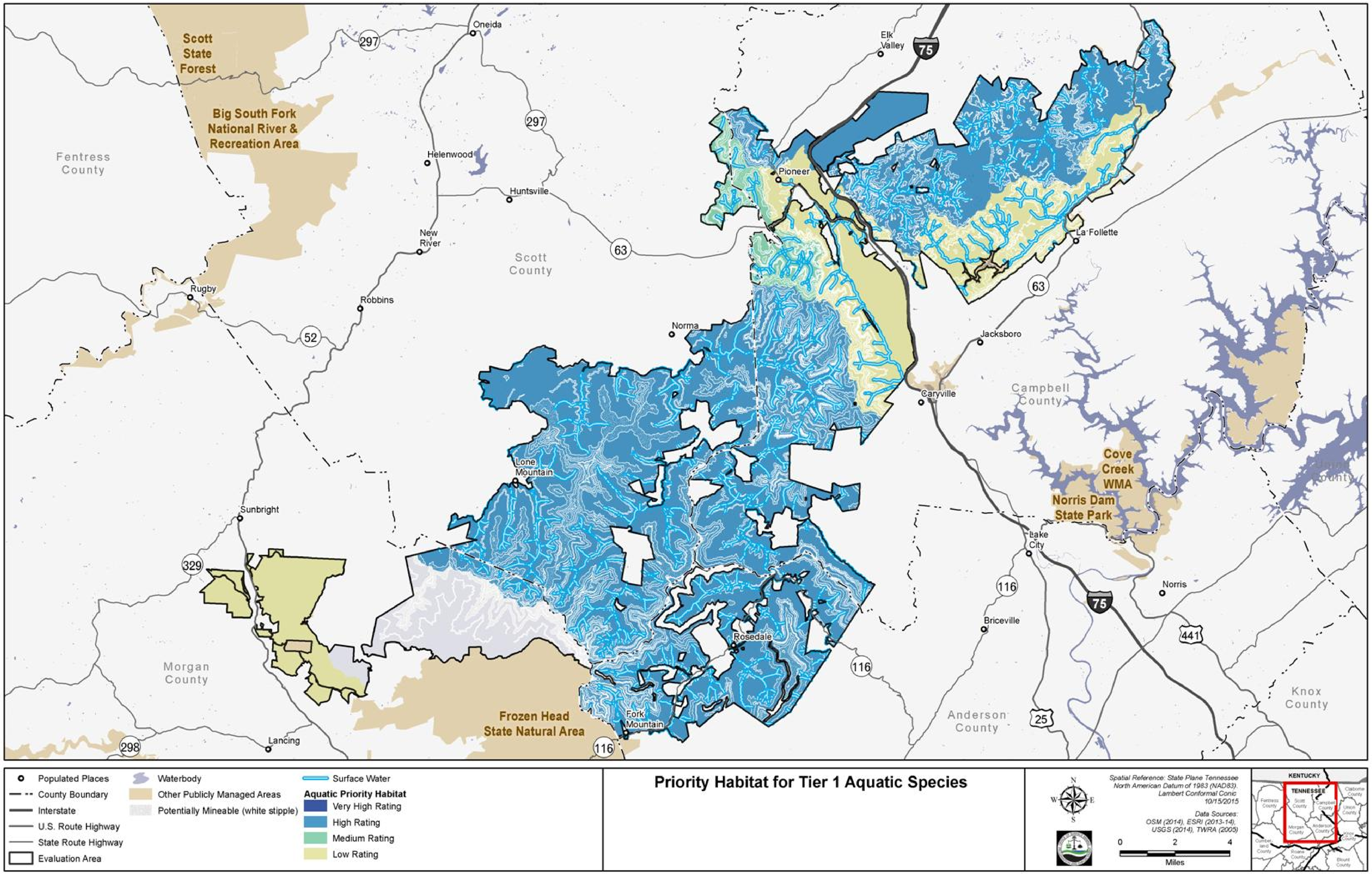


FIGURE 4-8: PRIORITY HABITAT FOR TIER 1 AQUATIC SPECIES

With regard to current taxononmy, it should be noted that while the duskytail darter (*E. percnurum*) is the officially listed taxon, the taxon that occurs in the evaluation area is actually the tuxedo darter (*E. lemiscatum*) (Blanton & Jenkins 2008). Also, the ashy darter has been split into two taxa, both of which are found in the evaluation area. The ashy darter is found in the Tennessee River basin, and the redlips darter (*E. maydeni*) is found in the Cumberland system, both within Big South Fork (Powers, Kuhajda, and Ahlbrand 2012).

Scott (2010) documented 79 fish species within the South Fork Cumberland Watershed, including 8 species not previously reported in the system: telescope shiner (*Notropis telescopus*), shorthead redhorse (*Moxostoma macrolepidotum*), river redhorse (*M. carinatum*), redbreast sunfish (*Lepomis auritus*), warmouth (*L. gulosus*), redear sunfish (*L. microlophus*), redlips darter (*E. maydeni*), and walleye (*Sander vitreus*). It should be noted however, that walleye are a stocked game fish in this region, and are not a reproductive population. Scott (2010) suggested the New River illustrated improvements in the fish abundance and species diversity when compared to surveys completed in the late 1960s and 1970s. Additionally, he documented an increase in rockbass (*Ambloplites rupestris*) and smallmouth bass (*Micropterus dolomieu*) populations indicating improving water quality (Scott 2010).

Mussels: The South Fork of the Cumberland River is home to 26 known species of mussels, including 11 that are federally endangered (Ahlstedt et al. 2004). Parts of the river, close to but outside the evaluation area, are federally designated as critical habitat for four species of mussels: Cumberland elktoe, Cumberlandian combshell, fluted kidneyshell, and oyster mussel (USFWS 2004a).

The mussel fauna of the Big South Fork has declined considerably from historic levels (Ahlstedt et al. 2004). The New River and Emory River drainages contain the mussel populations in streams draining the NCWMA. Mussels are not abundant in the upper portions of the New River. However, Ahlstedt and others (2004, 2008) documented the presence of suitable habitat in the New River, suggesting that the lower portions of the New River, downstream of the Bull Creek confluence, may have been more diverse in mussel fauna in the past, given the its connectivity to Big South Fork, which contains a diverse mussel assemblage (Ahlstedt, Walker, and Bakaletz 2008). Despite the decline, it still contains some of the best mussel populations remaining in the Cumberland River system and there are indications it is slowly recovering (Ahlstedt et al. 2004). A multi-agency recovery effort is underway to restore the mussel population in the river using captive propagation and translocation (Simmons 2010).

The most recent comprehensive mussel survey in the New River drainage was completed in 2008 (Ahlstedt, Walker, and Bakaletz 2008). The main stem and several tributaries of the New River were surveyed from the headwaters down to Winona. Larger tributaries of the New River were also surveyed including Buffalo Creek, Smoky Creek, and Brimstone Creek. Three species of live mussels were found in the main stem of the New River; pocketbook (*Lampsilis cardium*), wavy-rayed lampmussel (*L. fasciola*), and fluted shell (*Lasmigona costata*). Live mussels were found as far upstream as the ford crossing below Hatfield Cemetery. Relict shells (old or eroded) of two species, spike and pocketbook, were found as far upstream as approximately 0.4 miles above the mouth of Little Creek. A relict shell, tentatively identified as a pimpleback (*Quadrula pustulosa*), was found in the New River upstream of its confluence with Montgomery Fork. Nonnative Asian clams (*Corbicula fluminea*) were found as far upstream as Roberts Ford near Shea, indicating possibly favorable conditions for colonization by native mussels. The federally endangered Cumberland elktoe also has been reported in portions of the New River (Ahlstedt, Walker, and Bakaletz 2008).

Seven mussel species were found live in the Buffalo Creek drainage; the federally endangered Cumberland elktoe (*Alasmidonta atropurpurea*), Cumberland papershell (*Anodontoides denigratus*), painted creekshell (*Villosa taeniata*), pocketbook, fluted shell, rainbow mussel (*Villosa iris*), and spike (*Elliptio dilatata*). All represent new distribution records for these species. Two mussel species were found to live in Brimstone Creek; painted creekshell and fluted shell. In addition, a relict shell of the pistolgrip (*Tritogonia verrucosa*) was also found, which is the first report of this species in the New River drainage since 1939 (Shoup and Peyton 1940).

No mussels were found in Smoky Creek, although conversations with a landowner indicated the possible historical occurrence of the spike mussel.

The mussel fauna in streams draining the NCWMA is largely limited to the New River drainage. One species of mussel, spike (*Elliptio dilatata*), was collected in Stinking Creek by the TWRA in 1990. However, none were observed during a 2002 survey (Carter et al. 2003).

Cumberland River Watershed

Fish Communities: Fish surveys in the Cumberland River watershed have not been as numerous as those in the New River drainage. However, in 2012 the TWRA conducted surveys of streams in the Cumberland River watershed including Elk Creek and Stinking Creek. Fourteen fish species were confirmed to be present in Elk Creek and 16 were confirmed in Stinking Creek. In Elk Creek redbreast sunfish and rainbow darter were by far the most abundant species. Several darter and sucker species were also found and game species included several species of sunfish and bass. Survey results confirmed similar species composition in Stinking Creek, but also noted a surprising high abundance of the Cumberland arrow darter (*Etheostoma sagitta sagitta*) (Carter et al. 2012).

Two Endangered Species Act-listed fishes are found in the Upper Cumberland River watershed: blackside dace (*Chrosomus cumberlandensis*) and Cumberland darter (*Etheostoma susanae*). These species are described in detail in “Appendix C: Special Status Species.”

Mussels: Mussels have been eliminated from the Clear Fork drainage of the NCWMA. Nonnative Asian clams (*Corbicula fluminea*) occur in Stinking Creek indicating possibly favorable conditions for mussel colonization.

Clinch River Drainage Upstream of Norris Dam

Fish Communities: A 2012 survey of the Clinch River Watershed including Cove Creek, conducted by the TWRA, confirmed the presence of 13 fish species. The two dominant species collected were striped shiner (*Luxilus chrysocephalus*) and large-scale stoneroller minnow (*Campostoma oligolepis*), which together comprised approximately 65% of the total individuals sampled. Two darter species (redline darter (*Etheostoma rufilineatum*) and rainbow darter (*E. caeruleum*) and one sucker species (northern hog sucker (*Hypentelium nigricans*)) were also collected during the survey. Game species collected included rock bass (*Ambloplites rupestris*), green sunfish (*Lepomis cyanellus*), bluegill (*L. macrochirus*), smallmouth bass (*Micropterus dolomieu*) and spotted bass (*M. punctulatus*). However, with the exception of bluegill, game species were found to occur in very low abundance (Carter et al. 2012).

Mussels: The Clinch River drainage of the NCWMA historically had high mussel abundance and diversity, but populations declined over time due to commercial and sustenance harvesting (Davis 2005) and the impoundment of a large portion of the Clinch River by Norris Dam (Parmalee and Bogan 1998). The Upper Clinch drainage still maintains 20 known rare mussel species (TDEC 2007).

Emory River Watershed

The Emory River watershed encompasses 872 square miles and drains into the Clinch River. The portion of the Emory River watershed within the evaluation area is known as the TDEC ERTCE. Major tributaries in the Emory River watershed include Little Creek and Laurel Branch.

The Emory River rises on the slopes of Frozen Head and Bird Mountain of the Cumberland Plateau in Morgan County, Tennessee. The stream initially flows westward; US Highway 27 crosses the stream. Turning more southwest, a rail line of the Norfolk Southern Railway parallels the stream. It meets the Obed River in the southeast corner of the expansive Catoosa Wildlife Management Area, a large game management area operated by the TWRA.

Fish Communities: Little data exist for fish communities in the portion of the Emory River that drains the NCWMA. Portions of the Emory River are designated critical habitat for the federally threatened spotfin chub, including some areas within the evaluation area (USFWS 1977). This watershed is known to contain populations of two state-level threatened species: the ashy darter and the sickle darter; it also contains the Tennessee dace, a species deemed in need of management in Tennessee. For a full discussion on threatened and endangered species and critical habitat see the “Special-Status Species” section. A 2003 survey of Laurel Branch only reported two species present; bluegill and largemouth bass (*Micropterus salmoides*) (Carter et al. 2003).

The mouth of the Emory leads into the Clinch River at the TVA Kingston Power Plant. In 2008 the Kingston Fossil Plant located outside the evaluation area at the confluence of Emory and Clinch Rivers experienced a coal fly ash slurry spill which heavily polluted the lower portion of the Emory River (TVA 2015). Effects of the spill on the fisheries included the following:

- increased selenium concentrations in fish ovaries from the Emory and Clinch Rivers were elevated in redear sunfish but remained lower than the EPA proposed assessment threshold (10 milligrams per kilograms) for all other fish
- collected blue gill at the spill site in 2009 experienced slight delay in ovarian development and fewer eggs when compared to other sites
- pathological differences in some major fish organs (e.g., gill and kidney) at the lower Emory River site as compared to reference indicated lower health condition
- anomalies in black bass, a sport fish, were lower than average and appeared to not be affected by the spill
- fish species richness did not appear to be affected in the two years following the spill (Stojak et al. 2011)

Mussels: The Emory River was once considered the economic heart of the pearl industry, and the State of Tennessee was one of the top six states in the United States for pearl production (Parmalee and Bogan 1998; Davis 2005). Currently, the Emory River is largely void of its once notable mussel population. However, recently two federally endangered mussels, the purple bean (*Villosa perpurpurea*) and the Alabama lampmussel (*Lampsilis virescens*), further described in the “Special-Status Species” section, were recently discovered above the confluence with the Obed River (Dinkins, Faust, and Ahlstedt 2012). These species were once thought to be extirpated from the Emory River (Parmalee and Bogan 1998). The Alabama lampmussel was previously known to exist only in the upper reaches of the Paint Rock River system in Alabama, where it is extremely rare (Williams, Bogan, and Garner 2008). The purple bean was previously known to exist in only five streams in the Tennessee River drainage (USFWS 2004a, 2006b). Other species recently found in the upper Emory include slippershell mussel (*Alasmidonta viridis*), Tennessee pigtoe (*Fusconaia barnesiana*), rainbow mussel (*Villosa iris*), and creeper (*Strophitus undulatus*) (Dinkins, Faust, and Ahlstedt 2012). Many of these species are threatened or endangered and are further discussed in the “Aquatic Species: Special-Status Species” section.

TERRESTRIAL SPECIES

A majority of the evaluation area has been rated as ‘very high’ for terrestrial habitat prioritization and species conservation by Tennessee’s Comprehensive Wildlife Conservation Strategy (TWRA 2005). There are approximately 38,110 acres of Tier 1 priority habitat located near potentially mineable resources. TWRA defines Tier 1 priority habitat as habitat necessary for a group of species in Greatest Conservation Need. The classifications are based on a species rarity and viability and provide the relative biological conditions of the area. Figure 4-9 shows priority habitat for Tier 1 aquatic species.

The Cumberland Plateau and Cumberland Mountains are considered a conservation priority under Tennessee’s Comprehensive Wildlife Conservation Strategy based on the following:

- high degree of endemism (geographically restricted) due to the rugged terrain
- abundance of very specific habitat types
- 101 terrestrial species in need of conservation inhabit the plateau (TWRA 2005)

Habitat preferences established by NatureServe (2014) and TWRA (2005) for the Cumberland Plateau and Cumberland Mountains and evaluation area were used to identify likely occurring wildlife species, and their associated habitat types present, and constitute the majority of the discussion below on unlisted terrestrial species. As mentioned above, a discussion related to listed (e.g., sensitive) terrestrial species occurs in the next major section.

Birds

The evaluation area provides breeding, wintering, and migration stopover habitat for a variety of birds. Historically, approximately 180 species have been reported in the NCWMA, although many of those are rare or transient (O’Connell, Jackson, and Brooks 2000). Bird species presence in the region varies seasonally, 115 species have been reported during spring, 93 during summer, 105 in autumn, and 66 in the winter in Big South Fork National River and Recreation Area (NPS 2011b). Thirty-seven species were reported as year round residents. The relatively high numbers of species observed during spring and fall result, in part, from the presence of transient migrants during these seasons (NPS 2011b). A high abundance of birds present were forest habitat specialists and neotropical migrants (NPS 2011b). Stedman and Stedman (2007) noted that the diversity of breeding neotropical migrants is good to excellent due to the fairly mature forest throughout the region. Of the 93 species reported during the summer season for a survey conducted in Big South Fork National River and Recreation Area, 68 (72%) were neotropical migrants (Stedman and Stedman 2007). Common species of bird in the evaluation area include ruffed grouse (*Bonasa umbellus*), turkey vulture (*Cathartes aura*), blue jay (*Cyanocitta cristata*), American crow (*Corvus brachyrhynchos*), ovenbird (*Seirurus aurocapilla*), and eastern towhee (*Pipilo erythrophthalmus*), among others. Nonnative avian species include the house sparrow (*Passer domesticus*), European starling (*Sturnus vulgaris*) and the rock pigeon (*Columba livia*) (TWRA 2014b).

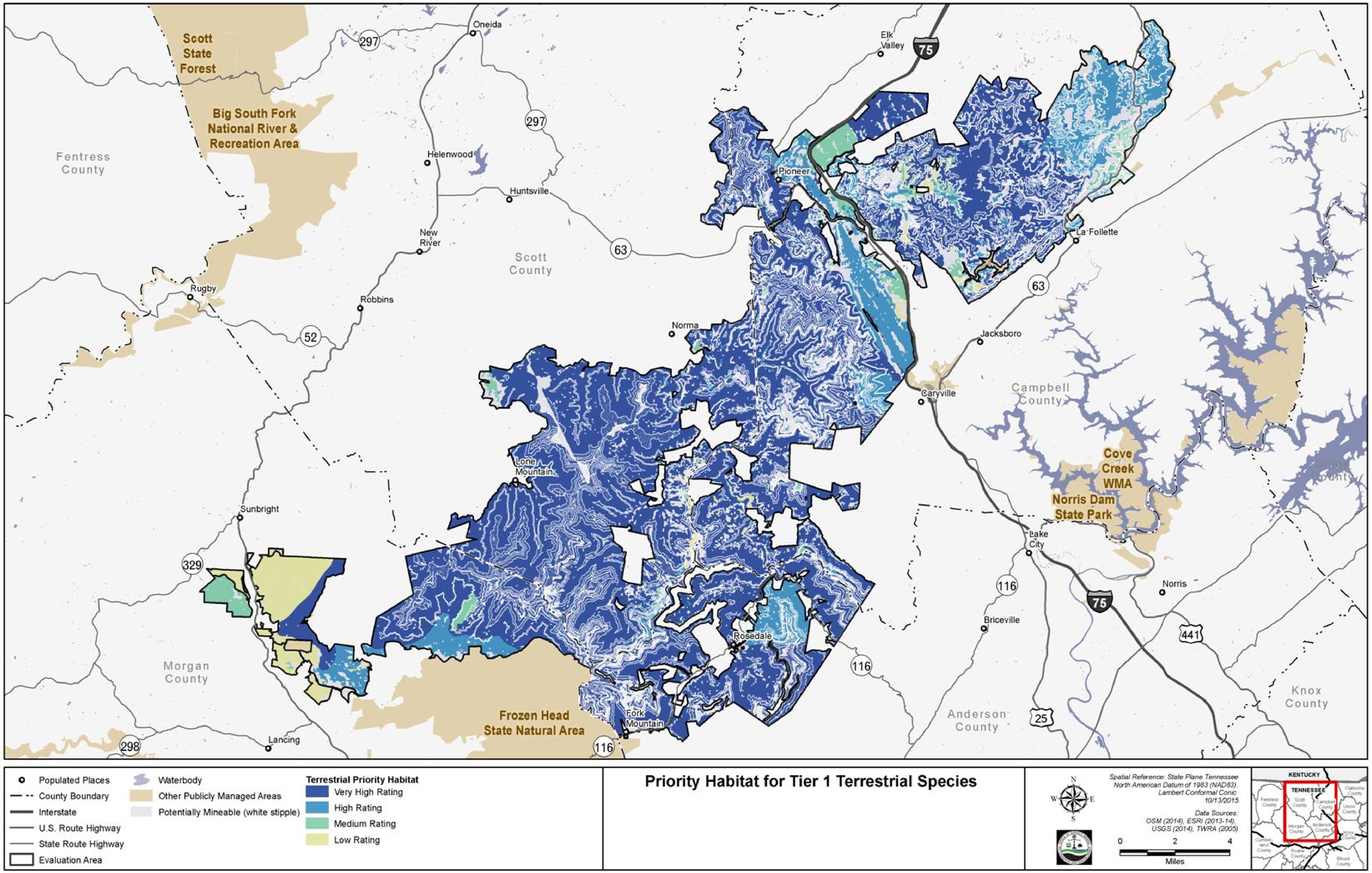


FIGURE 4-9: PRIORITY HABITAT FOR TIER 1 TERRESTRIAL SPECIES

Mammals

Mammals are important components of grassland and forest ecosystems where they affect plant communities, engineer landscapes, and play roles at multiple trophic levels (Ryszkowski 1975; Marti et al. 1993; Rooney and Waller 2003). A recently conducted mammalian inventory at Big South Fork National River and Recreation Area from autumn of 2003 to the autumn of 2004 resulted in the confirmation of 47 species, including 42 native and four nonnative mammals (Britzke 2007). Reported mammals included 15 species of rodent, 11 species of bat, 10 species of carnivore, 5 species of insectivores, and 2 species of cervid. In addition, there have been occurrences of nine-banded armadillo (*Dasypus novemcinctus*), Virginia opossum (*Didelphis virginiana*), eastern cottontail (*Sylvilagus floridanus*), and feral hog (*Sus scrofa*) (Britzke 2007). The most frequently observed (non-bat) mammal was the white-footed mouse (*Peromyscus leucopus*).

Elk Near the Elk Viewing Tower

Formerly widespread in Canada and the United States, elk (*Cervus canadensis*) are now mostly restricted to the western portions of both countries, with small reintroduced populations elsewhere. Elk were extirpated from Tennessee in the mid 1800s, though specific reasons for their local extinction have not been identified (TWRA 1992). Elk were reintroduced into the area beginning in 2000 and the evaluation area is within the Elk Restoration Zone (figure 4-10). Currently, there are about 400 elk in Tennessee and it is hoped that over the next 30 years, the population of elk will expand to a population of 1,400 to 2,000. The Cumberland Plateau was chosen for elk reintroduction because it has habitat suitable for supporting elk herds and because it contains few farm crops and few people (TWRA 1992).

The four nonnative mammal species that were reported including free-ranging or feral domestic dogs (*Canis familiaris*) and cats (*Felis catus*), feral hogs, and the nine-banded armadillo.

Reptiles and Amphibians

The project area is within the southern and central Appalachian region and characterized by high amphibian and reptile diversities (Dodd 2003). A baseline inventory of reptiles and amphibians in the region was conducted from February 2004 to June 2007, and reported 57 species including 17 salamanders, 11 frogs, 16 snakes, 6 lizards, and 7 turtles (table 4-16) (Stephens, Kiser, and MacGregor 2008). The region has greater species richness when compared to similar sites (Meade 2003, 2005; Niemellier, Near, and Fitzpatrick 2011).

TABLE 4-16: HERPETOFAUNAL SPECIES PRESENT WITHIN THE CUMBERLAND PLATEAU

Species Group	Reported
All Species	57
Frogs/Toads	11
Salamanders	17
Snakes	16
Lizards	6
Turtles	7

Small isolated wetland (vernal) ponds occur on the Cumberland Plateau and are known to harbor amphibian fauna more characteristic of the southeastern US Atlantic and Gulf Coastal Plains (Corser 2008; Jones 1989). Corser surveyed 18 vernal pools in the Cumberland Plateau and identified the following species: four-toed salamander (*Hemidacylium scutatum*), southern leopard frog (*Rana utricularia*), zig-zag salamander (*Plethodon dorsalis*), mountain chorus frog (*Pseudacris brachyphona*), mole salamander (*Ambystoma talpoideum*), narrowmouth toad (*Gastrophryne carolinensis*), red-spotted newt (*Notopthalmus viridescens*), pickerel frog (*Rana palustris*), marbled salamander (*Ambystoma opacum*), northern cricket frog (*Acris crepitans*), spotted salamander (*Ambystoma maculatum*), Cope's gray treefrog (*Hyla chrysoscelis*), upland chorus frog (*Pseudacris triseriata*), spring peeper (*Pseudacris crucifer*), wood frog (*Rana sylvatica*), bullfrog (*Rana catesbeiana*), green frog (*Rana clamitans*), and American toad (*Bufo americanus*). No known nonnative reptiles or amphibians occur in the four counties of the evaluation area.

Terrestrial Invertebrates

Terrestrial invertebrates are possibly the least understood taxonomic group population trends in the evaluation area. The nearby Frozen Head State Park has an exhaustive list of 57 families of terrestrial invertebrates, including 10 families of spiders (e.g., cobweb, wolf, orb weavers, crab spiders), 2 families of harvestmen (e.g., daddy long-legs), 4 families of grasshoppers, 1 family of walkingsticks, 3 terrestrial families of true bugs (e.g., planthoppers, spittlebugs, and leafhoppers), 1 family of mantids, 8 terrestrial families of ground beetles, 3 families of bees and kin, 16 families of butterflies and moths, and 9 families of flies (see appendix F). Furthermore, three nonnative species that could occur in the evaluation area are the fire ant (*Solenopsis* spp.) (Tennessee Department of Agriculture 2015), camphor shot borer (*Cnestus mutilatus*) (USDA 2014c), and the walnut twig beetle (*Pityophthorus juglandis*). Also partially africanized bees (*Apis mellifera scutellata*) and the emerald ash borer (*Agrilus planipennis*) are known to occur near, but not within counties in the evaluation area (USDA 2014c).

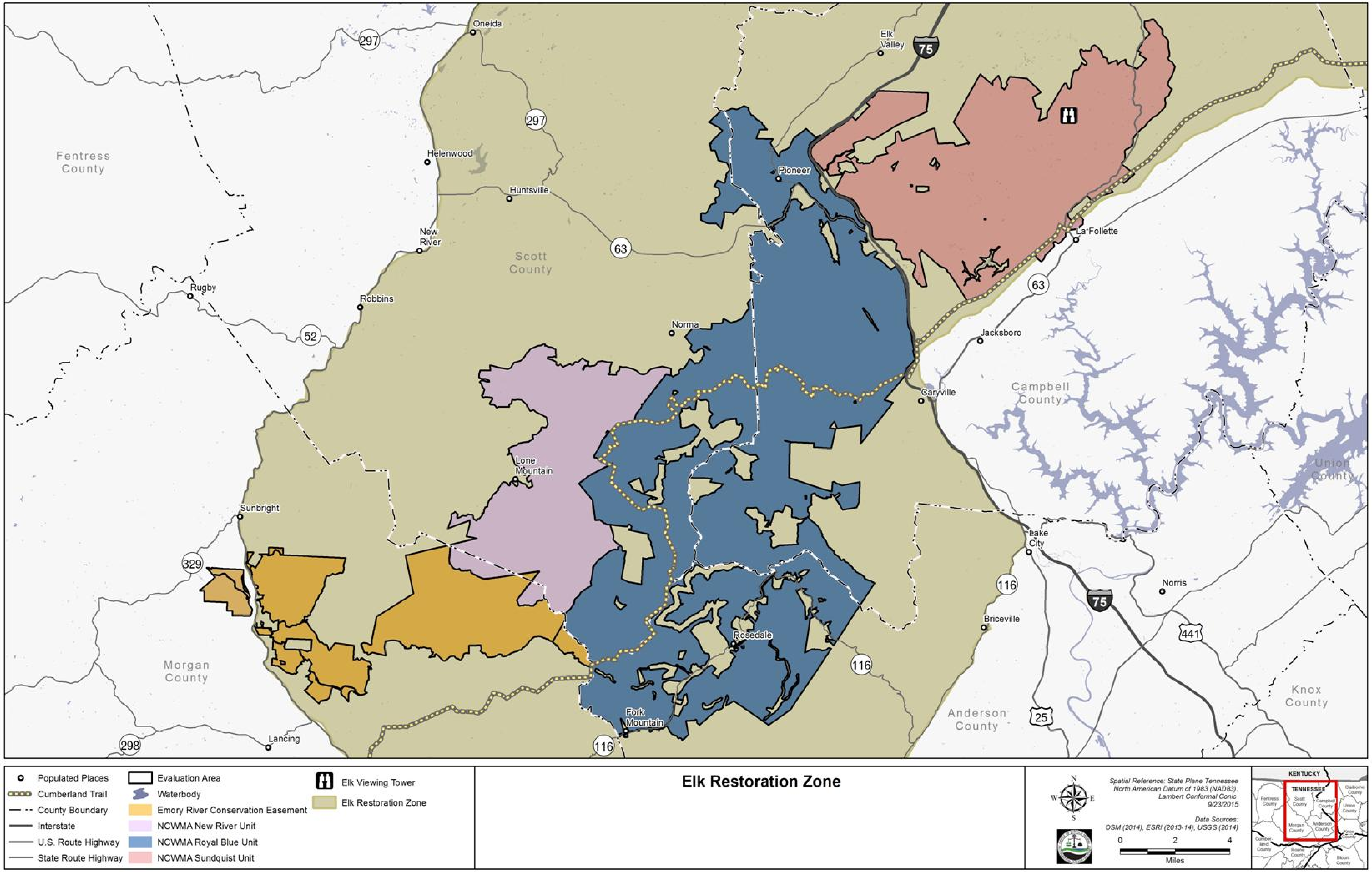


FIGURE 4-10: ELK RESTORATION ZONE AND EVALUATION AREA

SPECIAL-STATUS SPECIES

This section identifies and describes special status species found in or near the evaluation area. Special-status species include federal and state protected species or species in need of management. Federally listed species are those designated by the USFWS as threatened or endangered under the Endangered Species Act of 1973. State-listed species are those given separate or additional protection at the state level in Tennessee under the Tennessee Nongame and Endangered or Threatened Wildlife Species Conservation Act of 1974 and the Rare Plant Protection and Conservation Act of 1985. The TWRA designates animal species protections at the state level, and TDEC Division of Natural Heritage designates plant species protections at the state level. These designations are separate from federal designation under the Endangered Species Act. In addition to protection under the Endangered Species Act and state level equivalents, the Bald and Golden Eagle Protection Act of 1940 protects bald eagles at the federal level, and the Migratory Bird Treaty Act of 1918 protects most migratory bird species.

To assess threatened, endangered, and rare species within the evaluation area, a list of federally listed threatened and endangered species for Anderson, Campbell, Morgan, and Scott Counties was obtained from the USFWS (2014a). In addition, a state list of rare species complied by the Tennessee Natural Heritage Program (TNHP 2009) as well as county-specific lists for each of the four counties within the evaluation area was developed (TDEC 2014c). These species are further discussed below by the following taxonomic groupings: fish, mussels, birds, mammals, reptiles and amphibians, and plants first by state and federal threatened or endangered species, then by Tennessee state species deemed in need of management, and finally by other sensitive species occurring or potentially occurring within the evaluation area.

AQUATIC SPECIAL-STATUS SPECIES

Tennessee has among the highest diversity of fish fauna of any state in the United States (Carter et al. 2012; Jenkins et al. 2015) and is home to a number of known federal and state-listed aquatic species. Those special-status species that are known to be present or could occur in the evaluation area or in the four counties (Anderson, Campbell, Morgan, and Scott) partially encompassed by the evaluation area are described herein.

Fishes

Six federally listed fish and one candidate species are known to occur within the four affected Tennessee counties (USFWS 2014a). Critical habitat has been designated for three of the federally listed species. However, only one species (spotfin chub) has designated critical habitat within the evaluation area (USFWS 1977). Critical habitat for the spotfin chub includes a portion of the Emory River, which borders the evaluation area to the south along the boundary of the ERTCE (figure 4-11). Five additional species listed as threatened or endangered at the state level in Tennessee may also be present in or near the evaluation area (TDEC 2014c). Table 4-17 and appendix C additional information about these species. Two species, emerald darter and rosyface shiner, have been "deemed in need of management" at the state level in Tennessee are known to occur within the evaluation area.

TABLE 4-17: LISTED FISH SPECIES POTENTIALLY OCCURRING IN THE EVALUATION AREA

Common name	Scientific Name	Status	Presence in Evaluation Area	Preferred Habitat Description
Ashy darter	*Etheostoma cinereum*	ST	Found in numerous streams in the evaluation area in the Tennessee River basin	Prefers areas of bedrock or gravel substrate with minimal silt deposits.
Blackside dace	*Chrosomus cumberlandensis* (= *Phoxinus cumberlandensis*)	FT ST	Occurs primarily in the Clear Fork drainage, but was discovered in Straight Fork, a tributary to the New River	Prefers areas with sand, sandstone, and shale substrates.
Blue sucker	*Cycleptus elongatus*	ST	Occurs in Anderson and Campbell Counties	Found in large rivers and lower parts of major tributaries, frequently occurring in channels and flowing pools with moderate current.
Cumberland arrow darter	*Etheostoma sagitta*	FC	Known to occur in Campbell and Scott Counties within the evaluation area	Habitat includes rocky riffles and pools of headwaters, creeks, and small rivers with moderate current.
Cumberland darter	*Etheostoma susanae*	FE SE	Known to exist in Morgan and Scott Counties and reported in creeks in the upper Cumberland River watershed	Inhabits shallow water in low velocity shoals and backwater areas of moderate to low gradient stream reaches with stable sand or sandy-gravel substrates.
Duskytail darter (Tuxedo darter)*	*Etheostoma percnurum (Etheostoma lemiscatum)***	FE SE	Occurs in the Big South Fork River	Inhabits major streams ranging from larger creeks to moderately large rivers. It occurs in gently flowing pools, generally in the vicinity of riffles, among large rocks over bedrock or sand.
Redlips darter	*Etheostoma maydeni*	ST	Occurs in the Cumberland River system in Big South Fork	Prefers areas of bedrock or gravel substrate with minimal silt deposits.
Slender chub	*Erimystax cahni*	FT ST	Historically found in the Holston, Powell, and Clinch Rivers	Inhabits small rivers.
Sickle darter	*Percina williamsi*	ST	Potentially present in Morgan County	Found in flowing pools over rocky, sandy, or silty substrates in clear creeks or small rivers.
Silverjaw minnow	*Notropis buccatus*	ST	Listed as being present in Campbell County	Inhabits creeks and rivers with moderate current and sandy or gravel substrates.
Spotfin chub	*Erimonax monachus* (= *Notropis and Cyprinella*)	FT ST	Occurs in the Emory River	Prefers clear water over gravel, boulders, and bedrock in large creeks and medium-sized rivers having moderate current.
Yellowfin madtom	*Noturus flavipinnis*	FT ST	Occurs in the Clinch and Powell Rivers	Inhabits warm pools and backwaters of moderate-sized streams less than one meter deep, with moderate gradient, and clean water with little silt.

Federal listings: FE = federally endangered; FT = federally threatened; FC = federal candidate species.
State listings: SE = state endangered; ST = state threatened.

*Although the duskytail darter (E. *percnurum*) is the officially listed taxon, the taxon that occurs in the evaluation area is actually the tuxedo darter (E. *lemiscatum*) (Blanton & Jenkins 2008).

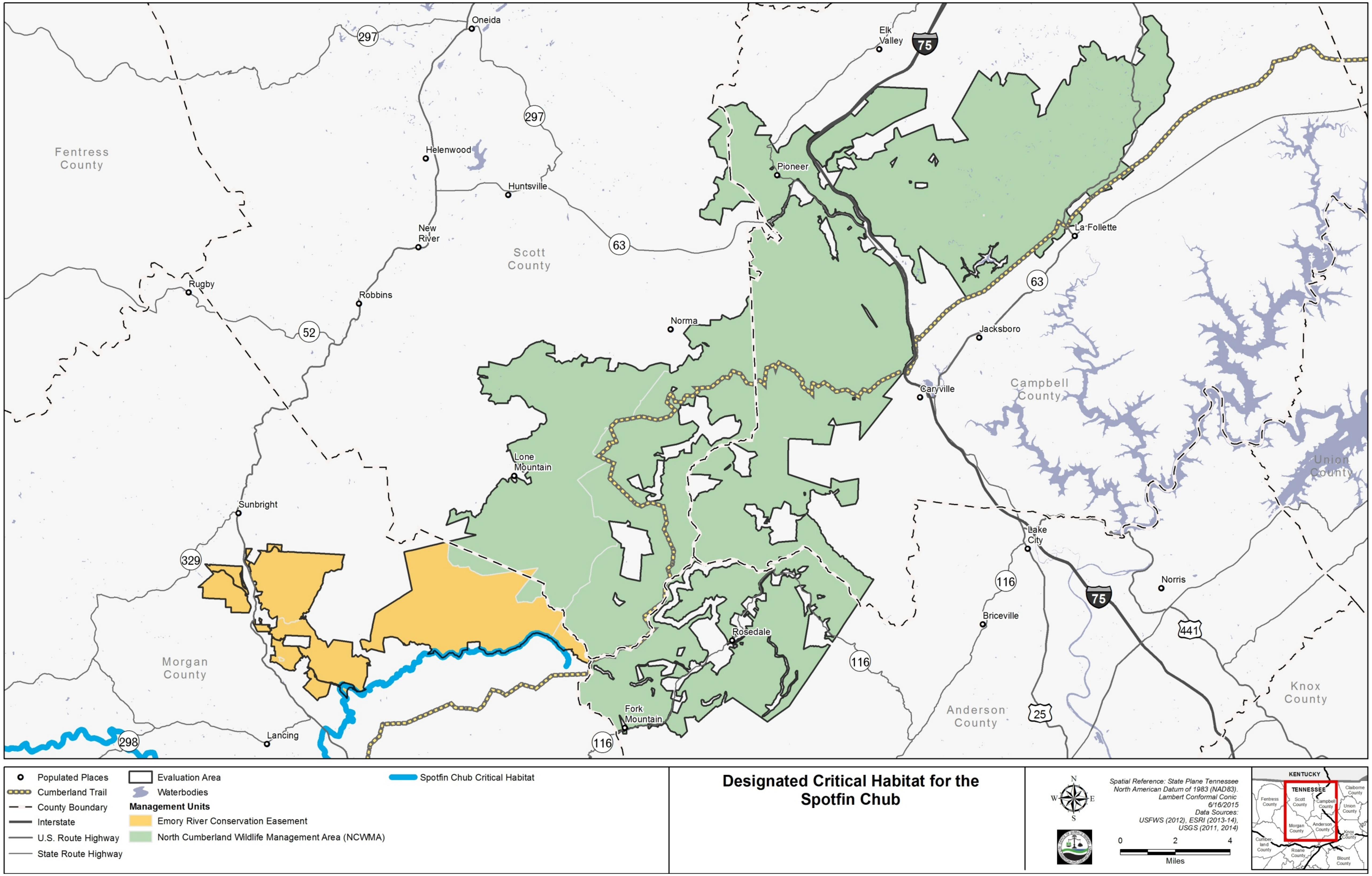


FIGURE 4-11: SPOTFIN CHUB CRITICAL HABITAT IN EVALUATION AREA

Mollusks

Twenty-three species of mussels are listed as federally endangered under the Endangered Species Act. Twenty of these species are listed as state endangered at the state level in Tennessee, in addition to their federal classification. Critical habitat has been designated for seven mussel species that occur within the evaluation area, although an extensive mussel survey has not been conducted within the evaluation area. No critical habitat for mussels occurs within the evaluation area. Table 4-18 lists the protected mussels. Appendix C provides descriptions of each species.

TABLE 4-18: LISTED MUSSEL SPECIES POTENTIALLY OCCURRING IN THE EVALUATION AREA

Common name	Scientific Name	Status	Presence in Evaluation Area	Preferred Habitat Description
Anthony riversnail	*Athearnia anthonyi*	FE SE	In Anderson and Campbell Counties	Prefers medium to large river habitats with cobble/boulder substrates in the vicinity of riffles with strong current.
Alabama lampmussel	*Lampsilis virescens*	FE SE	Emory River	Found in sand and gravel substrates in shoal areas of small to medium sized streams.
Birdwing pearlymussel	*Lemiox rimosus*	FE SE	Documented in the upper Clinch River watersheds	Prefers small to medium sized rivers in riffle areas with sand and gravel substrates in mod-fast currents.
Cracking pearlymussel	*Hemistena lata*	FE SE	Believed to be present in Clinch River in Anderson County	Prefers sand, gravel, and cobble substrates in swift currents or mud and sand in slower currents.
Cumberland bean	*Villosa trabalis*	FE SE	Documented in Morgan and Scott Counties and Big South Fork	Prefers riffle areas of small rivers and streams in sand, gravel, and cobble substrates with swift current.
Cumberland elktoe	*Alasmidonta atropurpurea*	FE SE	Restricted to tributaries of the upper Cumberland River	Preferred habitat appears to be shallow flats or pools with slow current and sand substrate with scattered cobble/boulder material, although it may be found in mud or rocky substrates and faster currents.
Cumberlandian combshell	*Epioblasma brevidens*	FE SE	Documented in the upper, Clinch, and Powell drainages	Occurs in shoals in large creeks and small to medium-sized rivers.
Dromedary pearlymussel	*Dromus dromas*	FE SE	Documented in the upper Clinch and Powell Rivers	Prefers clear, clean, fast-flowing water and cannot tolerate excessive siltation.
Fanshell	*Cyprogenia stegaria*	FE SE	Documented in the upper and Lower Clinch drainages	Prefers to inhabit the river bottoms in medium to large streams.
Finerayed pigtoe	*Fusconaia cuneolus*	FE SE	Found in the Clinch River and Powell River drainages	Prefers clear, high gradient streams in firm cobble and gravel substrates.

Common name	Scientific Name	Status	Presence in Evaluation Area	Preferred Habitat Description
Fluted kidneyshell	*Ptychobranchus subtentum*	FE	Documented in the Clinch and Powell Rivers	Inhabits small to medium rivers in areas with swift current or riffles.
Littlewing pearlymussel	*Pegias fabula*	FE SE	Documented in the upper Clinch River	Occurs in creeks and small rivers.
Orangefoot pimpleback	*Plethobasus cooperianus*	FE SE	Documented in the Clinch, Powell, and Cumberland Rivers	Found in medium to large rivers in sand, gravel, and cobble substrates in riffles and shoals in deep water and steady currents as well as some shallower shoals and riffles.
Oyster mussel	*Epioblasma capsaeformis*	FE SE	Documented to occur in the Big South Fork	Occurs in shoals of small to large rivers in sand and gravel substrate.
Pink mucket	*Lampsilis abrupta*	FE SE	Documented in the upper Clinch River	Occurs in the bottoms streams among gravel and cobble in depths ranging from one inch to five feet in depth and swiftly moving currents and in much deeper waters with slower currents.
Purple bean	*Villosa perpurperea*	FE SE	Could occur in the upper Clinch and Powell Rivers	Habitat is creeks to medium-sized rivers and occasionally headwaters. It is found in substrates ranging from silty-sand to boulder-sized rocks.
Rough pigtoe	*Pleurobema plenum*	FE SE	Could occur in the upper Clinch and Powell Rivers	Inhabits medium-sized to large rivers in swift currents but often exists in areas close to, but not in, the swiftest current.
Rough rabbitsfoot	*Quadrula cylindrica strigillata*	FE SE	Could occur in the upper Clinch and Powell Rivers	Inhabits medium-sized to large rivers in swift currents but often exists in areas close to, but not in, the swiftest current.
Sheepnose mussel	*Plethobasus cyphyus*	FE	Documented in the Clinch and Powell Rivers	Inhabit riffles and gravel/cobble substrates but usually has been reported from deep water (>2 m) with slight to swift currents and mud, sand, or gravel bottoms.
Shiny pigtoe	*Fusconaia cor*	FE SE	Documented in the upper Clinch and Powell Rivers	Inhabits shoals and riffles of small to medium sized clear rivers with moderate to fast current.
Slabside pearlymussel	*Pleuronaia dolabelloides*	FE SE	Documented in the upper Clinch and Powell Rivers	Occurs in moderate to high gradient riffles systems in creeks to large rivers. It is generally found at depths <1 m, moderate to swift current velocities, and substrates from coarse sand to heterogeneous assemblages of larger sized particles.

Common name	Scientific Name	Status	Presence in Evaluation Area	Preferred Habitat Description
Spectaclecase	*Cumberlandia monodonta*	FE	Documented in the upper Clinch	Occurs in substrates from mud and sand to gravel, cobble, and boulders in relatively shallow riffles and shoals with slow to swift current.
Tan riffleshell	*Epioblasma florentina walkeri*	FE SE	Documented in the Big South Fork and upper Clinch Rivers	Occurs in headwater streams.

Federal listings: FE = federally endangered; FT = federally threatened.
State listings: SE = state endangered; ST = state threatened.

Benthic Macroinvertebrates

One state-level endangered crustacean is known to occur in the Clinch and Emory drainages in Anderson and Campbell Counties: the valley flame crayfish (*Cambarus deweesae*). A full description of this species' ecology is provided in appendix C.

TERRESTRIAL SPECIAL-STATUS SPECIES

There are several known federal and state-listed species (wildlife and plants) that are present (or likely to be present) in the evaluation area or in the counties (Anderson, Campbell, Morgan and Scott) associated with the evaluation area. Below is a specific discussion of the listed birds, mammals, reptiles, amphibians, and plants.

Birds

According to the USFWS (2015a) list of threatened and endangered species, there are no federally listed bird species listed for the four counties. However, the USFWS (2015a) lists 22 birds of conservation concern for the four counties (table 4-19). Apart from those birds already listed as endangered or threatened under the Endangered Species Act, birds of conservation concern (USFWS 2014b) are species identified by USFWS as those species in need of conservation action. One species is state-listed, Bewick's wren (*Thryomanes bewickii*). Appendix C describes these federally and state-listed species further.

TABLE 4-19: FEDERAL AND STATE-LISTED BIRD SPECIES POTENTIALLY OCCURRING IN THE EVALUATION AREA

Common name	Scientific Name	Status	Presence in Evaluation Area	Preferred Habitat Description
Bald eagle	*Haliaeetus leucocephalus*	BOCC	One recorded observation near the southern border of the evaluation area. Several other observations are mapped just outside the evaluation area.	Forested areas near large bodies of water.
Bewick's wren	*Thryomanes bewickii*	SE	No known occurrence within the evaluation area. Closest known observations are recorded in Rutherford County.	Rural farms with brushy hedgerows and old buildings.
Black-billed cuckoo	*Coccyzus erythropthalmus*	BOCC	One observation was recorded within the evaluation area.	Forests, forest edges and thickets, frequently associated with water.

Common name	Scientific Name	Status	Presence in Evaluation Area	Preferred Habitat Description
Black-capped chickadee	*Poecile atricapillus*	BOCC	No recorded observations within the evaluation area. The closest recorded observations are southeast of Knoxville.	Deciduous and mixed forests generally above 4,000 feet in elevation.
Blue-winged warbler	*Vermivora pinus*	BOCC	Several recorded observations within the evaluation area.	Shrubby, secondary growth habitats, such as abandoned farmlands and forest clearings, which have scattered trees.
Canada warbler	*Wilsonia canadensis*	BOCC	Four observations within the evaluation area and several more observations nearby.	Large stands of deciduous and coniferous forests with a dense shrubby understory.
Cerulean warbler	*Dendroica cerulea*	BOCC INOM	Many observations within the evaluation area; 80% of the known occurrences are within the petition area (Welton 2014).	Mature deciduous forests.
Fox sparrow	*Passerella liaca*	BOCC	No recorded observations within the evaluation area, but some observations immediately adjacent to this boundary.	Shrubby fields and woodland edges (often in multiflora rose hedgerows).
Golden-winged warbler	*Vermivora chrysoptera*	INOM	Several recorded observations within the evaluation area.	Shrubby, secondary growth habitats, such as old strip mine benches.
Henslow's sparrow	*Ammodramus henslowii*	BOCC	Two recorded observations within the evaluation area.	Overgrown wet fields and meadows with standing dead vegetation or scattered low shrubs or tree saplings.
Kentucky warbler	*Geothlypis formosa*	BOCC	Many observations within the evaluation area.	Large forest stands with mature trees and a thick understory.
Least bittern	*Ixobrychus exilis*	BOCC	No recorded observations within the evaluation area, but a few observations adjacent to this boundary.	Marshes with tall, emergent vegetation.
Loggerhead shrike	*Lanius ludovicianus*	BOCC	No recorded observations within the evaluation area, but a few observations adjacent to this boundary.	Short grasslands (including cropland, pastureland, and old fields) with isolated trees or shrubs.
Louisiana waterthrush	*Parkesia motacilla*	BOCC	Four recorded observations within the evaluation area, and a dozen observations adjacent to this boundary.	Forested streams in hardwood forests.
Northern saw-whet owl	*Aegolius acadicus*	BOCC ST	No recorded observations within the evaluation area.	Spruce-fir forests above 5,000 feet in elevation.
Prairie warbler	*Setophaga discolor*	BOCC	Several recorded observations within the evaluation area.	Variety of low elevation shrubby habitats, including early seral forests and open fields.

Common name	Scientific Name	Status	Presence in Evaluation Area	Preferred Habitat Description
Prothonotary Warbler	*Protonotaria citrea*	BOCC	No recorded observations within the evaluation area. Closest recorded observations are near the evaluation area.	Wooded swamps, flooded bottomland forests, and along slow-moving rivers.
Red crossbill	*Loxia curvirostra*	BOCC	One recorded observation within the evaluation area and two recorded observations immediately adjacent to the evaluation area.	Mature, coniferous forests.
Red-headed woodpecker	*Melanerpes erythrocephalus*	BOCC	Several recorded observations within the evaluation area and many recorded observations in adjacent parcels.	Open deciduous woodlands and river bottoms.
Rusty blackbird	*Euphagus carolinus*	BOCC	Two observations within the eastern portion of the evaluation area.	Flooded or wetland hardwood forests, beaver ponds, and pond edges.
Short-eared owl	*Asio flammeus*	BOCC	No recorded observations within or near the evaluation area.	Open areas and brushy fields.
Swainson's warbler	*Limnothlypis swainsonii*	BOCC INOM	Two recorded observations within the evaluation area and several observations nearby.	Mountainous sites with dense evergreen understories associated with moist forest ravines.
Wood thrush	*Hylocichla mustelina*	BOCC	Several recorded observations within the evaluation area and many observations nearby.	Wide variety of deciduous and mixed forests with a well-shaded understory, and a fairly open forest floor with leaf litter.
Worm-eating warbler	*Helmitheros vermivorum*	BOCC	About a dozen observations within the evaluation area and observations nearby.	Large stands of mature deciduous or mixed deciduous-coniferous forest with patches of dense understory, typically on steep slopes.

These species are further discussed in appendix C.
Federal listings: BOCC = bird of conservation concern.
State listings: SE = state endangered; ST = state threatened; INOM = species deemed in need of management.

Mammals

According to the USFWS (2015a) and TDEC (2015a) list of threatened and endangered species, there are two federally and state-endangered mammal species currently (February 2015) listed for the four counties: the gray bat (*Myotis grisescens*) and the Indiana bat (*Myotis sodalis*). Furthermore, the northern long-eared bat (*Myotis septentrionalis*) is a federally listed threatened species (table 4-20).

Reptiles and Amphibians

No federally listed threatened or endangered reptiles or amphibians are known to occur within the evaluation area (USFWS 2015a). However, the northern pinesnake (*Pituophis melanoleucus melanoleucus*), a state threatened species, occurs in two of the four counties (Anderson and Morgan) within the evaluation area (TDEC 2015a). No federally or state-listed amphibians occur in the counties represented by the evaluation area, and are not further discussed in this document (table 4-21).

TABLE 4-20: FEDERAL AND STATE-LISTED MAMMALS SPECIES POTENTIALLY OCCURRING IN THE EVALUATION AREA

Common name	Scientific Name	Status	Presence in Evaluation Area	Preferred Habitat Description
Gray bat	*Myotis grisescens*	FE, SE	No recorded observations within or near the evaluation area.	Forested caves and open water of rivers, lakes, and reservoirs
Indiana bat	*Myotis sodalis*	FE, SE	Observations within the northern portion of the evaluation area in Anderson County.	Caves and forests.
Northern long-eared bat	*Myotis septentrionalis*	FT	Recorded observations within the evaluation area, but one hibernacula record within a mile of the southeast corner of the evaluation area.	Caves, attics, under shutters or tree bark.

These species are further discussed in appendix C.

Federal listings: FE = federal endangered; FT = federal threatened.
State listings: SE = state endangered.

TABLE 4-21: STATE-THREATENED REPTILES AND AMPHIBIANS SPECIES POTENTIALLY OCCURRING IN THE EVALUATION AREA

Common name	Scientific Name	Status	Presence in Evaluation Area	Preferred Habitat Description
Northern pinesnake	*Pituophis melanoleucus melanoleucus*	ST	Known to occur in two of the four counties that the evaluation area extends across.	Well-drained, sandy soils in pine or mixed hardwood forests.

This species are further discussed in appendix C.

State listings: ST = state threatened.

Terrestrial Invertebrates

There are no federally or state-listed terrestrial invertebrates within the evaluation area and this group of species are not discussed further in this document.

PLANTS

The rare plant list issued by the Tennessee Natural Heritage Program includes 20 plant species found in the Cumberland Mountains physiographic province within Tennessee. Within the approximately 172,000-acre evaluation area, three federally listed and five state-listed species are known to occur. The federally listed species include two federally threatened plant species, the Cumberland rosemary (*Conradina verticillata*) and Virginia spiraea (*Spiraea virginiana*); and one federally endangered plant species, the Cumberland sandwort (*Arenaria cumberlandensis*). State endangered species include pale corydalis (*Corydalis sempervirens*) and Ozark bunchflower (*Melanthium woodii*). State threatened species include tubercled rein-orchid also know commonly as the pale green orchid (*Platanthera flava var. herbiola*). State special concern species commercially exploited include American ginseng (*Panax quinquefolius*) and pink lady’s slipper (*Cypripedium acaule*) (table 4-22).

TABLE 4-22: EIGHT SPECIES OF PLANTS LISTED AS ENDANGERED, THREATENED, OR SPECIAL CONCERN STATE STATUS REPORTED TO OCCUR WITHIN THE NORTH CUMBERLAND LANDS UNSUITABLE FOR MINING BOUNDARY

Common Name	Scientific Name	Status
Cumberland rosemary	*Conradina verticillata*	FT/ST
Virginia spiraea	*Spiraea virginiana*	FT/SE
Cumberland sandwort	*Arenaria cumberlandensis*	FE/SE
Pink lady's slipper	*Cypripedium acaule*	SCE
Pale corydalis	*Corydalis sempervirens*	SE
American ginseng	*Panax quinquefolius*	SCE
Ozark bunchflower	*Melanthium woodii*	SE
Tubercled rein-orchid	*Platanthera flava var. herbiola*	ST

Comprehensive surveys of the entire evaluation area for rare plants have not been completed.
Federal listings: FE = federally endangered; FT = federally threatened.
State listings: SE = state endangered; ST = state threatened; SCE = special concern species commercially exploited.

The Ozark bunchflower occurs primarily on lower slopes and stream terraces in moist, hardwood forests, usually over basic soils. Similar to other interior-forest species, threats include logging and clearing of hardwood forests, among others (NatureServe 2014). Found in 13 states from Iowa and Missouri to Georgia and Florida, the bunchflower is only considered “apparently secure” in Missouri (NatureServe 2014). In Tennessee, the plant is considered “critically imperiled.” As described in the petitioner’s letter, there are only nine known populations in Tennessee and two of those are within the NCWMA.

In contrast to the Ozark bunchflower, the pale corydalis is found in two habitat types: rocky sites on dry to dry-mesic, well-drained, often acidic soils; and recently disturbed sites, including burned areas. Pale corydalis occurs on exposed rocky areas, ledges, and cliffs from the Carolinas to Canada and Alaska, and is a rock outcrop obligate in the Appalachians. Pale corydalis has a limited distribution and occurs in restricted, infrequent habitat (NatureServe 2014). Similar to the bunchflower, there are only two documented occurrences of this plant within the NCWMA.

Between August 2002 and July 2004, representatives of the TVA conducted literature searches and field surveys in an effort to identify whether state or federally listed plant species were present in the area. This area is now part of the Royal Blue and Sundquist Units of the NCWMA. In an unpublished document, the TVA indicated that three federally listed plant species were reportedly located in western Scott County. Extensive TVA field investigations of potential habitats within the Royal Blue/Koppers property failed to identify these species. These species were not reported from the Campbell County portion of the Koppers property. Refer to appendix C for a description of all federal and state-listed plant species.

TENNESSEE STATE SPECIES DEEMED IN NEED OF MANAGEMENT

In addition to state-level threatened and endangered classifications under the Tennessee Nongame and Endangered or Threatened Wildlife Species Conservation Act of 1974, the State of Tennessee provides an additional category for species “deemed in need of management.” This designation is given to species that should be investigated to develop information relating to populations, distribution, habitat needs, limiting factors, and other biological and ecological data to determine management measures necessary for their continued ability to sustain themselves successfully, as determined by the TWRA. This category is analogous to “species of special concern” (TNHP 2009). Table 4-23 describes species occurring within the four counties included in the evaluation area that have been deemed in need of management.

TABLE 4-23: SUMMARY OF STATE SPECIES LISTED ONLY AS DEEMED IN NEED OF MANAGEMENT AND LIKELY PRESENCE IN THE EVALUATION AREA

Common name	Scientific Name	Presence in Evaluation Area	Preferred Habitat Description
Fish			
Arrow darter	*Etheostoma sagitta*	The arrow darter has been found in numerous streams in the Clear Fork system (Carter et al. 2012).	The arrow darter is a small fish that occurs in streams with bedrock and rubble substrates that include sandy areas. It is most common in the Cumberland Plateau region and is listed as being present in Campbell and Scott Counties (TDEC 2014c).
Emerald darter	*Etheostoma baileyi*	The emerald darter is known to occur in Anderson, Campbell, Morgan, and Scott Counties (TDEC 2014c). It has been found in numerous streams draining the NCWMA (Carter et al. 2003, 2012; TNHP 2009).	The emerald darter is a small fish that inhabits rocky pool areas and runs of creeks and small rivers (TDEC 2014c).
Olive darter	*Percina squamata*	The olive darter is known to occur in Morgan and Scott Counties (TDEC 2014c).	The olive darter is a small fish that lives in high gradient rivers among boulder and bedrock chutes with a strong current (TDEC 2014c).
Rosyface shiner	*Notropis rubellus*	The rosyface shiner has been found in numerous streams draining the NCWMA (Carter et al. 2003, 2012; TNHP 2009).	The rosyface shiner is a minnow that inhabits large creeks and small rivers with clear water and rubble, boulder, and bedrock substrates (TDEC 2014c).
Tangerine darter	*Percina aurantiaca*	The tangerine darter is known to occur in Anderson, Campbell, and Morgan Counties (TDEC 2014c).	The tangerine darter is a small fish found in moderate to large size headwater tributaries to the Tennessee River. It is typically found in clear, fairly deep, rocky pools, usually below riffles (TDEC 2014c).
Tippecanoe darter	*Etheostoma tippecanoe*	The Tippecanoe darter is known to occur in Big South Fork in the Cumberland River watershed (Scott 2010; TNHP 2009).	The tippecanoe darter is a small fish found in medium to large rivers in shallow riffle areas containing fine gravel substrate (TNHP 2009).
Birds			
Barn Owl	*Tyto alba*	No recorded observations within the evaluation area, though this species is known to occur in Anderson County.	Upland and open areas around farms.
Golden-winged warbler	*Vermivora chrysoptera*	Several recorded observations within and adjacent to the evaluation area.	Secondary growth areas (abandoned pastures) with scattered trees and shrubs.
Sharp-shinned hawk	*Accipiter striatus*	Several recorded observations within the evaluation area and many observations nearby.	Large stands of deciduous, coniferous, and mixed pine-hardwood forests.

Common name	Scientific Name	Presence in Evaluation Area	Preferred Habitat Description
Mammals			
Allegheny woodrat	*Neotoma magister*	Likely to occur in the evaluation area.	Outcrops, cliffs, talus slopes, crevices, sinkholes, caves, and karst areas in forested areas, often at higher elevations.
Cinereus shrew	*Sorex cinereus*	Likely to occur in the study area.	It favors thick leaf litter in damp forests and nests in shallow burrows or above ground in logs and stumps. Rich upland woodlands of many types; open fields; middle and east Tennessee.
Eastern small-footed myotis	*Myotis leibii*	Likely to occur in the evaluation area.	Permanent resident of Tennessee, and uses forested habitats, bridges, abandoned buildings, and barns.
Hairy-tailed mole	*Parascalops breweri*	Likely to occur in the evaluation area.	Moist soils in deciduous forests with thick humus; east Tennessee.
Meadow jumping mouse	*Zapus hudsonius*	Likely to occur in the evaluation area.	Moist lowland habitats with thick vegetation.
Rafinesque's big-eared bat	*Corynorhinus rafinesquii*	Likely to occur in the evaluation area.	Caves, hollow trees, abandoned buildings; often associated with forested areas in Campbell County. Much historically occupied habitat was lost with the clearing of swampland forests.
Smoky shrew	*Sorex fumeus*	Likely to occur in the evaluation area.	Moist hardwood forests with decaying logs, thick leaf litter, and moss-covered rocks; frequently found in higher elevations.
Southeastern shrew	*Sorex longirostris*	Likely to occur in the evaluation area.	Various habitats including wet meadows, damp woods, and uplands and prefers moist to wet areas with dense ground cover.
Southern bog lemming	*Synaptomys cooperi*	Likely to occur in the evaluation area.	Boggy habitat but is also common in marshes, meadows, and moist upland forests with thick humus layer.
Woodland jumping mouse	*Napaeozapus insignis*	Likely to occur in the evaluation area.	Deciduous and coniferous forests with herbaceous groundcover; middle and east Tennessee
Reptiles and Amphibians			
Black mountain salamander	*Desmognathus welteri*	This species occurs throughout the North Cumberland Mountains and is known to be present in Anderson, Campbell, Morgan, and Scott Counties (TDEC 2014c).	The black mountain found in spring runs and permanent streams in wooded mountainous terrain (TDEC 2014c).
Eastern slender glass lizard	*Ophisaurus attenuates longicaudus*	This species is known to occur in Anderson and Scott Counties (TDEC 2014c).	The eastern slender glass lizard prefers dry upland areas including woodlands, areas with dense brush, and grassy fields (TDEC 2014c).
Four-toed salamander	*Hemidactylium scutatum*	This species is known to occur in Anderson, Campbell, and Scott Counties (TDEC 2014c).	The four-toed salamander is found in woodland swamps, shallow depressions, and sphagnum mats on acidic soils (TDEC 2014c).

Common name	Scientific Name	Presence in Evaluation Area	Preferred Habitat Description
Hellbender	*Cryptobranchus alleganiensis*	This species is known to occur in Anderson, Campbell, and Morgan Counties (TDEC 2014c).	The hellbender occurs in rocky, clear creeks and rivers with large shelter rocks (TDEC 2014c).
Wehrle’s salamander	*Plethodon wehrlei*	This species prefers sheltered areas in mesic hardwood forests. It is known to occur in Campbell County (TDEC 2014c).	The Wehrle’s salamander is found in upland areas in the Cumberland Mountains (TDEC 2014c).

LAND USE AND RECREATION

The evaluation area consists of approximately 172,000 acres of publicly accessed lands lying within the NCWMA and the ERTCE (NLCD 2011). This area spans four counties in northeast Tennessee: Scott, Anderson, Campbell, and Morgan. Maintained by the TWRA, the NCWMA consists of more than 151,818 acres in three units: the Royal Blue Unit, Sundquist Unit, and New River Unit, while the ERTCE adds roughly an additional 20,317 acres directly adjoining the NCWMA to the southwest.

Mountains and valleys dominate the surrounding landscape, which is largely rural or undeveloped, with several scattered small towns. The evaluation area begins approximately three miles north of Wartburg and extends 40 miles in a northeasterly direction, to approximately 8 miles north-northeast of LaFollette (EPA 2013b). Other nearby communities include Winfield, Huntsville, Sunbright, Jacksboro, Clinton, Jellico, Caryville, Rocky Top, and Oliver Springs. Knoxville lies approximately 35 miles to the southeast of the evaluation area. Land uses immediately adjoining the evaluation area include forestry, agriculture, and low-density residential development.

Forests, agriculture, and developed lands comprise nearly 98% of the land area within the evaluation area, as shown in table 4-24. Forests alone comprise more than 91% of the land cover.

TABLE 4-24: EXISTING LAND COVER CATEGORIES FOR THE EVALUATION AREA

Land Cover	Acreage	Percent of North Cumberland Wildlife Management Area / Emory River Tracts Conservation Easement
Forest	156,726.9	91.05
Agriculture	7,184.6	4.17
Developed	4,426.8	2.57
Shrub	3,422.3	1.99
Barren	206.0	0.12
Wetlands	87.8	0.05
Water	80.8	0.05
Total	**172,135.2**	**100.00**

The top three land use categories are aggregates of several land cover types identified in the National Land Cover Database of 2011 (NLCD 2011). The forest category includes deciduous, evergreen, and mixed forests. The agriculture category includes grassland/herbaceous, pasture/hay, and cultivated crops. The developed category includes developed open space, developed low intensity, and developed medium intensity.

Land management within the boundary of the evaluation area is characterized by a mix of public lands with mixed mineral rights (NCWMA), private land managed under a conservation easement (Emory River Tracts), and small privately held in-holdings. Figure 4-12 shows the boundaries of the various units of the NCWMA and the ERTCE.

Although a comprehensive management plan for the NCWMA has yet to be developed, the TWRA is directed by the management plans for the Royal Blue and Sundquist Units to manage these lands for multiple public benefits. The privately owned Emory River Tracts provide public benefits through public conservation easements. The purposes of the ERTCE are to ensure long-term professional forest management for the production, management, and harvesting of economically valuable timber and related forest products; protect conservation values and prevent any use that will significantly impair or interfere with conservation values; and provide opportunities for noncommercial, nonmotorized, and nonmechanized public recreation (ERTCE).

RESOURCE OWNERSHIP AND MANAGEMENT

Mineral interests within the evaluation area are allocated to a number of entities. The Brimstone Company holds mineral interest underlying approximately 22,956 acres in the New River Unit of the NCWMA. National Coal, LLC own the mineral interests in approximately 31,568 acres in the Royal Blue Unit. Similarly in the Royal Blue Unit, the Rowland Land Company and U.S. Inc., own mineral interests in about 10,900 acres and 465 acres, respectively. Finally, Triple H Coal LLC owns a mineral interest in approximately 19,438 acres in both the Royal Blue and Sundquist Units. Within the northeastern part of the Sundquist Unit, the TWRA owns the surface and timber rights but does not own oil, gas, or coal. A privately owned company harvests timber in this area under an agreement with the TWRA; the agreement expires in 2017. Mineral ownership will pass to the TWRA after 99 years under a purchase agreement. Within both the southwestern part of the Sundquist Unit and the northeastern part of the Royal Blue Unit, the TWRA owns the surface, timber, oil, and gas, and manages the timber harvest. The TVA Koppers Coal Reserve underlies these portions of the petition area The Koppers Coal Reserve is a 53,000 acre area in western Campbell County and eastern Scott County, with boundaries similar but not identical to the Royal Blue Unit. TVA owns all of the coal rights within the Koppers Coal Reserve but not the oil or gas. National Coal has a lease on a portion of the TVA holdings.

Within the southwestern part of the Royal Blue Unit, the TWRA owns the surface and timber but does not own oil, gas, or coal. The same privately owned company harvesting timber in the Sundquist Unit currently harvests timber in this area, under the previously referenced lease agreement with the TWRA. The area has multiple mineral owners. Within the New River Unit, the TWRA has a recreation lease which grants the TWRA the right to offer recreation to the public. Surface, timber, and all mineral interests are privately owned, and timber harvest activities are ongoing. Within the ERTCE, surface, timber, oil, gas, and coal interests are privately owned and managed (according to parcel data in the State of Tennessee Tax Assessor database).

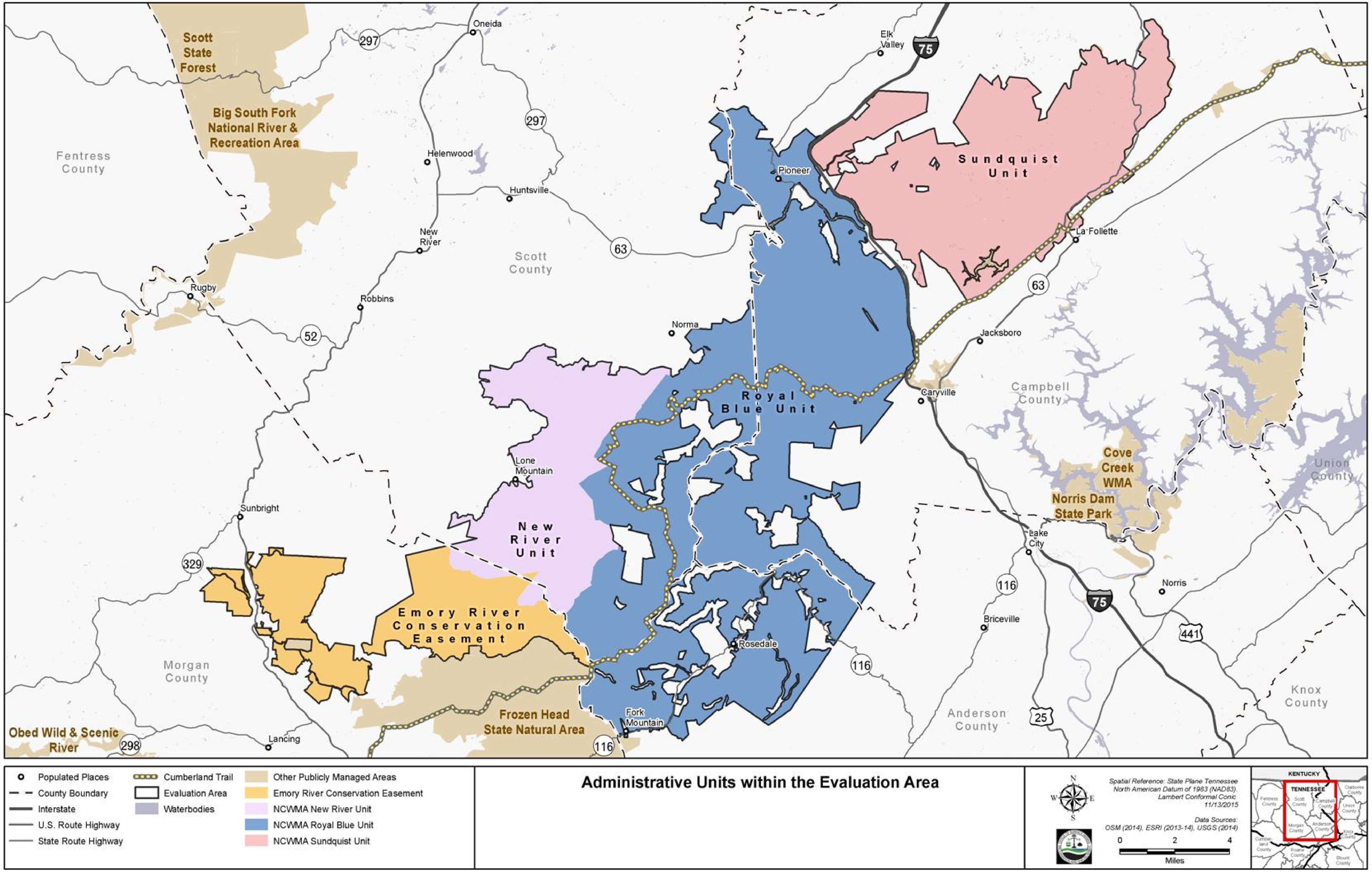


FIGURE 4-12: ADMINISTRATIVE UNITS WITHIN THE EVALUATION AREA

TIMBER HARVEST ACTIVITIES

The OSMRE collected available data related to logging operations within the evaluation area in 2012. Figure 4-13 shows the distribution of timber harvest data obtained for the period from 1888 to 2012 covering 52,465 acres in the evaluation area. The OSMRE included the acres harvested during timber salvage operations on permitted mine sites in the forestry data. The OSMRE acknowledges gaps in silvicultural data for certain geographic areas of the area.

Past Timber Operations

Historically, all of the areas within the NCWMA were harvested for timber, beginning in the early 1900s when several sawmills and logging camps existed in the area. Since the entire area has been managed as a working forest for timber production for many decades, no virgin forests exist within the North Cumberland LUM area. A privately owned company continues timber harvest activities within the northeastern part of the Sundquist Unit and the southwestern part of the Royal Blue Unit, under a lease agreement that expires in 2017. Under the timber harvest management plan filed with the TWRA, the company plans to harvest timber an average of 1,600 acres per year over 10 years for a total of 16,000 acres. The TWRA estimates timber harvested over the last three years by the private company under the lease agreement affected 4,998 acres in 2012, 2,635 acres in 2013, and 1,939 acres in 2014. Timber productivity on these lands averages 4,500 board feet per acre per year. An average of 120 acres per year is harvested on lands where the TWRA manages timber harvests. After 2017, the TWRA will manage timber harvests on all of the Sundquist and Royal Blue Units.

Using these estimates, the OSMRE anticipates approximately 1,600 acres per year will be harvested within the lease area of the Sundquist and Royal Blue Units and approximately 120 acres per year within the TWRA managed parts of the Sundquist and Royal Blue Units will be harvested by 2017.

The annual average amount of land harvested within the evaluation area from 1968 through 2002 was 505 acres annually. Logging activity increased dramatically in 2003, resulting in an annual average of 1,605 acres between 2003 and 2014.

COAL MINING OPERATIONS

The OSMRE identified areas previously or presently disturbed by coal mining operations based on a review of its permitting records, aerial photography, digital aerial imagery, US Geological Survey 7.5-minute topographic quadrangle maps, and elevation data derived from Light Detection and Ranging overflights of the evaluation area in March, 2011. The results of this analysis, as seen in figure 4-14, show approximately 17,455 acres cumulatively historically disturbed by surface mining operations.

From 1984 to 2011, a period for which the OSMRE has the most complete records, the average number of coal mining acres under permit at one time in a given year is 1,787 acres, or slightly over 1% of the evaluation area. Approximately 33 permits are active in a given year. Active permit status includes permits from the time they are issued until reclamation is complete and the reclamation bond is fully released; therefore, not all active permits are actively mining coal. Figure 4-15 shows coal mining permits within the evaluation area.

As of October 7, 2014, OSMRE records indicate no permits are actively producing coal within the evaluation area, while 20 other permits comprising 2,446 total acres are contained partly or wholly within the area and are in various phases of mining and reclamation. For a detailed discussion of coal mining in the evaluation area, see “Chapter 5: Evaluation of Coal Resources.”

Oil and Gas Wells

Permitted Oil Well within the Evaluation Area

Drilling of oil and gas wells in Tennessee is permitted by the TDEC. From data of oil and gas well locations provided by the Tennessee Division of Geology, 289 oil and gas wells were identified within the boundaries of the evaluation area. The level of surface disturbance associated with oil and gas wells varies based on the depth of the well, but typically includes a 2-acre well pad, 0.1 miles of gravel road, and 0.55 miles of utility lines. The total area of disturbance is typically about 4.8 acres (BLM 2008). Therefore, approximately 1,387 acres of land within the evaluation area have been disturbed by oil and gas drilling. Using the period from 1978 to 2011, an average of approximately eight wells per year were permitted within the NCWMA. Figure 4-16 shows the distribution of these permitted facilities.

Specific Land Use Plans

Regulations established by the respective counties govern land uses on private lands surrounding the evaluation area. Scott, Morgan, and Campbell Counties do not have comprehensive planning documents or zoning ordinances (Morgan County 2014b; Scott County 2014b; State of Tennessee 2014). Anderson County has a countywide zoning ordinance (Anderson County 2009), but does not have a comprehensive plan.

The majority of acres within the evaluation area are under state ownership or management. Draft management plans have been developed to guide the management and use of the Royal Blue and Sundquist Units, but the management plans have not been formally adopted. Until 2007, the TWRA managed the Royal Blue Unit and the Sundquist Unit as the Sundquist Wildlife Management Area and the Royal Blue Wildlife Management Area. The *Surface Use Plan, Sundquist Wildlife Management Area* (TWRA 1992) and *A Management Plan for the Royal Blue Wildlife Management Area* (TWRA 1992) guided management of these areas. In 2007, the conservation project known as “Connecting the Cumberlands” linked these two wildlife management areas with other public and private lands to provide public access rights on approximately 127,000 acres in Anderson, Campbell, Morgan, and Scott Counties. Also known as the “North Cumberlands Conservation Acquisition,” this acquisition partnered resources from the State of Tennessee, Conservation Forestry, Lyme Timber, and The Nature Conservancy in what has been determined to be the largest conservation investment in state history and the largest conservation appropriation by any one state in recent years (The Nature Conservancy 2015).

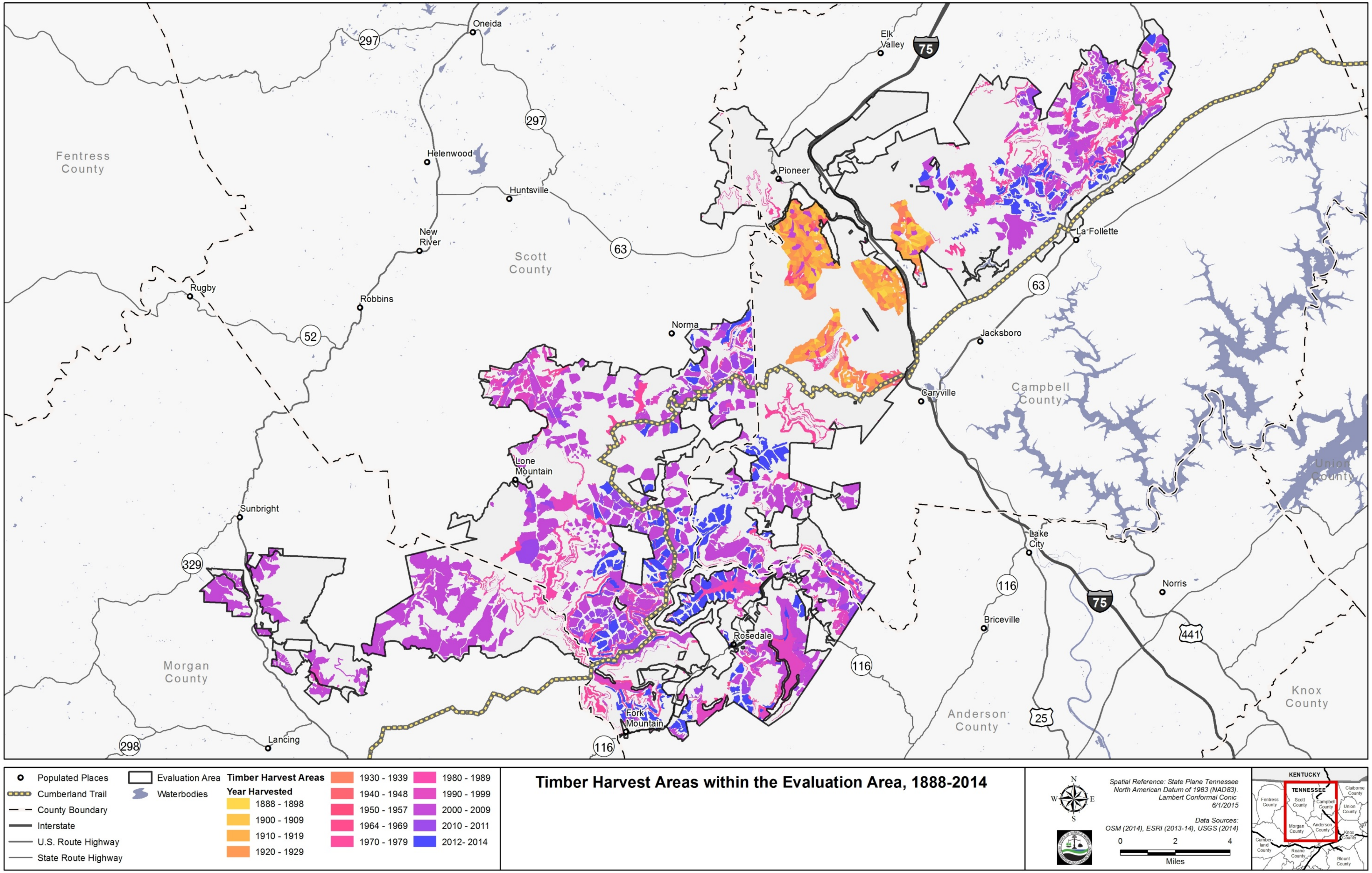


FIGURE 4-13: TIMBER HARVEST AREAS WITHIN THE EVALUATION AREA, 1888–2012

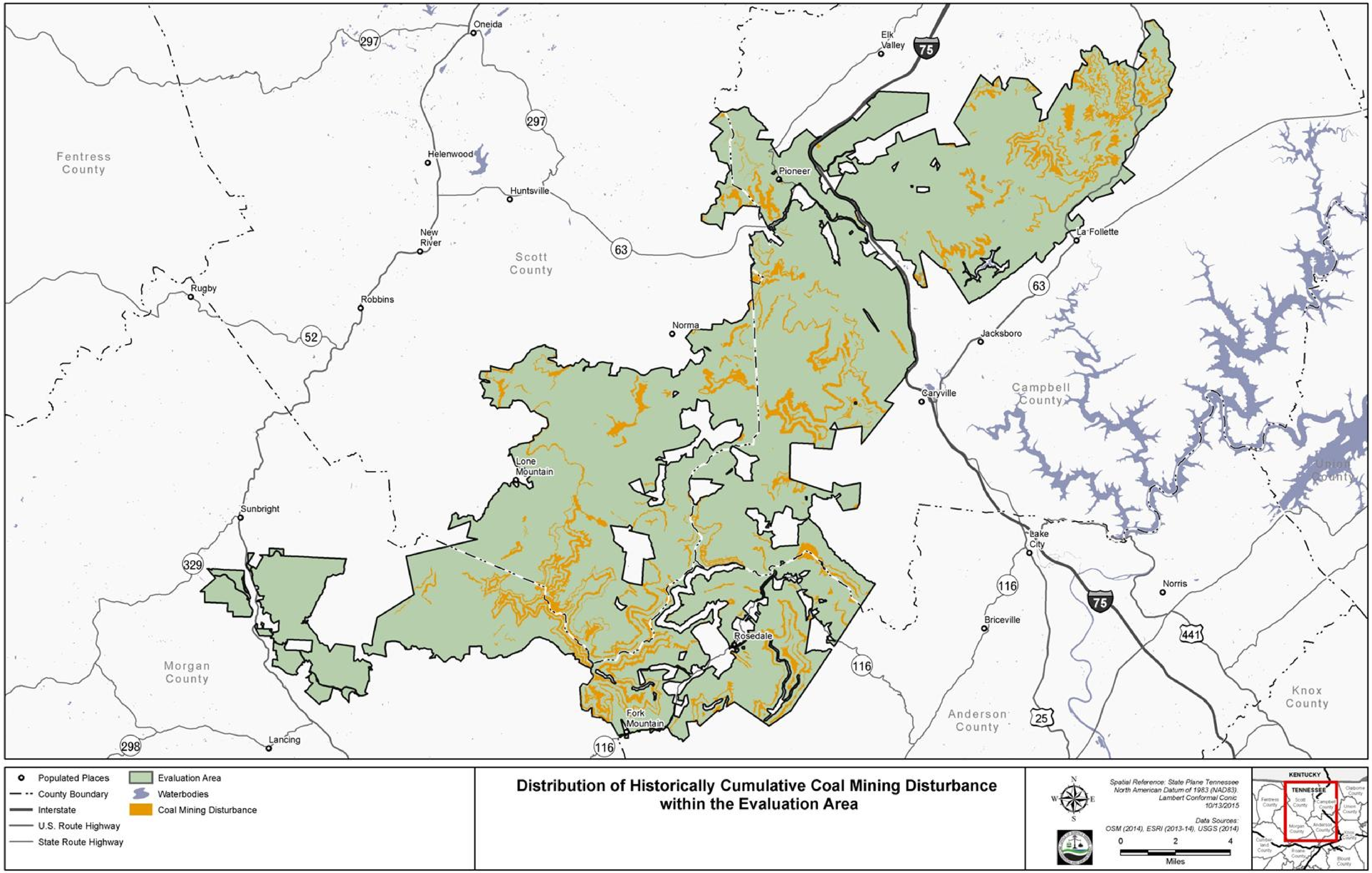


FIGURE 4-14: DISTRIBUTION OF COAL MINING DISTURBANCE WITHIN THE EVALUATION AREA

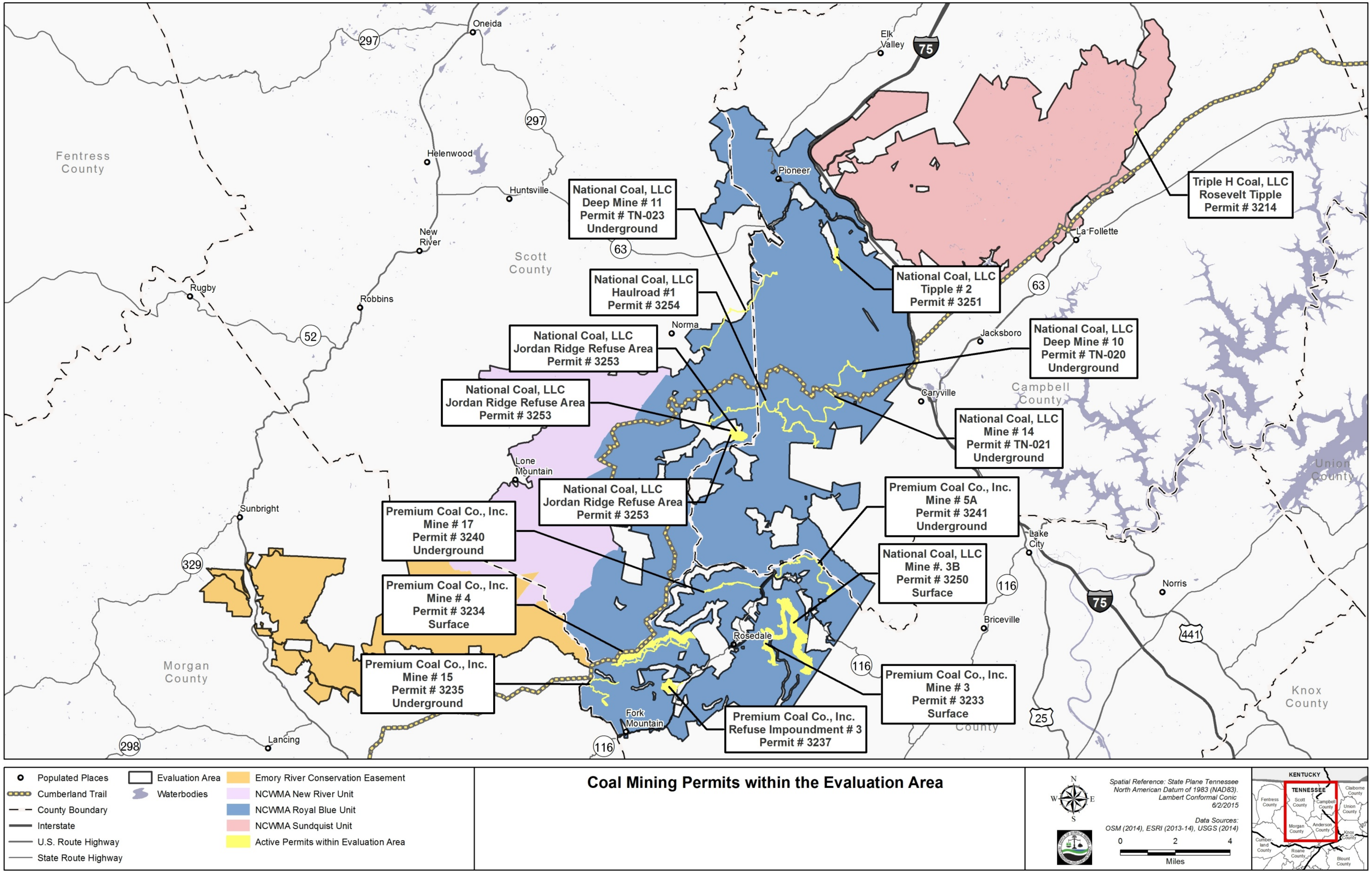


FIGURE 4-15: COAL MINING PERMITS WITHIN THE EVALUATION AREA

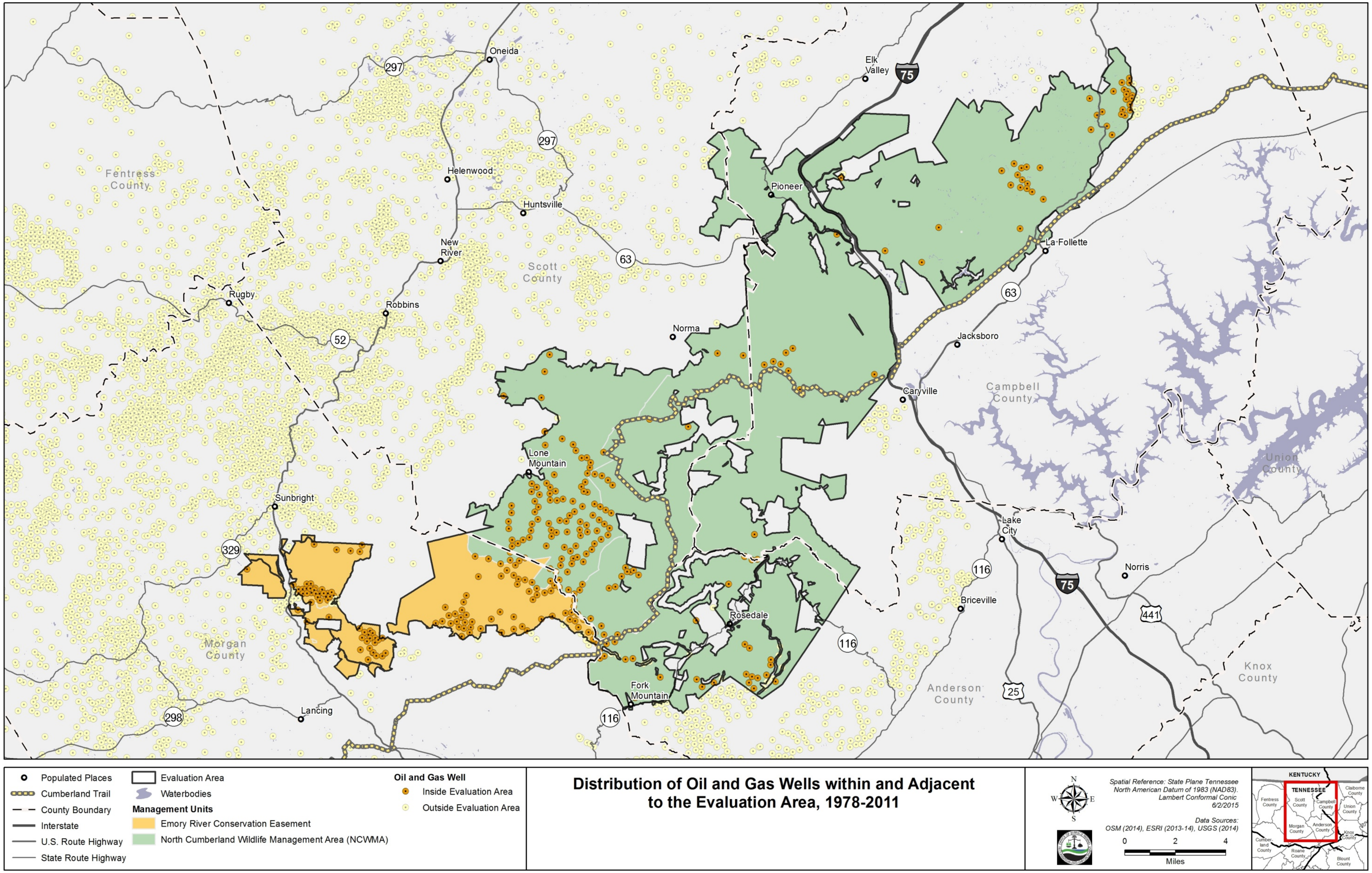


FIGURE 4-16: DISTRIBUTION OF OIL AND GAS WELLS WITHIN AND ADJACENT TO THE EVALUATION AREA, 1978–2011

Surface Use Plan for the Sundquist Wildlife Management Area

The Sundquist Wildlife Management Area includes two tracts of land cooperatively managed by TWRA, the Conservation Fund, and Harlac, Inc. and operated under a shared use agreement. The TWRA manages the surface rights of both tracts, which were purchased by the State in 2003. The two other partners own timber interests and underground mineral interests. Additionally, a linear portion of the area extending 184,800 feet by 300 feet (approximately 1,320 acres) was established by the State of Tennessee as the Cumberland Trail State Park in 1998. No official management plan is known to exist for this park; however, its development and management is a cooperative effort between various state agencies such as the Division of Tennessee State Parks, TDEC, TWRA, and the Cumberland Trail Conference of the Tennessee Trails Association (Friends of the Cumberland Trail 2014).

According to the mission statement of the surface use plan for the Sundquist Wildlife Management Area, the TWRA, as the surface owner, shall have the duty to manage and operate the surface for conservation and recreation. These stated conservation and recreation goals recognize and take into account the presence and continued existence of the other partners and their rights to the timber and underground minerals within the Sundquist Wildlife Management Area. "Conservation and recreation," according to the surface use plan, means that the surface property will be operated to (1) preclude development of the property for commercial, industrial, residential, and agricultural purposes; (2) sustain a natural hardwood forest using natural forestry and sustainable forest management practices, which will conserve biological diversity and provide habitat for native plant and animal species; (3) maintain and improve watershed quality over time by prohibiting development and using best management practices during logging and road building activities; and (4) provide public recreational opportunities including hiking of the Cumberland Trail, hunting, fishing, wildlife viewing, and other activities (TWRA 1992).

Surface Use Plan for the Royal Blue Wildlife Management Area

The Royal Blue Wildlife Management Area adjoins the Sundquist Wildlife Management Area to the southwest. The State of Tennessee owns the surface rights as well as the timber and oil rights on the Royal Blue Wildlife Management Area, while he TVA owns the mineral rights. Together, the Royal Blue Wildlife Management Area and the Sundquist Wildlife Management Area form a continuous tract of land covering approximately 120,000 acres, which is managed by the TWRA.

The TWRA published a draft operational plan dated April, 1992 for the Royal Blue Wildlife Management Area. The draft plan lists the goals and specific objectives for the resources within the Wildlife Management Area that are under TWRA management. Like the surface use plan for the Sundquist Wildlife Management Area, the operational use plan for the Royal Blue Wildlife Management Area centers around "conservation and recreation." The specific management goals of the TWRA under the Royal Blue Wildlife Management Area are to

- improve the quality and quantity of wildlife
- improve the quality and quantity of timber within the concepts of sound wildlife management
- provide the opportunity for wildlife enjoyment through hunting, fishing, viewing, etc.
- provide for plant and animal restoration
- maintain and/or improve water quality and increase recreational opportunity
- maintain and/or improve soil productivity
- provide for compatible forms of non-wildlife associated recreation

- coordinate management activities with surrounding land use
- provide the opportunity for scientific research and demonstration projects
- protect and manage threatened and endangered flora and fauna
- protect unique geological, archaeological, and historic areas
- provide that the extraction of nonrenewable resources and site reclamation is performed in an environmentally sound manner (TWRA 1992)

Other Management Plans

Other state plans set goals for lands within and surrounding the evaluation area. Since the purpose of these plans is to set statewide management policies and goals, they can inform management efforts in the area but are general in nature. These plans include the Tennessee Wildlife Resources Agency Strategic Plan 2014–2020 (TWRA 2014), Tennessee’s Comprehensive Wildlife Conservation Strategy (TWRA 2005), the Tennessee State Recreation Plan (TDEC 2009), and the Tennessee Greenways and Trails Plan (TDEC 2008).

Recreation

This section provides an overview of the recreational resources within the NCWMA and ERTCE (the evaluation area), as well as the surrounding region. The “Socioeconomics and Environmental Justice” section contains information on the contributions of recreational use to the local economy.

Local residents as well as visitors travel to various outdoor recreational sites in and around the evaluation area for visual, cultural, and natural amenities. Several public and private sector facilities meet this recreational demand, though public lands managed by state agencies are the most extensive resource available for recreational opportunities in the area. Approximately 185,328 total acres of public land within and surrounding the evaluation area offer visitors the opportunity to participate in numerous recreational activities. More than 91,200 acres of privately owned recreation areas provide visitors with the opportunity to participate in many of the same activities as those at state parks, wildlife management areas, and recreational areas. Figure 4-17 shows the evaluation area along with surrounding public and private recreational resources.

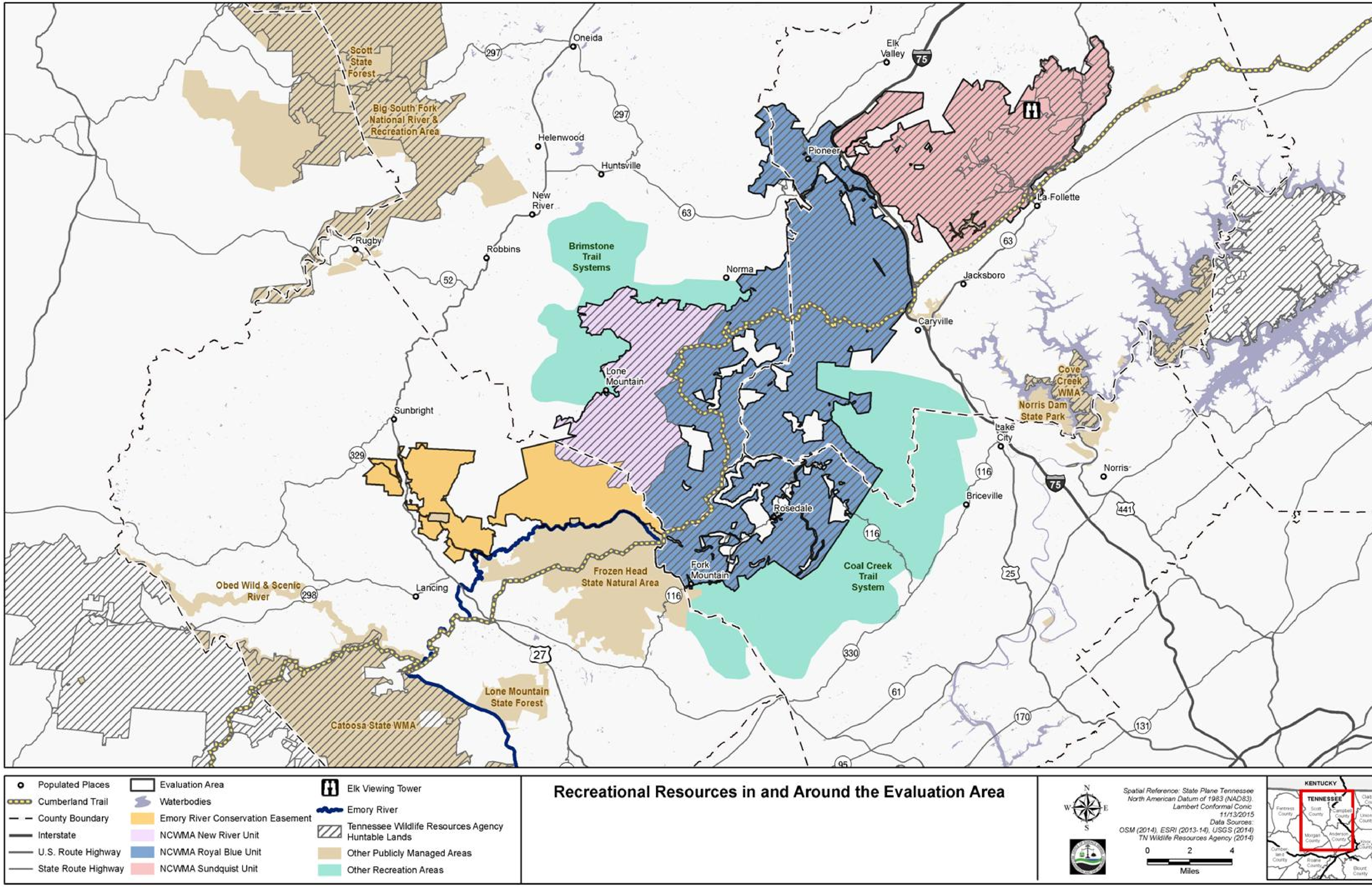


FIGURE 4-17: RECREATIONAL RESOURCES IN AND AROUND THE EVALUATION AREA

Public Lands

Public lands managed by state agencies constitute the most extensive resource available for recreation in and surrounding the evaluation area. These lands include the evaluation area itself, in addition to three state parks.

Cave Branch Trailhead of the Cumberland Trail

Within the evaluation area boundaries, approximately 1,300 acres are part of the Cumberland Trail State Park. This park is Tennessee’s only linear state park, and when completed it will include an estimated 300 miles of trail connecting Signal Point in Chattanooga, Tennessee, with Cumberland Gap National Historic Park in Middlesboro, Kentucky (Tennessee State Parks 2011). Much of the state park within the evaluation area has already been constructed (Cumberland Trail Conference 2014). The trail enters public lands at the western edge of Frozen Head State Park and extends in a northeasterly direction for approximately 50 miles through the park and the NCWMA before exiting the evaluation area roughly 2 miles northeast of LaFollette, Tennessee.

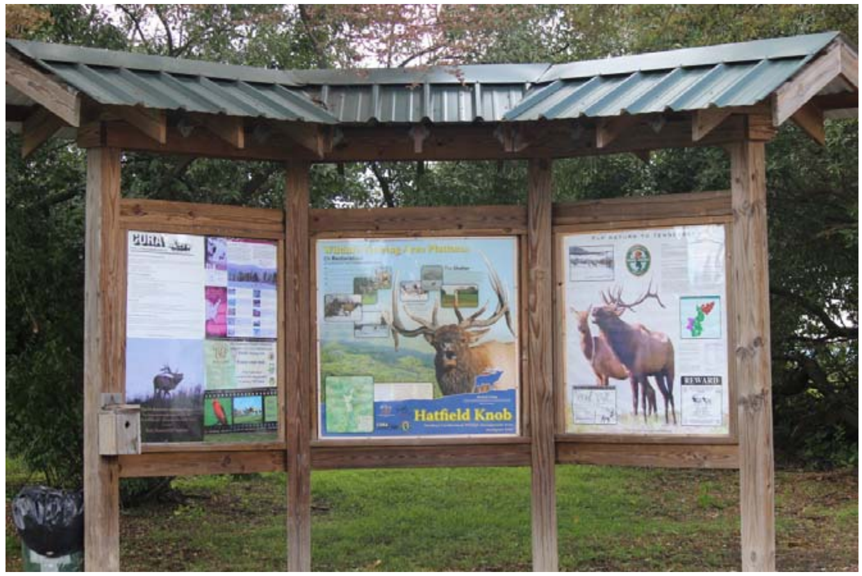
Frozen Head State Park and Natural Area adjoins the southern boundary of the evaluation area. The park includes more than 24,000 acres of wilderness area (Tennessee State Parks 2014a). Cove Lake State Park covers 717 acres in Caryville, Tennessee, along the eastern boundary of the evaluation area. Cove Lake State Park provides more developed visitor amenities than the other public lands in the evaluation area (Tennessee State Parks 2014b).

Public lands managed by state agencies provide visitors the opportunity to participate in a wide variety of recreational activities, including off-highway vehicle touring, camping, fishing, hiking, horseback riding, hunting, and wildlife viewing. A discussion of the recreational activities prevalent on each of the principal recreational resource areas follows.

North Cumberland Wildlife Management Area: Recreational activities enjoyed in the NCWMA include hunting, trapping, fishing, wildlife viewing, off-highway vehicle use, horseback riding, mountain biking, camping, hiking, rock climbing, swimming, auto touring, and range shooting.

Large and small game hunting is permitted in season anywhere within the NCWMA, provided hunters have the appropriate state licenses and wildlife management area permits. Trapping in season is also permitted anywhere within the boundaries of the wildlife management area with the proper state license

(TWRA 2015d). Fishing is allowed in the larger streams within the NCWMA and requires a valid state fishing license.



Elk Interpretative Display

People can view wildlife throughout the NCWMA. The only designated area for this activity is the Hatfield Knob elk viewing tower on the Sundquist Unit, 4 miles north of LaFollette, Tennessee.

Horseback riding, mountain biking, and off-highway vehicle use are allowed throughout the NCWMA. Vehicles are only allowed on designated roads and trails. A special use permit must be purchased for these activities. Youth under 13 years of age and individuals holding a valid annual or permanent hunting license are exempt from the requirement to purchase a special use permit (TWRA 2014a). Off-highway vehicle use in the area is relatively high. Very little horseback riding or mountain biking take place in the wildlife management area, since horses and off-highway vehicle use do not coexist well (TWRA 2015d).

Camping is permitted anywhere within the NCWMA; there are no designated camping areas. Camping is primitive and no facilities are provided. Hiking is allowed anywhere within the wildlife management area, although the only area specifically identified as a hiking trail is Cumberland Trail State Park. Rock climbing is allowed anywhere within the NCWMA where rock formations protrude. The only frequently used climbing area is on the east side of Pine Mountain between Interstate 75 and Stinking Creek (TWRA 2015d).

Swimming is permitted anywhere within the NCWMA stream system where flow and streambed morphology allow. There are no designated or maintained swimming areas within the area. Any swimming is generally by local residents in their favorite family swimming area (TWRA 2015d).

Auto touring takes place along many of the principal roads passing through the evaluation area. The primary roads in the vicinity that lend themselves to this activity are sections of State Highway 116, 25W, and 63, as well as Stinking Creek Road. An 8.5-mile section of State Highway 63, designated a state scenic highway, passes through the wildlife management area. Additionally, a shooting range is on the Sundquist Unit approximately 5 miles north of Caryville, Tennessee.

Emory River Tracts Conservation Easement: Visitors to the Emory River Tracts portion of the evaluation area participate in many of the same recreational activities as visitors to other portions of the evaluation area. The exception is all-terrain and off-highway vehicle use, which can take place on existing roads within the easement tracts only in association with hunting. Recreational all-terrain and off-highway vehicle use is otherwise prohibited. Hunting in season is permitted on the easement with the proper state licenses. Likewise, fishing is allowed in the Emory River and its tributaries with a valid state license.

Camping is allowed anywhere within the Emory River Tracts; all camping is primitive, and there are no developed sites. Hiking, recreational horseback riding, and cross-country skiing are allowed anywhere on the easement tracts. Wildlife viewing and sightseeing can occur anywhere within the easement. There are no specifically designated areas within the easement tracts for wildlife viewing and sightseeing. Similar to the NCWMA, swimming is allowed anywhere within the easement tracts stream system where flow and streambed morphology are appropriate; however, there are no designated or maintained swimming areas.

Three state parks surrounding the evaluation area offer a wide array of recreational activities. Information for each of the parks follows.

Frozen Head State Park: With a valid state license, fishing is allowed in Flat Fork Creek from DeBord Waterfall to the park entrance and in the Emory River portion of the park. The sections of Flat Fork Creek within the park are stocked with rainbow trout each spring; a trout stamp is required. Hunting in season with the proper state licenses is allowed on portions of the recently acquired Emory River property, but is not permitted in any other parts of the park.

There are more than 80 miles of hiking trails in the park. Cumberland Trail State Park passes through the park. Camping is allowed in developed and primitive backcountry sites, with 36 developed sites and 11 backcountry sites designated within the park. Camping is allowed in the recently acquired Emory River portion of the park, but this area has no designated campsites.

Mountain biking is allowed on the 6.9-mile Lookout Tower Trail/Jeep Road Trail. Recreational horseback riding is allowed on the same road, and on the “Old Tipple Site” road (Road # 5). Horseback riding is allowed in association with hunting on the Emory River property. Use of all-terrain and off-highway vehicles is allowed only on existing roads in the Emory River property, and only in association with hunting. Recreational all-terrain and off-highway vehicle use is prohibited.

People can view wildlife throughout the park, although there are no specifically designated areas for wildlife viewing. Likewise, swimming is allowed anywhere within the park stream system where flow and streambed morphology allow, but no designated or maintained swimming areas exist within the park. Other recreational opportunities available at Frozen Head State Park include picnicking, which occurs at 32 picnic sites and three group shelters; two playgrounds; two volleyball courts; a basketball court; and horseshoe pits (Tennessee State Parks 2014a).

Cove Lake State Park: Cove Lake State Park offers similar recreational opportunities to those available on other publicly managed lands in and surrounding the evaluation area, but also offers more developed recreational facilities and therefore a slightly different recreational experience. Fishing is allowed year-round on 210-acre Cove Lake with a valid state license, although no stocking currently occurs in the park Hiking is allowed on a 3.5-mile paved hiking and biking trail. Biking is also allowed on the 3.5-mile paved hiking trail but there are no unpaved trails for mountain biking. Camping may take place on 100 developed sites in the park, but no backcountry camping is allowed. People can view wildlife in the park, but there are no designated wildlife viewing areas within the park.

Other recreational opportunities include rowboats and pedal boats, which are available for rent on Cove Lake. No personally owned boats are allowed. Swimming is permitted in the park swimming pool, but is not allowed in Cove Lake. Picnicking occurs in the park at the 112 picnic sites, six outdoor group shelters, and one indoor pavilion. In addition, the park offers playgrounds, volleyball courts, horseshoes, badminton, shuffleboard, table tennis, and tennis courts (Tennessee State Parks 2014b).

Cumberland Trail State Park: Hiking is the principal recreational use associated with the Cumberland Trail State Park. Within and surrounding the evaluation area, camping occurs along the trail under the requirements of the NCWMA and Frozen Head State Park. With a valid state license, fishing is allowed at any point where the trail crosses a stream and stream flow and streambed morphology are conducive to fishing. People can view wildlife anywhere along the length of the park, but there are no areas specifically designated for wildlife viewing (Tennessee State Parks 2011).

For the past five years (2009–2014), the Cumberland Trail 50-kilometer race has been held here. The racecourse is approximately 31 miles long and is located largely within the evaluation area or Cove Lake State Park.

Private Lands

Although public lands make up the majority of lands available for recreation in the region surrounding the evaluation area, recreational activities also take place on privately owned lands adjacent to the evaluation area. The Coal Creek Off-Highway Vehicle Area, Brimstone Recreation Area, and the Ride Royal Blue facilities represent the principal privately owned recreational opportunities in the region surrounding the evaluation area. The Coal Creek properties adjoin the southeastern boundary of the NCWMA and extend from Oliver Springs, Tennessee to Rocky Top, Tennessee. At approximately 72,000 acres, the Coal Creek Off-Highway Vehicle Area is the largest of the privately owned recreational properties (East Tennessee River Valley Geotourism 2014). The Brimstone Recreation properties include slightly fewer than 19,200 acres along the northwest boundary of the NCWMA, approximately 2 miles south of Huntsville, Tennessee (Brimstone Recreation Area 2014). The Ride Royal Blue facilities are located on Stinking Creek along the northern boundary of the NCWMA, about 7 miles northwest of LaFollette, Tennessee. Both Coal Creek and Ride Royal Blue provide guest accommodations for off-highway vehicle riders. More importantly, the Ride Royal Blue facilities provide access to trails within the Royal Blue Unit of the NCWMA, rather than offering a privately owned trail system (Ride Royal Blue 2014).

Private lands provide a significant component of the recreational resource in the vicinity surrounding the evaluation area. Similar to public lands, private lands provide the opportunity for visitors to participate in a wide variety of recreational activities including off-highway vehicle touring, camping, fishing, hiking, horseback riding, hunting, wildlife viewing, and many other activities. The recreational activities for each of the principal private recreational areas are accessible to anyone possessing a valid permit from the landowner and are discussed below.

Coal Creek Off-Highway Vehicle Area: The primary feature of this area is its network of more than 250 miles of trails. Camping is also available at the Coal Creek 259-acre campground, which provides 39 RV campsites, 10 rental cabins, and 25 primitive campsites. In addition, mountain biking is allowed on a designated 25-mile mountain bike trail (East Tennessee River Valley Geotourism 2014).

Brimstone Recreation Area: Visitors to the Brimstone Recreation Area are largely off-highway vehicle enthusiasts who use this 300-mile trail network, but visitors also participate in a number of other recreational activities. Both large game and small game hunting occurs on the Brimstone property. Hunting in season can generally occur anywhere on the property providing the hunter has the appropriate state licenses. Fishing can take place in the larger streams on the Brimstone property with a valid state fishing license. Hiking, horseback riding, and mountain biking are also generally allowed anywhere on the Brimstone trail system. Camping is permitted at the adjacent Trails End campground and another adjacent private campground. Tent camping, RV camping, and cabins/RVs are available for rent; some primitive backcountry camping is also possible (Brimstone Recreation Area 2014).

Ride Royal Blue: The Ride Royal Blue facilities are immediately adjacent to the Royal Blue Unit of the NCWMA and serve as a jump-off point for many off-road vehicle enthusiasts using the area. Camping is allowed at the Ride Royal Blue campground, which has 31 RV campsites and an unknown number of developed and primitive tent sites. Ride Royal Blue facilities also include 32 rental cabins, several picnic shelters, a small log country church for religious and wedding ceremonies, and a lodge and restaurant (Ride Royal Blue 2014).

WILD AND SCENIC RIVERS

The NPS administers the Obed Wild and Scenic River, the only stream in Tennessee designated as part of the National Wild and Scenic Rivers System. The Obed Wild and Scenic River encompasses 45.3 stream miles, including approximately 1.3 miles of the Emory River at its confluence with the Obed River. Approximately 43.3 miles of the Obed Wild and Scenic River is classified as "wild," with the remaining 2 miles classified as "scenic" (National Wild and Scenic Rivers System 2014). The river, and the land within the boundaries of its corridor, is popular for whitewater canoeing and kayaking, rock climbing, fishing, and hunting (NPS n.d.b). The headwaters of the Emory River originate within the evaluation area. The Emory River eventually flows into the Obed Wild and Scenic River system, located slightly more than 10 miles from the evaluation area at its closest point. Whereas the New River drains into the Big South Fork National River and Recreation Area approximately 20 miles downstream from the evaluation area.

Emory River Section of Obed Wild and Scenic River

Nationwide Rivers Inventory

The Nationwide Rivers Inventory is a national listing of river segments that are potentially eligible for designation as wild and scenic. The Nationwide Rivers Inventory may list a river segment if it is free flowing and has one or more "outstandingly remarkable values" including: exceptional scenery, fishing or boating, unusual geological formations, rare plant and animal life, and cultural or historical artifacts that are of more than local or regional significance. A 1979 presidential directive requires agencies to consult with the NPS Trails and Conservation Assistance Program before taking any action that could effectively foreclose wild, scenic, or recreational river status on rivers in the inventory (NPS 2014b). The Nationwide Rivers Inventory lists the Emory River, from its headwaters in Frozen Head State Park to the Roane County line over 33 miles downstream. Much of the headwaters area of the Emory River is within or immediately adjacent to the evaluation area. Rock Creek, also listed on the Nationwide Rivers Inventory in Scott and Morgan Counties, passes within 0.7 miles to the south-southwest of the ERTCE at its closest point. The headwaters of Stinking Creek, another Nationwide Rivers Inventory stream, are within the evaluation area, and the river flows to the northeast out of the northern portion of the evaluation area. While only the headwaters lie within the evaluation area itself, downstream portions of Stinking Creek are surrounded by the evaluation area (NPS 2014c).

AESTHETICS

Aesthetics typically refers to facets of the environment that are pleasing to the senses. This section describes the existing conditions of visual resources or scenic quality and the soundscape of the evaluation area.

VISUAL RESOURCES

In general, high scenic quality is a product of extraordinary topography, geology, and cultural history. Scenically diverse vistas, canyon riverways, rare and unusual geological formations, coastal ecology, unique viewsheds, and cultural manifestations all contribute to the high visual quality of individual areas. Visitor interest in and public concern for visual resources in a particular area, the degree of public visibility of an area, the level of use of an area by the public, and the type of visitor use that an area receives all play a part in the visual quality of a particular area.

The scenic quality within the NCWMA, located almost entirely within the Cumberland Mountains, is similar to other watersheds in the Tennessee Cumberland Mountains. The aesthetic character of the area appears relatively natural. However, considerable portions of the aesthetic character are derived from past land use practices. Some of the reclaimed strip and deep mines resulted in a disturbed, forest-covered, mountainous terrain (TWRA 1992). The views within this area are common to the Cumberland Mountains where coal mining, timber logging, and oil and gas well production routinely occurred.

The US Department of Agriculture Handbook 701 defines a system for the inventory and analysis of the aesthetic values of National Forest lands to establish resource goals and objectives, monitor scenic resources, and manage scenery in ecosystems. The OSMRE uses some elements of the handbook as reference to characterize the visual components of the evaluation area. These elements include scenic attractiveness, distance zones, sensitivity/concern levels, scenic class, and scenic integrity (USDA 1995).

Scenic View of the Evaluation Area

Scenic Attractiveness: The evaluation area has features that are typical of the eastern Tennessee Cumberland Mountains, including vistas predominated by lushly vegetated mountains and valleys. These areas are beautiful but not pristine; the scenic quality of these features has been impacted by many past and current human activities. The evaluation area contains no unique landforms or features that would draw national recognition like features preserved within the national park system. The evaluation area is highly scenic but in a more subdued way, with landform features of a smaller scale and grandeur. Landform features identified by the Cumberland Trail State Park and within the evaluation area include two waterfalls (Adkins Branch and Duncan Branch), one spring (Tank Springs), one rock formation (Overhang Rock), and six highpoints (Bear Knob, Cross Highpoint, Gibson Knob, Guinea Hill Knob, Lick Creek Mountain, and Salting Knob). Landform features within the evaluation area includes nine waterfalls (Asher Branch, Hickory Creek, Jennings Creek, Meadow Creek, Rock Creek, Small Hollow, Thirteen Hollow, Waterfall Branch, and Wheeler Creek) and two rock formations (Cumberland Trail Rock Window and Titus Arch). Approximately half of the landform features fall within the 600-foot-wide ridgeline buffer zone petition area submitted by the State of Tennessee. Views of landscapes at most locations within the area have Class B (Typical) scenic attractiveness because they have generally positive, yet common, attributes of variety, unity, vividness, mystery, intactness, order, harmony, uniqueness, pattern, and balance. Some areas deemed Class C (Indistinctive) scenic attractiveness have low scenic qualities, lack any consequential water or rockforms, and have weak or missing attributes of the above scenic attractiveness elements.

Distance Zones: Approximately 94% of the evaluation area contains forest that restricts distance-viewing opportunities. Foreground distance views (up to 0.5 mile) are the only possible ones at most locations in this area due to thick tree canopy and steep, mountainous terrain. Middle ground distance views (0.5 mile to 4 miles) are possible from a few locations where trees have been removed such as coal mines, logged areas, and coal haul roads. Background distance views (4 miles to the horizon) are generally possible only at a few viewpoints at high elevations, such as mountaintops, many of which have been mined for coal.

Sensitivity/Concern Levels: Public sensitivity/concern levels, which consider the type of area and level of use as a joint measure of interest in scenery, estimate the degree of importance placed on landscapes viewed from travel ways and use areas. These levels are moderate to low for the evaluation area. The area does not contain highly developed, commercialized recreational use areas such as water recreation (beaches, boating, swimming, fishing, water skiing), visitor centers, developed campgrounds, primary resorts, or winter sports areas, highly sensitive communities, primary summer home tracts, primary geological areas, designated scenic areas, primary botanical or forest demonstration areas, or primary historical sites. Public use facilities do exist, however, indicating some public concern. These facilities include the TWRA NCWMA (hunting), the Cumberland Trail State Park (hiking, backpacking), and the TWRA Hatfield Knob Elk Viewing Tower (wildlife observation). Trail infrastructure provided by the Cumberland Trail State Park to promote public use within the NCWMA includes seven trailheads (at Adkins Branch Coal Road, Cave Branch Smoky Road, Cross Mountain Lot (Frenchmans Grave), Montgomery Creek, Norma Road, Smoky Mountain Top, and Tank Springs), six bridges, two primitive campsites (Montgomery Creek and Greens Branch), a shelter building, a parking lot, rock steps, kiosks, and signs. The Cumberland Trail 50-kilometer race uses trails within the evaluation area and has drawn runners from 10 states, but has a 100-runner limit.

Scenic Class—Evaluation of scenic attractiveness, with distance zones and sensitivity/concern levels of landscape, provides a series of values ranging from high to low. Most of the views in the NCWMA have a moderate scenic class.

Views of Development Impacts to the South of the Evaluation Area

Scenic Integrity: Many landscapes in the evaluation area have low scenic integrity due to reduced intactness or wholeness, causing these landscapes to appear moderately altered compared to natural scenery. These alterations include visible disruptions that bring about discordant relationships among scenic attributes. Features causing diminished scenic integrity include development impacts from coal mines, logging, roads, powerlines, and gas wells. These impacts can occur during daylight and nighttime hours, as mining operations can add light to an otherwise unimpacted night sky increasing in light pollution and obscuring natural night sky views. In some watersheds, landscapes have been heavily altered to extremely altered, resulting in diminished scenic integrity. Examples include watersheds with views of orphan coal mines containing abandoned highwalls, unreclaimed spoil piles and depressions, and unstable landslides.

Views inside the evaluation area are generally from various public use areas, such as hiking trails, trailheads, campgrounds, public roads, viewpoints, and public lands within the NCWMA. Views from these locations are common since the entire NCWMA is public use land accessible by approximately 1,171 miles of roads and trails within the area. A few locations, however, would allow visitors to observe the aesthetic qualities of the area unrestricted by tree canopy. In addition, even though approximately 42.2 miles of the Cumberland Trail transit part of the evaluation area and no restricted public access areas exist within this area, recreational opportunities for scenic viewing are limited to those areas accessible by foot or bike, such as hunting, bird watching, hiking, climbing, and mountain biking. The remote, isolated nature of the points with unrestricted scenic views and limited recreational activities allow only hardy visitors and those seeking solitude to experience the aesthetic qualities of the area. Due to the nature of recreational opportunities within the forest, the public cannot generally view the area except from the highest locations. In addition, general visibility is often reduced during the growing season, typically occurring between May and October. In periods when trees are void of leaves, visibility is increased and visitors do not have to use overlooks to view mountains, valleys, and steep terrain. At times during the winter, snow and ice cover mountain peaks, and upper trails are open to hiking and cross-country skiing, offering common views of the Cumberland Mountain watersheds.

Evidence of Past Coal Mining and Reclamation

Vistas from within the evaluation area are often not of natural woodland settings, but of previously mined areas with vegetation either planted during reclamation or populated by volunteer plant species though natural succession. Areas within and adjacent to the area exhibit numerous visible scars from surface coal mining practices prior to the Surface Mining Reclamation and Control Act. In some locations, past coal mining operations dominate the views, revealing exposed highwalls, spoil piles, barren slopes, and landslides. Orphan strip benches on multiple coal seam elevations are often visible. The evaluation area contains approximately 391 miles of unreclaimed highwalls and 17,455 acres of mining disturbance. The majority of the permitted coal mining areas has been reclaimed and differ in visual impact from unreclaimed orphan mine sites. Most recent reclaimed mining areas are open fields and grasslands; more mature reclamation (older than 15 years) is less recognizable to the layperson as a coal mining feature. Historic records indicate that approximately 72,000 acres (42%) of the evaluation area have been logged, although the entire area has likely been logged at some point in time. Most coal mining and logging disturbances, however, are generally visible only from the highest elevations in the evaluation area during leaf-off conditions, from a recently logged area, or from the margins of a coal haul road.

SOUNDSCAPES

Natural soundscapes exist in the absence of human-caused sound. The natural soundscape is the aggregate of all the natural sounds that occur in the environment, together with the physical capacity for transmitting natural sounds. Natural sounds are intrinsic elements of the environment. Natural sounds are necessary for ecological functioning and occur within and beyond the range of sounds that humans can perceive. Many mammals, insects, and birds decipher sounds to find desirable habitat and mates, avoid predators and protect young, establish territories, and to meet other survival needs. In addition, recreationalists often seek out areas that lack the noises of society.

Sound is caused by vibrations that generate waves of minute air pressure fluctuations in the air. The number of pressure fluctuations per second (referred to as frequency) is reported as cycles per second or Hertz (Hz). Air pressure fluctuations that occur from 20 to 20,000 times per second can be detected as audible sound by humans.

The magnitude of sound, also referred to as noise, is described by its pressure. Because the range of pressure varies greatly, the logarithmic scale decibel (dB) is used to relate measured pressure to a reference pressure. Pressures described in decibels are often defined in terms of frequency-weighted scales. In community noise management, airborne sound level measurements are usually expressed as an A-weighted average energy value over a specified time interval. A-weighting provides a method of summing sound energy across the audible spectrum in a way that approximates human judgments of loudness, in other words, how loud people would perceive a sound to be. Sound levels expressed in A-weighted decibels are indicated with the abbreviation “dBA.”

Key soundscape terms used in this section include the following:

- **Existing Ambient Sound Level (L_{50})**: All sounds in a given area, including natural, mechanical, electrical, and other human-caused sounds. L_{50} is the same as the median; the middle value where half the sound levels are above and half below.
- **Background Ambient Sound Level (L_{90})**: The sound level that is exceeded for 90% of time, and is a measure of the background or residual sound levels in the absence of recurring noise events.
- **Maximum Sound Level (L_{max})**: The maximum instantaneous sound level during the analysis period.
- **Equivalent Sound Level (L_{eq})**: This term refers to the logarithmic average (i.e., on an energy basis) of pressure levels over a specific period. "Energy averaged" sound levels are generally much higher than arithmetic averages because they are logarithmic values. Typically, L_{eq} values are calculated for a specific period (e.g., 1-hour and 12-hour periods); L_{eq} values are computed from all the 1-second L_{eq} values for the specific period. L_{eq} must be used carefully in quantifying sound levels because occasional loud sound events may heavily influence/increase the L_{eq} value, even though sound levels for that period are typically lower.
- **Audibility**: Audibility is the ability of animals with normal hearing (including humans) to hear a given sound. The main factors that affect audibility are the hearing ability of the animal, other simultaneous interfering sounds or stimuli, and the frequency content and amplitude of the sound.

Table 4-25 provides an overview of mining noise, non-mining noise sources common in the evaluation area, as well as examples of other familiar noise sources. The sources specific to the evaluation area are shown in bold. The table also indicates the effect of each sound level on humans.

Potential sources of noise from coal mining sites that may affect the evaluation area include active coal preparation facilities, blasting, additional traffic such as coal trucks and heavy equipment associated with active mining, active coal removal from both surface and underground mining operations, underground mining ventilation systems, and other activities necessary for commercial and private coal removal. The OSMRE assessed the potential acoustic impacts active surface coal mining may have on wildlife habitat within the evaluation area and adjacent areas, including the NCWMA and the ERTCE (hereafter referred to as the evaluation area; Ambrose et al. 2012). The OSMRE collected and analyzed three sets of data to establish a baseline soundscape for the evaluation area, including sounds of other resource extractions (e.g., logging operations, oil and gas production), sounds of other human activities in or near the area, and sounds of two active coal mines within the evaluation area.

Posted Blasting Warning Sign

Currently regulations do not control the noise levels from all coal removal activities. However, federal and state regulations control noise and prevent personal injury or property damage during blasting operations (2010 Tennessee Code Title 68; TN DOC 1999). Blasting is likely to occur during both surface and underground mining operations. The Code of Federal Regulations specifies both minimum frequencies and maximum intensities (audibility) to control the adverse effects of blasting. The regulations provide airblast standards that limit the flat frequency response to 200 Hz, specifying the maximum sound intensity (L_{max}) level to correspond to specific frequencies (30 CFR § 816.67).

TABLE 4-25: DECIBEL LEVELS OF COMMON SOUND SOURCES IN COMPARISON TO MINING SOUNDS

Sound	Noise Level (dBA)	Effect
Shotgun firing, jet takeoff (at 100–200 feet)	130	Painful
Turbo-prop at 200 feet, rock concert	110-140	Threshold of pain begins around 125 dB
Thunderclap (near)	120	Threshold of sensation begins
Chainsaw, jackhammer	110	Regular exposure to sound over 100 dB of more than one minute risks permanent hearing loss
Jet flyover (1,000 feet)	103	
Electric furnace, garbage truck, cement mixer	100	No more than 15 minutes of unprotected exposure recommended for sounds between 90–100 dB
Large Coal Mine at 50 feet (National Coal mine) (Ambrose et al. 2012)	91.1	80 dB or higher is annoying, interferes with conversation, constant exposure may cause damage 85 dB is the level at which hearing damage (8 hrs) begins The National Institute for Occupational Safety and Health recommends hearing protection for long-term exposure at this level
Lawnmower/nearby thunder Subway, motorcycle (at 25 feet)	85-90	
Diesel truck (40 mph at 50 feet)	84	
Highway at 70 mph (50 feet)	76.8	
Small Coal Mine at 50 feet (Triple H mine) (Ambrose et al. 2012)	76.7	
Logging operation at 50 feet	75.5	
Dishwasher, washing machine	75-78	Interferes with telephone conversation
Off-road vehicle (25 mph)	69.7	
Highway (45–55 mph) at 50 feet	60.8	Noise at 60 dB interferes with open air conversation
Croaking raven (100 feet), conversation	50–65	
Quiet Office	50–60	
Refrigerator humming	40	Recommended background levels in schoolrooms and bedrooms is 35 dBA
Natural ambient (L_{90}) from evaluation area monitoring data	34	
Rustling leaves	20	Desired background level in a recording studio
Normal breathing	10	
Lowest ambient sound levels in pristine backcountry areas	0	Approximate threshold of human hearing at 1 kHz

Table adapted from the National Institute on Deafness and Other Communicative Disorders at http://www.nidcd.nih.gov/health/education/teachers/pages/common_sounds.aspx.

Many noise impact assessments collect baseline data during summer and winter. The OSMRE baseline data, however, were collected during the winter only, at seven locations between October 29 and November 27, 2011. The winter season provided the researchers the opportunity to collect ambient noise data during the quietest time of year. This will allow for the most conservative estimate of impacts when potential mining-related noise impacts are considered during the analysis of alternatives because the analysis will be based on the quietest possible current conditions. Table 4-26 lists the data collected for the existing ambient (L_{50}), background ambient (L_{90}), and energy-averaged (L_{eq}) sound levels for three periods.

TABLE 4-26: Background Ambient (L_{90}), Existing Ambient (L_{50}), and Energy-Averaged (L_{eq}) Sound Levels in the Evaluation Area

	Ambient sound levels (dBA)		
Time period	L_{90}	L_{50}	L_{eq}
0000–2400	34.3	38.4	41.5
0800–1600	34.5	39.4	42.8
1600–0800	34.2	37.7	40.6

Source: Ambrose et al. 2012.

Note: 0–2400 for full day; 0800–1600 for typical workday; 1600–0800 for non-working hours.

Sound levels generated by National Coal (identified as the large surface coal mine) are high at close range (about 91.1 dBA at 50 feet) compared to ambient baseline levels (L_{eq}= 42.8 dBA). The sounds transmitted from the mine may be blocked by the topography, which shields areas removed from the operation but can intensify sound levels within close range of the mine. Noise levels generally diminish further away from an active mine. Acoustically, a large coal mine may be much louder than other sources, but the area of impact is much smaller due to terrain and shielding of noise. Ground cover type and tree cover also can help attenuate noise, with greater attenuation occurring with the transmission of sound across acoustically "soft" surfaces such as a vegetated area, in comparison to acoustically "hard" surfaces such as pavement or water that reflect a greater portion of sound energy.

Table 4-27 provides an estimate of the total acreage that experienced elevated (above background) sound levels. This estimate was developed through the noise modeling software Soundplan. The software assisted researchers in measuring the current noise impact of two operational mines in the evaluation area. The computer model used for this work is a "ray-trace" model which conceptually treats acoustic sources as points, lines or areas in which "rays" emanate from these sources that approximate the path of sound waves. The model has the capability of predicting sound levels generated by point sources (generator or a material conveyor belt for example) or line sources (roadways for example) and area sources (a large area where many sources of sound are present, both stationary and moving). The model estimates the magnitude of the sound energy produced by the sources and then predicts the attenuation of the sound as it travels through the air and reaches a point receiver (such as a residential home), or in a grid fashion to compute contours (for example, all areas >55 dBA) (Ambrose et al. 2012).

TABLE 4-27: SOUND SOURCE AND AREA OF IMPACT (ACRES)

dBA contour	Large coal mine (acres impacted)	Small coal mine, logging operation (acres impacted)	Interstate 75 (acres impacted)
40 dBA*	4,260	407	14,392
45 dBA	2,392	190	8,450
50 dBA	695	91	5,038
55 dBA	268	44	2,272

Source: Ambrose et al. 2012.

* 40 dBA represents existing ambient sound level +1 dBA.

The sound levels indicate that the modeled coal mining operations have a smaller impact area than Interstate 75 (Ambrose et al. 2012). See figure 4-18 for a comparison of the area of impacts from different sources.

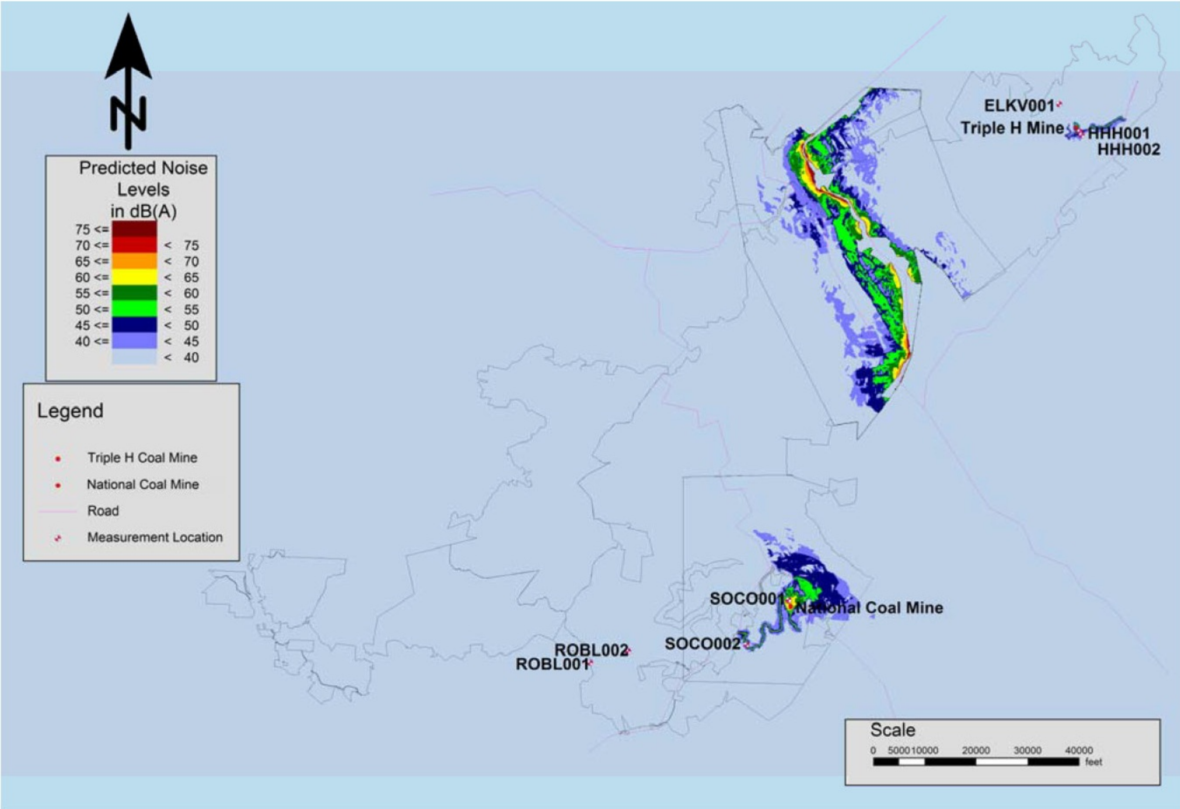


FIGURE 4-18: PREDICTED NOISE LEVELS AND ASSOCIATED IMPACT AREAS OF MINE SITES WITHIN THE EVALUATION AREA

Figure 4-18 depicts the four levels of acoustic impact for both existing surface mines sites within the boundary of the evaluation area. It shows the area of impact for those areas where the noise levels are >40 dBA, >45 dBA, >50 dBA, and >55 dBA. The >40 dBA represents any areas above the existing ambient level (39 dBA +1). Based on the model, noise from the large surface mine, using a criterion of >55 dBA as reference, affects an area of about 268 acres from the center of the mine. The affected acreage in table 4-27 could roughly be applied to other locations within the evaluation area, but terrain will influence the size and shape of the predicted impact area.

Figure 4-19 provides a more detailed examination of the National Coal mining operation and associated modeled impact area.

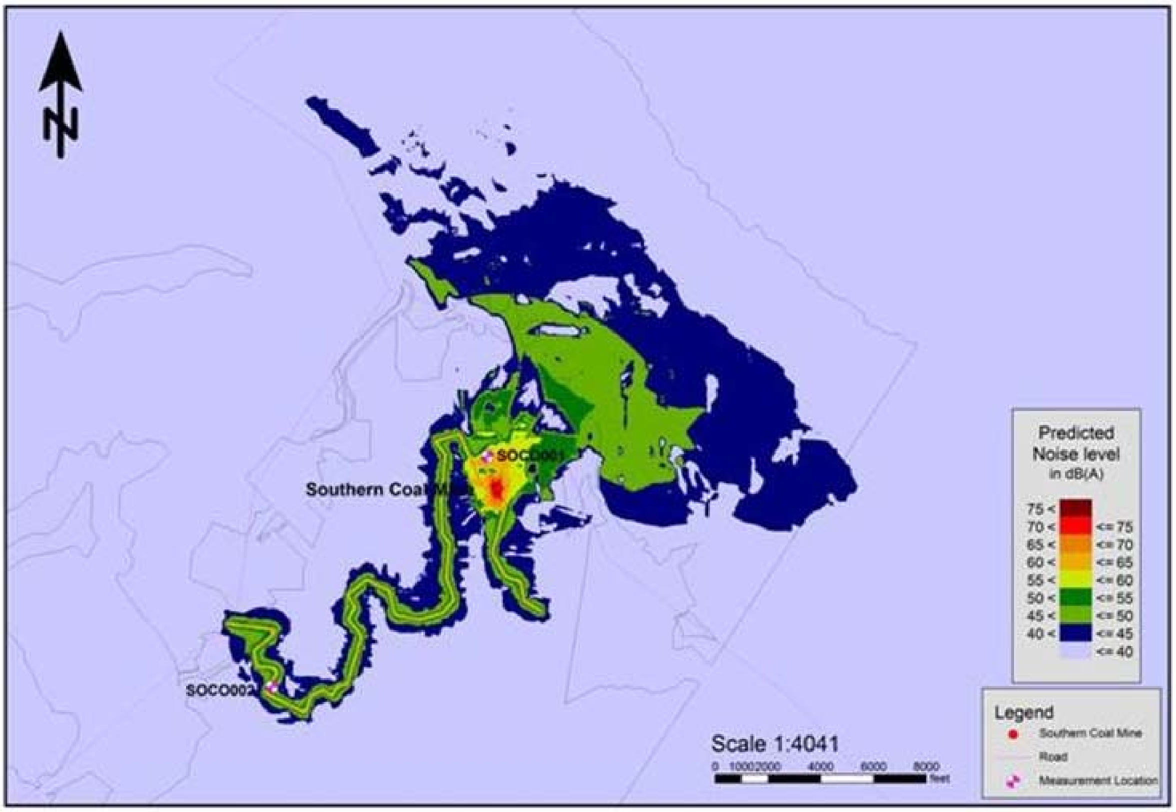


FIGURE 4-19: PREDICTED NOISE LEVELS (DBA) FROM THE NATIONAL COAL SITE IN THE EVALUATION AREA

The analysis did not include sound levels from other human activities in the area such as hiking, fishing, hunting, and mountain biking. However, it did include sounds from logging, other roads, and highways. For a typical logging operation, mean sound levels were similar to those of the small coal mining operation (range 73.6–80.6 dBA). Sound levels for roads and highways were computed using traffic count data from the State of Tennessee and the Traffic Noise Model from the Federal Highway Administration and the applicable speed limits for each roadway. Using 2010 data, the calculated noise ranged from 54.6 to 76.3 dBA for estimated sound levels at 50 feet. Because vehicle travel was infrequent and intermittent for many of the roads in and around the evaluation area, vehicles do not contribute significantly to acoustic conditions within the evaluation area.

OSMRE research suggests that responses to human-caused sounds are extremely variable; likewise, the responses to sound may also vary among animal species. For a given environment, assigning a single reference decibel to characterize sound impacts on humans and wildlife remains impossible. Despite this, a standard of >55 dBA was chosen as the level above which annoyance and interference with human outdoor activities occurs (EPA 1974). Understanding how and at what levels human-caused sounds affect animals also remains unknown. Generally, the literature suggests that intermittent human-caused sounds under 40–45 dBA do not significantly affect wildlife species. Chronic (near-continuous) noise over 45 dBA appears to disturb some species, but not others. For both humans and animals, some sounds are more tolerable than others; tolerance levels appear to be a function of many variables. Refer to “Chapter 6: Environmental Consequences” for a detailed discussion of the rationale for the selected thresholds of 55 dBA for human annoyance and 45 dBA for wildlife disturbance.

SOCIOECONOMICS AND ENVIRONMENTAL JUSTICE

The socioeconomic affected environment provides a summary of the demographic, economic, and fiscal resources, and public services and services within the evaluation area. Additionally, this section describes timber and logging and oil and gas activities, and summarizes recreation and visitor spending, and its economic contribution to the region.

In general, the socioeconomic affected environmental includes data and information on Anderson, Campbell, Morgan, and Scott Counties, which is called the four-county area. A smaller geography defined by census tracts comprising or adjacent to the evaluation area or with proximate communities to the evaluation area that could be potentially affected by the alternatives is also included, as data is available. Nineteen census tracts were identified based on the following approach (see figure 4-20):

- Criterion 1: Census tracts that intersect and/or are immediately adjacent to the evaluation boundary.
- Criterion 2: Census tracts in proximity to the evaluation boundary that fill geographic gaps associated with the criteria 1 census tracts.
- Criterion 3: Select census tracts in proximity to the evaluation boundary that comprise communities that are most likely to be affected by the plan alternatives.

Socioeconomic data were gathered from various sources, including the US Census Bureau; US Bureau of Labor Statistics; US Energy Information Administration; the Tennessee Advisory Commission on Intergovernmental Relations; the East Tennessee Development District (ETDD); the Tennessee State Data Center and other state agencies; and Anderson, Campbell, Morgan, and Scott Counties. Various reports, plans, and studies were also reviewed and summarized as relevant. Socioeconomic data and information is summarized at various geographic levels, including national, state, county, and census tracts, where data is available and relevant.

DEMOGRAPHICS, EMPLOYMENT/INCOME, TAX REVENUE

Anderson, Campbell, Morgan, and Scott Counties are mostly rural and largely undeveloped. The towns of Winfield, Huntsville, Sunbright, Wartburg, Oliver Springs, La Follette, Jacksboro, Clinton, Rocky Top, Caryville, and Jellico are located within the 19 census tracts in close proximity to the evaluation area. Other towns and towns located within the four-county area but outside of the 19 census tracts include Norris, Oak Ridge, Oneida, Harriman, and Oakdale.

The evaluation area is part of the larger Appalachian area. In the early 20th century, logging and coal mining companies provided jobs and income for this region. Since the 1960s, as a result of declining coal production and other factors, communities in the evaluation area as well as others in the Appalachian Region have experienced considerable poverty and economic challenges. Since the early 2000s, tourism has taken a larger role in boosting the local economy (Dotter 2008).

This section describes demographic characteristics of the four-county area, including population trends, age, race and ethnicity, housing, and educational attainment.

Population: In 2014, the estimated the total population in the State of Tennessee was 6,549,352 (US Census 2014). The Tennessee State Data Center is projecting the total state population to be 7,799,933 in 2030, a 21.1% increase between 2014 and 2030. In Anderson, Campbell, and Scott Counties, populations have consistently grown since 2010; Morgan County faced a small decline in population in 2005 but otherwise has increased over time as well. An estimated 163,734 people resided in Anderson, Campbell, Morgan, and Scott Counties in 2014, approximately 2.5% of the state's population. The Tennessee State Data Center is projecting an overall 7.1% increase in population in the four-county area from 2010 to 2030 (table 4-28).

TABLE 4-28: COUNTY POPULATION AND POPULATION PROJECTIONS

County	Year						Projected Change	Percent Change
	2000	2010	2012	2014	2020	2030	2010–2030	2010–2030
Anderson County	71,330	75,129	76,042	76,881	79,061	82,202	7,073	9.41%
Campbell County	39,854	40,716	41,000	41,245	41,787	41,894	1,178	2.89%
Morgan County	19,757	21,987	22,469	22,934	23,168	23,402	1,415	6.44%
Scott County	21,127	22,228	22,461	22,674	23,224	23,947	1,719	7.73%
Four-county Area	152,069	160,060	161,972	163,734	167,240	171,445	11,385	7.11%
Tennessee	5,689,283	6,346,105	6,502,668	6,657,905	7,107,296	7,799,933	1,453,828	22.91%

Sources: US Census 2000; Tennessee State Data Center 2014.

Over the past 20 years, the populations in Campbell, Morgan, and Scott Counties have remained relatively stable with steady increases over time (figure 4-21). Anderson County experienced an increase in population of more than double from 1940 to 1950, after which the population continued to increase at a steady rate. Since the 1950s, Anderson County has had a much greater population than the remaining evaluation area counties.

In 2013, an estimated 76,560 people lived within the 19-census tract region, which was only slightly higher (1.2%) than the population in 2000 (table 4-29).

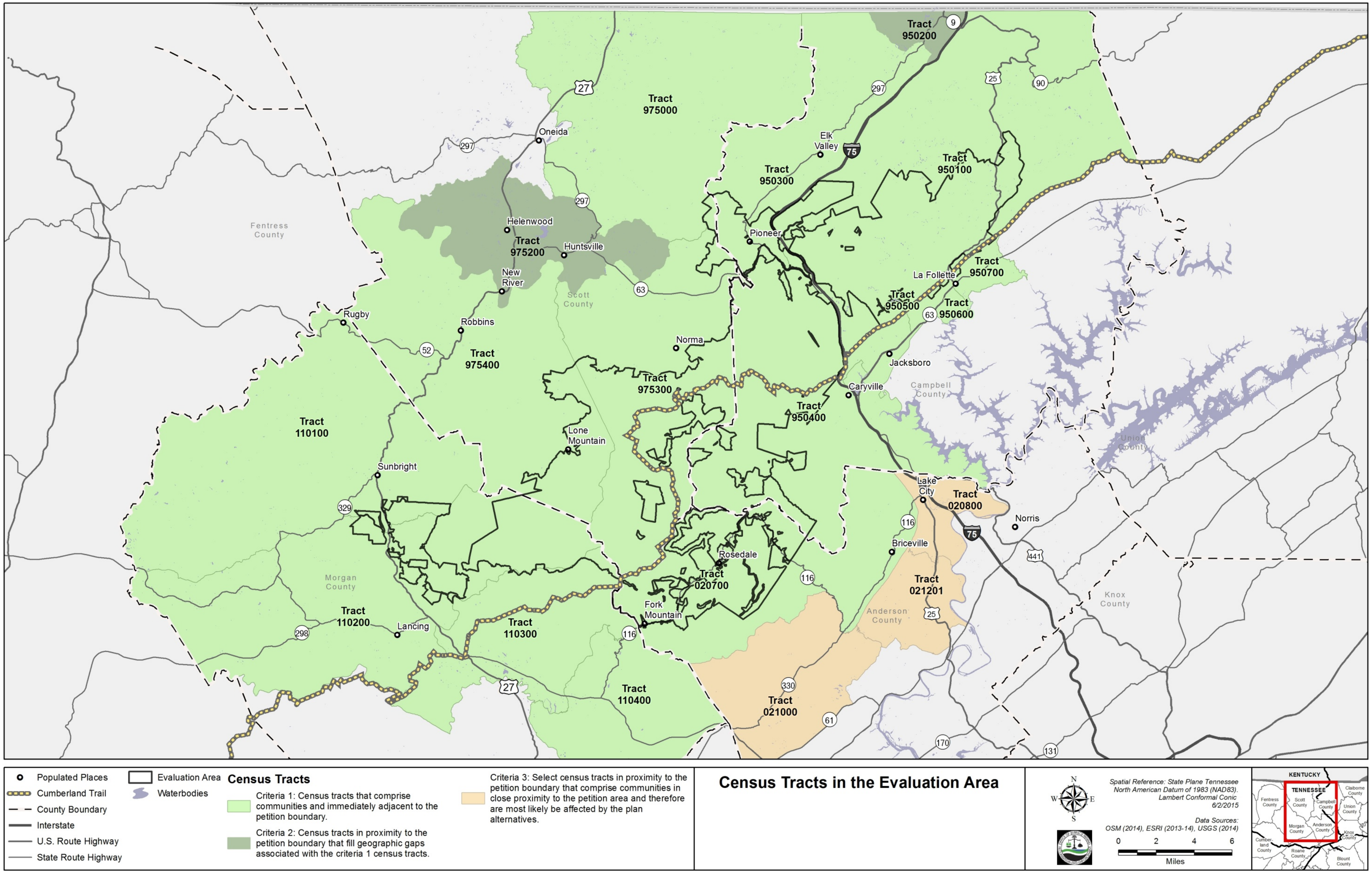
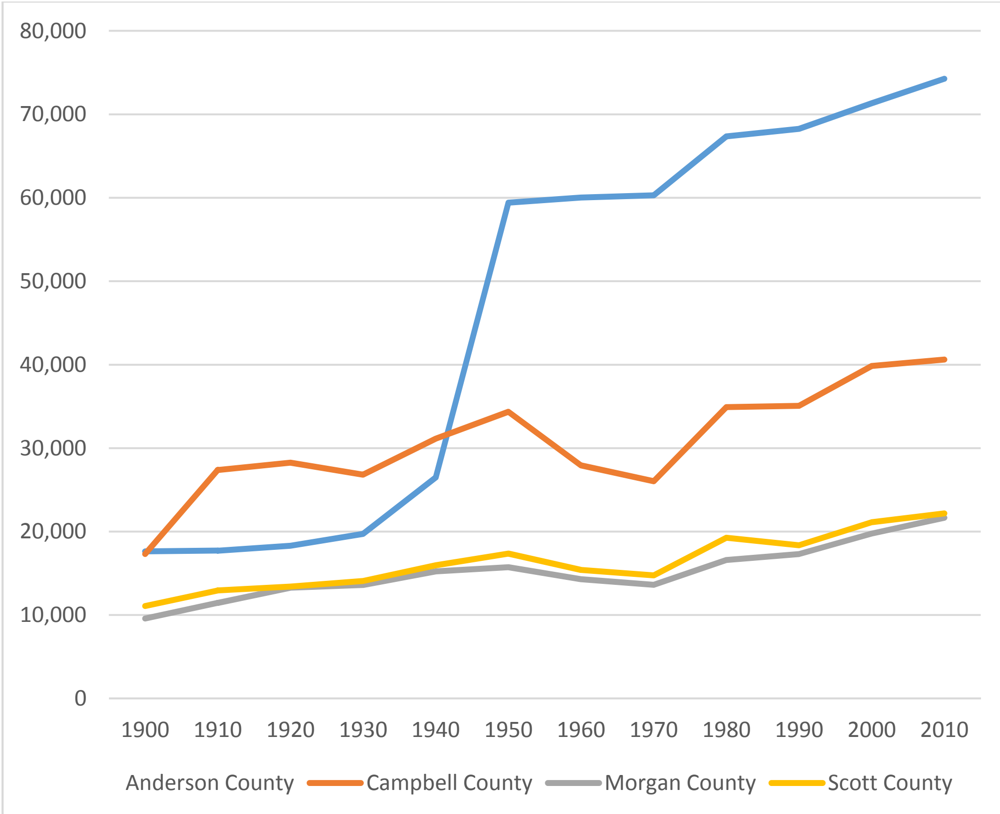


FIGURE 4-20: CENSUS TRACTS IN THE EVALUATION AREA



Source: US Census 1990.

FIGURE 4-21: HISTORIC POPULATION TRENDS, 1900–2010

TABLE 4-29: CENSUS TRACT POPULATION

Region	Year			Change 2000–2013	% Change
	2000	2010	2013		2000–2013
Anderson County census tracts	18,138	17,538	17,604	-534	-2.94%
Campbell County census tracts	27,636	27,153	26,777	-859	-3.11%
Morgan County census tracts	15,308	17,034	16,933	1,625	10.62%
Scott County census tracts	14,561	15,382	15,246	685	4.70%
All Census Tracts	**75,643**	**77,107**	**76,560**	**917**	**1.21%**

Source: US Census 2000, 2010b, 2013a.

Age: Census data indicate that middle-aged people comprise the largest part of the population within the 19-census tract region (table 4-30). As the baby boomers across the country get older, the average age of the population continues to increase. The average age of the region's population increased during the past decade.

TABLE 4-30: CENSUS TRACTS POPULATION, BY AGE AND GENDER, 2010

Geographic Area	Total Population, All Ages	Male				Female			
		Total	By Age			Total	By Age		
			0–29	30–59	60+		0–29	30–59	60+
Anderson County census tracts	17,538	8,651	3,170	3,652	1,829	8,887	3,024	3,672	2,191
Campbell County census tracts	27,153	13,186	4,927	5,413	2,846	13,967	4,687	5,576	3,704
Morgan County census tracts	17,034	9,638	3,507	4,524	1,607	7,396	2,597	3,049	1,750
Scott County census tracts	15,382	7,623	3,044	3,253	1,326	7,759	2,964	3,186	1,609
Total	**77,107**	**39,098**	**14,648**	**16,842**	**7,608**	**38,009**	**13,272**	**15,483**	**9,254**

Source: US Census 2010a.

Race and Ethnicity: The populations in the evaluation area and across the state as a whole are predominantly white and non-Hispanic. Table 4-31 shows racial and ethnic data from 2013 (US Census 2013a). All four counties have predominantly white populations, with percentages of the white alone population ranging from 92 to 99%. This is significantly higher than the percentage of white population in the state as a whole of 78%. The four-county area exhibits similar racial and ethnic composition (see the "Environmental Justice" section for data on race and ethnicity).

TABLE 4-31: COUNTY AND STATE POPULATION BY RACE/ETHNICITY, 2013

Geography	White Alone	Black or African American Alone	American Indian and Alaska Native Alone	Asian Alone	Native Hawaiian and Other Pacific Islander Alone	Some other race Alone	Hispanic Ethnicity
Anderson County	69,541	3,103	152	934	0	154	1,796
	92.4%	4.1%	0.2%	1.2%	0.0%	0.2%	2.4%
Campbell County	39,595	228	76	14	0	149	499
	97.6%	0.6%	0.2%	0.3%	0.0%	0.4%	1.2%
Morgan County	20,737	801	26	55	12	7	216
	94.4%	3.6%	0.1%	0.3%	0.1%	0.0%	1.0%
Scott County	21,877	31	54	22	0	-	187
	98.7%	0.1%	0.2%	0.1%	0.0%	0.0%	0.8%
State of Tennessee	5,007,014	1,073,534	16,604	95,801	3,110	93,081	300,159
	78.2%	16.8%	0.3%	1.5%	0.0%	1.5%	4.7%

Source: US Census 2013a.

Housing: Table 4-32 summarizes the housing characteristics in the four-county area and the State of Tennessee. The vast majority of housing units in the four-county area are located in Anderson County. Scott County has the lowest median housing value; the median housing value in 2013 ranged from $127,000 in Anderson County to $81,500 in Scott County.

TABLE 4-32: EVALUATION AREA HOUSEHOLD AND HOUSING CHARACTERISTICS, 2013

Evaluation Area	Total Housing Units	% Occupied Housing Units	% Vacant Housing Units	Total Occupied Housing Units	% Owner Occupied Housing Units	% Renter Occupied Housing Units	Median Housing Value
Anderson County	34,655	88.1%	11.9%	30,548	68.5%	31.5%	$127,000
Campbell County	20,022	79.7%	20.3%	15,959	69.2%	30.8%	$91,500
Morgan County	8,881	83.9%	16.1%	7,455	80.6%	19.4%	$90,700
Scott County	9,862	83.2%	16.8%	8,206	77.5%	22.5%	$81,500
State of Tennessee	2,821,797	87.7%	12.3%	2,475,195	67.8%	32.2%	$139,200

Source: US Census 2013b.

Economic Characteristics

The evaluation area is part of the federally designated Appalachian Region. In determining this designation, the 1965 Appalachian Regional Development Act noted (40 USC § 143) that

> Congress finds and declares that the Appalachian region of the United States, while abundant in natural resources and rich in potential, lags behind the rest of the Nation in its economic growth and that its people have not shared properly in the Nation's prosperity. The region's uneven past development, with its historical reliance on a few basic industries and marginal agriculture, has failed to provide the economic base that is a vital prerequisite for vigorous, self-sustaining growth.

The Appalachian Regional Commission was "established by Congress in 1965 to support economic and social development in the Appalachian Region." The Appalachian Region, currently defined by the Commission, includes 420 counties in 13 states, including all counties in east Tennessee. The Commission gives each county one of five possible economic designations— distressed, at-risk, transitional, competitive, or attainment— with "distressed" counties being the most economically endangered and "attainment" counties being the most economically prosperous. These designations are based primarily on three indicators— three-year average unemployment rate, market income per capita, and poverty rate. Campbell and Scott Counties have been identified as "distressed," Morgan County as "at-risk," and Anderson County as "transitional." The "Environmental Justice" section includes additional description of the Appalachian Regional Commission and the economic indicators.

The following discussion presents a general overview of employment, unemployment, and wage characteristics of the four-county area. For a detailed analysis of the coal industry, see the coal mining subsection and "Chapter 5: Evaluation of Coal Resources."

Employment: Overall employment in the four-county area has experienced a 2.3% increase between 2001 and 2013, with Anderson, Campbell, and Morgan Counties experiencing increases in overall employment (4.8%, 2.7% and 2.0%, respectively), while Scott County has experienced a decline over this period (-12.3%).

Both Anderson and Campbell Counties (tables 4-33 and 4-34) experienced employment increases in finance and insurance; real estate and rental and leasing; accommodations and food services; and health care and social assistance. Mining employment (including oil and gas) has decreased 15.6% since 2010 in

Anderson County, while mining employment data is not disclosed in Campbell County. Industries with decreasing employment in Campbell County include construction, manufacturing, and wholesale trade.

TABLE 4-33: ANDERSON COUNTY EMPLOYMENT

Employment	2001	2010	2011	2012	2013	% change 2001–2013*
Total Employment	50,501	52,609	53,921	52,415	52,923	4.8%
Farm employment	633	493	490	471	469	-25.9%
Forestry, fishing, and related activities	(D)	79	83	80	79	0.0%
Mining (includes oil and gas)	(D)	275	327	269	232	-15.6%
Utilities	(D)	(D)	(D)	(D)	(D)	(D)
Construction	2,985	4,110	4,157	3,303	3,535	18.4%
Manufacturing	10,038	9,428	10,136	10,469	10,575	5.3%
Wholesale trade	1,064	884	998	1,021	1,008	-5.3%
Retail trade	4,997	4,443	4,569	4,446	4,365	-12.6%
Transportation and warehousing	(D)	(D)	(D)	(D)	(D)	(D)
Information	437	264	270	240	244	-44.2%
Finance and insurance	1,381	2,017	2,111	2,157	2,189	58.5%
Real estate and rental and leasing	1,168	1,588	1,554	1,504	1,538	31.7%
Professional, scientific, and technical services	(D)	7,254	6,724	6,469	6,302	-13.1%
Management of companies and enterprises	(D)	130	157	136	135	3.8%
Administrative and waste management services	(D)	3,585	4,103	4,027	3,961	10.5%
Educational services	416	381	362	357	371	-10.8%
Health care and social assistance	4,290	4,724	4,865	4,914	5,116	19.3%
Arts, entertainment, and recreation	614	674	647	621	639	4.1%
Accommodation and food services	2,442	3,126	3,183	2,951	3,168	29.7%
Other services, except public administration	2,414	2,658	2,747	2,743	2,755	14.1%
Government and government enterprises	5,365	5,640	5,545	5,458	5,433	1.3%
Federal, civilian	1,134	1,030	1,011	968	948	-16.4%
Military	275	255	255	248	244	-11.3%
State and local	3,956	4,355	4,279	4,242	4,241	7.2%

Source: US Bureau of Economic Analysis 2013.

(D) indicates that data was not provided to avoid disclosure of confidential information, but the estimates for this item are included in the totals.

(L) indicates less than 10 jobs, but the estimates for this item are included in the totals.

*If data was not disclosed for 2001, percent change from 2010 to 2013 was provided.

TABLE 4-34: CAMPBELL COUNTY EMPLOYMENT, 2001, 2010, 2011, 2012, AND 2013

Employment	2001	2010	2011	2012	2013	% change 2001–2013*
Total Employment	13,847	13,540	13,665	14,108	14,220	2.7%
Farm employment	454	380	378	365	362	-20.3%
Forestry, fishing, and related activities	72	(D)	(D)	(D)	(D)	(D)
Mining (includes oil and gas)	141	(D)	(D)	(D)	(D)	(D)
Utilities	(L)	(L)	(L)	(L)	(L)	(L)
Construction	1,519	1,090	1,166	1,412	1,399	-7.9%
Manufacturing	1,828	1,436	1,327	1,340	1,451	-20.6%
Wholesale trade	464	226	201	195	186	-59.9%
Retail trade	1,936	1,884	1,946	2,015	2,005	3.6%
Transportation and warehousing	431	384	399	422	436	1.2%
Information	(D)	108	90	80	89	-17.6%
Finance and insurance	401	469	443	468	454	13.2%
Real estate and rental and leasing	363	563	540	521	514	41.6%
Professional, scientific, and technical services	322	327	336	330	330	2.5%
Management of companies and enterprises	(D)	(D)	(D)	(D)	40	(D)
Administrative and waste management services	(D)	(D)	(D)	(D)	818	(D)
Educational services	(D)	(D)	(D)	(D)	(D)	(D)
Health care and social assistance	(D)	(D)	(D)	(D)	(D)	(D)
Arts, entertainment, and recreation	150	241	225	221	230	53.3%
Accommodation and food services	935	566	572	694	672	-28.1%
Other services, except public administration	899	960	1,013	1,001	995	10.7%
Government and government enterprises	2,309	2,325	2,293	2,250	2,193	-5.0%
Federal, civilian	84	93	83	82	79	-6.0%
Military	152	136	137	132	129	-15.1%
State and local	2,073	2,096	2,073	2,036	1,985	-4.2%

Source: US Bureau of Economic Analysis 2013.

(D) indicates that data was not provided to avoid disclosure of confidential information, but the estimates for this item are included in the totals.

(L) indicates less than 10 jobs, but the estimates for this item are included in the totals.

*If data was not disclosed for 2001, percent change from 2010 to 2013 was provided.

A fair amount of the employment data in Morgan and Scott Counties has not been disclosed due to confidentiality issues (tables 4-35 and 4-36). Industries in Morgan County are experiencing increasing employment include mining (includes oil and gas) (69.3%) and finance and insurance (19.6%) while manufacturing employment has been decreasing (-43.2%). In Morgan County, construction and manufacturing employment have been decreasing (28.0% and 23.9%, respectively), while administrative and waste management services have been increasing (11.4%).

TABLE 4-35: MORGAN COUNTY EMPLOYMENT, 2001, 2010, 2011, 2012, AND 2013

Employment	2001	2010	2011	2012	2013	% change 2001–2013*
Total Employment	6,010	6,173	6,374	6,198	6,129	2.0%
Farm employment	440	378	376	363	360	-18.2%
Forestry, fishing, and related activities	(D)	(D)	(D)	(D)	(D)	(D)
Mining (includes oil and gas)	(D)	(D)	(D)	(D)	(D)	(D)
Utilities	(D)	(D)	(D)	(D)	(D)	(D)
Construction	757	491	533	546	545	-28.0%
Manufacturing	545	396	404	393	415	-23.9%
Wholesale trade	(D)	(D)	(D)	(D)	54	(D)
Retail trade	576	543	555	510	512	-11.1%
Transportation and warehousing	(D)	222	211	(D)	(D)	(D)
Information	68	56	51	54	56	-17.6%
Finance and insurance	(D)	(D)	(D)	(D)	(D)	(D)
Real estate and rental and leasing	(D)	(D)	(D)	(D)	(D)	(D)
Professional, scientific, and technical services	140	(D)	(D)	(D)	(D)	(D)
Management of companies and enterprises	(D)	(D)	(D)	(D)	(D)	(D)
Administrative and waste management services	(D)	439	523	505	489	11.4%
Educational services	31	(D)	(D)	(D)	(D)	(D)
Health care and social assistance	310	(D)	(D)	(D)	(D)	(D)
Arts, entertainment, and recreation	(D)	(D)	(D)	(D)	(D)	(D)
Accommodation and food services	(D)	(D)	(D)	(D)	(D)	(D)
Other services, except public administration	542	555	594	587	598	10.3%
Government and government enterprises	1,445	1,606	1,530	1,458	1,397	-3.3%
Federal, civilian	44	40	39	37	36	-18.2%
Military	71	66	66	64	63	-11.3%
State and local	1,330	1,500	1,425	1,357	1,298	-2.4%

Source: US Bureau of Economic Analysis 2013.

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(L) indicates less than 10 jobs, but the estimates for this item are included in the totals.

*If data was not disclosed for 2001, percent change from 2010 to 2013 was provided.

TABLE 4-36: SCOTT COUNTY EMPLOYMENT, 2001, 2010, 2011, 2012, AND 2013

Employment	2001	2010	2011	2012	2013	% change 2001–2013*
Total Employment	9,117	7,923	8,002	7,840	7,995	-12.3%
Farm employment	303	233	231	221	221	-27.1%
Forestry, fishing, and related activities	80	59	60	74	74	-7.5%
Mining (includes oil and gas)	75	75	95	121	127	69.3%
Utilities	(D)	(D)	(D)	(D)	(D)	(D)
Construction	607	494	563	552	554	-8.7%
Manufacturing	2,692	1,251	1,103	1,206	1,529	-43.2%
Wholesale trade	(D)	(D)	(D)	98	105	(D)
Retail trade	1,039	870	878	870	857	-17.5%
Transportation and warehousing	361	283	325	(D)	(D)	(D)
Information	32	41	40	32	33	3.1%
Finance and insurance	189	223	226	222	226	19.6%
Real estate and rental and leasing	122	165	158	129	131	7.4%
Professional, scientific, and technical services	(D)	182	171	172	172	-5.5%
Management of companies and enterprises	(D)	—	—	—	—	(D)
Administrative and waste management services	(D)	294	317	263	264	-10.2%
Educational services	20	(D)	(D)	(D)	(D)	(D)
Health care and social assistance	785	(D)	(D)	(D)	(D)	(D)
Arts, entertainment, and recreation	(D)	(D)	(D)	(D)	(D)	(D)
Accommodation and food services	(D)	(D)	(D)	(D)	(D)	(D)
Other services, except public administration	475	495	546	530	545	14.7%
Government and government enterprises	1,339	1,622	1,647	1,634	1,576	17.7%
Federal, civilian	90	93	89	100	88	-2.2%
Military	82	75	75	72	70	-14.6%
State and local	1,167	1,454	1,483	1,462	1,418	21.5%

Source: US Bureau of Economic Analysis 2013.

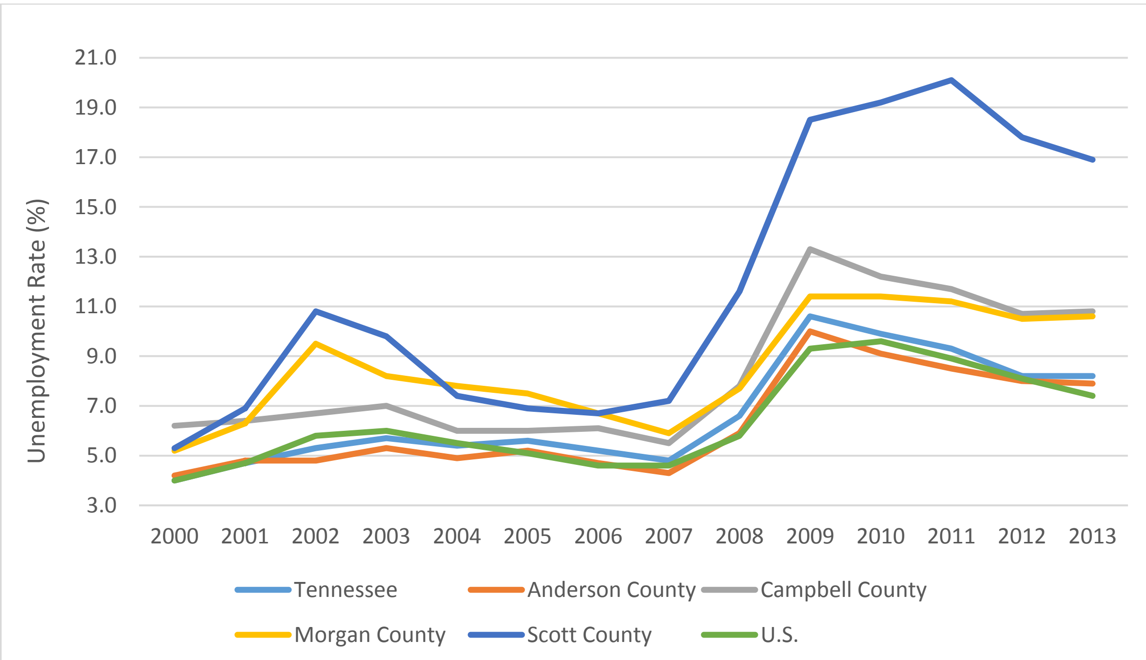
(D) indicates that data was not provided to avoid disclosure of confidential information, but the estimates for this item are included in the totals.

(L) indicates less than 10 jobs, but the estimates for this item are included in the totals.

*If data was not disclosed for 2001, percent change from 2010 to 2013 was provided.

Income and Unemployment: As described previously, the Appalachian Regional Commission has categorized Campbell and Scott Counties as “distressed,” and these counties have a number of indicators that reflect lower income and higher unemployment rates than the other counties in the evaluation area. Morgan County is categorized as “at-risk,” while Anderson County is “transitional” (ARC 2014).

Unemployment within the four-county area (figure 4-22) reflects the Appalachian Regional Commission ratings, with Scott and Campbell Counties having the highest unemployment rates since 2008. Morgan County has also experienced a higher unemployment rates since 2008. Anderson County exhibits unemployment rate trends similar to the state as a whole and the rest of the nation (tables 4-33, 4-34, 4-35, and 4-36).



Source: BLS 2013.

FIGURE 4-22: ANNUAL UNEMPLOYMENT RATE, 2000–2013, NOT SEASONALLY ADJUSTED

Total and average annual wage increases between 2001 and 2012 (table 4-37) mirrored the overall employment trends, with Morgan County experiencing the overall largest increase in total wages (81%) and the highest percentage increase in average annual pay (61%) in comparison to the other evaluation area counties. Anderson County experienced the second highest increase in total wages (42%) followed by Campbell County (34%) and Scott County (27%). All of the counties experienced increases in total wages and average annual wage that are comparable to the state and national levels, with the exception of Scott County, which only experienced a 26% increase in average annual wage from 2001 to 2012 and a 4.7% increase in total wages.

TABLE 4-37: COUNTY, STATE, AND NATIONAL TOTAL WAGES AND ANNUAL AVERAGE, 2001, 2010, AND 2013

Evaluation Area	Total Wages % change 2001–2013	Average Annual Wage 2001	Average Annual Wage 2010	Average Annual Wage 2013	Average Annual Wage % change 2001–2013
Anderson County	47.9%	$36,114	$50,187	$51,535	42.7%
Campbell County	34.2%	$22,526	$29,435	$31,293	38.9%
Morgan County	80.3%	$20,213	$29,139	$33,496	65.7%
Scott County	12.4%	$22,395	$27,345	$29,703	32.6%
State of Tennessee	43.5%	$31,520	$41,572	$44,091	39.9%
United States	42.1%	$36,219	$46,751	$49,808	37.5%

Source: BLS 2014.

Note: Average annual wage figures are presented in nominal figures (not adjusted for inflation). Wages for 2014 are preliminary and not included in the table.

FISCAL RESOURCES

The following section describes tax revenue related to coal production in fiscal year 2013.

Severance Taxes: Tennessee collects a severance tax on all coal products severed from the ground in the state. The tax is levied upon the entire production in the state regardless of the place of sale or the fact that delivery may be made outside the state. The coal severance tax is currently $1.00 per ton (University of Tennessee 2014). Nine-nine percent of the severance tax revenue is returned to the counties in which the mining occurs, and the tax revenue is split evenly between the county educational system and highway and stream maintenance.

Current and recent coal production (since 2008) from the evaluation area has ranged from 54,000 to 240,000 tons of coal, with severance tax receipts ranging from $54,400 to $240,000 (see "Chapter 5: Evaluation of Coal Resources"). Anderson and Campbell counties have accounted for from 200,000 to 1.2 million tons of coal since 2008. In fiscal year 2014 (July 2013–June 2014), total coal severance tax collected in Tennessee was $932,345 (Tennessee Department of Revenue 2014b).

In fiscal year 2014 (July 2013–June 2014), total severance tax revenues paid to the counties in the four-county area were $176,915. Campbell County received $77,670 and Morgan County received $99,245 (Campbell County 2014; Morgan County 2014a). Anderson County and Scott County did not receive coal severance tax revenue in fiscal year 2014 (Anderson County 2014; Scott County 2014c). These tax receipts in Anderson and Campbell Counties account for approximately 19% of the total severance tax collected in the state in 2014.

Sales and Use Tax Receipts: Sales and use taxes are generally applied to the gross sales of any business, organization, or person engaged in retail sales, including the selling, leasing, or renting of tangible personal property and the selling of certain taxable services specified in the law. Sales and use taxes are generated when mining workers spend their money on retail and other taxable items within the study area economy. Sales and use tax receipts are also generated by visitors spending in the four-county area as well as service sector workers spending their wages in the local economy (see recreation below).

In Tennessee, sales and use tax is a combination of a 7% state tax and a local option tax imposed by city and/or county governments. In the four-county area, the local option tax ranges from 2.75% in Anderson

County, to 2.25% in Campbell and Scott Counties, and 2.0% in Morgan County (Tennessee Department of Revenue 2014a).

In fiscal year 2014, Anderson County generated $772,057 in local option sales taxes for governmental activities and approximately $7.1 million from Anderson County School Department (Anderson County 2014). Campbell County generated $1.1 million in local option sales taxes from total governmental activities and $3.1 million from Campbell County School Department (Campbell County 2014). Morgan County generated $905,123 from local option sales taxes; and Scott County generated $354,316 from governmental activities and $1.3 million from Scott County School Department (Scott County 2014c).

Franchise and Excise Taxes: Franchise and excise taxes are privilege taxes imposed on corporations, limited partnerships, limited liability companies, and business trusts chartered, organized, or operating their business within Tennessee. The franchise tax is 0.25% of a corporation's net worth or real and tangible personal property, whichever is greater. The excise tax is a 6.5% rate on net earnings or income (Tennessee Department of Revenue 2014a). Total franchise and excise taxes collected by the State of Tennessee in fiscal year 2014 were $1.85 billion, or 13% of total revenue collected by the State (Tennessee Department of Revenue 2014b).

Community Facilities, Services, and Public Infrastructure

Transportation and Access to the Four-County Area: The four-county area is bisected by one major interstate system, Interstate 75. The Tennessee Department of Transportation (TDOT) maintains Interstate 75, which crosses Campbell and Anderson Counties. The TDOT is in the process of preparing the Interstate 75 Corridor Feasibility Evaluation to understand the deficiencies of the corridor and develop corridor level multi-modal solutions to address these deficiencies (TDOT 2011). Significant US highways such as 25W and 27 traverse the four-county area and provide important access to regional and local traffic.

The TDOT 2012–2014 Transportation Improvement Plan lists projects in Campbell, Morgan, and Scott Counties. In Campbell County, a trucking lane is proposed along the corridor to help facilitate passing and relieve congestion. Along SR 29/US 27 in Morgan County, highway improvements for 2.5 miles are proposed just south of Wartburg. The project listed for Scott County is for SR 29/US 27 in Oneida, which is just outside the evaluation area. No projects were listed for Anderson County. In general, highway access is adequate, although improvements are needed in various local jurisdictions.

Electrical Service: Within the ETDD, there are seven electric cooperatives and nine municipalities that provide electric service to local residents and businesses. Electricity for the entire ETDD region is generated by the TVA, which sells power to all providers in the region. In general, capacity is adequate to meet demand although large new industrial users may require capacity or distribution upgrades in order to operate (City of Knoxville 2012). The ETDD is a voluntary association of municipal and county governments in the sixteen-county region of east Tennessee surrounding Knoxville. Organized in 1966, the ETDD provides a forum of local governments to solve common problems of economic development and growth. All four counties in the evaluation area are included in the ETDD.

Natural Gas Service: There are two private companies, six public utility districts, and seven municipalities that provide natural gas service to local residents and businesses in the ETDD. Natural gas service is generally available in all incorporated areas but somewhat spotty in most of the rural areas. In general, capacity is adequate to meet demand, although large new industrial users may require distribution upgrades in order to operate (ETDD 2014).

Water Service: Within the ETDD, there are 35 public utility districts and 28 municipalities that provide water service to local residents and businesses. Water service is generally available in all incorporated areas and in much of the more densely populated rural areas. In general, capacity is adequate to meet demand, although large new commercial/industrial users may require treatment, storage, and distribution upgrades in order to operate. Significant service gaps exist in the rural, unincorporated areas of north Campbell County, southwest and southeast Morgan County, and north Scott County. Significant investment in water infrastructure in north Anderson County has resulted in an almost total alleviation of public water supply problems for residents in that area (ETDD 2014).

Wastewater Service: There are 14 public utility districts and 35 municipalities that provide wastewater collection and treatment service to local residents and businesses within the ETDD. Wastewater service is generally available in all incorporated areas but largely nonexistent in most of the rural areas. Most providers are under constant pressure to improve their collection and treatment capacity. Inflow and infiltration is a common concern for most providers. Most large new users require collection and/or treatment upgrades in order to operate. Significant improvements need to be made to systems operated by the Knoxville Utilities Board, the Town of Cumberland Gap, and the City of Jellico (ETDD 2014). As the area continues to grow and expand, investments in wastewater will need to be made.

All of the counties in the four-county area provide wastewater services. In Anderson County, 928 wastewater customers are served by the Anderson County Water Authority (Anderson County Water Authority 2012). The primary source of water is drawn from Clinch River and the Authority has 2 water treatment plants, 1 wastewater treatment plant, and 13 water reservoir tanks. In Campbell County, LaFollette Utilities Board is a municipally-owned electrical power distributor, water and wastewater utility owned by the City of LaFollette, Tennessee. LaFollette Utilities Board serves approximately 3,541 wastewater customers in portions of Campbell, Claiborne, and Union Counties (LaFollette Utilities 2014). Wastewater is treated at the LaFollette Utilities Boards 1.25-million-gallon-per-day wastewater treatment plant. In Morgan County, the City of Sunbright and Wartburg both have public sewer systems within their incorporated city limits. The Wartburg System has a current usage of 700,000 gallons per day and total system capacity of 1.3 million gallons per day (Morgan County 2014). The Huntsville Utility District and Oneida Water & Wastewater Department serves customers in Scott County (Scott County 2014b). The Oneida Water & Wastewater Department has a wastewater treatment plant is located just outside of town on O&W Road. In October 2010, a $1.3 million grant was announced for water improvements in the Town of Oneida (Town of Oneida 2014).

Emergency Services: Emergencies necessitating a response by law enforcement, paramedics, fire, or search and rescue teams are dispatched through the 911 communication systems of each county. Law enforcement in nonurbanized areas is provided by the sheriff’s departments, with emergency, fire, and medical service supplied by a combination of full-time professional staff and volunteer organizations. For a list of emergency services within the evaluation area see appendix G.

MINING

Coal production in Tennessee has declined by nearly 89% from its peak of 11.2 million tons in 1972 to its production of 1.19 million tons (OSMRE 2014a) in 2013. The Energy Information Administration has projected that Appalachian coal production, including Tennessee, will continue to decline over the next 10 years and then level off to relatively constant production levels thorough 2040. Additional information on the coal production in the state, Appalachian region, counties, and evaluation area is provided in "Chapter 5: Evaluation of Coal Resources."

Coal Processing Facility

Coal mining employment in Tennessee has remained stable in the early 2000s but since 2009 has been declining sharply (figure 4-23). According to the Energy Information Administration, coal mining employment in Tennessee totaled 297 employees in 2013, 135 of whom worked in surface mining.

Source: EIA and MSHA 2015.

FIGURE 4-23: COAL MINING EMPLOYMENT IN TENNESSEE, 2001–2013

Table 4-38 provides additional information on coal mining employment and production in the state. While surface coal mining production in the state has been decreasing, underground mining production has increases 32% between 2010 and 2013. However, employees in both underground and surface mining operations in Tennessee have decreased, -20% and -61%, respectively.

TABLE 4-38: COAL MINING PRODUCTION AND EMPLOYMENT IN TENNESSEE

	2010	2011	2012	2013	Percent Change 2010–2013
Surface Mining Production (tons)	1,225,463	1,124,384	517,337	367,518	-70%
Surface Mining Employment	344	326	188	135	-61%
Underground Mining Production (tons)	554,713	422,651	572,910	730,919	32%
Underground Mining Employment	202	179	175	162	-20%
Total Mining Production (tons)	1,780,176	1,547,035	1,090,247	1,098,437	-38%
Total Mining Employment	546	505	363	297	-46%

Source: EIA and MSHA 2015.

Four-County Coal Mining Employment and Production: All of the 2013 Tennessee coal production came from only three counties: Anderson, Campbell, and Claiborne. Other permits were identified in Scott and Fentress Counties but no production was reported for 2013. Table 5-44 in chapter 5 shows the 2008 to 2013 production levels for all counties. In 2013, Anderson and Campbell Counties accounted for 18% of state production. However, between 2008 and 2012, these two counties have accounted for between 32 and 66% of state production. No coal production has recently occurred in Morgan or Scott Counties. Recent coal production (between 2006 and 2013) in the evaluation area has ranged from 54,000 to 240,000 tons of coal, accounting for between 5 and 16% of Tennessee production.

According to 2013 US Energy Information Administration and the Mine Safety and Health Administration data, there are six active or temporarily closed coal mining operations within the Anderson and Campbell Counties, four of which are surface mining operations. Table 4-39 summarizes the number of coal mining employees within Anderson, Campbell, and Scott Counties. Average annual employment estimates for each type of mine were estimated over a four-year period from 2010 to 2013.

Table 4-40 summarizes the surface and underground mining employment within the four-county area. Employment is presented as a four-year average of annual employment for the years 2010–2013. Surface mining operations provided an average of 178 total jobs annually in the study area counties between 2010 and 2017, accounting for 0.2% of the four-county area employment.

Table 4-41 shows the county surface and underground mining employment as a percentage of average annual state total coal mining employment between 2010 and 2013. Surface and underground mining employment in the four-county area (178 and 84 employees, respectively) represents 41.6% and 19.6% of total state coal mining employment, respectively. Production from the evaluation area has ranged from 5 to 16% of total coal production in the state.

Additional description of coal mining production and coal prices is provided in "Chapter 5: Evaluation of Coal Resources."

TABLE 4-39: COAL MINING AVERAGE EMPLOYEES IN THE FOUR-COUNTY AREA

	2010	2011	2012	2013	Average Annual
Anderson County					
Surface Mining	59	59	26	22	41
Active or temporarily closed	59	38	26	22	36
Abandoned	—	21	0	0	5
Underground Mining	52	27	4	0	21
Active or temporarily closed	52	27	4	0	21
Abandoned	—	—	—	—	—
Total Coal Mining Anderson County	**111**	**86**	**30**	**22**	**62**
Campbell County					
Surface Mining	191	177	98	57	131
Active or temporarily closed	191	177	80	14	116
Abandoned	0	0	18	43	15
Underground Mining	99	64	49	27	60
Active or temporarily closed	99	64	49	27	60
Abandoned	—	—	—	—	—
Total Coal Mining Campbell County	**290**	**241**	**147**	**84**	**191**
Scott County					
Surface Mining (all are active or temporarily closed)	11	3	4	0	5
Underground Mining (all are active or temporarily closed)	10	3	0	0	3
Total Coal Mining Scott County	**21**	**6**	**4**	**0**	**8**
Four-County Area					
Surface Mining	261	239	128	79	177
Underground Mining	161	94	53	27	84
Four-County Area – Both Surface and Underground	**422**	**333**	**181**	**106**	**261**

Source: EIA and MSHA 2015.

TABLE 4-40: COAL MINING EMPLOYMENT IN THE FOUR COUNTIES

Location	Surface Mining Employees 2010–2013 Annual Average	Underground Mining Employees 2010–2013 Annual Average	Total Coal Mining Employees 2010–2013 Annual Average	Avg. Total County Employment 2010–2013	Surface Mining % of Total County Employment	Underground Mining % of Total County Employment
Anderson County	42	21	63	52,967	0.08%	0.04%
Campbell County	131	60	191	13,883	0.94%	0.43%
Morgan County	0	0	0	6,219	0.00%	0.00%
Scott County	5	3	8	7,940	0.06%	0.04%
Four-County Area	178	84	262	81,009	0.22%	0.10%

Source: EIA and MSHA 2015; US Bureau of Economic Analysis 2013.

TABLE 4-41: FOUR-COUNTY COAL MINING EMPLOYMENT AS PERCENT OF STATE COAL MINING EMPLOYMENT

Location	Surface Mining Employees 2010–2013 Annual Average	Underground Mining Employees 2010-2013 Annual Average	Total State Coal Mining Employees 2010-2013 Annual Average	Surface Mining Employment % of Total State Coal Mining Employment	Underground Mining Employment % of Total State Coal Mining Employment
Anderson County	42	21	428	9.8%	4.9%
Campbell County	131	60		30.6%	14.0%
Morgan County	0	0		0.0%	0.0%
Scott County	5	3		1.2%	0.7%
Four-County Area	178	84		41.6%	19.6%

Source: EIA and MSHA 2015.

LOGGING AND FORESTRY ACTIVITIES

In Tennessee, approximately 14 million acres of timberland were harvested in 2012, roughly 53% of the state, yielding 412 million cubic feet of timber (USFS 2014). In 2012, nearly half of Tennessee land area, 11.8 million acres, was farmland; 80% of Tennessee forests are owned by private, non-industrial landowners, many of which are farmers. Tennessee had $305 million in timber sales generated on farm and non-farm acres in 2012, which supports 78,000 jobs (Tennessee Department of Agriculture, 2012; Tennessee Department of Agriculture 2013). The majority of Tennessee forest cover is comprised of hardwoods.

In 2012, there were 919,502 acres of timberland in Anderson, Campbell, Morgan, and Scott Counties that yielded approximately 17 million cubic feet (USFS 2014). Within the four-county area, 68.9% of harvested trees were on privately owned land, while 21.8% were on publicly owned land. This area comprises 6% of the timberland acres and 4% of the cubic feet harvested within the state. From 2006 to

2010, approximately 26,200 acres in the evaluation area were logged (OSMRE 2011a). Logging activity in the evaluation area has decreased over the time with 6,744 acres logged in 2006 to 2,622 acres in 2010. The economic output associated with 26,200 acres of timber was $1.2 million, supporting 14 annual jobs (English et al. 2012).

A privately owned company continues timber harvest activities within the northeastern part of the Sundquist Unit and the southwestern part of the Royal Blue Unit, under a lease agreement that expires in 2017. Under the timber harvest management plan filed with the TWRA, the company plans to harvest timber an average of 1,600 acres per year over ten years for a total of 16,000 acres. The TWRA estimates timber harvested over the last three years by the private company under the lease agreement affected 937 acres in 2009, 1,675 acres in 2010, and 1,900 acres in 2011. Timber productivity on these lands averages 4,500 board feet per acre per year. Using these estimates, the OSMRE anticipates approximately 1,600 acres per year will be harvested within the lease area of the Sundquist and Royal Blue Units and approximately 120 acres per year within the TWRA managed parts of the Sundquist and Royal Blue Units will be harvested by 2017.

In 2013, there were approximately 834 people employed in the logging and forestry industry in Tennessee. Of all non-farm employees in the state, logging employees accounted for 0.03% of total employees (BLS 2014). Although much of the current data for logging and forestry employment in the evaluation area is not disclosed, there are indications that employment in logging and forestry is not a considerable contributor to the local economy. In 2007, there were 10 people employed in logging and forestry in Campbell County, 22 employees in 2004 in Morgan County, and 20 employees in 2012 in Scott County (no data was available for this industry for Anderson County) (BLS 2014). According to the 2013 US Census, there are nine forestry and logging establishments in the four-county area (US Census 2013c).

OIL AND GAS

In 2012, Tennessee ranked among the lowest 10 producing states in both crude oil and marketed natural gas production (EIA 2014e). The first commercial petroleum production in Tennessee started in 1866, but exploration since then has found relatively few reservoirs. Tennessee produces only small amounts of crude oil and has no proven crude oil reserves, but much of the state remains unexplored (EIA 2014e). Active wells in Tennessee produced 371,000 barrels of oil in 2012. The state has one petroleum refinery, located in Memphis, which can process about 180,000 barrels of crude oil per calendar day.

Tennessee produces less than 1% of the nation’s natural gas. Active wells in Tennessee produced 5,825 million cubic feet of natural gas. Operating wells are clustered in the northeast portion of the state. However, eastern Tennessee overlies the Chattanooga Shale, and some exploration of potential natural gas resources is under way. The Chattanooga Shale is also located in northern Alabama, southern Kentucky, and northeast Georgia. The Chattanooga Shale, while still in its infancy, is a fairly small shale gas play in the United States but a number of companies are actively obtaining mineral rights and prospecting in the region.

RECREATION AND VISITOR SPENDING

Since 2009, there has been growth in visitation and visitor spending in Tennessee. In Tennessee, there were 50.9 million overnights and 41.3 million day trips, for a total of 92.1 million trips (in person-stays) in 2012 (D.K. Shifflet and Associations Ltd 2012). Many of the travelers reside within Tennessee (43.6%), while other origin states are in close proximity to Tennessee, including Georgia (6.8%), Kentucky (6.3%), Alabama (6.0%), Mississippi (4.3%), North Carolina (3.3%), and Virginia (3.1%).

The four-county area draws a number of visitors to the region through its parks, wilderness areas, hiking, bike, horse, and off-highway vehicle trails, and other recreation resources (see the "Land Use and Recreation" section). Anderson County has a thriving tourism industry, thanks to major attractions such as Norris Lake, the Museum of Appalachia, and American Museum of Science and Energy. Oak Ridge National Laboratory and the Y-12 National Security Complex are located in Anderson County (English, et al. 2012). Campbell County is home to three state parks, Cove Lake State Park near Caryville, Indian Mountain State Park near Jellico, and portions of Norris Dam State Park. Two trailheads lead to the Cumberland Trail located in Campbell County. Morgan County is known for its rugged mountain terrain, and cold mountain streams and rivers. The Crab Orchard Mountains comprise a large area of the county, which includes several designated wilderness areas, Frozen Head State Park, and Lone Mountain State Forest. The reintroduction of elk in Tennessee since 2000 also draws visitors. There are currently about 400 elk in Tennessee; however, it is speculated that over the next thirty years the population of elk will expand to a population of 1,400 to 2,000.

Visitors coming from outside of the local area spend approximately $177.4 million within the four-county area, approximately 65% of which is spent in Anderson County. Together, the four-county area accounts for approximately 1% of the nonlocal visitor spending in the state. In total, travel and tourism-related expenditures support 1,420 jobs in the four-county area as well as $10.4 million in state tax receipts and $6.0 million in local tax receipts (table 4-42).

TABLE 4-42: ECONOMIC IMPACT OF TRAVEL ON TENNESSEE AND FOUR-COUNTY AREA

Geography	Tennessee	Anderson County	Campbell County	Morgan County	Scott County	Four-County Area
Tourism and Travel Spending ($millions)	$16,157.4	$114.7	$47.6	$4.6	$10.5	$177.4
Spending Percent of State	—	0.7%	0.3%	0.03%	0.06%	1.1%
Employment	232,4000	920	410	10	80	1,420
State Tax Receipts ($millions)	$785.7	$6.9	$2.6	$0.3	$0.6	$10.4
Local Tax Receipts ($millions)	$451.0	$2.4	$2.4	$0.6	$0.6	$6.0

Source: US Travel Association 2012.

In 2009, tourism sectors of the four-county area were evaluated with IMPLAN data to estimate the percentage of economic output attributed to tourism activity. Tourism economic output represents roughly 2.4% ($175.7 million) of the total economy in Anderson County ($7,401.7 million), 2.7% ($39.1 million) of the total economy in Campbell County ($1,445.0 million), 2.0% ($10.3 million) of the total economy in Morgan County ($522.7 million), and 2.8% ($21.8 million) of the total economy in Scott County ($780.4 million) (English et al. 2012).

A survey of recreational users of the evaluation area was implemented in the fall of 2011 and spring of 2012 (English et al. 2012; Schexnayder et al. 2012). Recreational users were estimated to spend approximately 230,500 recreational days in the area annually and spend $10.3 million in 2011 (reported in 2009 dollars). This visitor spending supports 230 jobs and $9.2 million in value added within the region (English et al. 2012). The most prevalent visitors are hunters (81,920 recreational days), followed by off-highway vehicle users (48,266 days), warm-water anglers (28,737 days), other users (site-seeing, wildlife viewing, biking, photography: 27,740 recreational days), and hikers (12,491 recreational days).

Environmental Justice

Executive Order 12898, "Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations" (signed February 11, 1994) requires federal agencies to evaluate the impacts of any federal action to determine if the proposed actions will disproportionately affect a minority or low-income community or population. The EPA defines these considerations, commonly referred to as "environmental justice," as follows:

> The fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies. Fair treatment means that no group of people, including racial, ethnic, or socioeconomic group should bear a disproportionate share of the negative environmental consequences resulting from industrial, municipal, and commercial operations or the execution of federal, state, local, and tribal programs and policies.

Consideration of environmental justice is intended to ensure that no person or group of people shoulders a disproportionate share of the negative environmental impacts resulting from federal actions, policies and programs, and to ensure that those impacted have a meaningful role in the decision-making process. This analysis identifies and assesses project impacts that could disproportionately affect low-income or minority populations.

Each of the four counties within the evaluation area is included as part of the federally designated Appalachian Region. In determining this designation, the 1965 Appalachian Regional Development Act noted (40 USC § 143) that:

> Congress finds and declares that the Appalachian region of the United States, while abundant in natural resources and rich in potential, lags behind the rest of the Nation in its economic growth and that its people have not shared properly in the Nation's prosperity. The region's uneven past development, with its historical reliance on a few basic industries and a marginal agriculture, has failed to provide the economic base that is a vital prerequisite for vigorous, self-sustaining growth.

In determining and analyzing potential environmental justice concerns associated with the evaluation, a broad area was initially identified which encompassed populations and communities which were projected to most likely bear the adverse effects, if any, of the proposed alternatives (i.e., areas most impacted by either implementing the petition or retaining the status quo concerning surface mining activities). Based on the intent of the executive order and designation in the 1965 Appalachian Regional Development Act, the four counties potentially affected by the proposed action were initially considered.

The evaluation area defined for this environmental justice analysis includes the census tracts areas noted in table 4-43 and shown in figure 4-20. The criteria used to select the evaluation area census tracts were as follows:

- Criterion 1: Census tracts that intersect or are located immediately adjacent to the evaluation area.
- Criterion 2: Select census tracts in proximity to the evaluation area that fill geographic gaps associated with the Criteria 1 census tracts.
- Criterion 3: Select census tracts in proximity to the evaluation area that comprise communities that are most likely to be affected by the proposed alternatives.

TABLE 4-43: EVALUATION AREA CENSUS TRACTS

Geography	Selection Criteria
Census Tract 020700, Anderson County	1
Census Tract 020800, Anderson County	3
Census Tract 021000, Anderson County	3
Census Tract 021201, Anderson County	3
Census Tract 950100, Campbell County	1
Census Tract 950200, Campbell County	2/3
Census Tract 950300, Campbell County	1
Census Tract 950400, Campbell County	1
Census Tract 950500, Campbell County	1
Census Tract 950600, Campbell County	1
Census Tract 950700, Campbell County	1
Census Tract 110100, Morgan County	1
Census Tract 110200, Morgan County	1
Census Tract 110300, Morgan County	1
Census Tract 110400, Morgan County	1
Census Tract 975000, Scott County	1
Census Tract 975200, Scott County	2/3
Census Tract 975300, Scott County	1
Census Tract 975400, Scott County	1

Data for Census Tract 1103 in Morgan County (table 4-44) indicates a substantially higher percentage of total minority population (15.4%) than other portions of the evaluation area. However, it appears that the presence of the Morgan County Correctional Complex population center within this census tract is the prevailing factor for this finding, as there are no other population centers within this area.

There are no known concentrations of low-income populations among the evaluation area (table 4-45). However, as the data shows, the entire evaluation area could be considered to be low-income because the evaluation area generally exhibits a poverty rate above 20% with portions of counties within the evaluation area reflecting higher rates of poverty compared to the counties overall.

TABLE 4-44: 2012 RACIAL AND ETHNIC CHARACTERISTICS OF EVALUATION AREA CENSUS TRACTS

Geography	Total Population	White	Black or African American	American Indian and Alaska Native	Asian	Native Hawaiian and Other Pacific Islander	Some Other Race	Two or More Races	Hispanic	Total Minority %	% Hispanic
Census Tract 020700, Anderson County	1,603	1,583	12	20	0	0	0	0	0	1.2	0.0
Census Tract 020800, Anderson County	5,071	4,844	18	15	0	0	6	28	167	4.5	3.3
Census Tract 021000, Anderson County	5,692	5,540	13	19	0	0	0	117	6	2.7	0.1
Census Tract 021201, Anderson County	5,111	4,812	88	15	0	0	0	122	0	5.9	0.0
Census Tract 950100, Campbell County	3,219	3,136	12	0	24	0	0	18	42	2.6	1.3
Census Tract 950200, Campbell County	2,530	2,388	61	10	0	0	7	23	23	5.6	0.9
Census Tract 950300, Campbell County	1,760	1,718	12	6	0	0	0	36	0	2.4	0.0
Census Tract 950400, Campbell County	4,534	4,325	18	0	7	0	73	119	36	4.6	0.8
Census Tract 950500, Campbell County	5,366	5,197	36	11	7	0	0	33	86	3.1	1.6
Census Tract 950600, Campbell County	4,463	4,348	26	0	10	0	0	0	89	2.6	2.0
Census Tract 950700, Campbell County	4,749	4,712	4	25	0	0	0	10	0	0.8	0.0
Census Tract 110100, Morgan County	2,708	2,572	18	11	0	0	0	113	0	5	0.0
Census Tract 110200, Morgan County	3,523	3,477	6	37	0	0	0	7	39	1.3	1.1
Census Tract 110300, Morgan County	6,410	5,422	189	0	2	0	0	170	135	15.4	2.1

Geography	Total Population	White	Black or African American	American Indian and Alaska Native	Asian	Native Hawaiian and Other Pacific Islander	Some Other Race	Two or More Races	Hispanic	Total Minority %	% Hispanic
Census Tract 1104, Morgan County	4,255	4,223	12	0	0	0	0	32	0	0.8	0.0
Census Tract 9750, Scott County	4,146	4,070	12	24	15	0	0	37	0	1.8	0.0
Census Tract 9752, Scott County	6,039	5,753	14	29	0	0	0	44	193	4.7	3.2
Census Tract 9753, Scott County	2,691	2,671	12	20	0	0	0	0	0	0.7	0.0
Census Tract 9754, Scott County	2,696	2,680	3	14	0	0	0	0	0	0.6	0.0

Source: US Census 2014.

TABLE 4-45: POVERTY STATUS BETWEEN SEPTEMBER 2013 AND SEPTEMBER 2014 – INCOME IN THE PAST 12 MONTHS BELOW POVERTY LEVEL

Population	All Census Tracts	Anderson County Census Tracts	Campbell County Census Tracts	Morgan County Census Tracts	Scott County Census Tracts
Total population	72,612	17,211	26,011	14,133	15,257
Total population below poverty	16,277	2,978	6,682	2,549	4,068
Total percent below poverty	22.4%	17.3%	25.7%	18.0%	26.7%
Below poverty minority percent	78.4%	83.5%	75.3%	82.5%	73.9%
White population below poverty	15,719	2,837	6,425	2,480	3,977
Below poverty percent White	21.6%	16.5%	24.7%	17.5%	26.1%
Black or African American population below poverty	102	40	59	2	1
Below poverty percent Black or African American	0.1%	0.2%	0.2%	0.0%	0.0%
American Indian and Alaska Native population below poverty	123	39	0	11	73
Below poverty percent American Indian and Alaska Native	0.2%	0.2%	0.0%	0.1%	0.5%
Asian population below poverty	7	0	7	0	0
Below poverty percent Asian	0.0%	0.0%	0.0%	0.0%	0.0%
Native Hawaiian and Other Pacific Islander population below poverty	0	0	0	0	0
Below poverty percent Native Hawaiian and Other Pacific Islander	0.0%	0.0%	0.0%	0.0%	0.0%
Some Other Race population below poverty	6	6	0	0	0
Below poverty percent some other race	0.0%	0.0%	0.0%	0.0%	0.0%
Two or More Races population below poverty	254	52	129	56	17
Below poverty percent two or more races	0.3%	0.3%	0.5%	0.4%	0.1%
Hispanic or Latino population below poverty	66	4	62	0	0
Below poverty percent Hispanic or Latino	0.1%	0.0%	0.2%	0.0%	0.0%

Source: US Census 2014b.

Although the all four counties exhibit low-income characteristics, there are individual areas that appear to have concentrated areas of low-income residents:

- Census Tract 9507 in Campbell County has a poverty level of approximately 42.0% and is located in the LaFollette area.
- Census Tract 9506 in Campbell County has a poverty level of approximately 35.1% and is located in the Fordtown and northern LaFollette area.
- Census Tract 9753 in Scott County has a poverty level of approximately 29.4% and is located in the Norma/Huntsville area.

CULTURAL RESOURCES

Cultural resources include archaeological resources, historic structures and districts, cultural landscapes, ethnographic resources, and museum objects. This section provides an overview of the history of the region and assesses the potential for cultural resources within the evaluation area based on nearby studies. Only archaeological resources and historic structures and districts are carried forward for analysis in this document. Although there has been little archaeological investigation of the evaluation area, studies in nearby areas indicate that there is a high potential for these resources to be present within the evaluation area.

HISTORIC CONTEXT OF THE AREA

Physical evidence indicates that East Tennessee has been an area of human occupation for the last 12,000 years.

The following summary of regional prehistory of the Cumberland Plateau provides a context for the archaeological research conducted as part of the draft petition evaluation document / environmental impact statement (draft PED/EIS). This overview examines cultural chronology, typology, and current interpretations of the region's Native American archaeological record. The Tennessee River Valley has a long history of government sponsored archaeological research under the auspices of the TVA, and much of this research is pertinent to the Cumberland Plateau (Lyon 1996). Archaeological research conducted as part of the Chickamauga, Normandy, and Tellico reservoir impoundment projects provided much of the data summarized below (Chapman 1975, 1977, 1985; Faulkner and McCollough 1973; Schroedl, Davis, and Boyd 1985).

Additional perspectives on the prehistory of the Cumberland Plateau were derived from research sponsored by the NPS and the TDOT (Bentz 1995, 1997; Ferguson et al. 1986). Several university theses and dissertations were also examined for contextual information (Franklin 2002).

Archaeologists divide Tennessee prehistory into eight broad chronological periods: Paleoindian (ca. 11,500 to 10,000 years before present [BP]), Early Archaic (ca. 10,000 to 8000 BP), Middle Archaic (ca. 8000 to 5500 BP), Late Archaic (ca. 5500 to 3000 BP), Early Woodland (ca. 3000 to 2200 BP), Middle Woodland (ca. 2200 to 1500 BP), Late Woodland (ca. 1500 to 1100 BP), and Mississippian (ca. 1100 to 400 BP) (dates uncalibrated) (Chapman 1985; Faulkner 2002).

Although Paleoindian sites are often rare due to their age and the ephemeral nature of most habitations, there is evidence for Paleoindian occupation of Tennessee. For example, over 1,000 fluted points, characteristic of this period and 100 archaeological sites have been identified that date to the Paleoindian period (Chapman 2009).

Apart from rare subsurface sites, such as Carson-Conn-Short and Dust Cave, the archaeological record of the Paleoindians in Tennessee consists mainly of projectile points (sometimes occurring in clusters designated as sites or localities) collected from plowed fields. Tabulation of such finds has shown that one of the densest concentrations of fluted points in North America is in western Tennessee. Paleoindian points are comparatively quite sparse in central and eastern Tennessee, although some have been recovered from surface contexts in the Eastern Highland Rim and Cumberland Plateau region (Franklin 2002:32).

In Tennessee, archaeologists conventionally divide the Archaic period into three sequential chronological units: Early (ca. 10,000 to 8000 BP), Middle (ca. 8000 to 5500 BP), and Late (ca. 5500 to 3000 BP). The beginning of this period coincides with the sudden onset of the present interglacial climatic era, the Holocene, at 11,600 cal BP (or 10,000 radiocarbon years BP). Faced with an altered climate and environment in the Southeast, the people of the Archaic period developed a diversified subsistence economy based upon a seasonal round of hunting, fishing, and harvesting nuts and seeds (Caldwell 1958). This diverse resource base allowed population growth, which led to territorial constriction and regional variability of cultures, development of trade and exchange networks, and ultimately the emergence of more complex societies Although people occupied rock shelters throughout prehistory, there is evidence of Archaic occupation of these features in the vicinity of the project area particularly at the Big South Fork National River and Recreation Area and the Obed Wild and Scenic River (NPS 2012).

Archaeologists divide the Woodland period in eastern Tennessee into Early (ca. 3000 to 2200 BP), Middle (ca. 2200 to 1500 BP), and Late (ca. 1500 to 1000 BP) (Faulkner 2002). Semi-permanent to permanent villages were established in riverine settings. Pottery, introduced during the Late Archaic, became more widespread for storage and cooking; new ceramic styles appeared, including cord-marked and fabric-impressed wares. Burial mounds and other earthworks were constructed; associated with the mounds were mortuary ceremonies and some degree of social stratification. Early in the Woodland period cultivation of the native plants of the Eastern Agricultural Complex intensified; their importance was eclipsed by maize in Late Woodland and Mississippian cultures (Chapman 1985).

These changes did not take place throughout Tennessee at the same time and although agriculture appeared in some places during this period, there is no evidence for this activity or the construction of large villages in the nearby Big South Fork National River and Recreation Area or Obed Wild and Scenic River. Instead, people continued to occupy rock shelters and there is evidence that these types of occupations increased during this time (NPS 2012).

Because of the paucity of identified Mississippian sites in the Cumberland Plateau, the late prehistoric culture historic framework for the region relies heavily on data generated by the Chickamauga Basin and Tellico Reservoir archaeological projects (Chapman 1985; Polhemus 1987; Schroedl, Davis, and Boyd 1985).

Archaeologists divide the Mississippian period in eastern Tennessee into Emergent, Early, and Late chronological units. In general, Mississippian cultures are characterized by the construction of platform mounds around a central plaza; use of bow and arrow; floodplain agriculture based on maize, beans, and squash; religious rituals and symbols associated with fertility; long-distance trade; increased territoriality and warfare; and a chiefdom level of political organization with social ranking (Chapman 1985; Walthall 1980).

Mississippian populations throughout the Southeast enhanced agricultural production and the exploitation of wild foods by locating settlements in floodplain settings that combined the advantages of easily tilled soils and access to rich sources of fish and waterfowl in oxbow lakes (Smith 1978). A multi-tiered settlement system consisting of mound centers, villages, hamlets, farmsteads, and special activity loci has been documented for Mississippian societies occupying major river valleys across the Southeast (Anderson 1994).

Franklin (2002) reports that large open sites dating to the Mississippian period are rare in the Eastern Highland Rim. The absence of wide alluvial floodplains in this region may account for the paucity of such sites. Most of the Mississippian sites in this area are located instead in upland coves, rock shelters, and caves. Relatively few Mississippian sites were found during the survey of the Normandy Reservoir (Faulkner and McCollough 1973).

In the nearby middle Cumberland River Valley, however, sufficient evidence has been gathered to construct two separate and distinct cultural units known as the Dowd phase (ca. 950 to 700 BP) and the Thruston phase (750 to 650 BP) (Franklin 2002). In the Nashville Basin, evidence of Mississippian mortuary practices has been recovered from the Averbuch Site. Three cemetery areas and an associated village yielded 887 human skeletons from 645 graves. Many of these graves were lined with slabs of limestone and contained non-utilitarian funerary goods.

The Protohistoric period begins with the Spanish exploration of the Southeast by Hernando DeSoto and his men. Landing on the west coast of Florida at Tampa Bay in the spring of 1539, Desoto led a small army of Spaniards on a trek of about 4,000 miles, encountering along the way many of the chiefdoms and polities that characterized the Mississippian world at that time (Hudson 1997). It appears that the indigenous peoples of eastern Tennessee had little contact with Europeans for about 100 years following the last Spanish incursions in 1568 until the arrival of English traders in 1670s (Hudson 1990).

By 1780, the Big South Fork and its tributaries were being explored and hunted. People began to homestead the area in the 1800s and small farms and communities were established along the upper Cumberland Plateau and the river bottoms of the Big South Fork and Cumberland Rivers (NPS 2012).

Prior to the 18th century, Native Americans of the Cherokee nation were the primary occupants of East Tennessee. Although the exact statistics are a matter of scholarly debate, it is widely accepted that in the 18th century the Cherokee population numbered between 16,000 and 22,000, with a territory that encompassed 126,000 square miles, including portions of eight states (Anderson County 2009). This huge territory included large buffer areas between the Cherokee and their enemies, the Creeks, Choctaws, and Chickasaws to the south and the Shawnees to the north (Ross 1999). The heartland of the Cherokee during this period contained 60 towns spread across the Appalachian Summit of Georgia, North Carolina, and Tennessee with settlements in the Ridge and Valley and South Carolina Piedmont (Schroedl 2001). Almost all of the autonomous Cherokee political entities were destroyed during the colonial wars of the mid-18th-century culminating in the American Revolutionary War.

By the early 1800s, European-American settlers began to move their settlements into Native American territory. Aspirations for the preservation of an autonomous Cherokee Nation east of the Mississippi River were not to be met, as political pressure to cede lands rapidly accelerated in the first decades of the 19th century. Between 1784 and 1836, the Cherokee entered into 16 treaties with the United States, all of which included cession of land in return for annuities, usually in the form of manufactured goods (Davis 1973). Responding to the outcries of its constituents, the United States Congress passed an Indian removal bill in 1830, which was signed into law by President Jackson (Davis 1973).

Enacted in 1835, the Treaty of New Echota was the instrument by which the United States asserted its authority to remove the Cherokee forcibly to lands west of the Mississippi River. The stipulations of the treaty were enforced by the US Army and state militias between 1836 and 1839, resulting in the removal of somewhere between 12,000 and 16,000 Cherokees from their homeland to the Indian Territory in what is now Oklahoma (Davis 1973). Loss of life and property was monumental as Cherokee families were forced to sell their property and belongings to unscrupulous whites under the eyes of impatient and unsympathetic soldiers. It is estimated that as many as 4,000 lost their lives during capture, detention, removal, and as a direct consequence of removal (Davis 1973). This number includes 1,400 to 1,600 individuals who died on the journey west, aptly named the Trail of Tears. The first permanent white settlement in what is now known as Anderson County dates to 1796 represented by a cabin built by Thomas Frost. Settlements expanded after statehood (1796) due largely to the arrival of German immigrants in 1800. Anderson County was created from parts of Knox and Grainger Counties. Agriculture formed the key occupation in the county's early history. Land speculation, especially in coal mining areas, began in the 1830s and continued throughout the 19th century. After the county was linked to the regional railroad networks, coal mining became its leading industry (Tennessee Historical Society 2010a).

Campbell County was created on September 11, 1806, from land taken from Anderson and Claiborne Counties. The primary attraction for early settlers was the wide, fertile swath of land known as Powell's Valley. Wide, navigable rivers and numerous tributaries also lured settlers to the county. Farming was the first organized activity, although the numerous coal and iron deposits began to attract attention in the early 1800s. Logging also provided benefits to the local economy. Railroad development in the county transformed the economy from subsistence farming to coal mining and lumber production. Except for temporary slumps, coal ruled the economy for three-quarters of a century. By the mid-1930s, men found employment in the coal mines while women worked in the growing textile industry (Tennessee Historical Society 2010b).

In 1817, Morgan County became the 39th county in Tennessee, derived from territory removed primarily from Roane County. The first permanent settlers are believed to be Samuel and Martin Hall who arrived soon after the Third Tellico Treaty opened the area to settlement in 1805. Early settlers made their homes in the isolated mountain valleys of the county. Only about half the acres in the county had land suitable for agriculture. The two major rivers in the county—the Obed and the Emory—were not suitable for the transportation of goods. Due to this situation, settlers engaged in subsistence farming, and the settlement and development of the county was slow. The abundance of coal, however, offered potential for economic advancement in the county.

Coal was first extracted in 1819. By 1860, two mines were in operation, employing nine men and producing $15,000 in coal annually. The Cincinnati Southern Railroad opened in Morgan County in 1880. Its opening brought significant changes to the lives of those in the county. The railroad ran south to north through the county, with shorter lines extending to the logging areas. As a result of the railroad, the extractive industries flourished and several towns profited from their position along the rail line (Tennessee Historical Society 2010c).

Scott County was created in 1849 out of parts of Anderson, Campbell, Fentress, and Morgan Counties. Settlers in the early 19th century carved out small, self-sufficient farms from the wilderness. Poor farming conditions (e.g., soils, topography) deterred population growth. In the mid-19th century, industry was limited to independent grist mills and whiskey production. Construction of the Cincinnati Southern Railroad in the early 1880s opened the county to timber, mining, and other industrial development. Extraction of natural resources provided the foundation for local urban and economic development until the Great Depression with Oneida serving as a shipping point for timber, coal, farm products, and livestock (Tennessee Historical Society 2010d).

Cultural resources that would typically occur within mine sites include cemeteries, historical sites and structures, archeological sites, and other features of cultural significance to surrounding communities. Historical cemetery sites may exist in coal mining areas because they were often located on mountaintops and ridge crests. Documentation indicates that Civil War activity did occur in the area of the evaluation.

ARCHAEOLOGICAL RESOURCES

Archeological resources consist of “any material or physical evidence of past human life or activities which are of archeological interest, including the record of the effects of human activities on the environment. They are capable of revealing scientific or humanistic information through archeological research” (NPS 1998). Archeological resources include both prehistoric and historic periods and can be found in both terrestrial and underwater settings.

In Tennessee, the agency responsible for maintaining an inventory of the state’s identified archaeological sites is located in Nashville. Research was conducted at the Tennessee Division of Archaeology in order to compile data on the known archaeological resources located within the evaluation area. Documented archaeological investigations in the evaluation area have been on-going since 1982 (Benthall and Manning 1988; Elmendorf 1986; Lawrence 2003; Niquette 1993; Pietak and Holland 2003). These combined studies have resulted in the identification of 14 sites (table 4-46).

TABLE 4-46: PREVIOUSLY IDENTIFIED ARCHAEOLOGICAL RESOURCES IN THE EVALUATION AREA

Site No.	County	Site Type	Temporal Period	Nation Register Recommendation
40CP46	Campbell	Open habitation	Undetermined prehistoric	Not evaluated; No further work recommended
40CP48	Campbell	Open habitation; Farmstead	Undetermined prehistoric; Late 19th-century	Not evaluated, No further work recommended
40CP49	Campbell	Open habitation	Undetermined prehistoric	Not evaluated; no further work recommended
40CP50	Campbell	Rock shelter; ruined historic structure	Undetermined prehistoric; Late 19th-century	Not evaluated
40CP57	Campbell	Open habitation; Farmstead	Undetermined prehistoric; Early-20th-century	Not eligible; No further work recommended
40CP134	Campbell	Rock shelter	Undetermined prehistoric	Not eligible; No further work recommended
40CP135	Campbell	Rock shelter	Undetermined prehistoric	Not eligible; No further work recommended
40CP137	Campbell	Historic cemetery	Late 19th-century	Not evaluated
40MO82	Morgan	Open habitation	Undetermined prehistoric	Not evaluated; further work is recommended
40MO83	Morgan	Open habitation	Archaic	Not evaluated; further work is recommended
40MO121	Morgan	Open habitation	Middle Archaic; Late Archaic	Not evaluated
40MO123	Morgan	Open habitation	Undetermined prehistoric	Not evaluated
40MO124	Morgan	Open habitation	Early Archaic	Not evaluated
40MO125	Morgan	Farmstead	Late 19th-century	Not evaluated

The summary data provided on the site forms and published reports indicate that nine of these sites have been classified as Native American in origin. These sites are characterized as open habitation concentrations of lithic artifacts and rock shelters in upland settings. Two sites have been inventoried as historic in age related to the largely Anglo-American settlement of the area during the late 18th–early

19th centuries. A few of these sites are related to farming and mining activities. Three sites have both Native American and likely Anglo-American components.

According to the site forms, Sites 40CP57, 40CP134, and 40CP135 have been recommended as not eligible for the National Register of Historic Places (see table 4-46). Sites 40MO82 and 40MO83 were recommended for additional archaeological investigation. It appears from the site forms that insufficient archaeological work was done at the remaining nine sites to support a National Register eligibility recommendation. For the purposes of this document, these sites have been classified as not evaluated.

Archaeological investigations in the evaluation area have been limited to a few localities in Campbell and Morgan Counties (Benthall and Manning 1988; Elmendorf 1986; Lawrence 2003; Niquette 1993; Pietak and Holland 2003). Given the minimal archaeological investigations within the evaluation area, information from the nearby Big South Fork National River and Recreation Area, the Obed Wild and Scenic River, and the Flat Fork were considered in the Tennessee LUM evaluation document and environmental impact statement (EIS) to demonstrate the potential for similar sites or evidence in the evaluation area.

The Big South Fork National River and Recreation Area sits as close as 6 miles northwest of the evaluation area. According to the NPS, some consider the Big South Fork National River and Recreation Area the most important archeological location in the NPS Southeast Region (NPS 2012). This area contains approximately 1,350 documented archeological sites with speculation that this number may represent only 40% of the estimated total for the park unit (NPS 2012). Between 1996 and 2001, 249 new culturally associated rock shelters were recorded, dated as early as Paleo-Indian through the Mississippian periods (10,000 BC–AD 1400) to the modern historic period (AD 1900–974) (NPS 2012).

Archeological resources at the Big South Fork National River and Recreation Area consist of locations used by prehistoric hunter-gatherers and include limited-use and seasonal hunting camps, rock shelters, semi-sedentary open campsites, and small hunting camps. Archeological sites created by historic occupations include 19th century farms and communities, moonshine still operations, niter (or saltpeter, an essential ingredient of gunpowder) mined rock shelter sites, salt manufacturing locations, coal mines and coal camps, timber production sites, and contemporary farms (NPS 2012).

The Obed Wild and Scenic River sits as close as 5 miles south-southwest of the evaluation area and approximately 20 miles south of the Big South Fork National River and Recreation Area. Similar to the Big South Fork National River and Recreation Area, the cultural history of the Obed Wild and Scenic River dates to the Paleo-Indian Period about 12,000 years ago. Native Americans lived in this region, hunting and gathering food along the river banks. More than 200 rock shelters have been recorded within the Obed Wild and Scenic River boundaries, with 10 assessed as significant archeological sites possibly eligible for the National Register of Historic Places (NPS 2012). Archeological resources in the vicinity include rock shelters, prehistoric open camps, historic camps, gristmills, moonshine still sites, subsistence farms, timber production sites, coal mines, and segments of historic railroad grade. Based on physiographic features and archeological investigations at the nearby Big South Fork National River and Recreation Area, an estimated 340 rock shelters may exist within the congressionally approved boundary of the Obed Wild and Scenic River (NPS 2004).

In late 1984, the Tennessee Division of Archeology conducted a survey to evaluate the archeological resources in the Flat Fork evaluation area, located approximately 1.5 miles south of the evaluation area. This survey revealed 15 prehistoric archeological sites. Four of the sites were small rock shelters or rock overhangs, exhibiting artifactual evidence of prehistoric human use. One site produced a projectile point characteristic of the Late Archaic Period (dating from about 1,000 BC). The remaining 11 sites are in Flat Fork valley and consist of prehistoric Indian campsites and villages, dating mainly from the Archaic

Period (9,000 to 1,000 BC). Eight of these sites were either too disturbed or contained too little artifactual material to warrant further investigation. Three sites warranted additional archeological research and are potentially eligible for the National Register of Historic Places.

HISTORIC RESOURCES

Historic structures are usually immovable, although some have been relocated and others are mobile by design. Historic structures include buildings, dams, millraces and canals, bridges, tunnels and roads, railroad locomotives, stockades and fences, defensive works, and outdoor sculpture (NPS 1998). A historic district "possesses a significant concentration, linkage, or continuity of sites, buildings, structures, or objects united historically or aesthetically by plan or physical development" (NPS 1997b).

According to the Tennessee Historical Commission, 30 properties on the National Register of Historic Places are within the four counties of the evaluation area: 18 in Anderson County, 6 in Campbell County, 2 in Morgan County, and 4 in Scott County (NPS 2014a). None of the properties appear to be situated within the evaluation area. Records at the Tennessee Historical Commission indicate that three previously surveyed structures are located within the evaluation area (table 47). All of these resources have been determined not eligible for listing in the National Register of Historic Places (Rogers 2015).

TABLE 4-47: PREVIOUSLY IDENTIFIED ARCHAEOLOGICAL RESOURCES IN THE EVALUATION AREA

Survey No.	County	Name	Nation Register Recommendation
MO00233	Morgan	Old Albert Newport Barn	Not Eligible
40CP48	Morgan	Albert Newport Barn	Not Eligible
40CP49	Morgan	Oak Hill School	Not Eligible

The potential for historic structures within the evaluation area can also be drawn from historical maps and historic resources identified in other areas in the immediate vicinity of the evaluation area.

Historic structures identified within the Big South Fork National River and Recreation Area are associated with early settlers, Cumberland farmsteads, and the brief boom of the industrial revolution. Historic resources include 13 "Cumberland" style farm structures, three railroad bridges, a low-water timber bridge, and a large steel coal mine tipple that have been determined eligible for listing in the National Register of Historic Places. Seventeen resources within the List of Classified Structures are primarily significant for their association with the subsistence farming culture of the Cumberland Plateau and as examples of vernacular folk architecture of Southern Appalachia.

Within the Obed Wild and Scenic River there are no identified historic structures listed in the List of Classified Structures or in the National Register of Historic Places. Potential historic structures within the park include resources associated with small coal mines located in the vicinity of the Obed Wild and Scenic River. Mines were in operation in the area as early as 1847. The number of mines increased by the end of the 19th century following the construction of the railroads and as a result of iron furnaces located around Rockwood that required coal. A number of mines were established after the 1880s, prior to the arrival of strip mining after World War II. Structures within the Obed Wild and Scenic River that are associated with coal mining and extraction sites include a 1880s railroad tunnel and mining camp remnants. Other aboveground resources of the historic period include gristmills, oil and gas development sites, and sandstone quarries used for producing building stones (NPS 2012).

Historical settlement and industry patterns suggest the potential for similar resources within the evaluation area. Aboveground resources are most likely related to subsistence farming and settlement, mining, logging, railroad, or other extraction-related activities.

PUBLIC HEALTH AND SAFETY

Public health and safety issues inherent to surface coal mines are described in this section, but first a brief description of surface mining methods is provided to give a better sense of how some of these issues are created. Surface-mining methods include area, contour, mountaintop removal, auger, and cross-ridge mining. Area mines are surface mines that remove shallow coal over a broad area where the land is relatively flat. Contour mines are surface mines that mine coal in mountainous terrain. A wedge of overburden is removed along the coal outcrop on the side of a mountain, forming a bench at the level of the coal. Mountaintop removal mines are area mines used where several thick coal seams occur near the top of a mountain. Large quantities of overburden are removed from the top of the mountains, and this material is often used to fill in valleys next to the mine. Auger mines are operated on surface-mine benches; the coal in the side of the mountain that cannot be reached by contour mining is drilled or augered out (Kentucky Geological Survey 2012). Cross-ridge mines are area mines that remove overburden and coal near the top of a mountain. A cross-ridge mine must be reclaimed using mine spoils to restore the approximate contours that existed prior to mining.

The specific surface-mining-related hazards that pose a potential risk to public health and safety within the evaluation area include:

Illustration of a Partially Reclaimed Highwall

Highwalls and Pits: Highwalls and pits are located where large areas of earth were excavated to uncover minerals near the surface. Open pits can be dry or filled with water. Water-filled pits pose a potential drowning hazard and can contain submerged physical hazards; furthermore the water can be highly acidic or contain harmful chemicals. Highwalls are vertical cliffs that can be unstable at the top and the bottom and have the potential to collapse. When approached from the top, the vertical edge of a highwall may not be seen in time or may crumble, leading to a fatal fall (BLM 2011). The highwalls within the evaluation area were created before SMCRA regulations took effect. Current regulations require that all highwalls be eliminated to the maximum extent technically practical using all available spoils. The OSMRE has used 4-foot LiDAR aerial imagery, taken between March 7, 2011, and April 3, 2011, to estimate that approximately 390.6 miles of highwalls are present within the evaluation area. By reviewing all cross sections included in surface mining permits within the evaluation area over a 10-year period (January 1, 2002 – January 1, 2012), the OSMRE determined that the average height of the existing highwalls is approximately 60 feet. The presence of highwalls and pits would present the greatest safety risk to hikers and off-highway vehicle riders. For highwalls in the evaluation area see figure 4-24.

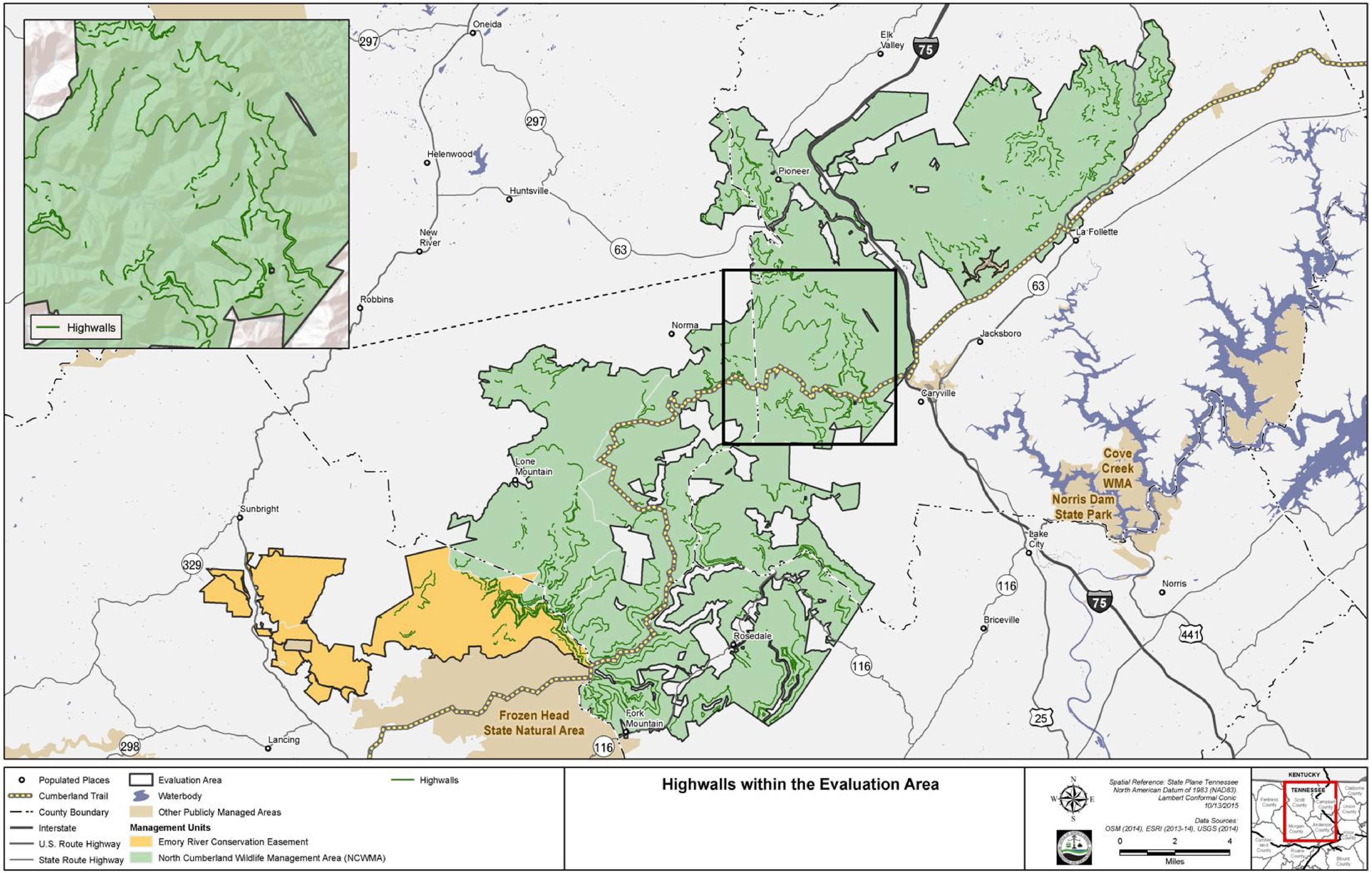


FIGURE 4-24: HIGHWALLS WITHIN THE EVALUATION AREA

Vehicle Traffic: Transportation of coal from the evaluation area occurs via truck. The Cumberland Trail State Park intercepts the haul road system that is present within the evaluation area at multiple locations. There are approximately 24.7 miles of permitted haul roads within the evaluation area. On the occasion when a recreational user encounters coal-related vehicular traffic, the noise, dust, and exhaust associated with the traffic could present a risk to the health of the user. There is also potential for coal-related vehicle accidents with recreational users crossing or traveling along haul roads. Accidents could be caused by operator error, mechanical failure (i.e., brake failure on steep decline), or other factors. The recreational users at risk would include hikers, off-highway vehicle riders, and auto tourists traveling in the vicinity of active coal haul roads.

Combustion from Engines: Diesel engines provide power to a wide variety of vehicles, heavy equipment, and other machinery used in mining and coal transportation operations. The exhaust from diesel engines contains a mixture of gases and very small particles that can create a health hazard when not properly controlled. Diesel particulate matter is a component of diesel exhaust that includes soot particles made up primarily of carbon, ash, metallic abrasion particles, sulfates, and silicates. Diesel soot particles have a solid core consisting of elemental carbon, with other substances attached to the surface, including organic carbon compounds known as aromatic hydrocarbons.

Short-term exposure to high concentrations of diesel exhaust/diesel particulate matter can cause headache, dizziness, and irritation of the eye, nose, and throat severe enough to distract or disable miners and other workers. Prolonged exposure to diesel exhaust and diesel particulate matter can increase the risk of cardiovascular, cardiopulmonary, and respiratory disease and lung cancer (OSHA and MSHA 2012). Air quality issues are discussed in greater detail in the “Air Quality and Greenhouse Gases” section.

Noise: Noise is generated by mining equipment, blasting, and transportation of the coal at active mines within the evaluation area. Depending on a number of variables such as proximity, duration, and intensity of exposure, noise generated by surface mining operations has the potential to impact the health of members of the public who are in the vicinity of the mine or haul road at the time the noise is generated. Noise is discussed in greater detail in the “Soundscapes” section.

Fugitive Dust: Surface mining operations and transportation of coal over the haul roads within the evaluation area have the potential to generate airborne particulate matter or fugitive dust. The EPA has developed national air quality standards to protect public health, welfare, and the environment from the potential effects of particulate matter less than 10 microns and greater than 2.5 microns in diameter and particulate matter 2.5 microns or less in diameter. Particulates in this size range can harm human health if inhaled. Particulate matter of any size can also impair visibility and contaminate materials and buildings (NDEQ 2014). Air quality issues are discussed in greater detail in the “Air Quality and Greenhouse Gases” section.

Blasting: Surface coal mine operations frequently have to loosen the rock above a coal seam. Blasting is a common technique used for this purpose. After the topsoil and subsoil layers are removed and stockpiled for later reclamation, holes are drilled in the rock and explosives are loaded into them. Denotation of the explosive materials fractures the rock so it can then be moved with heavy earth-moving equipment. Dynamite is not typically used in surface coal mining. The blasting agent commonly used is called ANFO, a mixture of ammonium nitrate and fuel oil.

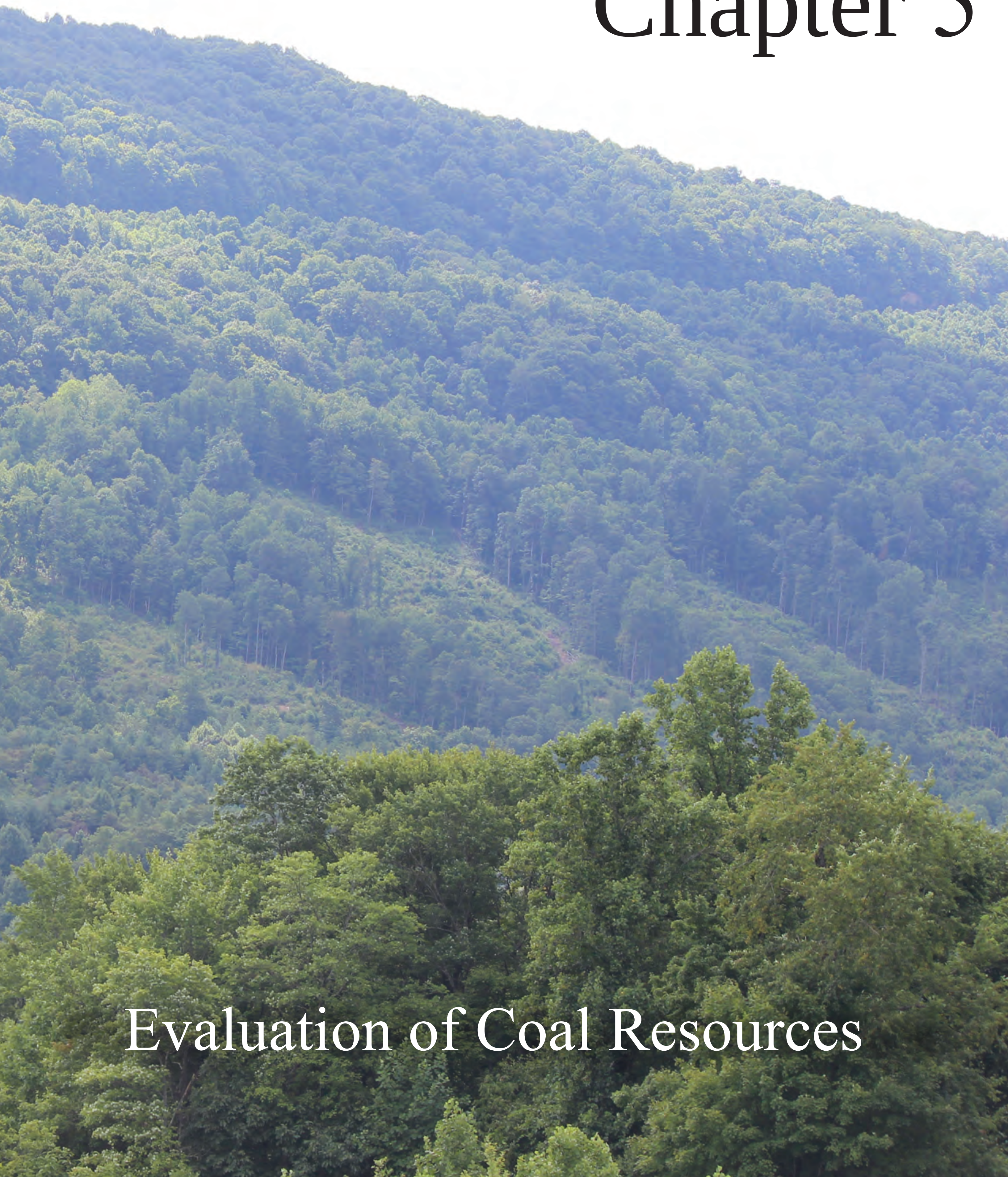
Flyrock, the rock propelled beyond the blast area by the force of an explosion, is the principal risk to public. Since the implementation of SMCRA, there has been one blasting / flyrock incident in Tennessee that impacted public health and safety. A passenger in a vehicle on Interstate 75 north was killed by flyrock. The cause of this accident was found to be negligence because the approved blasting plan was not followed (NIOSH n.d.).

Fire: Fire is a potential hazard during surface coal mining operations. Coal mine/seam fires exist in all coal mining regions of the Unites States. During the period from 1990 through 2007, there were 1,601 reportable fires in the United States mining industry. The leading causes of United States mine fires include flame cutting and welding operations, frictional heating and ignitions, electrical shorts, mobile equipment malfunctions, and spontaneous combustion (NIOSH 2010).

Water Contamination: If not properly handled during the mining and reclamation process, high sulfur coals and associated overburdens can potentially generate significant acidity with high concentrations of metals resulting from the low pH water. Such occurrences are relatively rare throughout the evaluation area and generally restricted to only a few coal seams. Should this occur, highly acidic water rich in metals can leach from surface coal mines and pose a potential public health risk. Abandoned mines can produce acid mine drainage for more than 100 years and, consequently, pose significant risks to surface water and groundwater. Acid mine drainage can lower the pH of surrounding surface water, making it corrosive and unable to support certain forms of aquatic life and vegetation. Humans may also be affected by consuming contaminated water and fish tissue (BLM 2014). Active and abandoned mines exist within the evaluation area. The specific water quality issues present are discussed in greater detail in the “Water Resources” section.

Chapter 5

Evaluation of Coal Resources



CHAPTER 5: EVALUATION OF COAL RESOURCES

INTRODUCTION

As required by section 522(d) of the Surface Mining Control and Reclamation Act (SMCRA), this chapter analyzes the potential coal resources of the petition area, the demand for coal from the petition area, and the impact on the economy and coal supply resulting from designating the petition area unsuitable for surface coal mining operations.

In order to fully analyze the coal resources in the petition area, this chapter takes a holistic approach to the coal resources in the entire North Cumberland Wildlife Management Area (NCWMA) and Emory River Tracts Conservation Easement (ERTCE) areas. All coal resources within the NCWMA and ERTCE area (including the petition area) are analyzed, categorized, and quantified within the limits or accuracy of the information available. The areas to be analyzed in this chapter are shown below:

1. **Regional Geology**: The regional geologic structure and stratigraphy of the NCWMA and ERTCE area is described.
2. **Potential Coal Resource**
   a. **Data Review**: The source of all data used in the coal resource analysis is established.
   b. **Commercial Coal Seam Determination**: Criteria are described for the selection of the coal seams to be analyzed and an in-depth description of each of the coal seams is provided.
   c. **Coal Seam Outcrop Determination**: Using geologic modeling, LiDAR mapping, and published coal seam outcrop data the location of the commercially viable coal seams is established.
   d. **Assumptions/Criteria**: Methodologies used for the geologic modeling and determinations of the coal resource quantification is discussed.
   e. **Mining Methods**: Descriptions of the various mining methods used in the coal resource calculations are provided.
3. **Alternative Analysis of Coal Resource**: Discussion and quantification of the effects of each of the alternatives on the coal resource are provided**.**
4. **Supply and Demand for Petition Area Coal**: A financial/commercial analysis of the supply and demand for petition area coal on a regional, nationwide, statewide, and local basis is performed.

The NCWMA and ERTCE area encompasses approximately 172,000 acres, and within this area there are multiple coal seams, coal seam riders, and geologic anomalies that constitute a very complex environment for surface coal mining. Therefore, no resource estimates generated as part of this NCWMA, Tennessee Lands Unsuitable for Mining Petition Evaluation Document / Environmental Impact Statement (draft PED/EIS) should be used as a definitive reserve calculation. This data does, however, provide an estimation on which the impacts to local, regional, and national coal supplies can be calculated.

REGIONAL GEOLOGY

STRUCTURE

The NCWMA and the ERTCE lie predominantly in two distinct structural areas of the Tennessee coalfield. The majority of the petition area is located in the North Cumberland Plateau/Wartburg Basin which is a structural low centered near the area where Scott, Morgan, Anderson, and Campbell Counties come closest to a common corner (figure 5-1). While the basin is a structural low, it is also a topographic high, containing the highest elevations in Tennessee outside of the Blue Ridge physiographic province along the border with North Carolina. The basin represents a highly eroded and deeply dissected plateau surface which bears little resemblance to the original physiography because of the lack of major resistant sandstones in these higher Pennsylvanian strata.

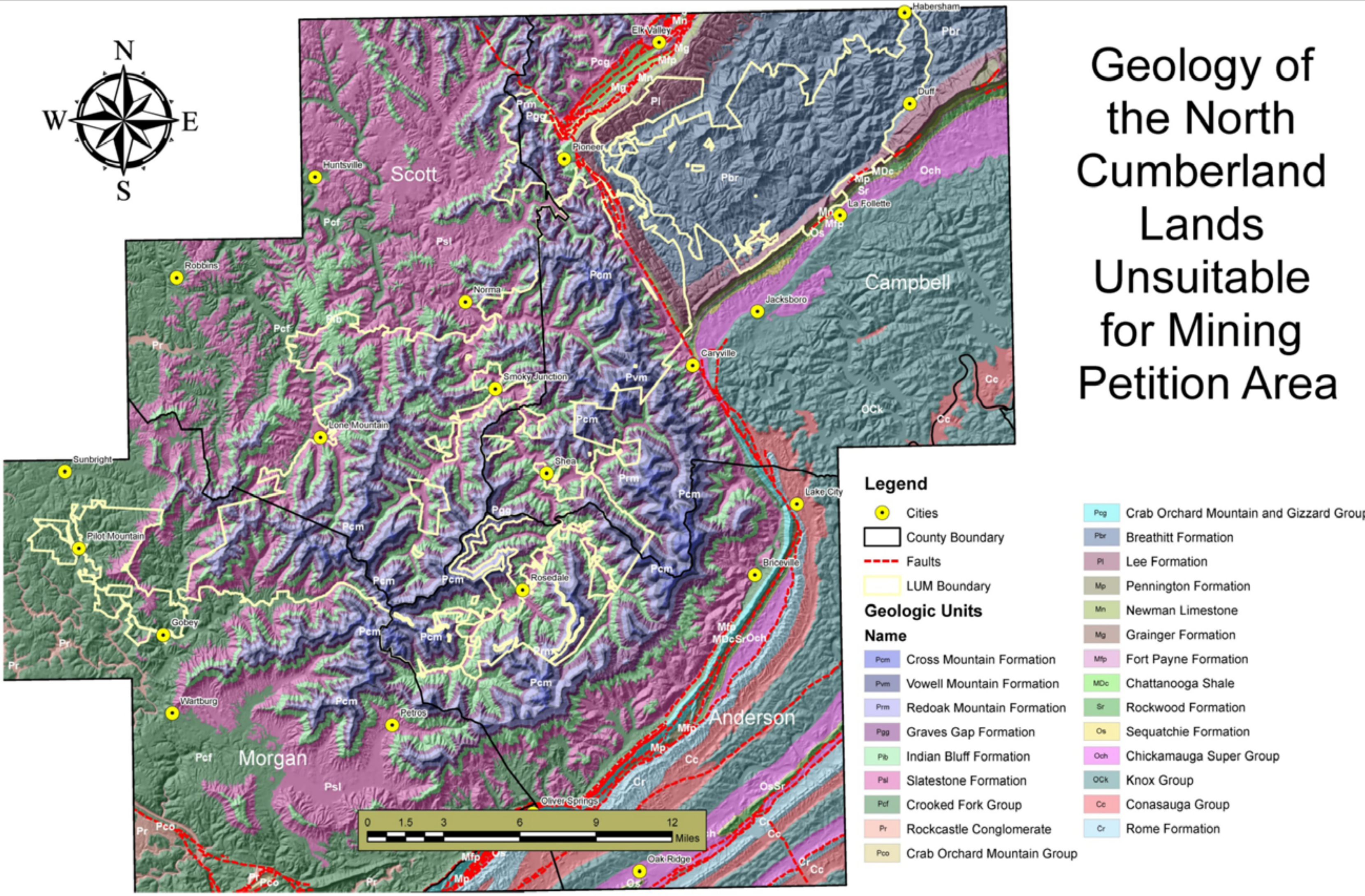
North Cumberland Plateau/Wartburg Basin

The Wartburg Basin is bounded on the southeast by Walden Ridge and on the northeast by the Jacksboro-Pine Mountain fault system. To the west it merges into the North Cumberland Plateau, which dips slightly to the east off the Nashville Dome, a southern extension of the Cincinnati Arch. The basin continues to the north into Kentucky. Strata dip gently into the basin from the Nashville Dome to the west and the Cumberland Plateau overthrust to the south, and steeply into the east side of the basin off Walden Ridge, the Jacksboro fault, and the Pine Mountain fault. Dips average less than 2 degrees except around the perimeter of the basin where more intense tectonic activity have resulted in strata dipping greater than 50 degrees into the basin. No major faults or folds are recognized in the interior parts of the basin, although they become increasingly profuse toward the tectonic boundaries of the basin.

Cumberland Block

The northeastern portions of the NCWMA and ERTCE are located in the Cumberland Block portion of the Tennessee coalfield. The Cumberland Block is bounded on the southeast by Cumberland Mountain, to the southwest by the Jacksboro tear fault, and the northwest by the Pine Mountain and the Pine Mountain fault system to the northeast, the Cumberland Block continues into Kentucky and Virginia. The Cumberland Block is a rectangular shaped physiographic province that has been shifted along the two fault systems; horizontally, a distance of approximately 11 miles along the southwest end and approximately 2 miles at the northeast end (Englund 1968) and uplifted vertically by nearly 500 feet. Because of these displacements, correlations across the Jacksboro-Pine Mountain fault system are difficult and have resulted in numerous miscorrelations.

From the peripheral margins of the Cumberland Block, rock strata initially dip steeply toward the interior of the basin before flattening out to form a relatively flat bottomed, asymmetrical basin. Along Pine Mountain, the beds dip from 10 to 35 degrees to the southeast. The strata along Cumberland Mountain dip even more steeply to the northwest, being locally vertical (Wilson, Jewell, and Luther 1956). The basin is bisected by the northward-trending Well Spring-Log Mountain anticline, forming two smaller subsidiary basins. The northeastern portion of the NCWMA and ERTCE is located in the Habersham basin while the Fonde basin is located to the northeast in Claiborne County, Tennessee and Whitley and Bell Counties, Kentucky. Since the geologic strata in the interior areas of the Cumberland Block are relatively flat lying, the geologic structure does not generally have a significant effect on coal mining. However, because of the uplift and subsequent erosion, many of the more abundant and common coals found in Kentucky and Virginia have been removed.



Source: Tennessee Division of Geology preliminary field maps and published maps.

FIGURE 5-1: SURFACE GEOLOGY OF THE NORTH CUMBERLAND WILDLIFE MANAGEMENT AREA AND ADJACENT AREAS

STRATIGRAPHY

The stratigraphic sequences of the NCWMA and ERTCE follow two distinctly different nomenclatures. The stratigraphy of the North Cumberland Plateau/Wartburg Basin follows the nomenclature developed by the Tennessee Geological Survey (Wilson, Jewell, and Luther 1956) while the Cumberland Block follows the current nomenclature used by the US Geological Survey (McDowell, Rice, and Newell 1985). The North Cumberland Plateau/Wartburg Basin section of the NCWMA and ERTCE represents nearly all of the Pennsylvanian-age strata preserved in Tennessee while the Cumberland Block has been subjected to nearly 500 feet of vertical displacement and has been subjected to more erosion of the younger Pennsylvanian strata. Figure 5-2 shows the generalized stratigraphic sequence of the North Cumberland Plateau/Wartburg Basin while figure 5-3 shows the general stratigraphy of the Cumberland Block area of Campbell County. While the maximum aggregate thickness of all Pennsylvanian rocks in Tennessee is estimated to be more than 4,000 feet (Luther 1959), only the highest elevations of the Cumberland Mountain section of the coalfield would approach such an overall thickness. Erosional processes have removed much of the Pennsylvanian strata across the southern and western portions of the Cumberland Plateau leaving only the most resistant sandstones and conglomerates as a caprock over most of the Tennessee coalfield. The following sections briefly describe the stratigraphy of both the North Cumberland Plateau/Wartburg Basin and Cumberland Block which represent two distinct divisions of the NCWMA and ERTCE.

North Cumberland Plateau/Wartburg Basin (Cumberland Mountains)

The Wartburg Basin is a structural low which corresponds closely to the Cumberland Mountain ecoregion. The Wartburg Basin follows the nomenclature originally developed by the Tennessee Geological Survey (Wilson, Jewell, and Luther 1956) with subsequent modifications to reclassify the Middle Pennsylvanian age strata into formations rather than groups (Hardeman, Miller, and Swingle 1966). This nomenclature is applied to all Pennsylvanian strata of the coalfield other than that contained in the Cumberland Block. Nearly the entire geologic column of Pennsylvanian strata is preserved within the NCWMA and ERTCE although the majority of the lower Pennsylvanian-age strata are located at depth with no surface exposure.

Gizzard Group: The Gizzard Group represents the oldest or lower-most Pennsylvanian strata of Tennessee and has no surface exposure anywhere in the NCWMA and ERTCE with the exception of a small outcrop area along the southwest corner of Pine Mountain near the Pioneer community. It includes all strata between the top of the Mississippian and the base of the Sewanee Conglomerate (Luther 1959). It obtains a maximum thickness in Tennessee of around 700 feet although data within the NCWMA and ERTCE seem to indicate only between 200 and 300 feet are present in this portion of the state. The group is comprised of relatively massive sandstones and conglomerates with intermediate shales and coals. The Signal Point Shale and associated Wilder coal is commonly missing in this area with the Warren Point Sandstone coming into direct contact with the overlying Sewanee Conglomerate. The Raccoon Mountain Formation comprises the base of the Gizzard Group and typically consists of alternating sandstone, shales, and coals. The Raccoon Mountain Formation typically contains the Bon Air, Sale Creek, and White Oak coal seams. However, this Formation is missing in portions of the NCWMA and ERTCE with the Warren Point Sandstone coming into direct contact with the underlying Mississippian Pennington Formation. The proposed petition area would have no impact on coal resources in the Gizzard Group as they are located at depth, with no surface exposure.

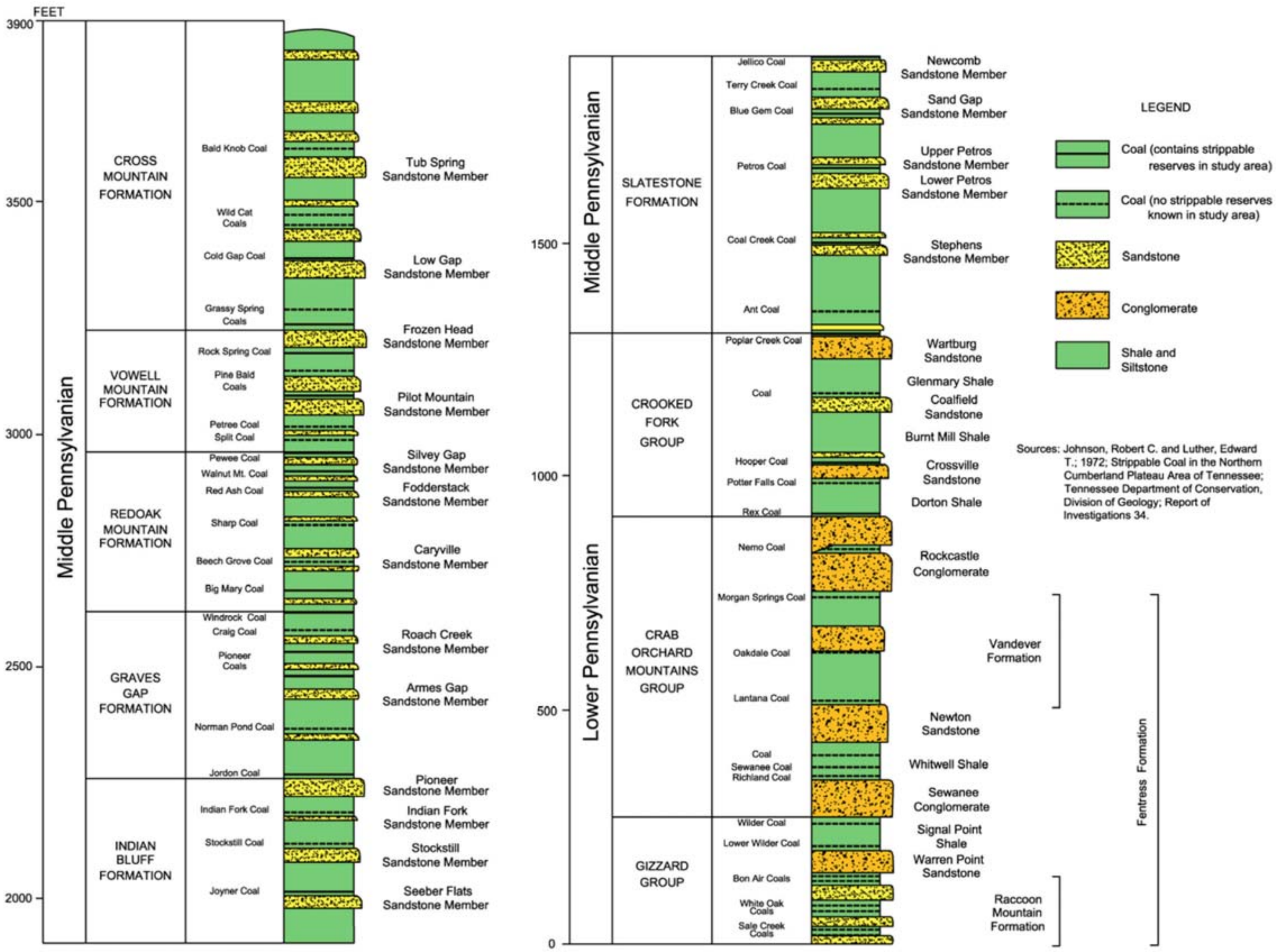


FIGURE 5-2: GENERALIZED STRATIGRAPHIC COLUMN OF THE NORTH CUMBERLAND PLATEAU/WARTBURG BASIN OF TENNESSEE

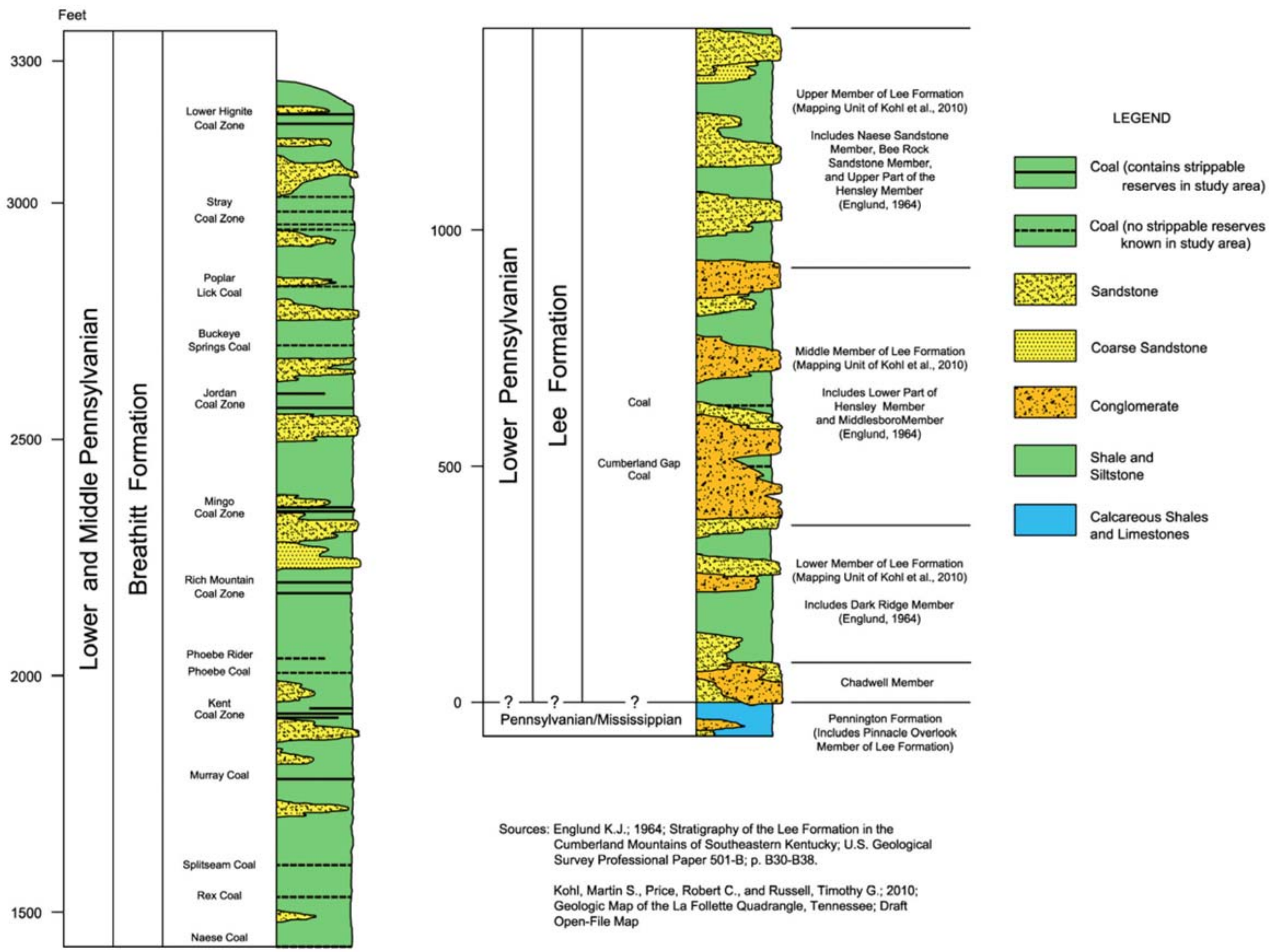


FIGURE 5-3: GENERALIZED STRATIGRAPHIC COLUMN OF THE CUMBERLAND BLOCK PORTION OF CAMPBELL COUNTY, TENNESSEE

Crab Orchard Mountains Group: The Crab Orchard Mountains Group is typically comprised of a series of massive regional conglomeratic sandstones separated by relatively consistent shale units and coals. The combined thickness of all strata in this group approaches 1,000 feet but thins in the northern and western portions of the NCWMA and ERTCE. The uppermost Rockcastle Conglomerate often contains a thin shale unit near the middle of the section which contains the Nemo coal seam. The other major shale units include portions of the Vandever Formation, which commonly include the Morgan Springs and Lantana coals, and the Whitwell Shale which commonly includes the Sewanee and Richland coals. Only the upper portions of the Rockcastle Conglomerate are exposed within a small portion the ERTCE along Scutcheon Creek and along a small area of Pine Mountain near Pioneer. The proposed petition area would have no impact on coal resources in the Crab Orchard Mountains Group as they are located at depth, with no surface exposure.

Crooked Fork Group: The Crooked Fork Group represents the upper portion of the Lower Pennsylvanian age strata and is exposed only in the lower elevations of the northwestern and western portions of the NCWMA and ERTCE. It represents the topmost group which is characterized by massive sandstones and averages between 300 and 400 feet in total thickness (Luther 1959). In the southwestern portion of the proposed petition area and ERTCE, this group is well developed and subdivided into multiple sandstone and shale units that can be mapped. However, to the north and east, many of these formations become indistinguishable or absent and the individual formations are not recognized or mapped. The two primary coal seams in this group are the Rex seam near the base and the Poplar Creek seam which marks the top of the group. The Hooper seam has also been mined in the vicinity of the petition area, but is considered of minor importance as it is located below drainage, with no surface exposure.

Slatestone Formation: The Slatestone Formation begins the Middle Pennsylvanian age sequences of strata that are dominated by shale and siltstones with sandstones becoming significantly less dominant and more discontinuous and thin than those of the Lower Pennsylvanian groups of strata. However, the frequency and significance of the coal resources become more important in these Middle Pennsylvanian strata. In the NCWMA and ERTCE the Slatestone Formation ranges between 350 and 640 feet thick but generally thins towards the northwest. The primary coals in this formation include the Coal Creek, Blue Gem, and Jellico seams. The Petros seam has also been mined in portions of the Emory River watershed but has not been shown to be of significant importance on a regional scale as it is located below drainage, with no surface exposure.

Indian Bluff Formation: The Indian Bluff Formation is predominately composed of shales and siltstones and averages between 200 and 470 feet thick. It also contains several named but thin and commonly absent sandstone units and various thin coals. The Pioneer Sandstone is the most consistent and well developed of the Middle Pennsylvanian aged sandstones and represents the top unit of this formation. The Joyner coal seam is the only seam which typically is of any commercial value in this formation.

Graves Gap Formation: The Graves Gap Formation includes all strata between the top of the Pioneer Sandstone and the top of the Windrock coal seam. It averages between 180 and 400 feet thick and is predominately shale and siltstone with minor thin to massive, but discontinuous sandstone units. The Roach Creek Sandstone is more well developed in the western portions of the Cumberland Mountains but thins and even disappears in some areas to the east and southeast (Luther 1959). Historically, this formation contains at least three coal seams which have had commercial value. These include the Windrock, which marks the top of the formation, the Pioneer, and the Jordan seams.

Redoak Mountain Formation: The Redoak Mountain Formation ranges from 300 to 460 feet thick and is dominated by shale and siltstone units with multiple thin and discontinuous sandstone units. It contains multiple coal seams of commercial historical value. The Pewee seam represents the top unit in the formation and has been heavily mined throughout the NCWMA and ERTCE. Likewise, the Walnut Mountain seam is located approximately 30 to 60 feet below the Pewee seam and has also been heavily mined throughout the area. The Red Ash seam averages 80 to 120 feet below the Walnut Mountain seam and is near the top of Fodderstack Sandstone. The Red Ash seam is more discontinuous and typically thinner than the overlying Pewee and Walnut Mountain seams but also has significant commercial value. Finally, the Big Mary seam is located near the bottom of the formation and has historically been one of the most mined seams in the Cumberland Mountains because of its consistency and thickness. In recent times, it has been in less demand due to high sulfur values of greater than 3% (table 5-1) because of water quality issues and clean air requirements at power plants. Other seams in this formation such as the Sharp and Beech Grove may reach commercial quantities in localized areas but have not been of much historical importance in the NCWMA and ERTCE.

Vowell Mountain Formation: The Vowell Mountain Formation represents all strata between the top of the Pewee coal and the top of the Frozen Head Sandstone. This group is preserved only in the higher elevations of the NCWMA and ERTCE. Based on geologic maps, the average preserved thickness of this formation ranges between 230 and 400 feet in these higher elevation ridges. The Pilot Mountain and Frozen Head sandstones are considered some of the more massive and uniform of the upper sandstone units. The Frozen Head Sandstone is commonly between 35 and 100 feet and is very coarse grained and well developed throughout the area where it is preserved (Luther 1959). Because this formation is only preserved in the higher elevations of the Cumberland Mountains, coal seams are commonly miscorrelated or misnamed between mountaintops and ridges. Likewise, these upper seams commonly have multiple splits and riders making correlations difficult. The Rock Spring and Pine Bald coals are commonly broken up into upper and lower seams and have been extensively mined as part of multiple seam surface mining operations along ridgelines or mountaintops.

Cross Mountain Formation: The Cross Mountain Group includes all strata of Pennsylvanian age in Tennessee above the Frozen Head Sandstone. The greatest thickness of this group preserved anywhere is 554 feet on Cross Mountain (Luther 1959). However, within the NCWMA and ERTCE, this the maximum preserved thickness is approximately 420 feet on the Fork Mountain quadrangle (Garmin and Ferguson 1975). The formation is consistent with the lower formations in that it is comprised primarily of shale and siltstone although numerous thin and discontinuous sandstones have been named. The Low Gap Sandstone and the Tub Spring Sandstone represent the youngest sandstones in the Pennsylvanian of Tennessee but are only preserved in the highest elevations of the Cumberland Mountains. The primary commercial coal seams in this formation are the Cold Gap and Grassy Spring coals. The Grassy Spring coal often splits into the Upper and Lower Grassy Spring and has been heavily mined along ridge tops and on upper knob areas within the NCWMA and ERTCE. Likewise, the Wildcat seams have commonly been mined as part of multiple seam operations associated with the Cold Gap and Grassy Spring seams. Much of the readily accessible upper elevation coals have already been removed making future development somewhat questionable or at least difficult.

TABLE 5-1: QUALITY DATA FOR COAL SEAMS OF THE CUMBERLAND PLATEAU AND BLOCK

Region	Seam	Moisture	Volatile Matter	Fixed Carbon	Ash	Sulfur	Heating Value	Free Swell Index	Rank
Cumberland Plateau	Jellico (Anderson	2.9	36.0	54.8	9.0	2.4	13,530		hvBb
	Jellico (Campbell)	4.1	38.5	55.5	5.9	1.1	13,970	1.5 – 6.0	hvBb
	Jellico (Morgan)	2.3	37.7	55.4	6.8	2.6	14,120		hvBb
	Pioneer	4.6	37.5	53.5	8.9	2.1	13,420	1.0	hvBb
	Windrock (Anderson)	2.4	38.3	54.5	7.0	0.8	13,940	3.5 – 6.0	hvBb
	Windrock (Scott)	3.4	34.9	53.6	11.4	0.9	13,190	4.5 – 5.5	hvBb
	Big Mary (Anderson)	1.9	37.5	52.5	9.9	3.1	13,460	4.5 – 7.0	hvBb
	Big Mary (Campbell)	3.1	36.2	50.4	13.3	3.0	12,820	4.5 – 6.5	hvCb
	Big Mary (Morgan)	1.5	38.8	51.8	9.3	2.8	13,600		hvBb
	Big Mary (Scott)	2.4	36.9	50.7	12.3	3.5	12,990	6.0 – 7.0	hvCb
	Red Ash (Campbell)	5.0	35.9	52.2	11.7	1.4	13,120	1.0 – 7.5	hvBb
	Red Ash (Scott)	3.1	37.4	53.5	9.0	1.0	13,520	2.5 – 5.5	hvBb
	Walnut Mountain (Anderson)	3.9	37.1	52.8	10.0	1.1	13,250	1.5 – 4.0	hvBb
	Walnut Mountain (Campbell)	2.9	37.5	54.1	7.5	1.5	13,545	3.5	hvBb
	Walnut Mountain (Morgan)	2.5	37.0	56.8	5.7	0.7	14,140	5.5	hvAb
	Pewee (Anderson)	2.9	37.6	56.0	6.3	0.7	13,990	1.5 – 4.5	hvBb
	Pewee (Campbell)	3.8	37.9	56.0	6.2	0.8	14,010	1.5 – 5.0	hvAb
	Upper Pine Bald[1]	2.5			7.3	0.8	13,820		hvBb
	Lower Pine Bald[2]	1.0			10.6	2.5	12,842	6	hvCb
	Rock Spring	3.8	36.6	49.5	13.8	2.2	12,750	1.5	hvCb
	Lower Grassy Spring	2.0			10.7	3.0	13,200		hvBb
	Upper grassy Spring	2.0			10.4	3.0	13,290		hvBb
	Cold Gap[3]	4.6	32.2	60.3	2.9	0.8	13,760		hvBb

Region	Seam	Moisture	Volatile Matter	Fixed Carbon	Ash	Sulfur	Heating Value	Free Swell Index	Rank
Cumberland Block	Murray	4.2	39.6	54.1	6.2	2.4	13,900	5.5	hvBb
	Kent	3.0	36.8	56.5	6.5	0.9 (1.34)[4]	14,040	4.5 – 6.0	hvAb
	Rich Mountain	4.3	40.3	57.1	2.5	1.1 (1.09)[4]	14,460	N/A	hvAb
	Mingo	4.1	38.5	55.5	5.9	1.1 (1.27)[4]	13,970	1.5 – 6.0	hvBb
	Jordan	4.6	37.7	56.5	5.6	1.0	13,890	1 – 5.5	hvBb

1 = Ray Leamon Conrich Reports (various dates).

2 = Brimstone Proprietary Data.

3 = Price 2002.

4 = Mean values from Johnson and Luther (1972).

Cumberland Block (Cumberland Mountain Thrust Block)

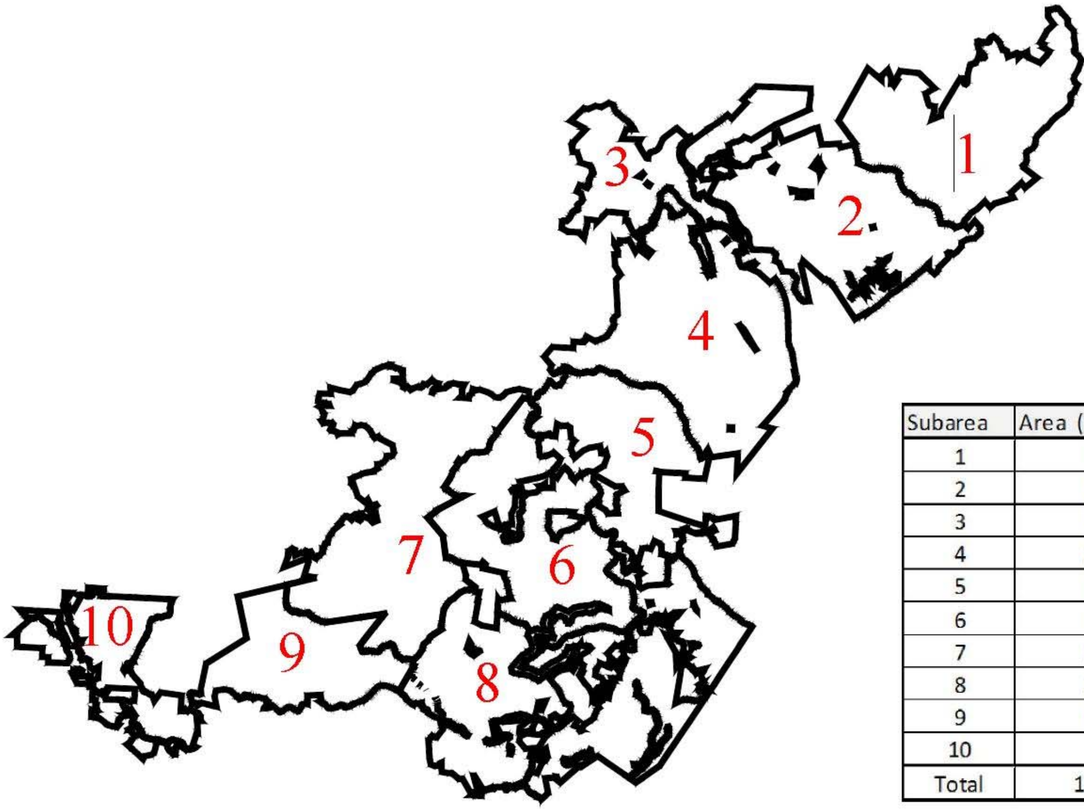
The Cumberland or Pine Mountain block corresponds to the Cumberland Mountain Thrust Block ecoregion. The entire region has been displaced both horizontally and vertically from the adjacent Cumberland Mountains portion of the coalfield and has resulted in problems in geologic correlations and subsequent naming conventions. Strata and coal seams have undergone multiple iterations of name changes and correlations using both Kentucky and standard Tennessee Pennsylvanian conventions. The currently used nomenclature recognized by the Tennessee Geological Survey follows the recommendations of the US Geological Survey (McDowell, Rice, and Newell 1985). This current nomenclature was based primarily on the fact that US Geological Survey quadrangle mapping has shown that the Breathitt Group of formations are not distinguishable on the basis of lithic character and that the coal beds, which define the tops and bottoms of the formations, are not laterally persistent throughout the Cumberland overthrust sheet but are missing over tens to hundreds of square miles.

Lee Formation: The Lee Formation forms the basal member of the Pennsylvanian strata in the Cumberland Block although the lower beds of the Lee grade laterally into, and intertongue with, the upper beds of the Pennington Formation of Mississippian age (Englund 1964). As a result, portions of these interbedded Lee units in the Pennington Formation are considered to be Late Mississippian in age. About 40% of the Lee Formation is fine-to coarse-grained, thick-bedded to massive conglomeratic sandstone that is commonly more than 90% quartz (Englund 1968). Another 30% of the Lee Formation is comprised of fine to medium grained, thick bedded to massive nonconglomeratic sandstones. The total thickness of the Lee Formation averages around 1,600 feet although in the NCWMA and ERTCE, it has been reported to range between 700 and 1,200 feet thick. The Lee Formation dips steeply off the tectonically disturbed perimeter areas of Pine Mountain, Cumberland Mountain, Cove Mountain, and Fork Mountain to quickly drop beneath the overlying Breathitt Formation. Although several minor coal seams do occur in the Lee Formation, no significant coal resources have been identified in this formation within the NCWMA and ERTCE.

Breathitt Formation: The Breathitt Formation represents the Middle Pennsylvanian strata of the Cumberland Block and attains a total thickness of 2,450 feet in the Elk Valley area (Englund 1968). It consists of interbedded sandstone, siltstone, and shale with lesser amounts of coal, underclay, and argillaceous limestone. In contrast to sandstone beds of the underlying Lee Formation, sandstones tend to be nonconglomeratic, less quartzone, less massive, thinner, and more discontinuous. The Breathitt Formation contains the vast majority of the coals in the Cumberland Block with over 40 different coal seams identified in various drill logs and geologic maps in the area. The Rex coal seam is located near the base of the formation and generally is the lowest commercially viable seam in the vicinity of the NCWMA and ERTCE. The Upper Hignite seam represents the uppermost historically commercially viable coal seam but is only preserved on the highest elevations of Walnut Mountain. Most of these areas have been previously mined making the potential for additional recovery somewhat speculative.

POTENTIAL COAL RESOURCE

The foundation for Potential Coal Resource for the NCWMA and ERTCE area is rooted in a comprehensive geologic model that will encompass all of the commercially viable coal seams within the project area. Because of the sheer size of the NCWMA and ERTCE area (approximately 172,000 acres) and the software limitations of the preferred AutoCad/ Carlson Software® geologic model platform, the comprehensive geologic model is a composite model built from a set of 10 subarea models. The subareas range in size from approximately 9,000 to 24,000 acres and were delineated to allow all of the data to be effectively processed on a reasonable scale and within a reasonable processing time. Individual Geologic models were constructed for each of the subareas with care being taken to minimize any offset of the coal seam locations in adjacent subareas. Figure 5-4 illustrates the locations and areas of the aforementioned subareas.



Subarea	Area (acres)
1	18,000
2	18,000
3	10,000
4	23,000
5	18,000
6	17,000
7	23,000
8	24,000
9	11,000
10	9,000
Total	171,000

FIGURE 5-4: COAL RESOURCE SUBAREAS IN THE NCWMA AND ERTCE

DATA REVIEW

Coal resource data was collected from all available sources and included data from previously permitted mine sites in the Office of Surface Mining Reclamation and Enforcement (OSMRE) databases; drill logs and outcrop maps from the Tennessee Geological Survey; drill logs and outcrop maps from the Tennessee Valley Authority (TVA); multiple coal reserve studies, drill logs, and outcrop maps from Brimstone Land Company and Ray Leamon, Consulting Geologist; and the OSMRE Mine Map Repository. The results provided over 12,000 data points for coal seam thickness and/or elevation on 174 different named or unnamed coal seams in the Cumberland Block and Cumberland Plateau section of the NCWMA and ERTCE. This data was subdivided into the following sections to be analyzed individually and to be made part of a comprehensive geologic model for all of the NCWMA and ERTCE.

- Commercial coal seam determination
- Coal Seam outcrop data
- Geographic information system (GIS) data

The overall NCWMA and ERTCE area was subdivided into 10 subareas in order to more accurately model the coal thickness and coal structure. These subareas were chosen by existing boundaries such as wildlife management area boundaries and state park boundaries, watersheds, and the limitations of the geologic modeling (approximately 9,000 to 24,000 acres per subarea). Each one of the subareas will be evaluated as a separate coal resource and then will be combined for reporting purposes.

COMMERCIAL COAL SEAM DETERMINATION

In order to evaluate the coal resources in the NCWMA and ERTCE, the coal seams to be analyzed to represent the two geological structures (Cumberland Block and Cumberland Plateau, figure 5-5) were chosen with the following criteria:

1. Historically mined in the NCWMA and ERTCE area.
2. Minimum continuous coal thickness of 12 inches (the smallest recoverable thickness).
3. Significantly represented in the available data used in this document. This is necessary to construct a viable geologic model.
4. Coal seams that are directly related to the petition areas or areas adjacent to the petition area. Note that coal seams that were below drainage and do not outcrop (lower than the Jellico coal seam) have never been historically surface mined and are not considered as part of this coal resource analysis.

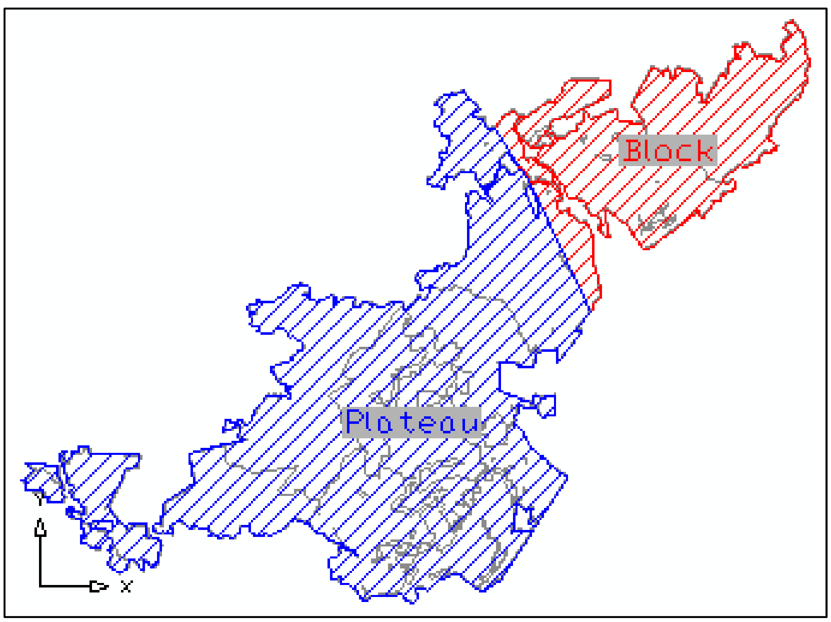


FIGURE 5-5: CUMBERLAND BLOCK (RED) AND CUMBERLAND PLATEAU (BLUE) SECTIONS OF THE NCWMA AND ERTCE

In order to confirm the overall selection of commercial coal seams, the original drill hole data were being reviewed and refined (see the "Geologic Model" section, below, for more detail). Coal seam splits and riders of less than 12 inches thick are eliminated from the model. Coal seam splits and riders of 12 inches or greater in thickness and within 5 feet of the main seam are added to the main seam (with parting). Coal seams, splits, and riders that are not adequately represented within the geologic column and across the subarea are eliminated from the model. Coals seams that occur predominantly below drainage are eliminated from the model.

As a result of the above described overall analysis, 13 coal seams were evaluated for the Cumberland Plateau section of the NCWMA and ERTCE and 5 seams will be evaluated for the Cumberland Block section of the NCWMA and ERTCE. Note that the criteria described above were reused on each of the subareas, and there was potential for individual coal seams to be eliminated on a subarea basis. These commercial seams are discussed below in ascending order.

Cumberland Mountain/Cumberland Plateau Section

Jellico Coal: The Jellico coal seam is stratigraphically the lowest commercially viable seam which could be significantly impacted by decisions related to this petition evaluation. It has historically been both surface and underground mined throughout the NCWMA and ERTCE averaging between 1,437 and 1,847 feet in elevation. The average seam thickness is 1.8 feet (table 5-2) although it occasionally splits into an upper and lower seam which has a combined thickness of over 5 feet. Likewise, a rider seam that averages approximately 0.4 feet has also been identified in portions of the NCWMA and ERTCE. The coal averages over 2% sulfur throughout the four-county region (table 5-1). Coal seam thickness and elevation ranges are taken from the 2015 geologic model (see the “Geologic Model” section, below).

TABLE 5-2: MODELED COAL SEAM DATA IN THE NCWMA AND ERTCE

In-situ Resource			
Coal Seam	**Area (acres)**	**Coal Thickness (feet)**	**Coal (tons)**
Jordan	3,789	1.79	11,700,000
Mingo	4,968	1.20	10,700,000
Rich Mountain	18,187	1.63	51,300,000
Kent	30,928	2.86	158,400,000
Murray	17,834	1.79	57,600,000
Block Total			**289,700,000**
Upper Grassy Spring	1,013	3.01	5,000,000
Lower Grassy Spring	2,476	2.45	9,100,000
Rock Spring	4,750	2.72	21,800,000
Upper Pine Bald	3,657	1.86	12,000,000
Lower Pine Bald	6,595	1.80	21,100,000
Pewee	15,638	2.42	66,200,000
Upper Walnut Mountain	4,264	1.64	12,600,000
Walnut Mountain	16,762	2.57	74,800,000
Red Ash	17,459	2.224	65,700,000
Big Mary	34,298	2.93	176,700,000
Windrock	30,606	2.08	110,700,000
Upper Pioneer	37,357	1.43	94,800,000
Lower Pioneer	40,003	2.34	152,400,000
Jellico	99,937	1.84	325,200,000
Plateau Total			**1,148,100,000**
Grand Total			**1,437,800,000**

Pioneer Coal: Most historical mining of the Pioneer seam has occurred in the northern NCWMA and ERTCE area along the Scott and Campbell County line near the Pioneer community. Its average location is between 1,914 and 2,403 feet in elevation. No currently permitted operations were identified on the Pioneer seam in the vicinity of the petition area. The Pioneer seam commonly splits into the Upper and Lower Pioneer seam and is mapped as separate coal seams separated by up to 50 feet of interburden. The average seam thicknesses of the Upper and Lower Pioneer seams average 1.4 and 2.3 feet, respectively (table 5-2). The Pioneer coal averages 2.1% sulfur in the Campbell County region (table 5-1). Coal seam thickness and elevation ranges are taken from the 2015 geologic model (see the "Geologic Model" section, below).

Windrock Coal: The Windrock coal seam has been heavily mined throughout the NCWMA and ERTCE and has an average elevation of between 2,048 and 2,491 feet. There are three currently permitted operations within the NCWMA and ERTCE on the Windrock seam. The seam averages 2.1 feet in thickness (table 5-2) but occasionally splits into an upper and lower seam or has a rider seam. The rider seam averages 1.4 feet thick and is located 20 to 40 feet above the main seam. Where the Windrock splits, the upper and lower seams only average between 0.7 and 0.9 feet each. The Windrock coal averages less than 1% sulfur (table 5-1) although sulfur as high as 4.1% was reported in Anderson County. Coal seam thickness and elevation ranges are taken from the 2015 geologic model (see the "Geologic Model" section, below).

Big Mary Coal: The Big Mary is one of the largest reserve seams in the State of Tennessee and has historically been heavily mined throughout the Cumberland Mountain region. Its outcrop averages between 2,099 and 2,550 feet in elevation and averages approximately 2.9 feet thick (table 5-2) although thicknesses of over 9 feet are reported in drill logs or outcrop measurements. However, as most seams, it sometimes has splits or riders associated with it. The upper Big Mary had an average thickness of 1.8 feet while the area that was mapped as the Big Mary rider had an average thickness of 2.4. The total sulfur content of the Big Mary is one of the highest in the state and averages over 3% (table 5-1) in the four-county region comprising the NCWMA and ERTCE. No currently permitted operations were identified within the NCWMA and ERTCE but are being proposed under the Clear Energy Corporation, Brimstone Surface Mine No. 1 permit application (OSMRE application number 3247). Coal seam thickness and elevation ranges are taken from the 2015 geologic model (see the "Geologic Model" section, below).

Red Ash Coal: Most of the currently known Red Ash coal resources are located in the northeastern portion of the Cumberland Mountain section of the NCWMA and ERTCE along the primary ridgelines such as Cross, Adkins, and Braden Mountains. It has an average outcrop of between 2,284 and 2,731 feet in elevation. Other minor occurrences have been identified throughout the NCWMA and ERTCE. The seam averages approximately 2.2 feet thick (table 5-2) in these areas with a known split into an upper and lower Red Ash seam. Where these splits occur, both seams average approximately 1.6 feet in thickness. Although historically this has been a heavily mined seam, currently there are only two permanent program underground mining permits on the Red Ash seam within the NCWMA and ERTCE. However, the Clear Energy Corporation, Roach Creek Mountain Surface Mine No. 1 (OSMRE application number 3261) is proposing both surface mining and augering on this seam in areas immediately adjacent to the NCWMA and ERTCE. The total sulfur content of the Red Ash seam averages between 1.0 and 1.4% (table 5-1) in Scott and Campbell Counties. Coal seam thickness and elevation ranges are taken from the 2015 geologic model (see the "Geologic Model" section, below).

Walnut Mountain Coal: The Walnut Mountain seam has an average outcrop of between 2,368 and 2,797 feet in elevation throughout the NCWMA and ERTCE and is therefore preserved only in the principal, higher elevation ridges. It has historically been heavily mined by both surface and underground mining and remains one of the principal commercial coal seams in the state. The average sulfur value ranges from 0.7 to 1.5% (table 5-1) in the four-county region and the average thickness is around 2.7 feet. It is normally separated from the overlying Pewee seam by the Silvey Gap Sandstone and is often part of a multiple seam mining operation. The Walnut Mountain is also often split into an upper and lower seam which averages 1.6 feet thick in the upper split and 2.6 feet thick in the lower split (table 5-2). Currently there are nine active permanent program permits on the Walnut Mountain seam in and immediately adjacent to the NCWMA and ERTCE. Likewise, the Clear Energy Corporation, Roach Creek Mountain Surface Mine No. 1 (OSMRE application number 3261) is proposing both surface mining and augering on this seam in areas immediately adjacent to the NCWMA and ERTCE. Coal seam thickness and elevation ranges are taken from the 2015 geologic model (see the “Geologic Model” section, below).

Pewee Coal: The Pewee seam generally averages between 40 and 60 feet above the Walnut Mountain seam although larger separations are common. The seam outcrop average is between 2,442 and 2,733 feet in elevation. Like the Walnut Mountain seam, the Pewee is generally only preserved on the higher elevations of the major ridges of the NCWMA and ERTCE. The Pewee seam averages 2.4 feet thick (table 5-2) and commonly has multiple riders associated with it although the upper riders are typically less than 1 foot thick. The primary rider averages 1.8 feet thick but has been measured as great as 4.1 feet. The measured total sulfur values typical average between 0.6 and 0.8% (table 5-1) in Scott, Campbell, and Anderson Counties. Currently there are 7 active permanent program permits on the Pewee seam in and immediately adjacent to the NCWMA and ERTCE. Likewise, the Clear Energy Corporation, Roach Creek Mountain Surface Mine No. 1 (OSMRE application number 3261) is proposing both surface mining and augering on this seam in areas immediately adjacent to the NCWMA and ERTCE. Coal seam thickness and elevation ranges are taken from the 2015 geologic model (see the “Geologic Model” section, below).

Upper Seams: The upper seams of coal include all coals in the Vowell and Cross Mountain Formations. These include the Pine Bald coals, the Rock Spring Coals, and the Grassy Spring coals. For narrative purposes these are considered together since they make up the uppermost coals within the NCWMA and ERTCE and are only preserved at the highest elevations as a series of islands. The Lower Pine Bald coal represents the lowest of the upper coal seams with an outcrop average of between 2,639 and 3,154 feet in elevation while the overlying Rock Spring coal outcrops between 2,696 and 3,227 feet in elevation. Each successive coal zone is generally separated by between 50 and 100 feet of overburden although this distance is quite variable and has been the subject of much miscorrelation because of the fragmented nature and limited outcrop area in these seams. The most concentrated areas of these coals is in the Fork Mountain area of Anderson, Scott, and Morgan Counties and in western Campbell County along the upper slopes of Cross and Adkins Mountain. Because of their proximity to each other and the multiple splits and riders associated with each seam, they have historically been mined as part of multiple seam contour mines, cross ridge mines, or mountaintop removal operations. Although these seams have been heavily mined in the past, there are no active permits on any of these seams in the NCWMA and ERTCE and only one in the general vicinity of the area. Because significant coal resources still exist in these seams and they are located near the ridge tops, as are the petition areas, the seams are affected by any decisions related to the proposed petition area. Coal thicknesses in these seams are highly variable and average between 1.8 and 3.0 feet (table 5-2). However, thicknesses over 5 feet have been recorded for each of these upper seams with multiple riders associated with each seam. Because of the lack of recent mining, minimal coal quality data is available from these upper seams. However, the sulfur values tended to be higher than for most of the lower seams averaging around 2% (table 5-1). Coal seam thickness and elevation ranges are taken from the 2015 geologic model (see the “Geologic Model” section, below).

Cumberland Block Section

Murray Coal: The Murray coal seam outcrop follows the perimeter of the Cumberland Block portion of the NCWMA and ERTCE. Because of the geologic structure, the coal seam elevation fluctuates significantly throughout the Cumberland Block. The coal seam outcrop average is between 1,150 and

1,551 feet in elevation. Although the seam has historically been heavily mined both by surface and underground methods, there are no active permits currently within the NCWMA and ERTCE or any adjacent areas. The coal seam averages about 1.8 feet in thickness (table 5-2) but reaches thicknesses greater than 4 feet. The sulfur content of the Murray coal seam averages 2.4% in the Campbell County area (table 5-1). Coal seam thickness and elevation ranges are taken from the 2015 geologic model (see the “Geologic Model” section, below).

Kent Coal: The Kent coal seam outcrops along the lower elevation hillsides above major drainages of the Cumberland Block. The outcrop average elevation range is from 1,355 to 1,745. The Kent coal zone commonly has multiple rider or splits which may significantly affect the total available coal resources in certain areas. The main seam averages 2.9 feet thick (table 5-2) but often has two riders that both average around 1.3 feet thick. However, the occurrences of such riders in close proximity to the main seam have also been known to create problems with roof stability and subsequent development for underground mining operations. The Kent seam has been heavily surface and underground mined both within the NCWMA and ERTCE and the adjacent areas. Currently there are five active permanent program permits either within the NCWMA and ERTCE or immediately adjacent to the area. According to US Department of Energy data, the total sulfur of the Kent seam in Campbell County averages around 0.9% with a maximum of 1.5%. Data from the Tennessee Geological Survey (Johnson and Luther 1972) show higher sulfur values with a maximum of 4.2% and an average sulfur value of 1.3% (table 5-1). Coal seam thickness and elevation ranges are taken from the 2015 geologic model (see the “Geologic Model” section, below).

Rich Mountain Coal: The Rich Mountain outcrop area is more dramatically affected by the geologic structure of the Cumberland Block than the other seams. The outcrop averages between 1,570 and 2,047 feet in elevation. The Rich Mountain has been heavily mined by surface mining methods in the northeastern portion of the NCWMA and ERTCE but generally thins to the southwest where there has been virtually no mining on this seam. The seam thickness averages around 1.6 feet (table 5-2) but thins over large areas. A rider seam is common but only averages about 0.6 feet thick. Currently there is one active surface mining operation within the NCWMA and ERTCE and several others immediately adjacent which are mining the Rich Mountain along with the Mingo seam. The Triple H Coal, LLC, Area 2 (OSMRE permit number 3205) permit is located in Rock Creek and is has recently submitted a permit application for Area 2A (OSMRE permit number 3265) to continue this operation within the NCWMA and ERTCE. The Rich Mountain in Campbell County typically has a total sulfur content of 1.1% and has the highest heating values of all the Cumberland Block coal seams (table 5-1). Coal seam thickness and elevation ranges are taken from the 2015 geologic model (see the “Geologic Model” section, below).

Mingo Coal: Most historical mining activities in the Mingo seam have been restricted to the northeastern most portion of the NCWMA and ERTCE where it obtains commercial quantities. No active permits are located on the Mingo seam within the NCWMA and ERTCE although three active permits are located immediately adjacent to the area near the Wynn and Cotula communities. The average thickness of the Mingo was estimated at 1.2 feet (table 5-2) although at least two rider seams have been identified in this zone that average between 2.3 and 1.9 feet thick, significantly increasing the overall potential resources in the areas where these may be present. Total sulfur values in this seam vary significantly from a maximum of 5.1% to a low of 0.6% and a mean value of 1.1% (table 5-1). The average range of elevation of the Mingo seam is from 1,745 to 2,217 feet. Coal seam thickness and elevation ranges are taken from the 2015 geologic model (see the “Geologic Model” section, below).

Jordan Coal: The Jordan seam represents the highest seam for which potential coal resources were calculated. The average range of elevation of the seam is from 1,963 feet to as high as 2,394 feet across the petition area with the higher elevations being near the northeast end of the NCWMA and ERTCE in the Habersham Basin. Although limited in outcrop area because of its elevation, it has been heavily mined throughout the petition area. However, there are no currently active operations in the NCWMA and ERTCE or adjacent areas on the Jordan seam with the last permit having expired in 1998. Average estimated thickness was only 1.8 feet (table 5-2) although it has reported thickness up to nearly 4 feet within the NCWMA and ERTCE. The average sulfur content is approximately 1% (table 5-1). Coal seam thickness and elevation ranges are taken from the 2015 geologic model (see the "Geologic Model" section, below).

Upper Seams: Coal mining has been conducted on at least three higher seams within the Cumberland Block portion of the NCWMA and ERTCE, including the Buckeye Springs, Poplar Lick, and Hignite seams. However, available data was inadequate to determine potential resources on these seams. Likewise, they tended to be isolated to the highest elevations of Rock Creek Mountain, Walnut Mountain, and Brushy Mountain.

All coals that were tested generally were considered high-volatile, Class B bituminous coals although a few seams maintained a high enough heating value to be considered as Class A bituminous (table 5-1). Likewise, several high ash and high moisture coals may have only been considered a Class C bituminous coal. The heating values for most coals ranged between 12,500 and 14,500 British thermal units and sulfur content ranged from 0.5 to 7.0%. Coals contained in the petition area are somewhat restricted in their potential use for metallurgical purposes either because of their low free-swell index, high ash content, high sulfur content, low carbon, or a combination of the these qualities. However, the potential for such use does exist for several seams if properly processed.

Shown below are definitions for the coal quality parameters used in table 5-1.

- **Moisture Content**: Loss of weight when heated under controlled conditions of temperature.
- **Volatile Matter**: refers to the components of coal, except for moisture, which are liberated at high temperature in the absence of air.
- **Fixed Carbon**: carbon found in the material which is left after volatile materials are driven off.
- **Ash**: is the noncombustible residue left after coal is burnt.
- **Sulfur**: Total sulfur, monosulfide, and sulfate sulfur are determined by infrared absorption of the sulfur dioxide produced by combustion of whole coal or of the separated forms of sulfur in an oxygen atmosphere.
- **Heating Value**: A British thermal unit is the amount of heat energy needed to raise the temperature of one pound of water by one degree F. Coal is normally ranked on British thermal unit per pound.
- **Free Swell Index**: The simplest test to evaluate whether a coal is suitable for production of coke is the free swelling index test. Coal with a Free Swell Index which lies between 2 and 5 is considered ideal for manufacturing coke.
- **Rank**: Used the US Geological Survey ranking system; hvAb is high-volatile A bituminous coal.
- **Note**: Blank spaces in table 5-1 represent an absence of available data.

COAL SEAM OUTCROP DETERMINATION

Analysis of Geologic Quadrangle Data

Geologic quadrangles, provided by the OSMRE, and drilling data, from the US Geological Survey coal quality database, were compared with the drill hole data from this project and the geology was found to be consistent on a regional scale. Although the coal seam names showed some variability, depending upon the author, the seam name conventions used in this project were accepted.

Analysis of Coal Seam Data

The coal seam data are contained within the drill hole data, which may represent either downhole data for multiple seams or outcrop data for an individual coal seam. These data were exported from shapefiles, provided by the OSMRE, using ArcMap software and imported into spreadsheets and formatted for import into Carlson Software®. After being formatted into a spreadsheet format, an analysis of the coal seam data was performed for each subarea using the following criteria:

- Construction of a consistent coal seam naming convention.
- Analysis and checking of coal seam elevations and the differences within the regional structural dip.
- Analysis of coal seam thicknesses and any regional or structural anomalies.
- Eliminating any splits or riders that are inconsequential to the quantification of the coal resource.

After the drill hole data were reviewed and edited, the coal seam data were imported into Carlson Software®. Cross-sections were created throughout each subarea to look for errors and anomalies, such as incorrect seam order (the data was eliminated if it cannot be corrected based upon data from proximal drill holes) and anomalously high or low seam elevations (the data was eliminated if it cannot be confirmed based upon data from proximal drill holes).

LiDAR Topography

The LiDAR surface topography information supplied by the OSMRE was used to create current topographic mapping that could be used to identify the previously surface mined areas, identify potential Remining areas and serve as the base topographic surface for the geologic modeling.

The LiDAR surface topography is divided into tiles that are 5,000 feet × 5,000 feet (approximately 573 acres) with approximately 40 such tiles needed to describe the 10 subareas within the NCWMA and ERTCE area. Manifold GIS software was used to create 5-foot contours for all of the subareas. The contoured subareas, along with any available aerial images or photography, were evaluated for evidence of mining highwalls and the previously mined areas were digitized. Exclusion polygons were crafted around the digitized areas of previous mining and were used during calculations of the resource estimates.

Underground Mining Data

Georeferenced underground mining boundaries were supplied by the OSMRE. The areas that have been previously underground-mined were digitized and excluded from any coal resource estimate within the NCWMA and ERTCE area. Investigation into additional underground mine mapping from publicly accessible sources was undertaken with little success.

Leamon Mapping

The mapping provided by Ray Leamon was reviewed and checked for correlation and was then georeferenced to the project area where applicable.

Geographic Information System Data

The coal seam outcrop analyses, as discussed above, were completed using GIS shape files, georeferenced images, and digital elevation models provided by the OSMRE. These files included the lands unsuitable for mining (LUM) boundary line, petition boundaries, permit and county roads, geologic quadrangles, quadrangle coal seams and fault lines, drill hole data, underground mining extents, and digital elevation models created by LiDAR. All GIS data was converted to a computer aided design / Carlson format for use in the geologic model and all other analyses.

ASSUMPTIONS AND CRITERIA

Geologic Model

The project area was divided into 10 subareas to facilitate geologic modeling of the coal seam resources. For each subarea, drill hole data, as defined above in the “Analysis of Coal Seam Data” section, were exported from shapefiles using ArcMap software and were imported into spreadsheets that were formatted for import into Carlson Software®. Drill hole data originating within each subarea were used for modeling that respective subarea, unless the concentration of drill hole data was insufficient and then drill hole data from adjacent subareas was used to augment the geologic modeling.

The data were then reviewed and data points that were not useable were deleted. The reasons for deletion of data points included: lack of, or incomplete, coordinate information, lack of coal seam name, and duplicate data. Coal seams, splits, and riders that were not adequately represented within the geologic column and across the subarea were eliminated from the model. Coals seams that occur predominantly below drainage, or below the Jellico coal seam, were eliminated from the model.

Using Carlson Software®, an inverse distance (squared) algorithm was used to construct three-dimensional grids of the base elevation and thicknesses of the coal seams and seam partings. Modeling residuals were determined by Carlson Software®, based upon the drill hole data and were used to verify the most appropriate modeling algorithm for building the seam grids. Base elevation grids estimate the vertical location of the coal seams across the property, while the thickness grids estimate seam thicknesses. Base elevation and thickness grids were combined, using the Grid File Utilities in Carlson Software® to calculate coal seam top elevations/overburden bases. The stacked grids comprise the geologic models for each subarea.

Cross-sections of the models were created throughout the subareas to look for errors and anomalies, such as incorrect seam order (the data was eliminated if it could not be corrected based upon data from proximal drill holes) and anomalously high or low seam elevations. The modeled grids were checked vertically, using cross-sections, and horizontally for anomalies in grid extent and seam thickness. The data was eliminated if it could not be confirmed based upon data from proximal drill holes.

The culmination of the geologic model is the calculation of the in-situ coal resource for the entire NCWMA and ERTCE (approximately 172,000 acres). The in-situ coal resource coal tonnage describes all coal resources (by commercially viable coal seam) within the NCWMA and ERTCE area that have a thickness equal to or greater than 1 foot. The basic calculation for coal tonnage that was used throughout chapter 5 follows: weighted average thickness of coal in feet (from coal thickness grids) × area in acres ×

1,800 tons per acre (density).The in-situ coal resource does not exclude previously mined or auger mined coal seams. This includes both surface and underground minable coal resources. Shown in the following sections are the breakdowns of the in-situ coal resource for each of the subareas.

Subarea 1

Subarea 1 is located in the Cumberland Block. The geologic model was built using 96 drill hole data points. All of the coal seam base elevation grids, except for the Murray, and thickness grids were created using Carlson Software® and an inverse distance squared algorithm. Gridding of the Murray coal seam base elevation was problematic as only 11 drill holes penetrated the seam. The average offset between the Murray seam and the Kent seam was determined from the 11 drill holes to be 195 feet. The base elevation grid for the Murray was then created by offsetting the Kent base elevation grid by 195 feet. The coal seam grid thicknesses are shown in table 5-3.

TABLE 5-3: SUBAREA 1 MODELED COAL SEAM DATA

Coal Seam	Area (acres)	Coal Thickness (feet)	Coal (tons)
Jordan	1,068	2.32	4,500,000
Mingo	3,039	1.18	6,400,000
Rich Mountain	10,637	1.83	35,000,000
Kent	15,971	2.62	75,400,000
Murray	17,834	1.79	57,600,000
Total			**178,900,000**

Subarea 2

Subarea 2 is also located in the Cumberland Block. The geologic model was built using 122 drill hole data points. All of the coal seam base elevation grids and thickness grids were created using Carlson software and an inverse distance squared algorithm. The coal seam grid thicknesses are shown in table 5-4.

TABLE 5-4: SUBAREA 2 MODELED COAL SEAM DATA

Coal Seam	Area (acres)	Coal Thickness (feet)	Coal (tons)
Jordan	2,721	1.46	7,200,000
Mingo	1,928	1.23	4,300,000
Rich Mountain	7,550	1.20	16,300,000
Kent	14,957	3.08	83,000,000
Total			**110,800,000**

Subarea 3

Subarea 3 is located predominantly in the Cumberland Plateau with small outcrops of Kent and Murray coal on the eastern border. These seams were not of sufficient quantity to model. The eastern portion of the subarea was truncated from its original boundaries, as the absence of drill hole data and geologic quadrangle mapping indicated that there were no commercial coals seams present in the area. The geologic model was built using 254 drill hole data points. All of the coal seam base elevation grids and thickness grids were created using Carlson software and an inverse distance squared algorithm. The coal seam grid thicknesses are shown in table 5-5.

TABLE 5-5: SUBAREA 3 MODELED COAL SEAM DATA

Coal Seam	Area (acres)	Coal Thickness (feet)	Coal (tons)
Pewee	591	1.68	1,800,000
Walnut Mountain	646	2.18	2,500,000
Red Ash	736	3.06	4,100,000
Big Mary	1,914	3.23	11,100,000
Windrock	1,723	1.18	3,700,000
Pioneer	2,879	2.25	11,700,000
Jellico	5,175	1.76	16,400,000
Total			**51,300,000**

The Grassy Spring and Rock Spring coal seams were not represented in the drill hole data and the Pine Bald coal seams were not adequately represented for gridding. The Pioneer coal seam is represented as a single seam in this subarea.

Subarea 4

Subarea 4 is located predominantly in the Cumberland Plateau with small outcrops of Kent and Murray coal on the eastern border. These seams were not of sufficient quantity to model. The geologic model was built using 720 drill hole data points. All of the coal seam base elevation grids and thickness grids were created using Carlson software and an inverse distance squared algorithm. The coal seam grid thicknesses are shown in table 5-6.

TABLE 5-6: SUBAREA 4 MODELED COAL SEAM DATA

Coal Seam	Area (acres)	Coal Thickness (feet)	Coal (tons)
Grassy Spring	1,110	1.16	2,300,000
Rock Spring	1,894	3.08	10,500,000
Upper Pine Bald	1,497	1.56	4,200,000
Lower Pine Bald	2,452	1.78	7,900
Pewee	4,513	2.49	20,200,000
Upper Walnut Mountain	4,264	1.64	12,600,000
Lower Walnut Mountain	3,314	1.59	9,500,000
Red Ash	5,600	2.71	27,300,000
Big Mary	8,128	2.93	42,800,000
Windrock	1,686	1.26	3,800,000
Upper Pioneer	7,757	1.36	18,900,000
Lower Pioneer	8,605	1.58	24,400,000
Jellico	14,588	1.45	38,000,000
Total			**222,400,000**

Subarea 5

Subarea 5 is located in the Cumberland Plateau. The geologic model was built using 350 drill hole data points. All of the coal seam base elevation grids and thickness grids were created using Carlson software and an inverse distance squared algorithm. The coal seam grid thicknesses are shown in table 5-7.

TABLE 5-7: SUBAREA 5 MODELED COAL SEAM DATA

Coal Seam	Area (acres)	Coal Thickness (feet)	Coal (tons)
Upper Grassy Spring	152	1.51	400,000
Lower Grassy Spring	114	1.27	300,000
Rock Spring	410	1.38	1,000,000
Upper Pine Bald	341	1.80	1,100,000
Lower Pine Bald	584	1.81	1,900,000
Pewee	1,540	3.22	8,900,000
Walnut Mountain	1,740	2.67	8,400,000
Red Ash	2,089	2.13	8,000,000
Big Mary	3,716	2.00	13,400,000
Windrock	4,660	1.50	12,600,000
Upper Pioneer	5,524	1.26	12,500,000
Lower Pioneer	3,382	1.48	9,000,000
Jellico	15,895	1.60	45,700,000
Total			**123,000,000**

Subarea 6

Subarea 6 is located in the Cumberland Plateau. The geologic model was built using 224 drill hole data points. All of the coal seam base elevation grids and thickness grids were created using Carlson software and an inverse distance squared algorithm. The coal seam grid thicknesses are shown in table 5-8.

The Grassy Spring coal seams were not adequately represented in this subarea for gridding. Grid thickness for the Lower Pioneer was adjusted due to an inadequate number of drill hole data points to adjust for a locally thick portion of the seam that propagated through the grid. Five drill holes containing Lower Pioneer coal seam thicknesses ranging from 7 to 13 feet, occurring along two ridges, affected portions of subareas 6 and 7. There were only six remaining drill holes in the combined subareas containing Lower Pioneer coal. The thicknesses in these holes ranged from 1 to 3 feet. Polygons were constructed around the ridges containing the thick seam data to maintain its representation, while the remaining grid area was set to an average thickness of 2 feet.

TABLE 5-8: SUBAREA 6 MODELED COAL SEAM DATA

Coal Seam	Area (acres)	Coal Thickness (feet)	Coal (tons)
Rock Spring	78	2.86	400,00
Upper Pine Bald	183	1.95	600,000
Lower Pine Bald	264	1.11	500,000
Pewee	1,012	2.74	5,000,000
Walnut Mountain	1,279	3.02	6,900,000
Red Ash	1,542	1.24	3,400,000
Big Mary	2,826	3.01	15,300,000
Windrock	3,683	2.20	14,600,000
Upper Pioneer	4,697	1.37	11,600,000
Lower Pioneer	5,205	2.90	27,100,000
Jellico	14,948	1.93	51,900,000
Total			**137,300,000**

Subarea 7

Subarea 7 is located in the Cumberland Plateau. The geologic model was built using 189 drill hole data points. All of the coal seam base elevation grids and thickness grids were created using Carlson software and an inverse distance squared algorithm. The coal seam grid thicknesses are shown in table 5-9.

TABLE 5-9: SUBAREA 7 MODELED COAL SEAM DATA

Coal Seam	Area (acres)	Coal Thickness (feet)	Coal (tons)
Upper Grassy Spring	220	3.76	1,500,000
Lower Grassy Spring	388	3.87	2,700,000
Rock Spring	574	3.09	3,200,000
Pine Bald	827	2.09	3,100,000
Pewee	2,020	2.21	8,000,000
Walnut Mountain	2,806	2.53	12,800,000
Red Ash	993	1.20	2,200,000
Big Mary	5,764	2.35	24,400,000
Windrock	6,447	2.33	27,000,000
Upper Pioneer	7,868	1.24	17,600,000
Lower Pioneer	8,371	3.14	47,200,000
Jellico	19,270	1.91	66,100,000
Total			**215,800,000**

The Pine Bald coal is represented as a single seam in this subarea**.** Grid thickness for the Lower Pioneer was adjusted due to an inadequate number of drill hole data points to adjust for a locally thick portion of the seam that propagated through the grid (for more detail, refer to the “Subarea 6” section).

Subarea 8

Subarea 8 is located in the Cumberland Plateau. The geologic model was built using 382 drill hole data points. All of the coal seam base elevation grids and thickness grids were created using Carlson software and an inverse distance squared algorithm. The coal seam grid thicknesses are shown in table 5-10.

TABLE 5-10: SUBAREA 8 MODELED COAL SEAM DATA

Coal Seam	Area (acres)	Coal Thickness (feet)	Coal (tons)
Upper Grassy Spring	423	2.26	1,700,000
Lower Grassy Spring	528	1.49	1,400,000
Rock Spring	1,345	1.80	4,400,000
Upper Pine Bald	1,635	2.07	6,100,000
Lower Pine Bald	1,987	1.83	6,500,000
Pewee	5,057	2.07	18,800,000
Red Ash	6,497	1.77	20,700,000
Big Mary	9,402	3.31	56,000,000
Windrock	9,629	2.24	38,700,000
Upper Pioneer	11,511	1.65	34,200,000
Lower Pioneer	11,560	1.58	33,000,000
Jellico	22,876	2.14	88,100,000
Total			**337,800,000**

Subarea 9

Subarea 9 is located in the Cumberland Plateau. The geologic model was built using 268 drill hole data points. All of the coal seam base elevation grids and thickness grids were created using Carlson software and an inverse distance squared algorithm. The coal seam grid thicknesses are shown in table 5-11.

TABLE 5-11: SUBAREA 9 MODELED COAL SEAM DATA

Coal Seam	Area (acres)	Coal Thickness (feet)	Coal (tons)
Upper Grassy Spring	219	3.56	1,400,000
Lower Grassy Spring	335	3.90	2,400,000
Rock Spring	449	2.990	2,300,000
Pine Bald	481	1.36	1,200,000
Pewee	905	2.16	3,500,000
Walnut Mountain	1,288	2.79	6,500,000
Big Mary	2,550	2.99	13,700,000
Windrock	2,778	2.06	10,300,000
Jellico	7,185	1.47	19,000,000
Total			**60,300,000**

The Pine Bald coal is represented as a single seam in this subarea, while the Red Ash and Pioneer coals seems are not represented.

Subarea 10

Subarea 10 is located in the Cumberland Plateau; however, none of the identified commercially mineable coal seams from the project area are represented in subarea 10.

Compilation of In-Situ Coal Resource

Weighted averages of the subarea individual coal seam thicknesses were used to estimate the overall in-situ NCWMA and ERTCE coal resource (table 5-2). Note that all tables in this chapter will refer to the Cumberland Block coal seams as “Block” and all of the Cumberland Plateau coal seams as “Plateau.”

Definitions of Coal Resource Categories

Upon completion of the geologic model, the coal resource of the NCWMA and ERTCE area was categorized within this chapter by factors including mining method, strip ratio, and recovery factors. All coal tonnages in chapter 5 will be referred to as resources due to the macro nature of the coal resource analysis. Shown below are the formal categories and their respective definitions that will be used throughout this chapter.

- **In-situ Coal Resource**: The in-situ coal resource tonnage describes all coal resources (by commercially viable coal seam) within the NCWMA and ERTCE area that have a thickness equal to or greater than 1 foot. The in-situ coal resource does not exclude any previously mined or auger mined coal seams and includes both surface and underground coal resources. The petition areas have no bearing on this calculation.
- **Potential Surface Mineable Coal Resource**: The potential surface mineable coal resource is coal resources within the NCWMA and ERTCE area that would be contour surface mined from the outcrop of each respective coal seam to a maximum highwall height of 40 times the average thickness (in feet) of that coal seam. In areas where the coal seams are near the top of the ridge, the contour mining method could become a cross-ridge/area type mining method due to topography. No exclusions for previously mined areas are included in this coal resource. The petition areas have no bearing on this calculation.
- **Potential Augerable Coal Resource**: The potential augerable coal resource is coal resources within the NCWMA and ERTCE area that would be auger mined from the maximum highwall location of the potential surface mineable coal resource to a depth of 200 feet. No exclusions for previously auger mined areas are included in this coal resource. The petition areas have no bearing on this calculation.
- **Surface Mineable Coal Resource**: The surface mineable coal resource is coal tonnage that is defined by the potential surface mineable coal resource minus all coal resources that have been previously mined by surface mining methods. The previously surface mined areas were quantified through the analysis of the LiDAR data and satellite imagery. The petition areas have no bearing on this calculation.
- **Augerable Coal Resource**: The augerable coal resource is coal resources within the NCWMA and ERTCE that is defined by the potential augerable coal resource minus all coal resources that have been previously mined by auger mining methods. The previously auger mined coal resources are approximated by assuming that 50% (best professional judgment) of the potential

augerable coal resource adjacent to the previously surface mined areas has been extracted. The petition areas have no bearing on this calculation.

- **Petition Area Mineable Coal Resource**: Petition area mineable coal resource is a coal resources within the NCWMA and ERTCE that could be mineable within the boundaries of any respective petition area configuration outlined in the "Alternative Analysis of Coal Resource" section of this chapter.
- **Petition Area Augerable Coal Resource**: Petition area augerable coal resource is a coal resource within the NCWMA and ERTCE that is within the boundaries of any respective petition area configuration outlined in the "Alternative Analysis of Coal Resource" section of this chapter. Any augerable coal resource that is adjacent to a surface mineable resource that is within the boundary of a respective petition area configuration would be considered a petition area augerable coal resource.
- **Non-Petition Area Patch Area Coal Resource**: Non-petition area patch area coal resource are mineable and/or augerable coal resources outside of the petition boundary (figure 5-6) that cannot be mined because of the following criteria:
  - Any area that is completely surrounded (with a break in the petition area of less than 200 feet) by the petition area boundaries will be considered a patch area.
  - Any area that is partially surrounded by the petition area and does not have access to a road (roads will be defined as any state, county or permitted road within the NCWMA and ERTCE area) will be considered a patch area.
  - Any area with potential mineable coal resources of less than 100,000 tons (or 50 acres) due to the configuration/alignment of the petition area will be considered a patch area. Figure 5-6 shows an illustration of a typical patch area
- **Remining Coal Resource**: The remining coal resource is defined as a coal resource within the NCWMA and ERTCE that could be extracted by surface and auger mining methods on previously surface mined areas that have not been auger mined. This surface coal resource is completely independent of the mineable coal resources. The shape or sizes of the petition areas have no bearing on the remining coal resource.

MINING METHODS

Conventional Surface Mining

Conventional surface mining for this document will be defined as contour mining with a limiting strip ratio criteria. In areas where the coal seams are near the top of the ridge, the contour mining method could become a cross-ridge/area type mining method due to topography. Criteria for conventional surface mining are shown below:

- Minimum recoverable seam height of 12 inches, as defined by modern equipment capabilities.
- Economical cumulative overburden to coal ratio based upon current market and site-specific criteria. Design criteria for the quantification of the potential surface mineable coal resource will be a strip ratio of 40 feet of maximum overburden height to 1 foot of coal thickness. This strip ratio is comparable to 18 bank cubic yards of overburden to 1 ton of coal. See figure 5-7.
- Surface mining resources will be calculated using a recovery factor of 100%.

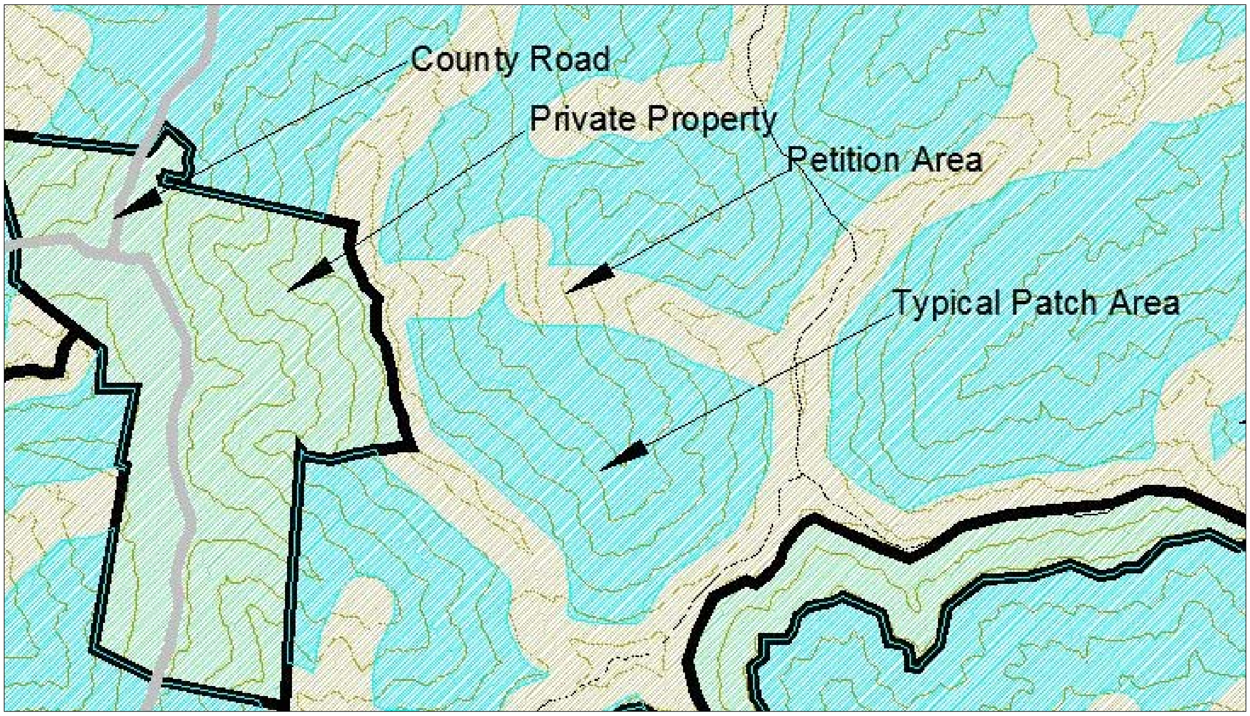


FIGURE 5-6: TYPICAL PATCH AREA ILLUSTRATION

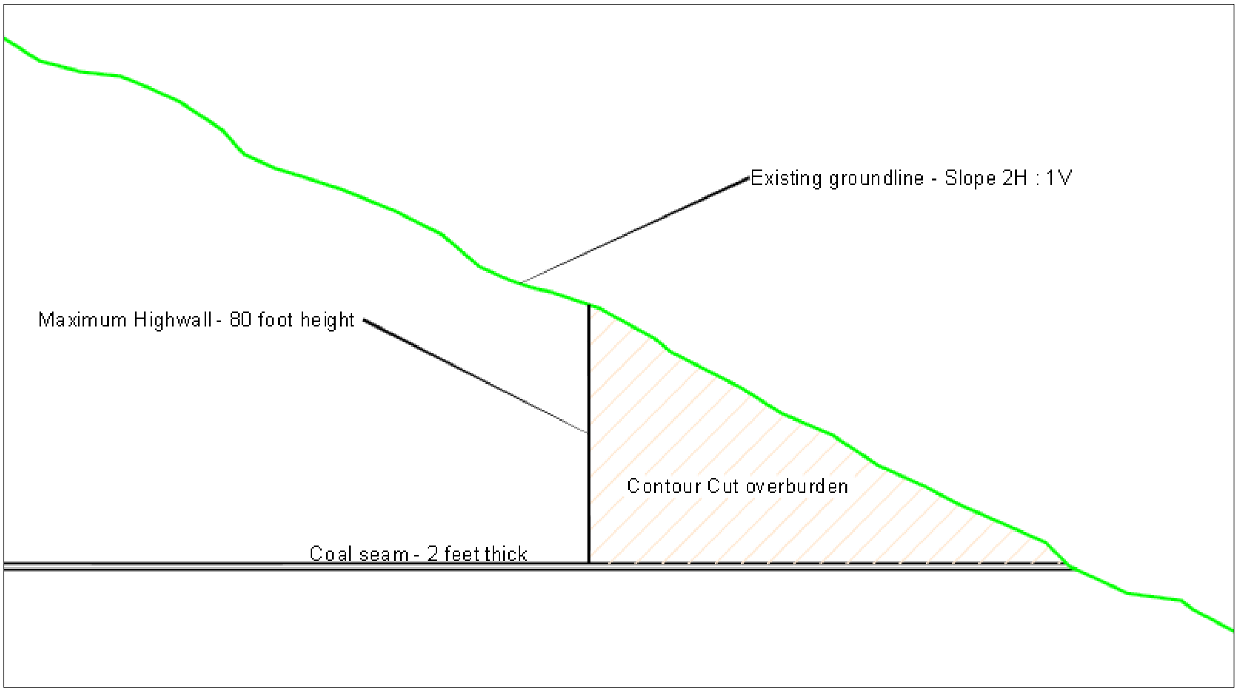


FIGURE 5-7: TYPICAL CONTOUR MINING CROSS-SECTION

The computation of the potential surface mineable resource assumed that no previous surface mining had been done in the NCWMA and ERTCE area. These results are shown in table 5-12.

TABLE 5-12: POTENTIAL SURFACE MINEABLE COAL RESOURCE IN THE NCWMA AND ERTCE

Coal Seam	Area (acres)	Thickness (feet)	Coal (tons)
Jordan	2,116	1.73	6,600,000
Mingo	2,969	1.05	6,500,000
Rich Mountain	3,121	1.84	10,300,000
Kent	4,072	3.13	22,900,000
Murray	225	1.74	700,000
Block Total			**47,000,000**
Upper Grassy Spring	895	2.86	4,600,000
Lower Grassy Spring	1,536	2.35	6,500,00
Rock Spring	3,297	2.71	16,100,000
Upper Pine Bald	3,158	1.71	9,800,000
Lower Pine Bald	4,296	1.85	14,300,000
Pewee	5,256	2.36	22,300,000
Upper Walnut Mountain	810	1.55	2,300,000
Walnut Mountain	7,556	2.55	34,700,000
Red Ash	4,875	2.05	19,400,000
Big Mary	8,320	3.13	46,800,000
Windrock	6,832	196	24,100,000
Upper Pioneer	7,348	1.44	19,100,000
Lower Pioneer	9,884	3.02	53,800,000
Jellico	6,208	2.00	22,400,00
Plateau Total			**296,200,000**
Grand Total			**343,200,000**

Previous Surface Mining

In order to quantify the amount of surface mineable coal available within the NCWMA and ERTCE for use in the analysis of the alternatives, an estimate of how much coal has been previously mined by surface methods was required. As discussed previously, the LiDAR mapping provided by the OSMRE was used to identify the areas where surface mining has already occurred in the NCWMA and ERTCE. These areas of previous surface mining were confirmed with the most recent satellite imagery available. Upon inspection of the LiDAR mapping and satellite imagery, polygons boundaries were digitized that outlined the previous surface mining disturbance. In order to use these previously mined polygons the following criteria and assumptions were executed:

- Identification of the coal seam mined within the previously mined polygons was accomplished through proximity of the polygons to the outcrops generated by the geologic model, minimum coal thickness (normally 2 feet) and historical mining information of the coal seam in the respective geographical area.

- Because the previously mined polygons constructed from the LiDAR data were very irregular in nature, a standardized method of approximating the extent of previous mining was employed. This method used the 40 to 1 strip ratio mining boundaries described in the preceding section. The previously mined polygons (from the LiDAR data) are juxtaposed unto the 40 to 1 strip ratio mining format within each respective area and the extents of mining are approximated. This standardized area is then used (along with seam thickness and density) to calculate the tonnage of previously surface mined coal. A typical illustration of this standardized method is shown in figure 5-8.

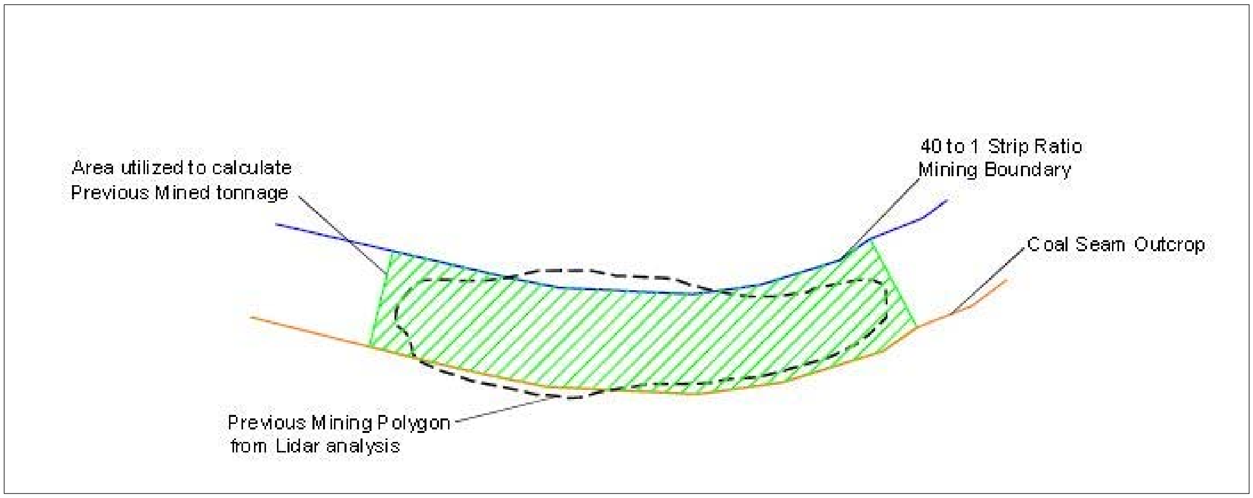


FIGURE 5-8: PREVIOUS MINING EXTENTS APPROXIMATION

Shown in table 5-13 is the surface mineable coal resource which has excluded all coal tonnage that has been previously surface mined in the NCWMA and ERTCE. The tonnages below will be the foundation and basis from which any surface mining tonnage excluded because of petition areas and/or patch areas will be subtracted.

TABLE 5-13: SURFACE MINEABLE COAL RESOURCE IN THE NCWMA AND ERTCE

Coal Seam	Area (acres)	Thickness (feet)	Coal (tons)
Jordan	1,028	1.27	2,400,000
Mingo	2,825	1.06	6,300,000
Rich Mountain	2,065	1.74	6,400,000
Kent	2,044	2.91	10,700,000
Murray	225	1.74	700,000
Block Total			**26,500,000**
Upper Grassy Spring	470	3.24	2,700,000
Lower Grassy Spring	1,275	2.24	5,000,000
Rock Spring	2,192	2.46	11,800,000
Upper Pine Bald	3,124	1.70	9,700,000
Lower Pine Bald	4,168	1.82	13,700,000
Pewee	3,513	2.14	13,500,000
Upper Walnut Mountain	810	1.55	2,300,000
Walnut Mountain	5,281	2.36	22,800,000
Red Ash	3,378	1.67	11,600,000
Big Mary	4,382	2.80	22,300,000
Windrock	6,415	1.93	22,800,000
Upper Pioneer	7,348	1.44	19,100,000
Lower Pioneer	9,715	3.03	53,100,000
Jellico	5,127	1.95	18,200,000
Plateau Total			**228,600,000**
Grand Total			**255,100,000**

Auger Mining

Historically, auger mining has been a small but significant part of the total coal production of the NCWMA and ERTCE area. With the overall coal thicknesses of the coal in the NCWMA and ERTCE area being from 1 to 3 feet, most of the augering would be conducted with a conventional circular auger (multihead). Auger mining, as a part of the overall coal resource, will be quantified in the NCWMA and ERTCE under the following criteria and assumptions:

- Auger mining resources will be quantified in coal seams measuring 1.5 feet in thickness or greater.
- Auger mining resources will be quantified in qualified coal seams to a depth of 200 feet from the extent of surface mining (highwall).
- Auger mining resources will be calculated by using a recovery factor of 40%, which will be applied to the entire augerable area.

The computation of the potential augerable coal resource assumed that no previous surface or auger mining had been done in the NCWMA and ERTCE area. These results are shown in table 5-14

TABLE 5-14: POTENTIAL AUGERABLE COAL RESOURCE NCWMA AND ERTCE

Coal Seam	Area (acres)	Thickness (feet)	Coal (tons)
Jordan	416	1.52	500,000
Mingo	0	0.00	0
Rich Mountain	1,791	1.86	2,400,000
Kent	2,375	2.90	5,000,000
Murray	256	1.61	300,000
Block Total			**8,200,000**
Upper Grassy Spring	87	2.32	100,000
Lower Grassy Spring	128	3.52	300,000
Rock Spring	801	2.35	1,400,000
Upper Pine Bald	390	1.97	600,000
Lower Pine Bald	1,069	1.67	1,300,000
Pewee	2,878	2.29	4,700,000
Upper Walnut Mountain	742	1.47	800,000
Walnut Mountain	2,261	2.71	4,400,000
Red Ash	2,230	2.10	3,400,000
Big Mary	5,123	2.78	10,300,000
Windrock	4,079	2.06	6,100,000
Upper Pioneer	1,093	1.67	1,300,000
Lower Pioneer	4,468	1.99	6,400,000
Jellico	6,068	1.89	8,300,000
Plateau Total			**49,400,000**
Grand Total			**57,600,000**

Previous Auger Mining

Auger mining in the NCWMA and ERTCE has typically been conducted adjacent to the previously contour mined areas. Economically speaking, in a typical surface and auger mining scenario, the cost per ton to extract the auger mined coal can be less than half the cost of extracting the surface mined coal. To quantify the previously auger mined coal resource in the NCWMA and ERTCE the following criterion/assumption was made:

- In all areas that were previously surface mined (outlined in the previous section) it will be assumed that half of the potential augerable resource adjacent to this previous mining has been extracted.

Shown in table 5-15 is the augerable coal resource which has excluded half of the augerable coal tonnage that is adjacent to the previously surface mined coal in the NCWMA and ERTCE. The tonnages below will be the foundation/basis from which any augerable tonnage excluded because of petition areas and/or patch areas will be subtracted.

TABLE 5-15: AUGERABLE COAL RESOURCE IN THE NCWMA AND ERTCE

Coal Seam	Area (acres)	Thickness (feet)	Coal (tons)
Jordan	284	1.52	400,000
Mingo	0	0.00	0
Rich Mountain	880	1.82	1,800,000
Kent	1,394	2.74	3,900,000
Murray	256	1.61	300,000
Block Total			**6,400,000**
Upper Grassy Spring	15	3.35	100,000
Lower Grassy Spring	90	3.34	300,000
Rock Spring	502	2.22	1,100,000
Upper Pine Bald	390	1.97	600,000
Lower Pine Bald	1,028	1.65	1,300,000
Pewee	1,838	2.11	3,800,000
Upper Walnut Mountain	742	1.47	800,000
Walnut Mountain	1,295	2.58	3,400,000
Red Ash	1,429	1.78	2,600,000
Big Mary	2,999	2.49	7,800,000
Windrock	3,725	2.03	5,800,000
Upper Pioneer	1,093	1.67	1,300,000
Lower Pioneer	4,364	1.98	6,300,000
Jellico	5,262	1.86	7,700,000
Plateau Total			**42,900,000**
Grand Total			**49,300,000**

Remining

Introduction

Remining is a surface mining operation that would fall under the definitions of the terms “remining” and “previously mined areas” as set forth in 30 CFR § 701.5. Undisturbed areas may be deemed suitable for surface mining activities if it is demonstrated that the undisturbed area is necessary to facilitate reclamation or elimination of the actual or potential environmental and public safety problems related to the proposed remining of previously mined areas.

Methodology for Remining Evaluation

Using the LiDAR mapping provided by the OSMRE, a topographic map with 5-foot contour intervals of the entire NCWMA and ERTCE was created. With this topographic mapping and satellite imagery, the previously mined areas within the NCWMA and ERTCE were identified. As indicated in the "Auger Mining" section of this chapter, it was assumed that one-half of all of the previously surface mined area was also auger mined. This area that has been both surface mined and auger mined has no coal resource for extraction by the remining mining method. The area represented by the previously surface mined area that was not auger mined is the target area for all of the remining resource that will be quantified.

Second Cut Remining

Second cut remining will be defined as remining that is proposed to take place where the existing configuration of the previously mined area is a long continuous unreclaimed highwall that follows the contour of the existing ground at approximately the same elevation. The second cut remining configuration will consist of taking an additional 60-foot wide contour cut of the undisturbed area above the existing highwall that would approximate the overburden volume to eliminate the newly excavated highwall. Upon completion of the additional contour cut, auger mining will be conducted to an average depth of 200 feet from the second-cut highwall. See figure 5-9 for a profile of the typical second cut remining configuration.

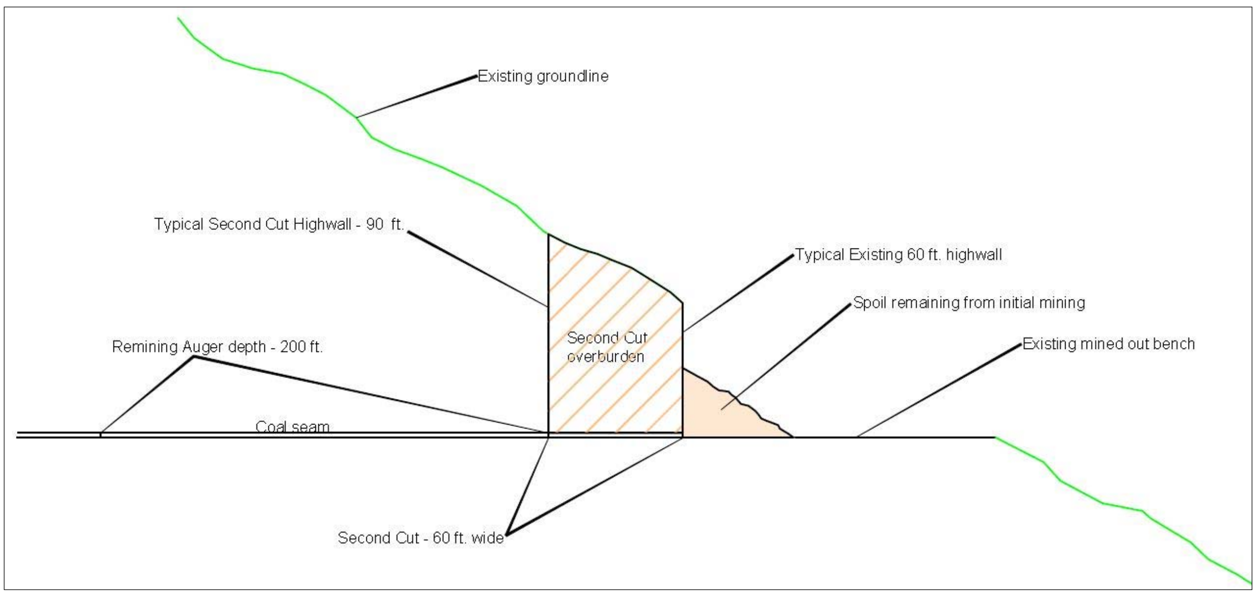


FIGURE 5-9: TYPICAL SECOND CUT REMINING CONFIGURATION

Table 5-16 describes the potential remining resource for the NCWMA and ERTCE using the assumptions and criteria described in this section.

All the analysis for remining in the petition and patch areas is shown in the "Alternative Analysis of Coal Resource" section of this chapter.

TABLE 5-16: REMINING COAL RESOURCE IN THE NCWMA AND ERTCE

Coal Seam	2nd Cut		Auger	
	Acres	Tons	Acres	Tons
Jordan	20	50,000	66	70,000
Mingo	0	0	0	0
Rich Mountain	137	470,000	456	620,000
Kent	147	830,000	491	1,110,000
Murray	0	0	0	0
Block Total	**304**	**1,350,000**	**1,012**	**1,800,000**
Upper Grassy Spring	11	40,000	36	50,000
Lower Grassy Spring	6	40,000	19	50,000
Rock Spring	45	210,000	150	280,000
Upper Pine Bald	0	0	0	0
Lower Pine Bald	6	20,000	20	30,000
Pewee	156	730,000	520	970,000
Upper Walnut Mountain	0	0	0	0
Walnut Mountain	145	750,000	483	1,000,000
Red Ash	120	580,000	401	770,000
Big Mary	319	1,830,000	1,062	2,440,000
Windrock	53	230,000	177	300,000
Upper Pioneer	0	0	0	0
Lower Pioneer	16	70,000	52	100,000
Jellico	121	460,000	403	620,000
Plateau Total	**997**	**4,960,000**	**3,323**	**6,610,000**
Grand Total	**1,301**	**6,310,000**	**4,336**	**8,410,000**

Underground Mining

Underground mining for this document is defined as room and pillar mining. Each coal seam was evaluated independently and consideration was given to partings and splits that may contaminate the coal during the mining process and thereby require additional processing and refuse disposal. To be considered practicable, the development of underground mining must satisfy all of the following criteria for mining through each seam evaluated (criteria subject to change based on market conditions and project specific parameters):

- Minimum recoverable seam height of 30 inches, defined by modern equipment capabilities and safe work heights for personnel;
- No overlying or underlying existing workings within 40 vertical feet, which is required for roof and floor stability and safety for personnel;
- A maximum in-seam parting of 18 inches, at which point coal processing becomes inefficient;

- A minimum 100 feet of vertical cover, as required by the Mine Safety and Health Administration;
- Underground mining resources will be calculated using a recovery factor of 50%.

Each subarea in the NCWMA and ERTCE was evaluated for coal seams with an average thickness of 2.5 feet, or greater. For each seam, exclusions were made for all potential mineable and augerable coal resources and polygons were constructed around the remaining underground coal resource which met the criteria defined above. The area and thickness of the underground polygons were used to estimate a coal resource tonnage. Underground coal resources were found predominantly in the Kent (Cumberland Block) and in the Big Mary and Walnut Mountain (Cumberland Plateau) (table 5-17).

TABLE 5-17: POTENTIAL UNDERGROUND COAL RESOURCE IN THE NCWMA AND ERTCE

Coal Seam	Area (acres)	Thickness (feet)	Coal (tons)
Kent	24,229	2.79	60,800,000
Block Total			**60,800,000**
Rock Spring	108.5	2.88	300,000
Pewee	428.4	3.07	1,200,000
Walnut Mountain	6.106	2.58	14,200,000
Big Mary	9,871	2.90	25,700,000
Plateau Total			**41,400,000**
Grand Total			**102,200,000**

Conclusions of Mining Methods Section

Table 5-18 shows all of the coal resources categorized by the mining method:

TABLE 5-18: COAL RESOURCE BY MINING METHOD IN THE NCWMA AND ERTCE

Coal Resource Designation	Coal (tons)
Surface mineable coal resource	255,100,000
Augerable coal resource	49,300,000
Remining coal resource	14,720,000
Potential underground coal resource	102,200,000

Note that in table 5-18 that the remining coal resource is independent of all other coal resources and includes augerable tonnage according to the remining coal resource definition.

ALTERNATIVE ANALYSIS OF COAL RESOURCE

Presented in this section is the discussion of the effect that the six alternatives have on the categorization/classification of the mineable and augerable coal resources within the NCWMA and ERTCE. These mineable and augerable coal resources will be based on the assumptions outlined in the "Mining Methods" section of this chapter. The following list is a definition of the categories that the mineable and augerable coal resources within the NCWMA and ERTCE could be assigned:

1. **Petition Area Mineable or Augerable Coal Resources**: Mineable or augerable coal resources that are located within the petition area boundary as defined in the respective alternative. These coal resources will be excluded from mining under the petition criteria.
2. **Non-Petition Area Mineable or Augerable Coal Resources**: Mineable or augerable coal resources that are located outside of the petition area boundary as defined in the respective alternative. These coal resources are mineable and are not bound by the petition criteria.
3. **Non-Petition Area-Patch Area Mineable or Augerable Coal Resources**: Patch area mineable or augerable coal resources are coal resources that are located outside of each petition area, but will be excluded from mining (surface or augerable) because of the orientation of the petition area (see definition of patch area coal resource).

The sum of the above described categories of mineable and augerable coal resources will constitute the total mineable and augerable coal resources within the NCWMA and ERTCE area (approximately 172,000 acres).

Figure 5-10 shows a typical categorization model for the mineable coal resource within the NCWMA and ERTCE area.

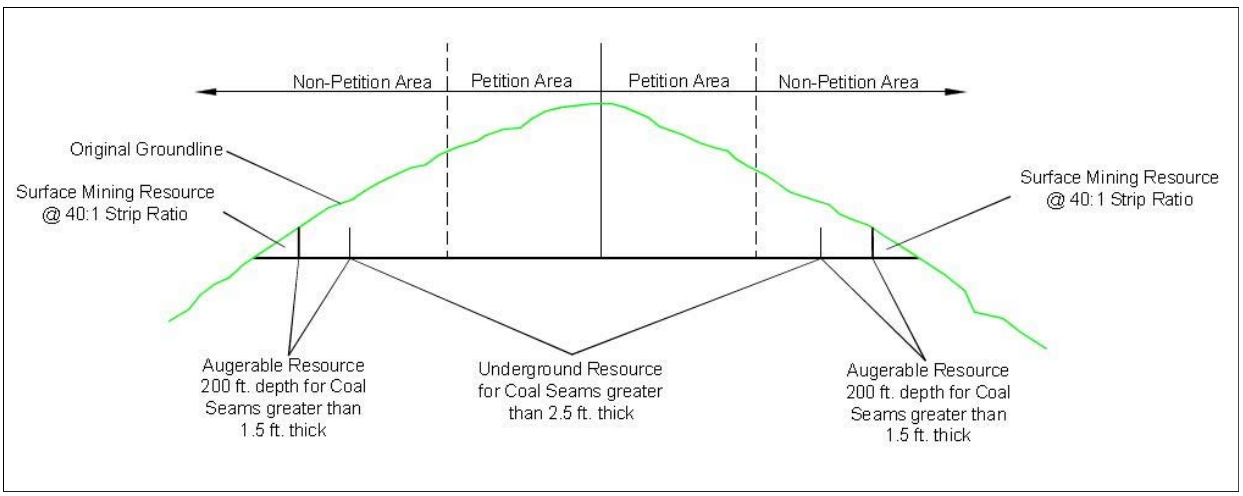


FIGURE 5-10: TYPICAL CATEGORIZATION MODEL FOR MINEABLE COAL RESOURCE

Definitions of surface, underground and augerable mineable coal resources are outlined in the "Mining Methods" section of this chapter.

ALTERNATIVE 1: NO DESIGNATION OF AN AREA AS UNSUITABLE FOR SURFACE COAL MINING OPERATIONS (NO–ACTION ALTERNATIVE)

Definition: Do not designate any public access lands as unsuitable for surface coal mining operations. In accordance with NEPA requirements, 40 CFR § 1502.14(d), this alternative is the "no action" alternative. Text at 30 CFR § 700.5 defines surface coal mining operations to mean—(a) Activities conducted on the surface of lands in connection with a surface coal mine or, subject to the requirements of section 516 of the Act, surface operations and surface impacts incident to an underground coal mine, the products of which enter commerce or the operations of which directly or indirectly affect interstate commerce. Such activities include excavation for the purpose of obtaining coal, including such common methods as contour, strip, auger, mountain top removal, box cut, open pit, and area mining; the use of explosives and blasting; in situ distillation or retorting; leaching or other chemical or physical processing; and the cleaning, concentrating, or other processing or preparation of coal. Such activities also include the loading of coal for interstate commerce at or near the mine site. *Provided,* these activities do not include the extraction of coal incidental to the extraction of other minerals, where coal does not exceed 16 2/3% of the tonnage of minerals removed for purposes of commercial use or sale, or coal exploration subject to section 512 of the Act; and, *Provided further,* that excavation for the purpose of obtaining coal includes extraction of coal from coal refuse piles; and (b) The areas upon which the activities described in paragraph (a) of this definition occur or where such activities disturb the natural land surface. These areas shall also include any adjacent land the use of which is incidental to any such activities, all lands affected by the construction of new roads or the improvement or use of existing roads to gain access to the site of those activities and for haulage and excavation, workings, impoundments, dams, ventilation shafts, entryways, refuse banks, dumps, stockpiles, overburden piles, spoil banks, culm banks, tailings, holes or depressions, repair areas, storage areas, processing areas, shipping areas, and other areas upon which are sited structures, facilities, or other property or material on the surface, resulting from or incident to those activities.

Alternative 1 would continue the current coal mining scenario within the NCWMA and ERTCE with no additional restrictions. All mineable coal resources for the no-action alternative will be categorized as non-petition area coal resources as described below for each respective coal seams (tables 5-19 and 5-20)

TABLE 5-19: ALTERNATIVE 1 MINEABLE COAL RESOURCES IN THE NCWMA AND ERTCE

Coal Seam	Petition		Non-Petition		Non-Petition – Patch Areas		Total	
	Surface	Auger	Surface	Auger	Surface	Auger	Surface	Auger
	Tons		Tons		Tons		Tons	
Jordan	0		2,400,000	400,000	0		2,400,000	400,000
Mingo			6,300,000	0			6,300,000	0
Rich Mountain			6,400,000	1,800,000			6,400,000	1,800,000
Kent			10,700,000	3,000,000			10,700,000	300,000
Murray			700,000	300,000			700,000	300,000
Block Total			**26,500,000**	**6,400,000**			**26,500,000**	**6,400,000**
Upper Grassy Spring			2,700,000	100,000			2,700,000	100,000
Lower Grassy Spring			5,000,000	300,000			5,000,000	300,000
Rock Spring			11,800,000	1,100,000			11,800,000	1,100,000
Upper Pine Bald			9,700,000	600,000			9,700,000	600,000
Lower Pine Bald			13,700,000	1,300,000			13,700,000	1,300,000
Pewee			13,500,000	3,800,000			13,500,000	3,800,000
Upper Walnut Mountain			2,300,000	800,000			2,300,000	800,000
Walnut Mountain			22,800,000	3,400,000			22,800,000	3,400,000
Red Ash			11,500,000	2,600,000			11,500,000	2,600,000
Big Mary			22,300,000	7,800,000			22,300,000	7,800,000
Windrock			22,800,000	5,800,000			22,800,000	5,800,000
Upper Pioneer			19,100,000	1,300,000			19,100,000	1,300,000
Lower Pioneer			53,100,000	6,300,000			53,100,000	6,300,000
Jellico			18,200,000	7,700,000			18,200,000	7,700,000
Plateau Total			**228,600,000**	**42,900,000**			**228,600,000**	**42,900,000**
Grand Total			**255,100,000**	**49,300,000**			**255,100,000**	**49,300,000**

Remining Resource

TABLE 5-20: ALTERNATIVE 1 REMINING COAL RESOURCES IN THE NCWMA AND ERTCE

	Petition		Non-Petition		Non-Petition – Patch Areas		Total	
	2nd Cut	Auger	2nd Cut	Auger	2nd Cut	Auger	2nd Cut	Auger
Coal Seam	Tons		Tons		Tons		Tons	
Jordan	0	0	50,000	70,000	0	0	50,000	70,000
Mingo	0	0	0	0	0	0	0	0
Rich Mountain	0	0	470,000	60,000	0	0	470,000	60,000
Kent	0	0	830,000	1,110,000	0	0	830,000	1,110,000
Murray	0	0	0	0	0	0	0	0
Block Total	**0**	**0**	**1,350,000**	**1,800,000**	0	0	**1,350,000**	**1,800,000**
Upper Grassy Spring	0	0	40,000	50,000	0	0	40,000	50,000
Lower Grassy Spring	0	0	40,000	50,000	0	0	40,000	50,000
Rock Spring	0	0	210,000	280,000	0	0	210,000	280,000
Upper Pine Bald	0	0	0	0	0	0	0	0
Lower Pine Bald	0	0	20,000	30,000	0	0	20,000	30,000
Pewee	0	0	730,000	970,000	0	0	730,000	970,000
Upper Walnut Mountain	0	0	0	0	0	0	0	0
Walnut Mountain	0	0	750,000	1,000,000	0	0	750,000	1,000,000
Red Ash	0	0	580,000	770,000	0	0	580,000	770,000
Big Mary	0	0	1,830,000	2,440,000	0	0	1,830,000	2,440,000
Windrock	0	0	230,000	300,000	0	0	230,000	300,000
Upper Pioneer	0	0	0	0	0	0	0	0
Lower Pioneer	0	0	70,000	100,000	0	0	70,000	100,000
Jellico	0	0	460,000	620,000	0	0	460,000	620,000
Plateau Total	**0**	**0**	**4,960,000**	**6,610,000**	0	0	**4,960,000**	**6,610,000**
Grand Total	**0**	**0**	**6,310,000**	**8,410,000**	0	0	**6,310,000**	**8,410,000**

Conclusions

The coal resources outlined in alternative 1 will be considered the mineable coal resource, augerable coal resource, and remining coal resource for the NCWMA and ERTCE area. All alternative tonnages will be compared to the mineable, augerable, and remining coal resource outlined in alternative 1.

ALTERNATIVE 2: STATE PETITION DESIGNATION

Definition: Designate as unsuitable for surface coal mining operations all public access lands proposed in the State's petition and as shown on the State's petition area map (1,200-foot corridor, 600 feet on both sides of 505 miles of ridgeline covering 67,326 acres). A drawing of the alternative 2 petition area is shown in figure 5-11.

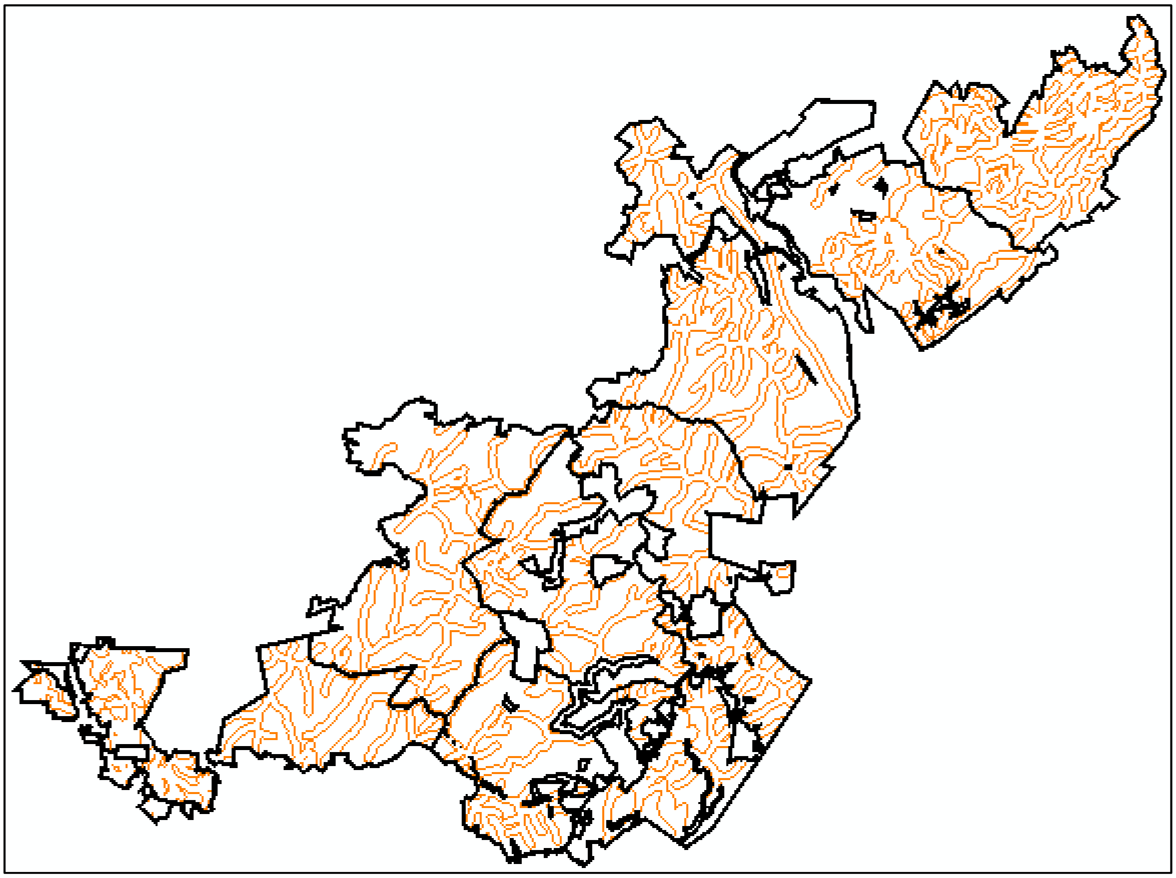


FIGURE 5-11: ALTERNATIVE 2 PETITION AREA

Alternative 2 excludes all NCWMA and ERTCE areas within the designated petition area from any and all mining-related activities. This includes any access roads and face-up areas for underground mining. Note that augering or underground mining beneath the petition area (without surface disturbance within the petition area) is allowed. With these restrictions, the patch analysis will identify any non-petition area mineable coal resources that will be excluded by the petition area if implemented.

Shown in table 5-21 is the categorization of all mineable and augerable coal resources within the NCWMA and ERTCE using the criteria defined in alternative 2:

TABLE 5-21: ALTERNATIVE 2 CATEGORIZATION OF MINEABLE COAL RESOURCES IN THE NCWMA AND ERTCE

	Petition		Non-Petition		Non-Petition – Patch Areas		Total	
	Surface	Auger	Surface	Auger	Surface	Auger	Surface	Auger
Coal Seam	Tons		Tons		Tons		Tons	
Jordan	1,500,000	40,000	800,000	330,000	100,000	30,000	2,400,000	400,000
Mingo	2,600,000	0	3,300,000	0	400,000	0	6,300,000	0
Rich Mountain	2,900,000	700,000	2,500,000	900,000	1,000,000	200,000	6,400,000	1,800,000
Kent	4,700,000	1,200,000	3,600,000	2,500,000	2,400,000	200,000	10,700,000	3,900,000
Murray	100,000	100,000	500,000	200,000	100,000	0	700,000	300,000
Block Total	**11,800,000**	**2,040,000**	**10,700,000**	**3,930,000**	**4,000,000**	**430,000**	**26,500,000**	**6,400,000**
Upper Grassy Spring	2,700,000	0	0	100,000	0	0	2,700,000	100,000
Lower Grassy Spring	4,800,000	300,000	200,000	0	0	0	5,000,000	300,000
Rock Spring	8,400,000	800,000	3,390,000	300,000	10,000	0	11,800,000	1,100,000
Upper Pine Bald	8,000,000	500,000	1,600,000	0	100,000	0	9,700,000	600,000
Lower Pine Bald	11,000,000	1,200,000	2,600,000	100,000	100,000	0	13,700,000	1,300,000
Pewee	8,200,000	2,100,000	4,400,000	1,500,000	900,000	200,000	13,500,000	3,800,000
Upper Walnut Mountain	800,000	300,000	1,400,000	480,000	100,000	20,000	2,300,000	800,000
Walnut Mountain	14,200,000	2,300,000	7,000,000	1,000,000	1,600,000	100,000	22,800,000	3,400,000
Red Ash	8,100,000	1,100,000	2,700,000	1,400,000	800,000	100,000	11,600,000	2,600,000
Big Mary	11,100,000	4,600,000	8,900,000	2,800,000	2,300,000	400,000	22,300,000	7,800,000
Windrock	9,200,000	3,300,000	10,500,000	1,900,000	3,100,000	600,000	22,800,000	5,800,000
Upper Pioneer	7,100,000	300,000	9,000,000	700,000	3,000,000	300,000	19,100,000	1,300,000
Lower Pioneer	29,200,000	2,600,000	17,800,000	3,100,000	6,100,000	600,000	53,100,000	6,300,000
Jellico	4,100,000	2,100,000	12,300,000	4,900,000	1,800,000	700,000	18,200,000	7,700,000
Plateau Total	**126,900,000**	**21,600,000**	**81,790,000**	**18,280,000**	**19,910,000**	**3,020,00**	**228,600,000**	**42,900,000**
Grand Total	**138,700,000**	**23,640,000**	**92,490.000**	**22,210,000**	**23,910,000**	**3,450,000**	**255,100,000**	**49,300,000**

As shown in table 5-22, alternative 2 excludes approximately 190 million tons of mineable and augerable coal resource (the sum of the petition and non-petition – patch areas tonnage) which is 62% of the total mineable and augerable coal resource in the NCWMA and ERTCE.

TABLE 5-22: ALTERNATIVE 2 COAL TONNAGE EXCLUSIONS IN THE NCWMA AND ERTCE

Total Mineable and Augerable Coal Resource (tons)	Total Mineable Augerable Coal Resource Excluded by Petition Areas and Patch Areas (tons)	Reduction
304,400,000	189,700,000	62%

In addition to the coal tonnage analysis, an analysis of the coal resource acreage was conducted to tie in with the relationship between the individual petition areas and the mineable and augerable coal resource areas. Table 5-23 shows the coal resource area analysis. Note that the percent reduction in the areas due to the petition area and the patch areas mirrors the coal Resource tonnage analysis in table 5-22.

TABLE 5-23: ALTERNATIVE 2 COAL AREA EXCLUSIONS IN THE NCWMA AND ERTCE

Total Petition Area (acres)	Total Mineable and Augerable Coal Resource (acres)	Total Mineable and Augerable Coal Resource Excluded by Petition Areas and Patch Areas (acres	Reduction
67,326	92,969	54,797	59%

Remining Resource

As shown in table 5-24, alternative 2 excludes approximately 8.5 million tons of the remining coal resource (non-petition – patch areas tonnage) which is 58% of the total remining coal resource in the NCWMA and ERTCE.

TABLE 5-24: ALTERNATIVE 2 REMINING RESOURCES IN THE NCWMA AND ERTCE

Coal Seam	Petition		Non-Petition		Non-Petition – Patch Areas		Total	
	2nd Cut	Auger	2nd Cut	Auger	2nd Cut	Auger	2nd Cut	Auger
	Tons		Tons		Tons		Tons	
Jordan	20,000	20,000	30,000	50,000	0	0	50,000	70,000
Mingo	0	0	0	0	0	0	0	0
Rich Mountain	300,000	400,000	150,000	190,000	20,000	30,000	470,000	620,000
Kent	360,000	490,000	420,000	560,000	50,000	60,000	830,000	1,110,000
Murray	0	0	0	0	0	0	0	0
Block Total	**680,000**	**910,000**	**600,000**	**800,000**	70,000	90,000	**1,350,000**	**1,800,000**
Upper Grassy Spring	40,000	50,000	0	0	0	0	40,000	50,000
Lower Grassy Spring	40,000	50,000	0	0	0	0	40,000	50,000
Rock Spring	200,000	270,000	10,000	10,000	0	0	210,000	280,000
Upper Pine Bald	0	0	0	0	0	0	0	0
Lower Pine Bald	20,000	30,000	0	0	0	0	20,000	30,000

Coal Seam	Petition		Non-Petition		Non-Petition – Patch Areas		Total	
	2nd Cut	Auger	2nd Cut	Auger	2nd Cut	Auger	2nd Cut	Auger
	Tons		Tons		Tons		Tons	
Pewee	470,000	630,000	250,000	320,000	10,000	20,000	730,000	970,000
Upper Walnut Mountain	0	0	0	0	0	0	0	0
Walnut Mountain	520,000	690,000	170,000	230,000	60,000	80,000	750,000	1,000,000
Red Ash	250,000	340,000	310,000	410,000	20,000	20,000	580,000	770,000
Big Mary	830,000	1,110,000	840,000	1,120,000	160,000	210,000	1,830,000	2,440,000
Windrock	30,000	50,000	180,000	220,000	20,000	30,000	230,00	300,000
Upper Pioneer	0	0	0	0	0	0	0	0
Lower Pioneer	40,000	50,000	30,000	40,000	0	10,000	70,000	100,000
Jellico	140,000	190,000	300,000	410,000	20,000	20,000	460,000	620,000
Plateau Total	**2,580,000**	**3,460,000**	**2,090.000**	**2,760,000**	**290,000**	**390,000**	**4,960,000**	**6,610,000**
Grand Total	**3,260,000**	**4,370,000**	**2,690,000**	**3,560,000**	**360,000**	**480000**	**6,310,000**	**8,410,000**

ALTERNATIVE 3: STATE PETITION DESIGNATION WITH REMINING AND ROAD ACCESS (PREFERRED ALTERNATIVE)

Definition: Designate all public access lands shown on the State's petition area map as unsuitable for surface coal mining operations but allow the following:

A. Access roads and haul roads in and through the designated area.

B. Remining (pursuant to 30 CFR Chapter VII) to reclaim previously impacted areas, and auger mining from these remining areas, within the designated area.

The alternative 3 petition area is identical to the alternative 2 petition area. A drawing of the alternative 3 petition area is shown in figure 5-12.

In alternative 3, the mineable and augerable coal resource that will be excluded within the petition area will be the same as the tonnage in alternative 2. The patch area analysis for alternative 3 will be altered so that mineable and augerable coal resources that can be accessed with newly constructed access roads through the petition area will not be excluded. The only mineable and augerable coal resource that will be excluded in the patch area analysis will be blocks of mineable and augerable coal resource that do not have a minimum coal resource of 100,000 tons (or have an area of less than 50 acres). Table 5-25 shows the categorization of all mineable and augerable coal resources within the NCWMA and ERTCE using the criteria defined in alternative 3.

In addition to the tabulation and categorization of the mineable coal resource in alternative 3, a coal resource will be calculated for the potential remining of areas adjacent to previously contour mined lands that are within and outside of the petition area.

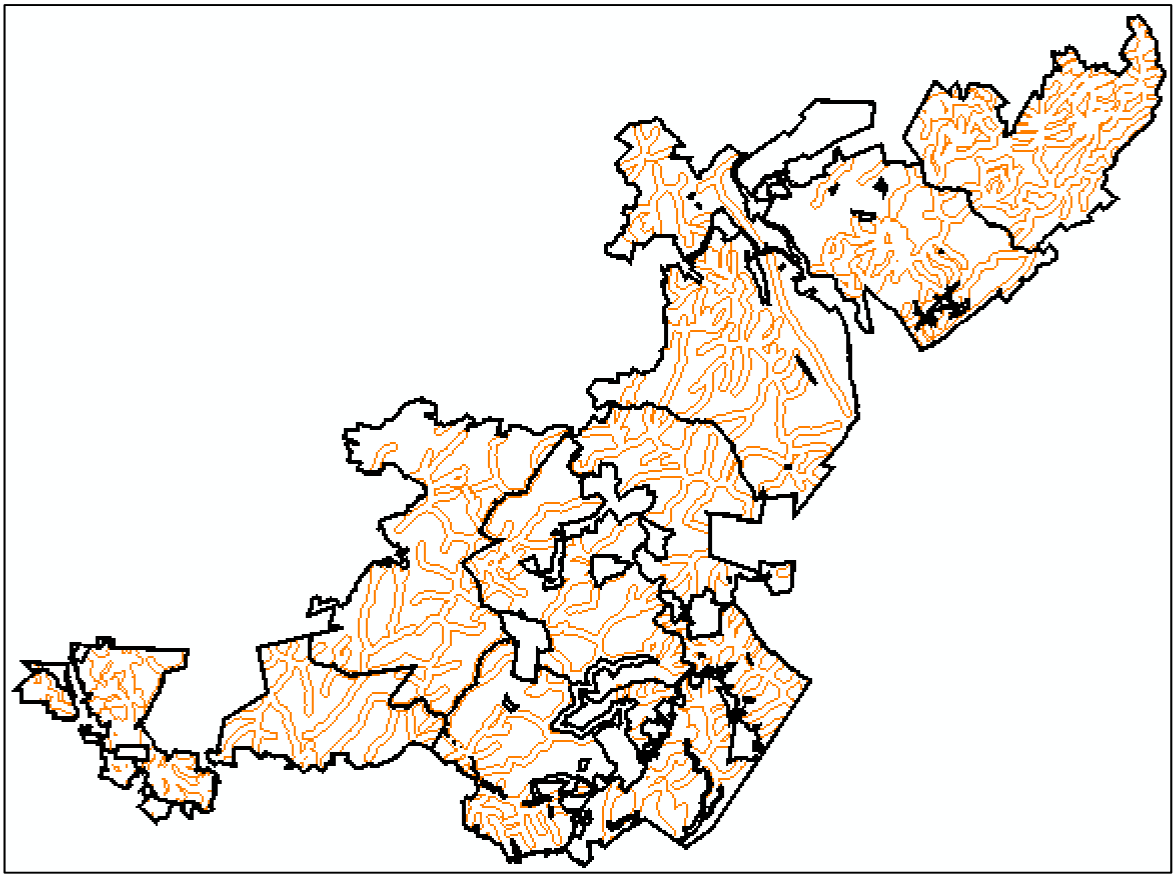


FIGURE 5-12: ALTERNATIVE 3 DESIGNATION AREA (PREFERRED ALTERNATIVE)

TABLE 5-25: ALTERNATIVE 3 (PREFERRED ALTERNATIVE) CATEGORIZATION OF MINEABLE COAL RESOURCES IN THE NCWMA AND ERTCE

Coal Seam	Petition		Non-Petition		Non-Petition – Patch Areas		Total	
	Surface	Auger	Surface	Auger	Surface	Auger	Surface	Auger
	Tons		Tons		Tons		Tons	
Jordan	1,500,000	40,000	860,000	360,000	40,000	0	2,400,000	400,000
Mingo	2,600,000	0	3,650,000	0	50,000	0	6,300,000	0
Rich Mountain	2,900,000	700,000	3,400,000	1,070,000	100,000	30,000	6,400,000	1,800,000
Kent	4,700,000	1,200,000	5,800,000	2,670,000	200,000	30,000	10,700,000	3,900,000
Murray	100,000	100,000	600,000	200,000	0	0	700,000	300,000
Block Total	**11,800,000**	**2,040,000**	**14,310,000**	**4,300,000**	**390,000**	**60,000**	**26,500,000**	**6,400,000**
Upper Grassy Spring	2,700,000	0	0	100,000	0	0	2,700,000	100,000
Lower Grassy Spring	4,800,000	300,000	200,000	0	0	0	5,000,000	300,000
Rock Spring	8,400,000	800,000	3,380,000	300,000	20,000	0	11,800,000	1,100,000
Upper Pine Bald	8,000,000	600,000	1,660,000	0	40,000	0	9,700,000	600,000
Lower Pine Bald	11,000,000	1,200,000	2,600,000	100,000	100,000	0	13,700,000	1,300,000
Pewee	8,200,000	2,100,000	5,100,000	1,650,000	200,000	50,000	13,500,000	3,800,000
Upper Walnut Mountain	800,000	300,000	1,490,000	500,000	10,000	0	2,300,000	800,000
Walnut Mountain	14,200,000	2,300,000	8,400,000	1,070,000	200,000	30,000	22,800,000	3,400,000
Red Ash	8,100,000	1,100,000	3,400,000	1,470,000	100,000	30,000	11,600,000	2,600,000
Big Mary	11,100,000	4,600,000	11,000,000	3,170,000	200,000	30,000	22,300,000	7,800,000
Windrock	9,200,000	3,300,000	13,500,000	2,500,000	100,000	0	22,800,000	5,800,000
Upper Pioneer	7,100,000	300,000	11,950,000	990,000	50,000	10,000	19,100,000	1,300,000
Lower Pioneer	29,200,000	2,600,000	23,800,000	3,670,000	100,000	30,000	53,100,000	6,300,000
Jellico	4,100,000	2,100,000	13,900,000	5,560,000	200,000	40,000	18,200,000	7,700,000
Plateau Total	**126,900,000**	**21,600,000**	**100,380,000**	**21,080,000**	**1,320,000**	**220,000**	**228,600,000**	**42,900,000**
Grand Total	**138,700,000**	**23,640,000**	**114,690,000**	**25,380,000**	**1,710,000**	**280,000**	**255,100,000**	**49,300,000304**

As shown in table 5-26, alternative 3 excludes approximately 164 million tons of mineable and augerable coal resource (the sum of the petition and non-petition – patch areas tonnage) which is 54% of the total mineable and augerable coal resource in the NCWMA and ERTCE.

TABLE 5-26: ALTERNATIVE 3 (PREFERRED ALTERNATIVE) COAL RESOURCE TONNAGE EXCLUSIONS IN THE NCWMA AND ERTCE

Total Mineable and Augerable Coal Resource (tons)	Total Mineable Augerable Coal Resource Excluded by Petition Areas and Patch Areas (tons)	Reduction
304,400,000	164,330,000	54%

In addition to the coal tonnage analysis, an analysis of the coal resource acreage was conducted to tie in with the relationship between the individual petition areas and the mineable and augerable coal resource areas. Table 5-27 shows the coal resource area analysis. Note that the percent reduction in the areas due to the petition area and the patch areas mirrors the coal resource tonnage analysis in table 5-26.

TABLE 5-27: ALTERNATIVE 3 (PREFERRED ALTERNATIVE) COAL RESOURCE AREA EXCLUSIONS IN THE NCWMA AND ERTCE

Total Petition Area (acres)	Total Mineable and Augerable Coal Resource (acres)	Total Mineable and Augerable Coal Resource Excluded by Petition Areas and Patch Areas (acres	Reduction
67,326	92,969	47,405	51%

Remining Resource

As shown in table 5-28, alternative 3 does not exclude any of the remining coal resource (the sum of the petition and non-petition – patch areas tonnage) in the NCWMA and ERTCE. Note that in alternatives 3 and 4 the remining resource in the petition area is not excluded (remining is allowed in these two alternatives in the petition area).

TABLE 5-28: ALTERNATIVE 3 (PREFERRED ALTERNATIVE) REMINING RESOURCES IN THE NCWMA AND ERTCE

Coal Seam	Petition		Non-Petition		Non-Petition – Patch Areas		Total	
	2nd Cut	Auger	2nd Cut	Auger	2nd Cut	Auger	2nd Cut	Auger
	Tons		Tons		Tons		Tons	
Jordan	0	0	50,000	70,000	0	0	50,000	70,000
Mingo	0	0	0	0	0	0	0	0
Rich Mountain	0	0	470,000	620,000	0	0	470,000	620,000
Kent	0	0	830,000	1,110,000	0	0	830,000	1,110,000
Murray	0	0	0	0	0	0	0	0
Block Total	**0**	**0**	**1,350,000**	**1,800,000**	0	0	**1,350,000**	**1,800,000**
Upper Grassy Spring	0	0	40,000	50,000	0	0	40,000	50,000
Lower Grassy Spring	0	0	40,000	50,000	0	0	40,000	50,000
Rock Spring	0	0	2210,000	280,000	0	0	2210,000	280,000

Coal Seam	Petition		Non-Petition		Non-Petition – Patch Areas		Total	
	2nd Cut	Auger	2nd Cut	Auger	2nd Cut	Auger	2nd Cut	Auger
	Tons		Tons		Tons		Tons	
Upper Pine Bald	0	0	0	0	0	0	0	0
Lower Pine Bald	0	0	20,000	30,000	0	0	20,000	30,000
Pewee	0	0	730,000	970,000	0	0	730,000	970,000
Upper Walnut Mountain	0	0	0	0	0	0	0	0
Walnut Mountain	0	0	750,000	1,000,000	0	0	750,000	1,000,000
Red Ash	0	0	580,000	770,000	0	0	580,000	770,000
Big Mary	0	0	1,830,000	2,440,000	0	0	1,830,000	2,440,000
Windrock	0	0	230,000	300,000	0	0	230,000	300,000
Upper Pioneer	0	0	0	0	0	0	0	0
Lower Pioneer	0	0	70,000	100,000	0	0	70,000	100,000
Jellico	0	0	460,000	620,000	0	0	460,000	620,000
Plateau Total	**0**	**0**	**4,960,000**	**6,610,000**	**0**	**0**	**4,960,000**	**6,610,000**
Grand Total	**0**	**0**	**6,310,000**	**8,410,000**	**0**	**0**	**6,310,000**	**8,410,000**

ALTERNATIVE 4: EXPANDED CORRIDOR DESIGNATION WITH REMINING AND ROAD ACCESS

Definition: Designate as unsuitable for surface coal mining operations the combination of all public access lands shown on the State's petition area map plus the additional ridgeline corridors which the State did not include in its petition area map (600 feet both sides of 569 miles of ridgeline covering 76,133 acres) and allow roads and remining as described in alternative 3.

In evaluating the State's petition, OSMRE identified a number of concerns with the State's graphic depiction of ridgelines in the petition area. The term "ridgelines" was not defined in the petition. In an effort to address these concerns, OSMRE developed a consistent and repeatable method to identify ridgelines within the proposed petition area. Using this method, OSMRE developed a map graphic of the petition area ridgelines that resolved many of the concerns identified with the State map but still met the State's intent as expressed in the petition. For this alternative, OSMRE established the following criteria for consistently identifying a ridgeline: OSMRE determined that Strahler 3rd order watershed boundaries most closely resemble the ridgelines shown on the State's petition area map. For these 3rd order watershed boundaries, all segments of ridgelines above the elevation of the average Strahler 1st order stream origin are considered to be ridgelines if they meet the criteria of having at least 500 feet of topographic relief above the lowest point within that 3rd order watershed. A corridor width of 600 feet was calculated on both sides of the resulting ridgelines to create the additional petition area to be evaluated in this alternative. Evaluating this additional area is consistent with the State's description of the petition area as "the area within 600 feet of all ridgelines lying within the North Cumberland Wildlife Management Area" on page 1 of the petition. A drawing of the alternative 4 petition area is shown in figure 5-13.

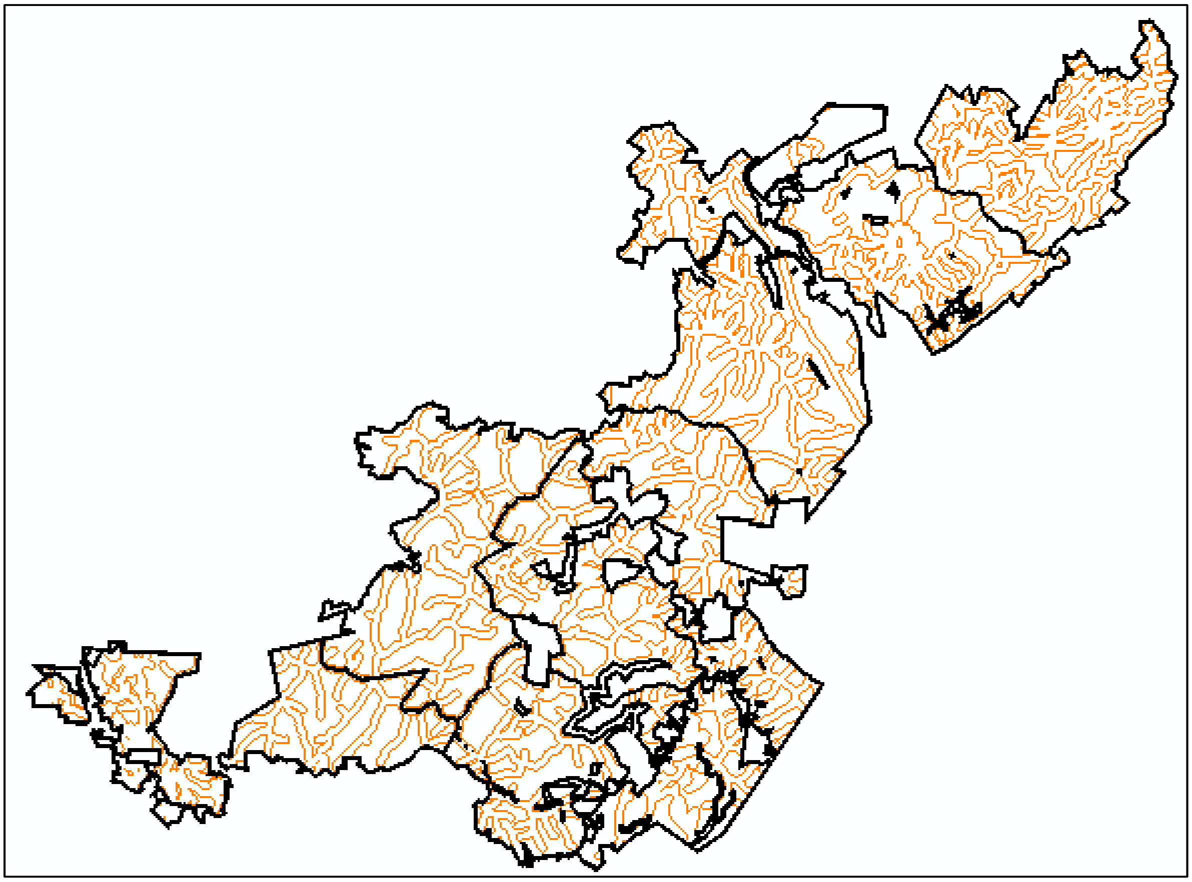


FIGURE 5-13: ALTERNATIVE 4 DESIGNATION AREA

With the addition of approximately 9,000 acres to the petition area in alternative 4 as compared to alternatives 1, 2, and 3, a complete reevaluation of the categorization of the mineable and augerable coal resource tonnage was conducted. The additional petition acreage in alternative 4 also alters the configuration of the petition area which in turn changes the results of the patch analysis. Table 5-29 shows the tabulation of the mineable and augerable coal resource categories for alternative 4:

TABLE 5-29: ALTERNATIVE 4 CATEGORIZATION OF MINEABLE COAL RESOURCES IN THE NCWMA AND ERTCE

Coal Seam	Petition		Non-Petition		Non-Petition – Patch Areas		Total	
	Surface	Auger	Surface	Auger	Surface	Auger	Surface	Auger
	Tons		Tons		Tons		Tons	
Jordan	1,600,000	40,000	760,000	360,000	40,000	0	2,400,000	400,000
Mingo	3,100,000	0	3,100,000	0	100,000	0	6,300,000	0
Rich Mountain	3,300,000	800,000	3,000,000	900,00	100,000	100,000	6,400,000	1,800,000
Kent	5,100,000	1,500,000	5,200,000	2,300,000	400,000	100,000	10,700,000	3,900,000
Murray	100,000	100,000	580,000	180,000	20,000	20,000	700,000	300,000
Block Total	**13,200,000**	**2,440,000**	**12,640,000**	**3,740,000**	**660,000**	**220,000**	**26,500,000**	**6,400,000**
Upper Grassy Spring	2,700,000	100,000	0	0	0	0	2,700,000	100,000
Lower Grassy Spring	4,800,000	200,000	200,000	100,000	0	0	5,000,000	300,000
Rock Spring	8,600,000	800,000	3,180,000	300,000	20,000	0	11,800,000	1,100,000
Upper Pine Bald	8,200,000	600,000	1,460,000	0	40,000	0	9,700,000	600,000
Lower Pine Bald	9,900,000	1,300,000	3,700,000	0	100,000	0	13,700,000	1,300,000
Pewee	8.600,000	2,300,000	4,700,000	1,400,000	200,000	100,000	13,500,000	3,800,000
Upper Walnut Mountain	900,000	300,000	1,390,000	490,000	10,000	10,000	2,300,000	800,000
Walnut Mountain	15,100,000	1,800,000	7,500,000	1,570,000	200,000	30,000	22,800,000	3,400,000
Red Ash	6,600,000	600,000	4,900,000	1,970,000	100,000	30,000	11,600,000	2,600,000
Big Mary	12,100,000	3,200,000	10,000,000	4,500,000	200,00	100,00	22,300,000	7,800,000
Windrock	11,100,000	2,800,000	11,600,000	3,000,000	100,000	0	22,800,00	5,800,000
Upper Pioneer	8,900,000	400,000	10,100,000	890,000	100,000	10,000	19,100,000	1,300,000
Lower Pioneer	27,600,000	3,000,000	25,400,000	3,200,000	100,000	100,000	53,100,000	6,300,000
Jellico	4,700,000	1,800,000	13,300,000	5,800,000	200,000	100,000	18,200,00	7,700,000
Plateau Total	**129,800,000**	**19,200,000**	**97,430,000**	**23,220,000**	**1,370,000**	**480,000**	**228,600,000**	**42,900,000**
Grand Total	**143,000,000**	**21,640,000**	**110,070,000**	**26,960,000**	**2,030,000**	**700,000**	**255,100,000**	**49,300,000**

As shown in table 5-30, alternative 4 excludes approximately 167 million tons of mineable and augerable coal resource (the sum of the petition and non-petition – patch areas tonnage) which is 55% of the total mineable and augerable coal resource in the NCWMA and ERTCE.

TABLE 5-30: ALTERNATIVE 4 COAL RESOURCE TONNAGE EXCLUSIONS IN THE NCWMA AND ERTCE

Total Mineable and Augerable Coal Resource (tons)	Total Mineable Augerable Coal Resource Excluded by Petition Areas and Patch Areas (tons)	Reduction
304,400,000	167,370,000	55%

In addition to the coal tonnage analysis, an analysis of the coal resource acreage was conducted to tie in with the relationship between the individual petition areas and the mineable and augerable coal resource areas. Table 5-31 shows the coal resource area analysis. Note that the percent reduction in the areas due to the petition area and the patch areas mirrors the coal resource tonnage analysis in table 5-30.

TABLE 5-31: ALTERNATIVE 4 COAL RESOURCE AREA EXCLUSIONS IN THE NCWMA AND ERTCE

Total Petition Area (acres)	Total Mineable and Augerable Coal Resource (acres)	Total Mineable and Augerable Coal Resource Excluded by Petition Areas and Patch Areas (acres	Reduction
76,133	92,969	51,483	55%

Remining Resource

As shown in table 5-32, alternative 4 does not exclude any of the remining coal resource (non-petition – patch areas tonnage only) in the NCWMA and ERTCE. Note that in alternatives 3 and 4 the remining resource in the petition area is not excluded (remining is allowed in these two alternatives in the petition area).

TABLE 5-32: ALTERNATIVE 4 REMINING RESOURCES IN THE NCWMA AND ERTCE

Coal Seam	Petition		Non-Petition		Non-Petition – Patch Areas		Total	
	2nd Cut	Auger	2nd Cut	Auger	2nd Cut	Auger	2nd Cut	Auger
	Tons		Tons		Tons		Tons	
Jordan	0	0	50,000	70,000	0	0	50,000	70,000
Mingo	0	0	0	0	0	0	0	0
Rich Mountain	0	0	470,000	620,000	0	0	470,000	620,000
Kent	0	0	830,000	1,110,000	0	0	830,000	1,110,000
Murray	0	0	0	0	0	0	0	0
Block Total	**0**	**0**	**1,350,000**	**1,800,000**	0	0	**1,350,000**	**1,800,000**
Upper Grassy Spring	0	0	40,000	50,000	0	0	40,000	50,000
Lower Grassy Spring	0	0	40,000	50,000	0	0	40,000	50,000
Rock Spring	0	0	210,000	280,000	0	0	210,000	280,000
Upper Pine Bald	0	0	0	0	0	0	0	0

Coal Seam	Petition		Non-Petition		Non-Petition – Patch Areas		Total	
	2nd Cut	Auger	2nd Cut	Auger	2nd Cut	Auger	2nd Cut	Auger
	Tons		Tons		Tons		Tons	
Lower Pine Bald	0	0	20,000	30,000	0	0	20,000	30,000
Pewee	0	0	730,000	970,000	0	0	730,000	970,000
Upper Walnut Mountain	0	0	0	0	0	0	0	0
Walnut Mountain	0	0	750,000	1,000,000	0	0	750,000	1,000,000
Red Ash	0	0	580,000	770,000	0	0	580,000	770,000
Big Mary	0	0	1,830,000	2,440,000	0	0	1,830,000	2,440,000
Windrock	0	0	230,000	300,000	0	0	230,000	300,000
Upper Pioneer	0	0	0	0	0	0	0	0
Lower Pioneer	0	0	70,000	100,000	0	0	70,000	100,000
Jellico	0	0	460,000	620,000	0	0	460,000	620,000
Plateau Total	**0**	**0**	**4,960,000**	**6,610,000**	**0**	**0**	**4,960,000**	**6,610,000**
Grand Total	**0**	**0**	**6,310,000**	**8,410,000**	**0**	**0**	**6,310,000**	**8,410,000**

Alternative 5: Targeted Resource Protection Designation

Definition: Designate as unsuitable for surface coal mining operations the following portions of the public access lands shown on the State's petition area map plus the additional ridgeline corridors which the State did not include, specifically: (a) a 1,500 foot wide corridor centered on the Cumberland Trail State Park (3,678 acres) with any associated Park campgrounds (55 dB acoustic impact area; 329 acres); (b) watershed areas of environmentally sensitive wetlands located in Campbell County on Stinking Creek just downstream of Stell Branch, on Meadow Creek, and on Thompson Creek (3,068 acres); (c) Hatfield Knob elk viewing tower area (45 dB acoustic impact area, 5,759-foot radius; 1,327 acres); (d) habitat frequently used by the cerulean warbler, a state-listed species (4,545 acres); and (e) areas associated with occurrences of Ozark bunchflower, Canada Lily, American ginseng, pink lady's slipper, pale corydalis, and leatherleaf meadowrue (500 acres); for a total of 12,331 acres (less than the sum because some areas overlap).

To ensure that a reasonable range of alternatives is analyzed under the National Environmental Policy Act (NEPA), and in response to comments received during scoping, OSMRE determined that a smaller acreage alternative was appropriate. The areas selected for alternative 5 were included because they either (1) fell within a category required to be examined under 30 CFR § 942.762(b) or (2) were identified by the State in its petition or by other agencies or commenters during the petition review and scoping process as possessing particularly important resource qualities. The selection of these portions and the non-selection of other portions for analysis and comparison in this alternative are not intended to, and do not reflect a conclusion or determination regarding the suitability or unsuitability of any area for mining. A drawing of the alternative 5 petition area is shown in figure 5-14.

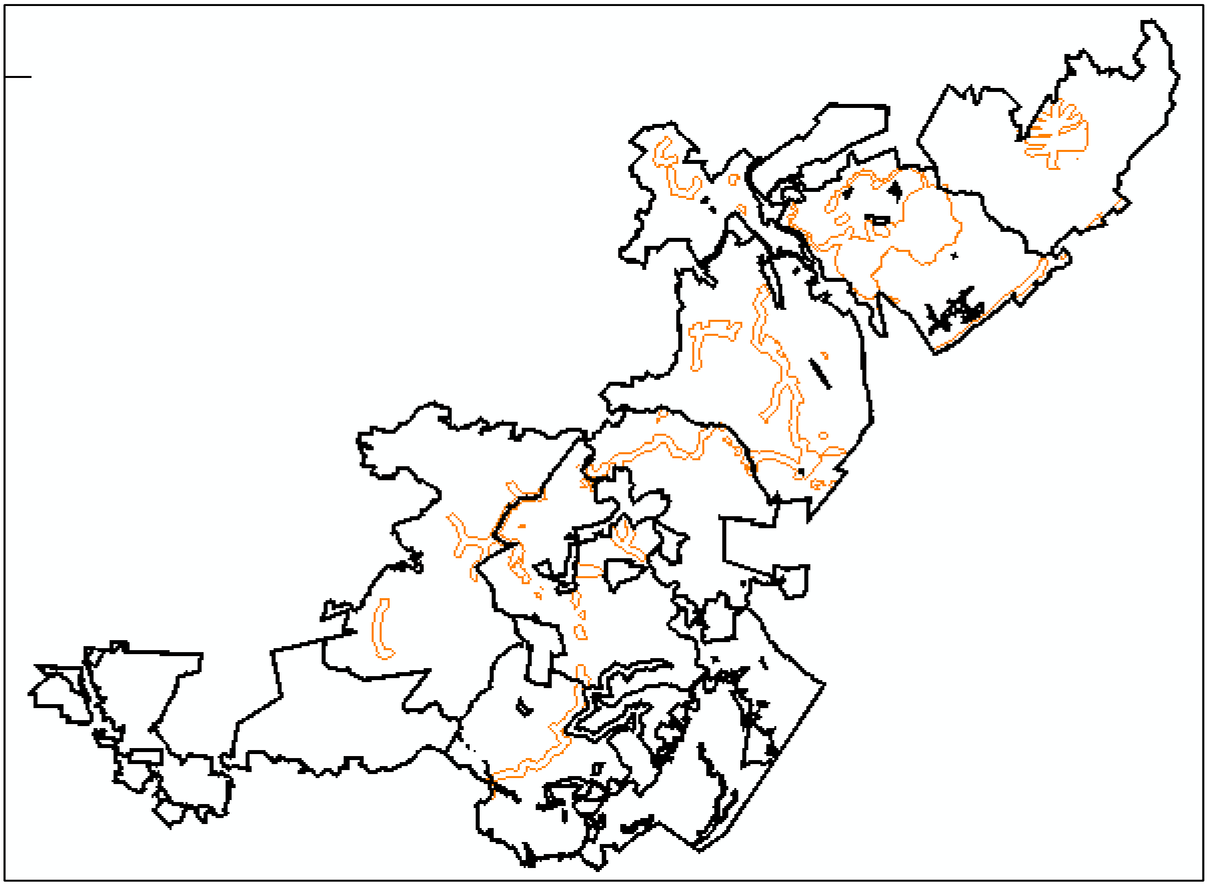


FIGURE 5-14: ALTERNATIVE 5 DESIGNATION AREA

With only approximately 12,000 acres to the petition area in alternative 5 a complete revaluation of the categorization of the mineable and augerable coal resource tonnage and remining coal resource was conducted. Table 5-33 shows the tabulation of the mineable coal resource categories for alternative 5:

TABLE 5-33: ALTERNATIVE 5 CATEGORIZATION OF MINEABLE COAL RESOURCES IN THE NCWMA AND ERTCE

	Petition		Non-Petition		Non-Petition – Patch Areas		Total	
	Surface	Auger	Surface	Auger	Surface	Auger	Surface	Auger
Coal Seam	Tons		Tons		Tons		Tons	
Jordan	900,000	0	600,000	390,000	900,000	10,000	2,400,000	400,000
Mingo	900,000	0	4,500,000	0	900,000	0	6,300,000	0
Rich Mountain	700,000	200,000	5,000,000	1,600,000	700,000	0	6,400,000	1,800,000
Kent	1,600,000	600,000	7,500,000	3,200,000	1,600,000	100,000	10,700,000	3,900,000
Murray	10	0	700,000	300,000	0	0	700,000	300,000
Block Total	**4,100,000**	**800,000**	**18,300,000**	**5,490,000**	**4,100,000**	**110,000**	**26,500,000**	**6,400,000**
Upper Grassy Spring	500,000	30,000	2,200,000	70,000	0	0	2,700,000	100,000
Lower Grassy Spring	800,000	0	4,200,000	300,000	0	0	5,000,000	300,000
Rock Spring	2,200,000	200.,000	9,590,000	900,000	10,000	0	11,800,000	1,100,00
Upper Pine Bald	3,200,000	100,000	6,490,000	500,000	10,000	0	9,700,000	600,000
Lower Pine Bald	3,700,000	400,000	9,990,000	900,000	10,000	0	13,700,000	1,300,000
Pewee	1,800,000	500,000	11,690,000	3,290,000	10,000	10,000	13,500,000	3,800,000
Upper Walnut Mountain	400,000	200,000	1,890,000	600,000	10,000	0	2,300,000	800,000
Walnut Mountain	3,200,000	300,000	19,600,000	3,100,000	0	0	22,800,000	3,400,000
Red Ash	2,200,000	0	9,400,000	2,600,000	0	0	11,600,000	2,600,000
Big Mary	1,900,000	800,000	20,370,000	6,990,000	30,000	10,000	22,300,000	7,800,000
Windrock	1,200,000	600,000	21,600,000	5,200,000	0	0	22,800,000	5,800,000
Upper Pioneer	1,500,000	0	17,600,000	1,300,000	0	0	19,100,000	1,300,000
Lower Pioneer	7,100,000	500,000	46,000,000	5,800,000	0	0	53,100,000	6,300,000
Jellico	400,000	200,000	17,800,000	7,500,000	0	0	18,200,000	7,700,000
Plateau Total	**30,100,000**	**3,830,000**	**198,420,000**	**39,050,000**	**80,000**	**20,000**	**228,600,000**	**42,900,000**
Grand Total	**34,200,000**	**4,630,000**	**216,720,000**	**44,540,000**	**4,180,000**	**130,000**	**255,100,000**	**49,300,000**

As shown in table 5-34, alternative 5 excludes approximately 43 million tons of mineable and augerable coal resource (the sum of the petition and non-petition – patch areas tonnage) which is 14% of the total mineable and augerable coal resource in the NCWMA and ERTCE.

TABLE 5-34: ALTERNATIVE 5 COAL RESOURCE TONNAGE EXCLUSIONS IN THE NCWMA AND ERTCE

Total Mineable and Augerable Coal Resource (tons)	Total Mineable Augerable Coal Resource Excluded by Petition Areas and Patch Areas (tons)	Reduction
304,400,000	43,140,000	14%

In addition to the coal tonnage analysis, an analysis of the coal resource acreage was conducted to correlate with the relationship between the individual petition areas and the mineable and augerable coal resource areas. Table 5-35 shows the coal resource area analysis. Note that the percent reduction in the areas due to the petition area and the patch areas mirrors the coal resource tonnage analysis in table 5-34.

TABLE 5-35: ALTERNATIVE 5 COAL RESOURCE AREA EXCLUSIONS IN THE NCWMA AND ERTCE

Total Petition Area (acres)	Total Mineable and Augerable Coal Resource (acres)	Total Mineable and Augerable Coal Resource Excluded by Petition Areas and Patch Areas (acres	Reduction
12,331	92,969	12,277	13%

Remining Resource

As shown in table 5-36, alternative 5 excludes approximately 1 million tons of the remining coal resource (the sum of the petition and non-petition – patch areas tonnages) which is 7% of the total remining coal resource in the NCWMA and ERTCE.

TABLE 5-36: ALTERNATIVE 5 REMINING RESOURCES IN THE NCWMA AND ERTCE

Coal Seam	Petition		Non-Petition		Non-Petition – Patch Areas		Total	
	2nd Cut	Auger	2nd Cut	Auger	2nd Cut	Auger	2nd Cut	Auger
	Tons		Tons		Tons		Tons	
Jordan	10,000	10,000	40,000	60,000	0	0	50,000	70,000
Mingo	0	0	0	0	0	0	0	0
Rich Mountain	10,000	20,000	460,000	600,000	0	0	470,000	620,000
Kent	30,000	30,000	800,000	1,080,000	0	0	830,000	1,110,000
Murray	0	0	0	0	0	0	0	0
Block Total	**50,000**	**60,000**	**1,300,000**	**1,740,000**	**0**	**0**	**1,350,000**	**1,800,000**
Upper Grassy Spring	0	0	40,000	50,000	0	0	40,000	50,000
Lower Grassy Spring	0	0	40,000	50,000	0	0	40,000	50,000
Rock Spring	50,000	60,000	160,000	220,000	0	0	210,000	280,000
Upper Pine Bald	0	0	0	0	0	0	0	0
Lower Pine Bald	10,000	10,000	10,000	20,000	0	0	20,000	30,000

Coal Seam	Petition		Non-Petition		Non-Petition – Patch Areas		Total	
	2nd Cut	Auger	2nd Cut	Auger	2nd Cut	Auger	2nd Cut	Auger
	Tons		Tons		Tons		Tons	
Pewee	50,000	70,000	680,000	900,000	0	0	730,000	970,000
Upper Walnut Mountain	0	0	0	0	0	0	0	0
Walnut Mountain	50,000	70,000	700,000	930,000	0	0	750,000	1,000,000
Red Ash	130,000	170,000	450,000	600,000	0	0	580,000	770,000
Big Mary	110,000	150,000	1,720,000	2,290,000	0	0	1,830,000	2,440,000
Windrock	0	0	230,000	300,000	0	0	230,000	300,000
Upper Pioneer	0	0	0	0	0	0	0	0
Lower Pioneer	0	0	70,000	100,000	0	0	70,000	100,000
Jellico	0	0	460,000	620,000	0	0	460,000	620,000
Plateau Total	**400,000**	**530,000**	**4,560,000**	**6,080,000**	**0**	**0**	**4,960,000**	**6,610,000**
Grand Total	**450,000**	**590,000**	**5,860,000**	**7,820,000**	**0**	**0**	**6,310,000**	**8,410,000**

ALTERNATIVE 6: REDUCED CORRIDOR DESIGNATION

Definition: Designate as unsuitable for surface coal mining operations public access lands shown on the State's petition area map but reduce the width of the ridgeline corridors from 1,200 feet (600 feet from each side of the ridgeline) to 600 feet (300 feet from each side of the ridgeline) (505 miles of ridgeline covering 39,106 acres). A drawing of the alternative 6 petition area is shown in figure 5-15.

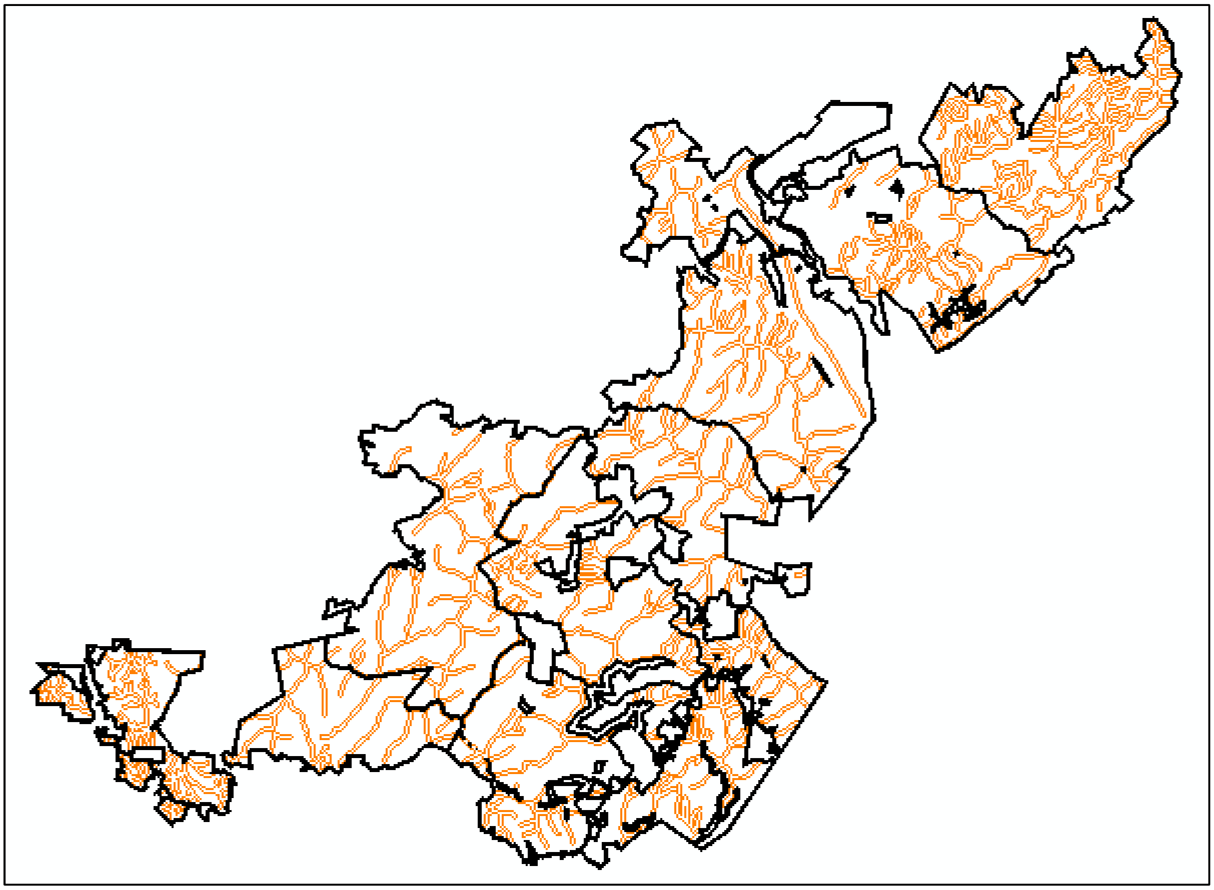


FIGURE 5-15: ALTERNATIVE 6 DESIGNATION AREA

A complete revaluation of the categorization of the mineable and augerable coal resource tonnage was conducted. Table 5-37 shows the tabulation of the mineable and augerable coal resource categories for alternative 6.

TABLE 5-37: ALTERNATIVE 6 CATEGORIZATION OF MINEABLE COAL RESOURCES IN THE NCWMA AND ERTCE

	Petition		Non-Petition		Non-Petition – Patch Areas		Total	
	Surface	Auger	Surface	Auger	Surface	Auger	Surface	Auger
Coal Seam	Tons		Tons		Tons		Tons	
Jordan	1,000,000	20,000	1,200,000	370,000	200,000	10,000	2,400,000	400,000
Mingo	1,500,000	0	4,500,000	0	300,000	0	6,300,000	0
Rich Mountain	1,400,000	400,000	4,300,000	1,100,000	700,000	300,000	6,400,000	1,800,000
Kent	2,100,000	500,000	8,000,000	3,200,000	600,000	200,000	10,700,000	3,900,000
Murray	100,000	30,000	500,000	270,000	0	0	700,000	300,000
Block Total	**6,100,000**	**950,000**	**18,600,000**	**4,940,000**	**1,800,000**	**510,000**	**26,500,000**	**6,400,000**
Upper Grassy Spring	2,300,000	100,000	390,000	0	10,000	0	2,700,000	100,000
Lower Grassy Spring	3,400,000	200,000	1,570,000	100,000	30,000	0	5,000,000	300,000
Rock Spring	5,200,000	600,000	6,500,000	500,000	100,000	0	11,800,000	1,100,000
Upper Pine Bald	5,200,000	400,000	4,100,000	160,000	400,000	40,000	9,700,000	600,000
Lower Pine Bald	6,500,000	900,000	7,000,000	350,000	200,000	50,000	13,700,000	1,300,000
Pewee	4,400,000	900,000	7,700,000	2,700,000	1,400,000	200,000	13,500,000	3,800,000
Upper Walnut Mountain	500,000	200,000	1,700,000	580,000	100,000	20,000	2,300,000	800,000
Walnut Mountain	8,500,000	900,000	12,500,000	2,400,000	1,800,000	100,000	22,800,000	3,400,000
Red Ash	5,000,000	300,000	5,700,000	2,200,000	900,000	100,000	11,600,000	2,600,000
Big Mary	5,400,000	1,600,000	14,400,000	5,600,000	2,500,000	600,000	22,300,000	7,800,000
Windrock	4,700,000	1,300,000	15,000,000	4,000,000	3,100,000	500,000	22,800,000	5,800,000
Upper Pioneer	3,600,000	200,000	13,400,000	1,000,000	2,100,000	100,000	19,100,000	1,300,000
Lower Pioneer	11,400,000	1,200,000	35,000,000	4,600,000	6,700,000	500,000	53,100,000	6,300,000
Jellico	1,900,000	800,000	14,500,000	6,200,000	1,800,000	700,000	18,200,000	7,700,000
Plateau Total	**68,000,000**	**9,600,000**	**139.460,000**	**30,390,000**	**21,140,000**	**2,910,000**	**228,600,000**	**42,900,000**
Grand Total	**74,100,000**	**10,550,000**	**158,060,000**	**35,330,000**	**22,940,000**	**3,420,000**	**255,100,000**	**49,300,000**

As shown in table 5-38, alternative 6 excludes approximately 111 million tons of mineable and augerable coal resource (the sum of the petition and non-petition – patch areas tonnage) which is 36% of the total mineable and augerable coal resource in the NCWMA and ERTCE.

Alternative 6 does not allow remining or access roads through the petition area (similar to alternative 2).

TABLE 5-38: ALTERNATIVE 6 COAL RESOURCE TONNAGE EXCLUSIONS IN THE NCWMA AND ERTCE

Total Mineable and Augerable Coal Resource (tons)	Total Mineable Augerable Coal Resource Excluded by Petition Areas and Patch Areas (tons)	Reduction
304,400,000	111,010,000	36%

In addition to the coal tonnage analysis, an analysis of the coal resource acreage was conducted to tie in with the relationship between the individual petition areas and the mineable and augerable coal resource areas. Table 5-39 shows the coal resource area analysis. Note that the percent reduction in the areas due to the petition area and the patch areas mirrors the coal resource tonnage analysis in table 5-38.

TABLE 5-39: ALTERNATIVE 6 COAL RESOURCE AREA EXCLUSIONS IN THE NCWMA AND ERTCE

Total Petition Area (acres)	Total Mineable and Augerable Coal Resource (acres)	Total Mineable and Augerable Coal Resource Excluded by Petition Areas and Patch Areas (acres	Reduction
39,106	92,969	34,260	37%

Remining Resource

As shown in table 5-40, alternative 6 excludes approximately 5 million tons of the remining coal resource (the sum of the petition and non-petition – patch areas tonnage) which is 32% of the total remining coal resource in the NCWMA and ERTCE.

TABLE 5-40: ALTERNATIVE 6 NCWMA AND ERTCE REMINING RESOURCES

Coal Seam	Petition		Non-Petition		Non-Petition – Patch Areas		Total	
	2nd Cut	Auger	2nd Cut	Auger	2nd Cut	Auger	2nd Cut	Auger
	Tons		Tons		Tons		Tons	
Jordan	10,000	10,000	40,000	60,000	0	0	50,000	70,000
Mingo	0	0	0	0	0	0	0	0
Rich Mountain	160,000	210,000	280,000	370,000	30,000	40,000	470,000	620,000
Kent	180,000	230,000	640,000	870,000	10,000	10,000	830,000	1,110,000
Murray	0	0	0	0	0	0	0	0
Block Total	**350,000**	**450,000**	**960,000**	**1,300,000**	40,000	50,000	**1,350,000**	**1,800,000**

Coal Seam	Petition		Non-Petition		Non-Petition – Patch Areas		Total	
	2nd Cut	Auger	2nd Cut	Auger	2nd Cut	Auger	2nd Cut	Auger
	Tons		Tons		Tons		Tons	
Upper Grassy Spring	20,000	30,000	20,000	20,000	0	0	40,000	50,000
Lower Grassy Spring	40,000	50,000	0	0	0	0	40,000	50,000
Rock Spring	120,000	160,000	80,000	100,000	10,000	20,000	210,000	280,000
Upper Pine Bald	0	0	0	0	0	0	0	0
Lower Pine Bald	20,000	30,000	0	0	0	0	20,000	30,000
Pewee	210,000	280,000	510,000	670,000	10,000	20,000	730,000	970,000
Upper Walnut Mountain	0	0	0	0	0	0	0	0
Walnut Mountain	240,000	320,000	450,000	600,000	60,000	80,000	750,000	1,000,000
Red Ash	140,000	190,000	420,000	560,000	20,000	20,000	580,000	770,000
Big Mary	420,000	570,000	1,250,000	1,650,000	160,000	220,000	1,830,000	2,440,000
Windrock	20,000	20,000	210,000	280,000	0	0	230,000	300,000
Upper Pioneer	0	0	0	0	0	0	0	0
Lower Pioneer	10,000	20,000	60,000	70,000	0	10,000	70,000	100,000
Jellico	80,000	100,000	370,000	500,000	10,000	20,000	460,000	620,000
Plateau Total	**1,320,000**	**1,770,000**	**3,370,000**	**4,450,000**	**270,000**	**390,000**	**4,960,000**	**6,610,000**
Grand Total	**1,670,000**	**2,220,000**	**4,330,000**	**5,750,000**	**310,000**	**440,000**	**6,310,000**	**8,410,000**

ALTERNATIVE ANALYSIS CONCLUSIONS

Shown in tables 5-41, 5-42, and 5-43 is a compilation of all the categorizations of the mineable, augerable, remining and underground coal resources for the NCWMA and ERTCE. Note that there is no effect on the underground coal resource by the petition or patch areas.

TABLE 5-41: NCWMA AND ERTCE MINEABLE AND AUGERABLE RESOURCES, ALTERNATIVES 1 THROUGH 6

	Petition		Non-Petition		Non-Petition – Patch Areas		Total		% Excluded	
	Surface	Auger	Surface	Auger	Surface	Auger	Surface	Auger	Surface	Auger
Alternative	Tons		Tons		Tons		Tons		Tons	
1	0	0	255,100,000	49,300,000	0	0	255,100,000	49,300,000	0%	0%
2	138,700,000	23,640,000	92,490,000	22,210,000	23,910,000	3,450,0	255,100,000	49,300,000	64%	55%
3	138,700,000	23,640,000	114,690,000	25,380,000	1,710,000	280,000	255,100,000	49,300,000	55%	49%
4	143,000,000	21,640,000	110,070,000	26,960,000	2,030,000	700,000	255,100,000	49,300,000	57%	45%
5	34,200,000	4,630,000	216,720,000	44,540,000	4,180,000	130,000	255,100,000	49,300,000	15%	10%
6	74,100,000	10,550,000	158,060,000	35,330,000	22,940,000	3,420,000	255,100,000	49,300,000	38%	28%

TABLE 5-42: NCWMA AND ERTCE REMINING RESOURCES, ALTERNATIVES 1 THROUGH 6

	Petition		Non-Petition		Non-Petition – Patch Areas		Total		% Excluded	
	2nd Cut	Auger	2nd Cut	Auger	2nd Cut	Auger	2nd Cut	Auger	2nd Cut	Auger
Alternative	Tons		Tons		Tons		Tons		Tons	
1	0	0	6,310,000	8,410,000	0	0	6,310,000	8,410,000	0%	0%
2	3,260,000	4,370,000	2,690,000	3,560,000	360,000	480,000	6,310,000	8,410,000	57%	58%
3	0	0	6,310,000	8,410,000	0	0	6,310,000	8,410,000	0%	0%
4	0	0	6,310,000	8,410,000	0	0	6,310,000	8,410,000	0%	0%
5	450,000	590,000	5,860,000	7,820,000	0	0	6,310,000	8,410,000	7%	7%
6	1,670,000	2,220,000	4,330,000	5,750,000	310,000	440,000	6,310,000	8,410,000	31%	32%

TABLE 5-43: NCWMA AND ERTCE POTENTIAL UNDERGROUND RESOURCE

Coal Seam	Area (acres)	Thickness (feet)	Coal (tons)
Kent	24,229	2.79	60,800,000
Block Total			**60,800,000**
Rock Spring	108.5	2.88	300,000
Pewee	428.4	3.07	1,200,000
Walnut Mountain	6,106	2.58	14,200,000
Big Mary	9,871	2.90	25,700,000
Plateau Total			**41,400,000**
Grand Total			**102,200,000**

The following conclusions can be made from the assimilation of all of the mineable, augerable, remining and underground coal resources tonnages and their respective exclusions:

- Essentially half of all mineable, augerable, and remining coal resources in the NCWMA and ERTCE are excluded from being mined in alternatives 2, 3, and 4 by the introduction of each respective petition area. Note that in alternatives 3 and 4 the remining resource in the petition area is not excluded (remining is allowed in these two alternatives in the petition area).
- The patch area analysis loses significance in alternatives 3 and 4 due to the ability to construct access roads through the petition area.
- Approximately 10% of all mineable, augerable, and remining coal resources are excluded from mining in the patch areas in alternatives 2 and 6. These alternatives forbid any type of mining activity, including access roads, from being conducted on the petition areas.
- Alternative 5, with the reduced petition area acreage (and in turn small patch areas), has little impact on the overall mineable, augerable, and remining coal resources in the NCWMA and ERTCE.
- The reduction of the petition area width from 1,200 feet in alternative 2, to 600 feet in alternative 6 has a significant effect on the amount of mineable, augerable, and remining coal resources that is excluded from being mined in alternative 6. An additional 75 million tons of mineable and augerable coal resource is available in alternative 6 versus alternative 2.
- Underground coal resources are not excluded under any of the alternatives and their respective petition criteria.

TENNESSEE ATTORNEY GENERAL'S OPINION ON SURFACE COAL MINING LIMITATIONS

INTRODUCTION

In a letter dated July 30, 2014, the Attorney General of Tennessee outlined its opinion related to a set of restrictions for surface coal mining within the boundaries of the NCWMA and ERTCE. The letter asserts that restrictions for this property date back to a 1994 Asset Purchase and Sale Agreement between Tennessee Mining Inc. and Champion International Corporation. In that agreement, approximately 85,000 acres of surface rights were conveyed by Tennessee Mining Inc. to Champion International Corporation with all mineral interests being retained by Tennessee Mining Inc. The conveyed property will be referred to as the Champion Lands.

Through a series of amendments to the 1994 Asset Purchase and Sale Agreement and property transfers (ending in 2002), an ultimate cap of 11,250 acres of surface mining was applied to the Champion Lands. This consists of 3,750 acres of surface mining on virgin areas and 7,500 acres of surface mining on previously mined land (remining).

Figure 5-16 shows the approximate location of the Champion Lands within the NCWMA and ERTCE.

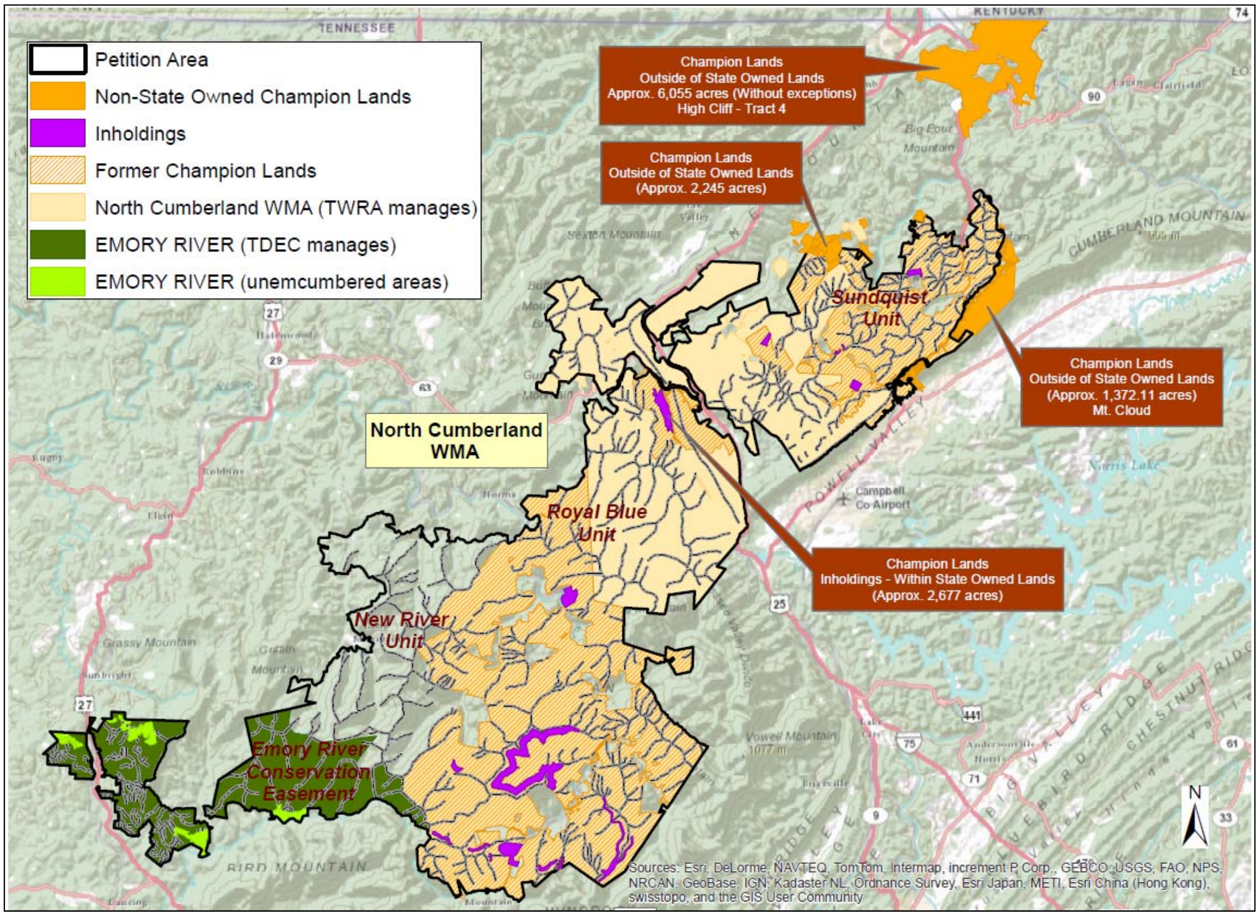


FIGURE 5-16: APPROXIMATE LOCATION OF THE CHAMPION LANDS WITHIN THE NCWMA AND ERTCE

HISTORY OF MINING ON CHAMPION LANDS

The Attorney General's opinion letter contained an analysis of the previous surface coal mining that had been conducted on the Champion Lands. Table 5-44 lists the mines and permits that were analyzed in the letter.

TABLE 5-44: TENNESSEE WILDLIFE RESOURCES AGENCY GIS ANALYSIS OF MINES AND ASSOCIATED PERMITS

Site No.	Operator	Mine Name	OSMRE Permit Numbers	Acreage
2068	Tennessee Mining Inc.	Buffalo Mtn Area 1	2956-2980-3025	875.33 to 1,130.43
2077	Tennessee Mining Inc.	Windrock #1	3019	43.62
3008	National Coal Corporation	Mine No. 1	2990-3026-3165-3198	297.7 to 375.84
3043	Addington Enterprises Inc	Mine No. 2	3008	278.64
4084	Premium Coal Co. Inc	Mine No. 3	3138-3233	298.03
4086	Premium Coal Co. Inc	Mine No. 4	3140-3234	497.50
4143	Triple H Coal, LLC	Area #2	3205	85.9 to 345.28
4183	National Coal, LLC	Mine No. 3B	3223-3250	519.50
			Totals	**2,896.2 to 3,488.82**

The information in table 5-44 is from GIS analysis completed by Tennessee Wildlife Resources Agency (TWRA). Please note that these acreages have not been classified as virgin or remining.

To quantify and classify potential surface mining that could be conducted on the Champion Lands, personnel from the Knoxville office of OSMRE completed an additional spatial/administrative analysis of the eight sites articulated in the Attorney General's letter. The methodology used in the OSMRE analysis is summarized below.

- Acreages for the eight sites were verified using OSMRE permitting documents.
- LiDAR and imagery were used to estimate existing surface disturbances for each of the pertinent OSMRE permits.
- Abandoned mine lands shape files and previously strip-mined locations were used to determine the extent of previous coal mining. This work also differentiated between virgin mining and remining areas.
- Investigation into the mining status (active, expired or retired) of each of the OSMRE permits was conducted (retired permits are those removed from the list of inspectable units).

Table 5-45 summarizes the results of the spatial/administrative analysis conducted by the OSMRE.

As shown in table 5-45, approximately 584 total acres has been disturbed by surface coal mining on the Champion Lands since the institution of the 11,250 acreage cap. In order to quantify the remaining surface coal mining disturbance on these permits, an additional analysis is needed on the currently active and unretired permits. Within each of the active/unretired permits are limits on acreage that can be disturbed on either virgin and/or remining areas. Table 5-46 lists the permitted limits of virgin and remining acreages in comparison with what has been disturbed at present (refer to chapter 3).

TABLE 5-45: OSMRE GIS ANALYSIS OF MINES AND ASSOCIATED PERMITS

Site No.	Permit	Company Name	Mine Name	Mine Status	Facility Type	Permitted Acres	Actual Disturbed Acres	Actual Virgin Acres Disturbed	Actual Remining Acres Disturbed	Permit Issued	Permit Expired	Permit Retired
2068	2956-2980-3025	Tennessee Mining Inc.	Buffalo Mtn Area 1	Phase 3 Bond Release	Surface	876.04	149.06	116.31	32.75	9/30/1998	10/15/2000	10/3/2000
2077	3019	Tennessee Mining Inc.	Windrock #1	Mine hasn't started	Surface	43.63	0.00	0.00	0.00	8/4/2001	8/3/2006	11/4/2004
3008	2990-3026-3165-3198	National Coal Corporation	Mine No. 1	Phase 3 Bond Release	Surface	198.65	48.45	0.00	48.45	2/1/2006	12/31/2006	10/14/2010
3043	3008	Addington Enterprises Inc	Mine No. 2	Mining Complete (now Phase 3 Bond Release)	Surface and Deep	278.35	59.07	12.39	46.68	7/28/1997	7/27/2002	9/30/1998
4084	3138-3233	Premium Coal Co. Inc	Mine No. 3	Mining Complete	Surface	298.21	184.71	109.04	75.67	12/23/2010	10/11/2015	
4086	3140-3234	Premium Coal Co. Inc	Mine No. 4	Temporary Cessation	Surface	497.38	0.00	0.00	0.00	1/3/2011	10/27/2015	
4143	3205	Triple H Coal, LLC	Area #2	Currently not Mining	Surface	334.25	74.51	44.66	29.85	5/8/2014	2/3/2018	
4183	3223-3250	National Coal, LLC	Mine No. 3B	Currently not Mining	Surface	524.83	67.86	8.47	59.39	10/27/2011	10/21/2015	
Total						**3,051.34**	**583.66**	**290.87**	**292.79**			

TABLE 5-46: PERMITTED LIMITS OF VIRGIN AND REMINING ACREAGES

Site No.	Permit	Company Name	Mine Name	Mine Status	Facility Type	Permitted Acres	Actual Disturbed Acres	Actual Virgin Acres Disturbed	Virgin Acres Listed in Permit	Actual Remining Acres Disturbed	Remining Acres Listed in Permit
4084	3138-3233	Premium Coal Co. Inc	Mine No. 3	Mining Complete	Surface	298.21	184.71	109.04	40.40	75.67	169.70
4086	3140-3234	Premium Coal Co. Inc	Mine No. 4	Temporary Cessation	Surface	497.38	0.00	0.00	55.60	0.00	164.80
4143	3205	Triple H Coal, LLC	Area #2	Currently not Mining	Surface	334.25	74.51	44.66	69.45	29.85	17.20
4183	3223-3250	National Coal, LLC	Mine No. 3B	Currently not Mining	Surface	524.83	67.86	8.47	8.60	59.39	200.00
Total						**1,654.67**	**327.08**	**162.17**	**174.05**	**164.91**	**551.70**

Illustrated in table 5-46 by the orange and blue shaded cells are instances where the acres listed in the permits for both virgin and remining mining methods are greater than what has been disturbed at present. In order to quantify what has been disturbed and what potentially could be disturbed by these active permits, the difference between acreages listed in the permits and the currently disturbed acreages were added to the overall disturbed acreages (table 5-47).

TABLE 5-47: ACRES OF MINING DISTURBANCE

Scenario	Virgin Disturbance Acreage	Remining Disturbance Acreage
Original Analysis – Table 5-44	291	293
Additional Potential Disturbance on Active Permits[1] – Table 5-46	81	399
Total Disturbance[2]	**371**	**692**

Note: All numbers are rounded to the nearest acre.

1 = The acres reported are the difference between the permitted virgin and remining acreages and the disturbed virgin and remining acreages shown in table 5-46. Note that only the active permits that had more permitted than disturbed acres were used in this calculation.

2 = The total disturbance acreages quantify the maximum amount of area that could be disturbed on the permits analyzed by OSMRE.

CORRELATION OF NCWMA AND ERTCE COAL RESOURCE WITH THE ATTORNEY GENERAL'S OPINION

Approximately 90% of the Champion Lands are located within subareas 1, 5, 6, and 8 as defined by the geologic model. The Champion Lands constitute approximately 50% of the overall acreage of the NCWMA and ERTCE. Tables 5-48 and 5-49 show a comparison of the Champion Lands with the Non-Champion Lands with respect to virgin and remining resources.

TABLE 5-48: CHAMPION LANDS BY SUBAREA

Champion Lands		
Subarea	**Virgin Surface Mineable Acreage**	**Re-Mining Surface Mineable Acreage**
1	3,706	255
5	6,920	80
6	8,833	90
8	11,465	374
Totals	**30,924**	**800**

TABLE 5-49: NON-CHAMPION LANDS BY SUBAREA

Non-Champion Lands		
Subarea	**Virgin Surface Mineable Acreage**	**Re-Mining Surface Mineable Acreage**
2, 3, 4, 7, 9	34,462	500

According to the coal resource estimations for remining, approximately 800 acres of surface mineable area within the Champion Lands is available for conducting remining operations.

Conclusions: Overall, the actual surface disturbance on the Champion Lands has been minimal—approximately 1,063 acres over a 24-year span. Table 5-50 lists the areas of previous coal mining completed on the Champion Lands since the institution of the 1994 Asset Purchase and Sale Agreement. Approximately 91 years of mining (at the annual surface area disturbance rate in the NCWMA and ERTCE of 112 acres/year) remain on the Champion Lands before the 11,250 acreage cap will be exhausted, if all production comes from the Champion Lands.

TABLE 5-50: AREAS OF PREVIOUS MINING COMPLETED ON THE CHAMPION LANDS

Scenario	Virgin Disturbance Acreage	Re-Mining Disturbance Acreage
Total Disturbance from OSMRE Analysis – Table 5-47	371	692
Total Allowable Disturbance from the 1994 Asset Purchase and Sale Agreement	3,750	7,500
Difference	3,379	6,808
Percent Remaining	90%	91%
Yearly Permit Acreage Burn Rate	112	112
Years of Mining Remaining	**30**	**61**

With approximately 34,000 acres of surface mineable area in the NCWMA and ERTCE on the non-Champion Lands, there are ample opportunities to help supply the forecasted 1 million tons of coal per year in demand for the State of Tennessee.

As this section indicates that there is approximately 800 acres of available remining acres remaining in the Champion Lands. This estimate is based on the following assumptions:

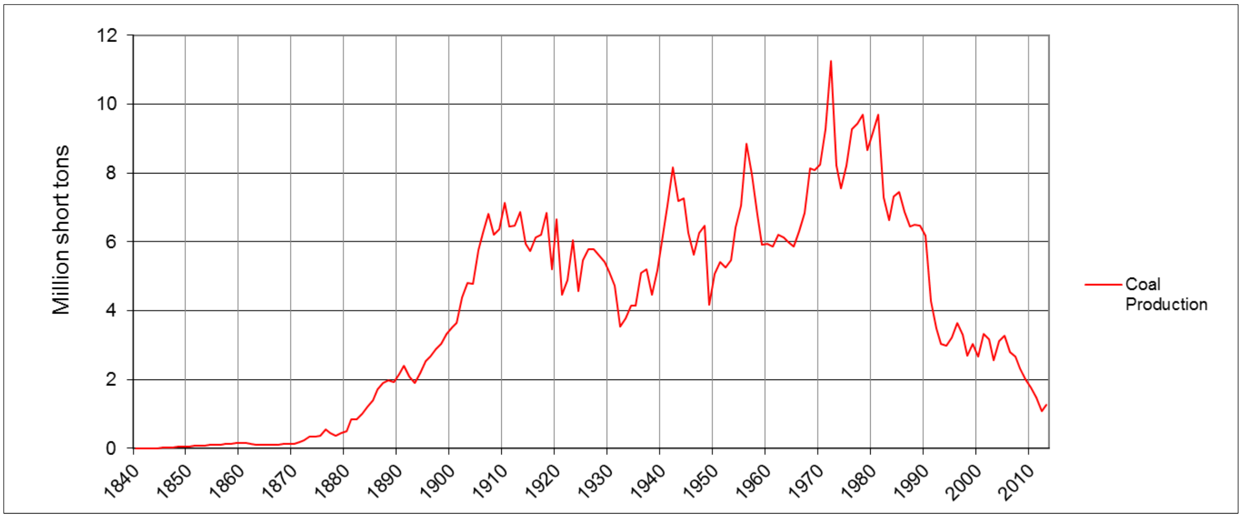
- Only 50% of the previously mined/unreclaimed highwall areas in the Champion Lands will be able to accommodate a remining operation.
- A 60-foot wide "second cut" contour cut would be mined in order to initiate the augering operation.

Therefore, the 11,250-acre cap on the Champion Lands will have no significant impact on the discussion of the preferred alternative for this Tennessee draft PED/EIS.

SUPPLY AND DEMAND FOR PETITION AREA COAL

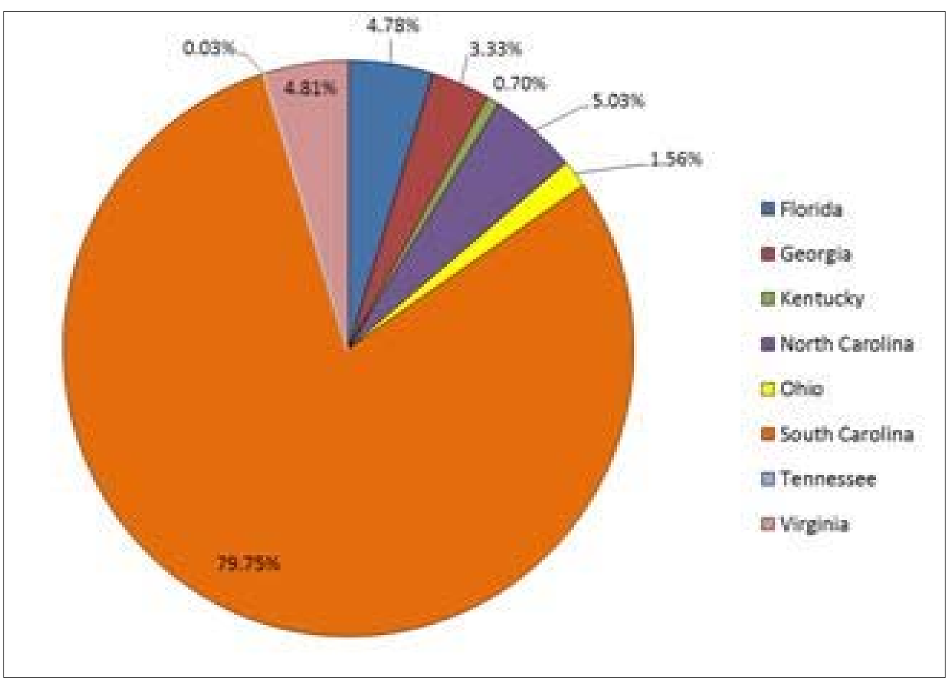
STATEWIDE: DISCUSSION OF STATEWIDE SUPPLY AND DEMAND FOR COAL IN TENNESSEE AND THE PETITION AREA

Coal production in Tennessee has declined by nearly 89% from its peak of 11.2 million tons in 1972 (figure 5-17) to its production of 1.19 million tons (OSMRE 2014a) in 2013. The Energy Information Administration has projected that Appalachian coal production, including Tennessee, will continue to decline (refer to figure 5-22 later in this chapter) over the next 10 years and then level off to relatively constant production levels thorough 2040. As a result, Tennessee coal is not expected to be a major factor in coal supplies at either the state or regional level and any loss in Tennessee production should be compensated by other regional producers. Tennessee coal production could only account for approximately 5.5% of the total coal consumed within the state. Currently all but 0.03% of Tennessee coal is shipped to out-of-state markets primarily in South Carolina and North Carolina (figure 5-18). However, although these two state markets account for 85% of all Tennessee coal production, Tennessee coal production accounts for less that 3% of the total coal consumed in South Carolina and North Carolina (EIA 2014c).



Source: Milici 1997 and EIA 2014d.

FIGURE 5-17: HISTORICAL COAL PRODUCTION IN TENNESSEE, 1840–2013



Source: EIA 2014c.

FIGURE 5-18: 2013 DISTRIBUTION OF TENNESSEE COAL

In 2013, preliminary coal production in Tennessee is estimated at between 1.19 (OSMRE 2014a) and 1.27 million tons (EIA 2014b), which was only 0.67% of the regions total. All of the 2013 Tennessee coal production came from only three counties: Anderson, Campbell, and Claiborne. Other permits were identified in Scott and Fentress Counties but no production was reported for 2013. Table 5-51 shows the 2008–2013 production levels for all counties. No significant coal production has occurred in Morgan County since 2000 with no production since 2006.

TABLE 5-51: 2008–2013 COAL PRODUCTION IN TENNESSEE BY COUNTY

County	2008	2009	2010	2011	2012	2013
Anderson	321,326	302,388	240,652	237,749	22,852	54,420
Campbell	718,110	921,330	959,275	688,668	348,449	164,171
Morgan	0	0	0	0	0	0
Scott	0	0	0	0	0	0
Claiborne	1,317,347	950,912	613,753	469,657	774,314	977,804
Cumberland	1,114	0	0	0	0	0
Fentress	21,704	21,356	16,768	203	0	0
Totals	**2,379,602**	**2,195,986**	**1,830,447**	**1,396,276**	**1,145,615**	**1,196,396**

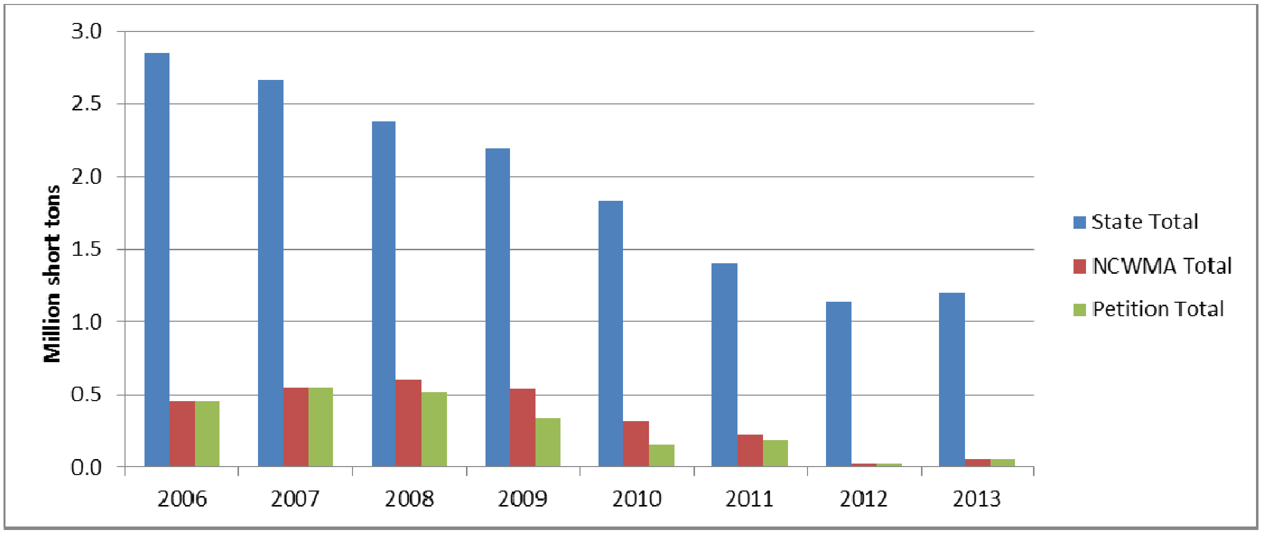
Source: OSMRE 2014a.

Claiborne County accounted for approximately 82% of the Tennessee coal production during 2013.

Supply and Demand for NCWMA and ERTCE Coal

In 2013, only about 4.5% of the Tennessee coal production (approximately 54,000 tons) came from permit areas within the NCWMA and ERTCE (figure 5-19). The NCWMA and ERTCE is located in parts of four counties: Anderson, Campbell, Morgan, and Scott. In 2008, approximately 25% of all coal produced in Tennessee came from the NCWMA while approximately 21% was within portions of the ERTCE. Because of ownership changes and coal markets, it is difficult to estimate the future production levels that might occur or be affected by the proposed petition. Scott County has not had any coal production since 2005 but because of renewed interest by the Clear Energy Corporation (OSMRE applications 3247 and 3261), it is anticipated that coal production increases of up to 240,000 tons per year can be expected in or immediately adjacent to the NCWMA and ERTCE over the next few years. This is consistent with the period between 2006 and 2013, when approximately 13 to 16% of Tennessee coal production was produced from the NCWMA and ERTCE.

Coal produced within the petition area can serve a variety of markets although no Tennessee or petition area coal has been used for metallurgical purposes in several years. Production from the petition area will likely continue to be consumed in the generation of electricity which accounted for 73% of the Tennessee coal use in 2013 (EIA 2014c). In addition to electric utilities such as TVA and Duke Energy, other consumers to be served by local coal producers include cement plants and heavy industry such as Eastman Chemical Company, major institutions such as the University of Tennessee, and smaller facilities contracts with school districts, government facilities such as the Department of Energy Oak Ridge Reservation and other similar operations. However, many utilities, industrial operations, and institutions are rapidly converting existing coal-fired plants to natural gas.



Source: OSMRE 2014a.

FIGURE 5-19: COAL PRODUCTION IN THE NCWMA AND ERTCE COMPARED AGAINST TOTAL STATEWIDE PRODUCTION BETWEEN 2006 AND 2013

REGIONAL: DISCUSSION OF REGIONAL SUPPLY AND DEMAND FOR COAL

The Appalachian coal basin, with its large reserve base, is expected to continue to serve as a major source of domestic coal in the foreseeable future. However, the demand for Appalachian coal is constrained by relatively high mining costs, as well as by competition from interior and western coal. In the export market, Appalachian coal represents the majority of all exports averaging between 70 and 84% of the total (EIA 2013b). Likewise, the five-state region which is comprised of Alabama, Tennessee, Kentucky, Virginia, and West Virginia accounted for between 61 to 94% of the Appalachian export market between the years of 2001 to 2012. In the export market, Tennessee coal has not had any coal exports since 2003 when it was reported to have shipped only 2,000 tons (EIA 2004).

Table 5-52 identifies past production levels in the five-state region and the ability of this region to meet future demands. The demonstrated reserve base includes publicly available data on coal mapped to measured and indicated degrees of accuracy and found at depths and in coalbed thicknesses considered technologically minable at the time of determinations. Additional coal reserves are likely to be present in proprietary mineral owner files and mineral resource evaluations. The State of Tennessee had a demonstrated reserve base of 753 million tons in 2012 (EIA 2013b). The demonstrated reserves for the Tennessee region encompassing Alabama, Kentucky, Tennessee, Virginia, and West Virginia were estimated at 47.1 billion tons.

TABLE 5-52: REGIONAL COAL PRODUCTION AND DEMONSTRATED RESERVES IN MILLION SHORT TONS

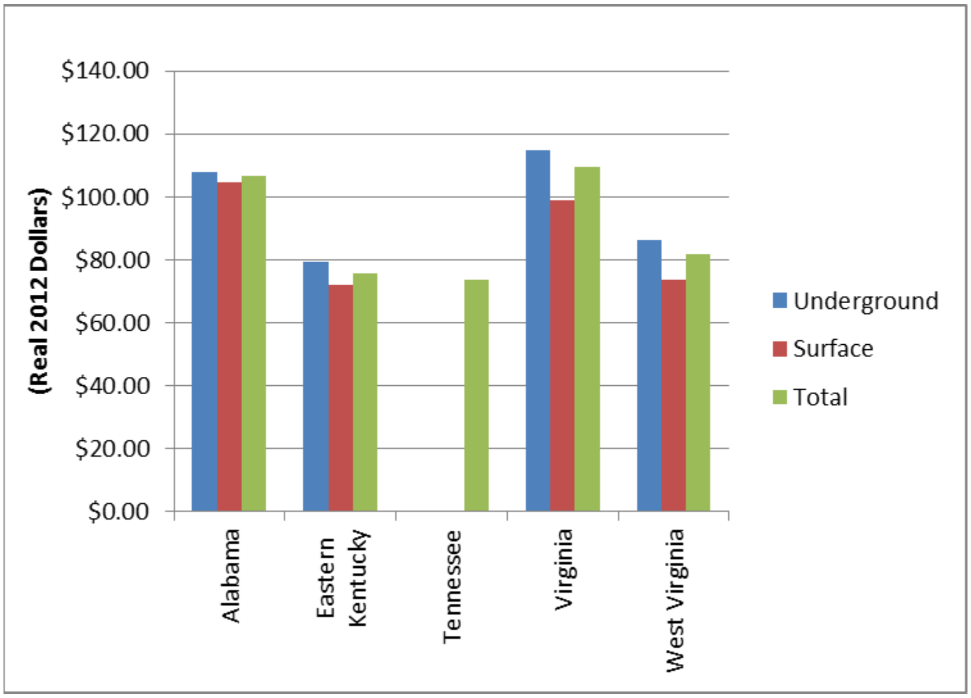
State	Production			Percent Change		Demonstrated Reserves		
	2003	2010	2013	10 Years	3 Years	Under-ground	Surface	Total
Alabama	20.118	19.915	18.411	-8.48	-7.55	844	3,130	3,974
Eastern Kentucky	91.309	68.062	39.048	-57.24	-42.63	64.4	9.008	9.652
Tennessee	2.564	1.780	1.271	-50.43	-28.60	500	253	753
Virginia	31.596	22.385	16.710	-47.11	-25.35	920	488	1,408
West Virginia	139.711	135.220	112.910	-19.18	-16.50	28,010	3,271	31,281
Total	**285.298**	**247.363**	**188.350**	**-33.98**	**-23.86**	**30,918**	**16,150**	**47,068**

Source: EIA 2004, 2006, 2012, 2014c.

The estimated 2013 coal production within the five-state region totaled 188.4 million tons (EIA 2014b). This is down nearly 34% from 2003 levels and approximately 24% from 2010 production levels. Eastern Kentucky and Tennessee showed the biggest decline through the 10-year period with over a 50% loss in coal production in both areas. Likewise, eastern Kentucky experienced the largest decline between 2010 and 2013 with an annual loss of nearly 43% of its coal production. Tennessee and Virginia both experienced a decline of over 28 and 25% each during this same 3-year period. Of the regions 47.1 billion tons of demonstrated reserves, Tennessee accounts for only about 1.6% of the total while accounting for only about 0.7% of the region's 2013 coal production. Likewise, only 0.0025% of the coal produced by Tennessee was used in Tennessee in 2013. Based on current production rates and using only the demonstrated reserve estimates, mining could be sustained for nearly 250 years. However, coal production in Appalachia is anticipated to continue to decline as a result of economic and environmental constraints.

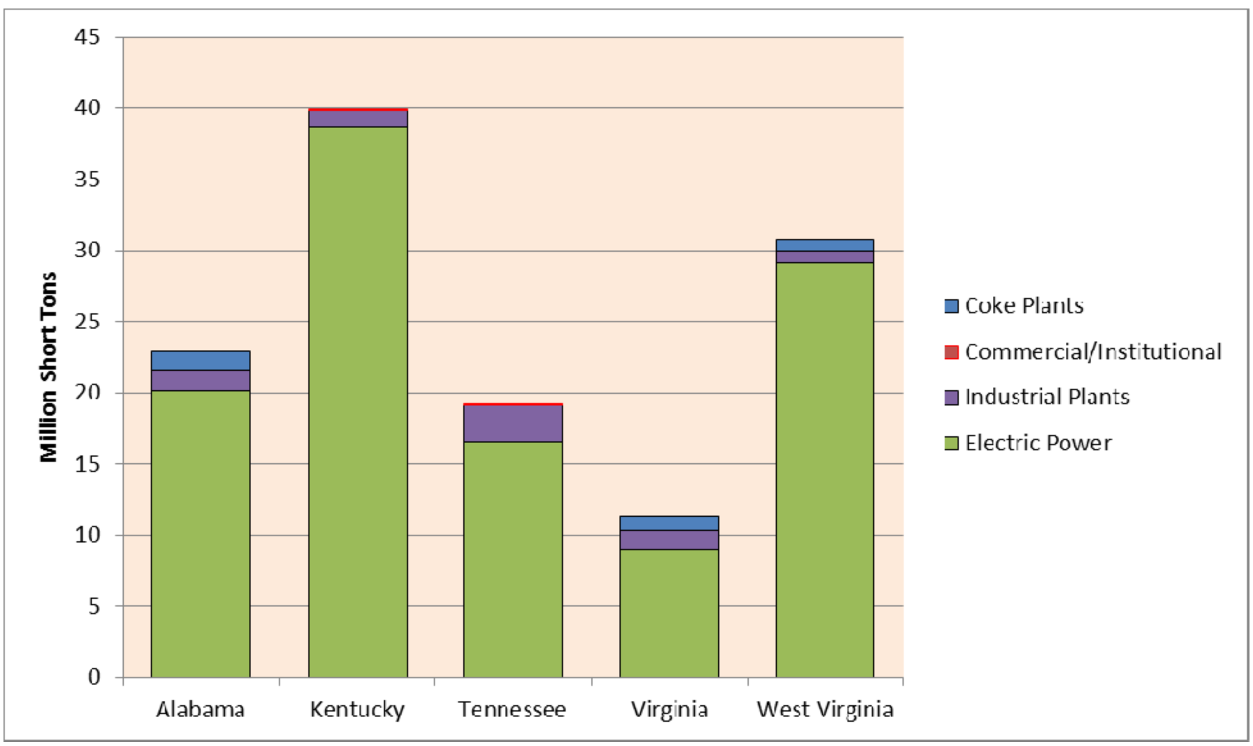
Coal prices in the five-state region will vary by the end-use sector purchasing the coal and have generally been increasing since 2008. However, average sales price have been highly volatile across the region for the period between 2011 and 2012, according to the Energy Information Administration (EIA 2013b). Virginia and West Virginia showed a decline in sales price of 19.1 and 3.6% respectively while Alabama and Eastern Kentucky showed sale price increases of 3.8 and 1.2% respectively. Tennessee coal showed a slight decline of 1.2% over this same period. Kentucky and Tennessee tend to maintain the lowest average coal prices while Alabama and Virginia have the highest (figure 5-20). Average prices for 2013 are not yet available but based on initial receipts by various end-users, it appears that 2013 coal prices have decreased between 3 and 10% over the 2012 prices.

According to the Energy Information Administration, domestic coal consumption in the region has been preliminarily estimated at approximately 124 million tons in 2013 (EIA 2014c); down from 145 million tons in 2010 (EIA 2013c). Over 91% of the total coal consumption has been for electricity generation followed by industrial plant uses at approximately 6%. Kentucky has the highest consumptive use of coal for electricity generation at 97% while Virginia has the lowest at approximately 79% (figure 5-21). Additional decreases in coal demand are anticipated in the future throughout the region. While Virginia, West Virginia, and Kentucky have excessive production capacity, Tennessee and Alabama are net importers of coal to meet their coal demand. In 2013, Tennessee coal production accounted for only about 5.5% of the coal consumed in the state, down from 11.2% in 2002. Alabama production accounts for about 63% of the state's consumption but has increased the share from its 53% of consumption in 2002.



Source: EIA 2013b.

FIGURE 5-20: 2012 AVERAGE COAL PRICES PER TON BY MINE TYPE FOR THE FIVE-STATE APPALACHIAN REGION



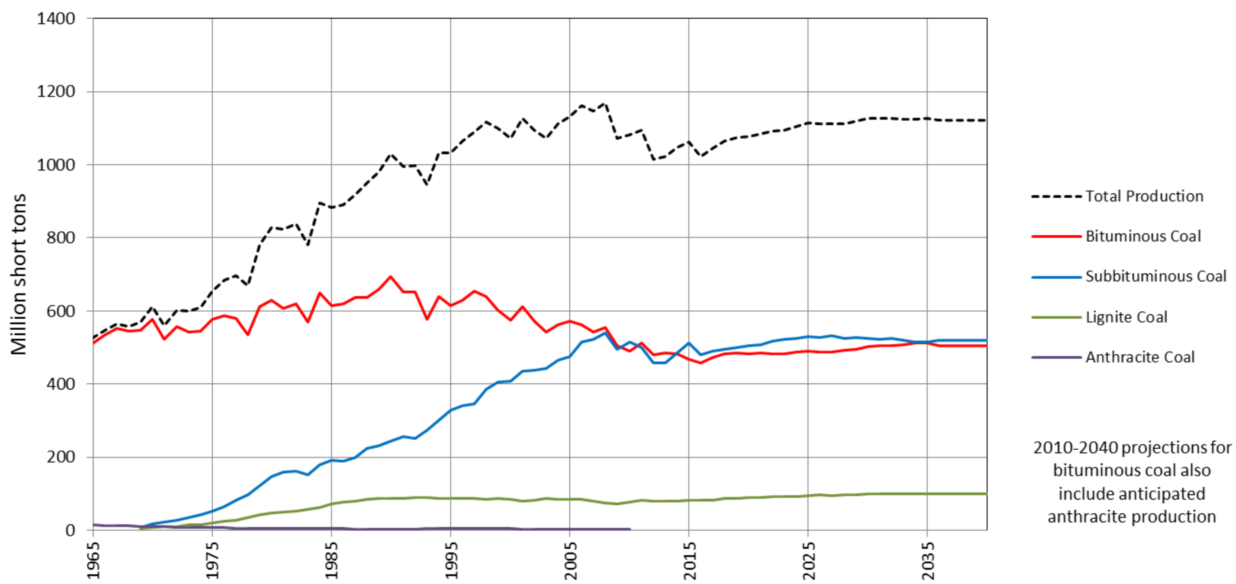
Source: EIA 2014c.

Note: Tennessee did not report individual costs for underground and surface mining prices.

FIGURE 5-21: 2013 COAL CONSUMPTION BY AND USE SECTOR FOR THE FIVE STATE APPALACHIAN REGION

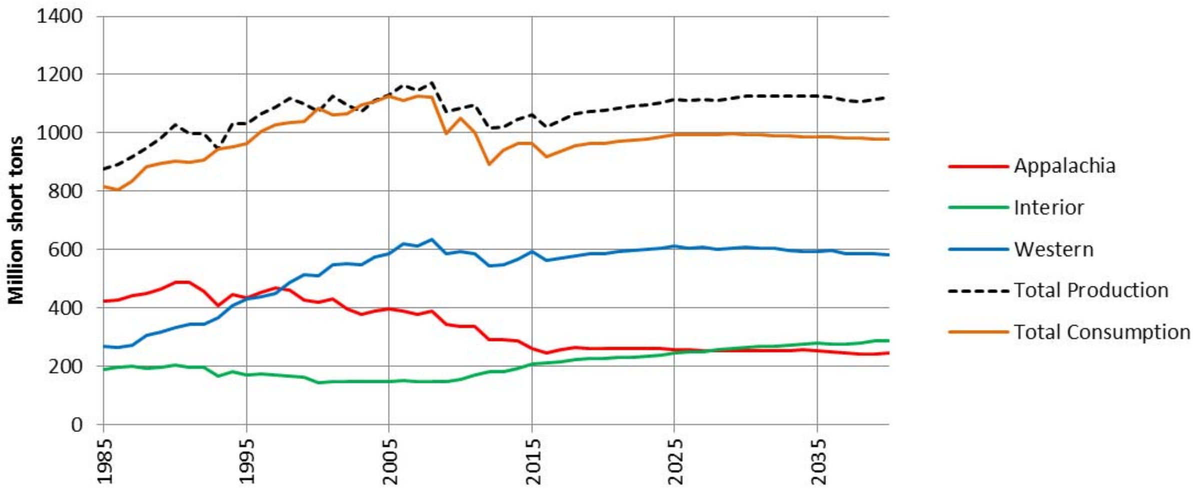
NATIONAL: DISCUSSION OF NATIONAL SUPPLY AND DEMAND FOR COAL

Coal production in the United States reached an estimated 984 million tons in 2013(EIA 2014b), a decrease of approximately 16% since the record high in 2008 (figure 5-22) of 1,172 million tons. According to the Annual Energy Outlook 2014 (EIA 2014a), total coal production is not expected to return to its peak 2008 level anytime within the reference conditions used for the 2040 projection period. This is the result of low natural gas prices, the retirement of a sizable amount of coal-fired generating capacity leading to an overall decline in the coal consumption by the electricity sector, new emission standards from existing power plants, and the development of other alternative energy sources. It is believed that these factors will keep coal production in a decline until after 2016 at which time an annual increase of only around 0.6% is anticipated. Appalachian bituminous coal production is anticipated to decline substantially from current levels as production from lower cost coals from the western and interior supply regions continue to replace this market as shown in figure 5-23. The Appalachian market share is anticipated to continue a steep decline of around 15% between 2013 and 2040 with a total decline of over 49% since the 1990 peak production level. Interior coal production shows the most significant increase with easily accessible reserves resulting in a 58% increase for the period between 2013 and 2040. Western coal production shows a much more modest increase of 6.8% for this same time period.



Source: EIA, 2012, 2014a, 2014b.

FIGURE 5-22: HISTORICAL COAL PRODUCTION AND PROJECTIONS BY YEAR AND RANK, 1965–2040



Source: EIA, 2006, 2014a, 2014b.

FIGURE 5-23: HISTORICAL AND PROJECTED COAL PRODUCTION AND CONSUMPTION BY REGION, 1985-2040

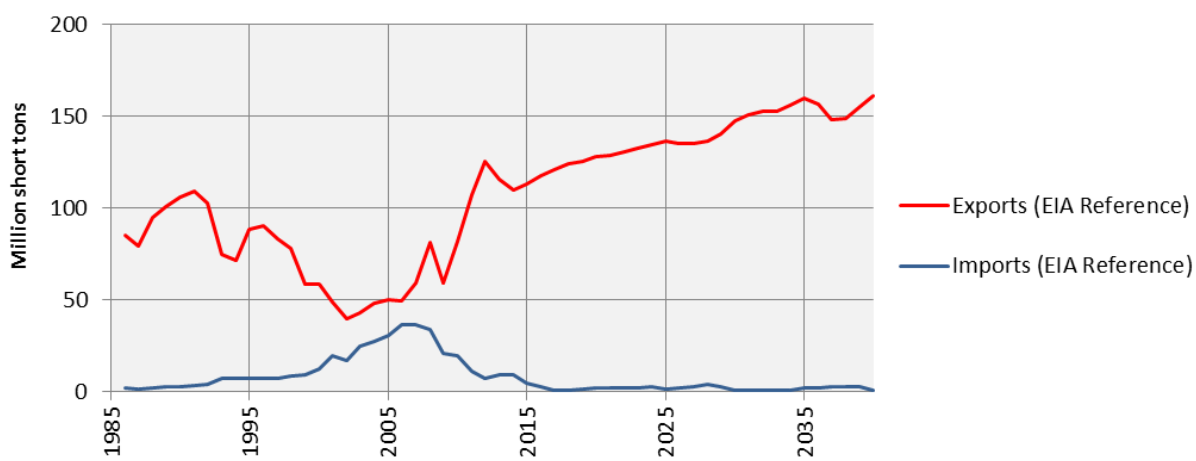
Overall coal consumption has been decreasing since 2007 as shown in figure 5-24. An overall decline of approximately 16.5% has occurred between the peak consumption year of 2007 and 2013 with some intermittent spikes which are commonly associated with the short-term weather and economic fluctuations. However, an overall annual increase of approximately 0.1% for the period 2011–2040 is projected under the Department of Energy / Energy Information Administration under the reference case (EIA 2014a). Residential and commercial consumption rates are anticipated to stay relatively constant through time while metallurgical coal consumption is expected to decline by approximately 14% by 2040 (table 5-53). Industrial uses are anticipated to increase by approximately 8.7 % by 2040. Electric power consumption is anticipated to continue in decline until after 2015 at which time it is projected to increase to current consumption levels by 2025 and continue to increase by 1.5% until 2040. Technologies for production and subsequent demand for coal-to-liquid conversion is also anticipated to gradually increase the consumption of coal for synthetic fuels beginning after 2015 but have not been estimated under the current Department of Energy / Energy Information Administration reference case (EIA 2014a).

Coal exports have increased by 192% from the recent low level in 2002 to approximately 115 million short tons in 2013 (figure 5-24). During this same time frame, coal imports have declined by 45% to approximately 9.2 million short tons. This is down 75% since the peak in 2007. The primary export markets are in Europe and Asia while imports originate largely from South America (EIA 2012). Long-term export market forecasts remain optimistic with exports anticipated to increase nearly 40% by 2040 according to Department of Energy / Energy Information Administration projections under the reference economic scenario (EIA 2014a). Imports are expected to continue their decline with an 88% decrease between the 2013 levels and the 2040 levels. Such a decline is attributable to a reduction in demand and over supply of domestic coal and continued low coal prices.

TABLE 5-53: COAL CONSUMPTION BY SECTOR WITH PROJECTIONS THROUGH 2040

Sector	2011	2012	2014	2020	2025	2030	2040
Domestic:	**Millions Short Tons**						
Residential and commercial	3	2	2	2	2	2	2
Coke plants	21	21	21	22	22	21	18
Other industrial	46	42	46	49	49	49	50
Coal-to-liquids heat and power	0	0	0	0	0	0	0
Coal-to-liquids production	0	0	0	0	0	0	0
Electric power	932	825	896	892	919	923	909
Domestic Consumption Total	**1,002**	**890**	**965**	**965**	**992**	**995**	**979**
Imports	11	8	9	2	2	1	1
Exports	107	126	110	128	137	148	160
Net imports	-96	-118	-101	-126	-135	-147	-159
Consumption and Export Total	**1,109**	**1,016**	**1,075**	**1,093**	**1,129**	**1,143**	**1,139**

Source: EIA 2014a.



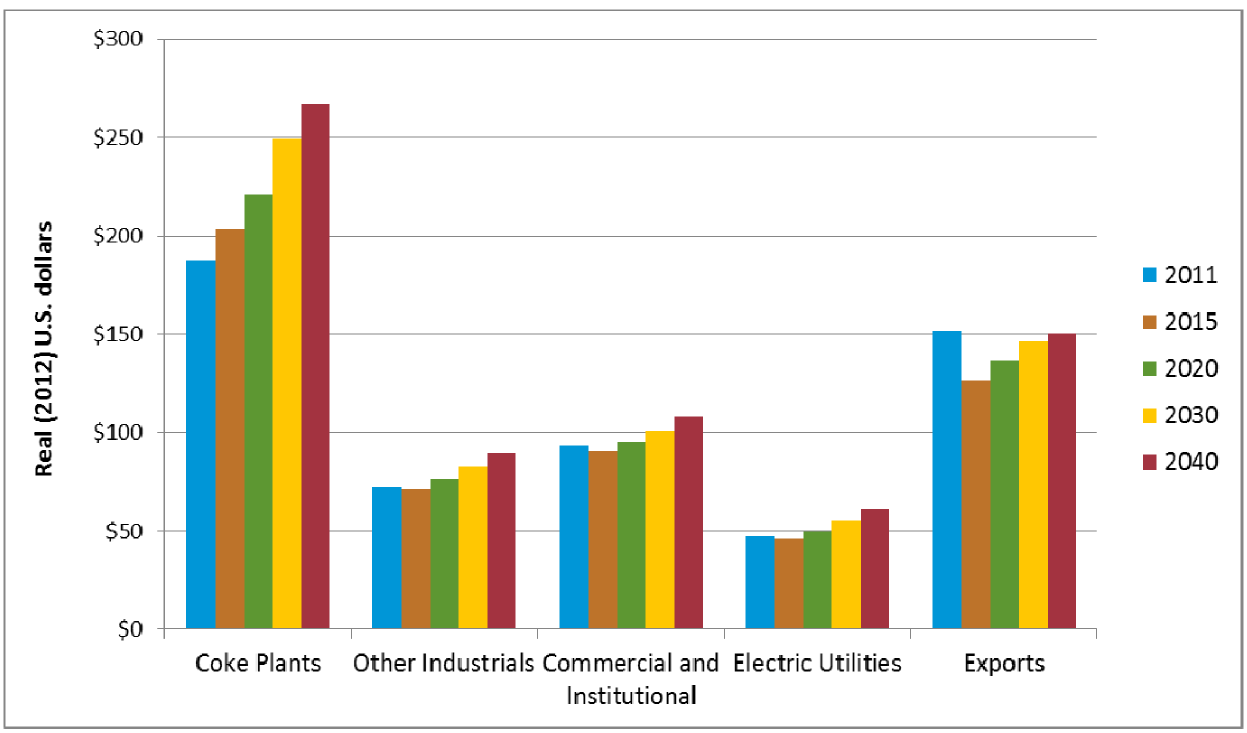
Source: EIA, 2012, 2014a.

FIGURE 5-24: UNITED STATES COAL IMPORTS/EXPORTS WITH PROJECTIONS, 1985–2040

From 2000 to 2011, the average price of all United States coals has increased by approximately 120% after adjusting for inflation using 2012 dollars. This is still 27% lower than the peak coal prices obtained in the 1970s. Likewise, bituminous coal prices have increased by 107% between 2000 and 2011 when adjusted for inflation. This is only 7.8% lower that the peak prices for bituminous coal achieved in 1980. Figure 5-25 shows the long-term and anticipated trends in the inflation adjusted price of coal by rank from 1965 to 2040 while figure 5-26 shows the inflation adjusted average price by use-sector from 2011 to 2040. The most significant price increases are directly associated with metallurgical uses of coal with coke plant receipt prices which are expected to increase by approximately 42% between 2011 and 2040. The electric utility sector is expected to experience lower price increases over this same period experiencing only about a 29% price increase. Other industrial uses of coal are expected to increase around 24% while commercial and institutional use prices increase only by about 15.8%. Export prices are actually anticipated to experience a sharp short-term decline and then rise gradually through the period. However, exports still experience a net decline of approximately 1% over the period between 2011 and 2014. All projections are made using the standard Department of Energy / Energy Information Administration reference case (EIA 2014a). Based on the reference case, the average mine mouth price of coal is anticipated to continue to increase by 1.4% per year until 2040, a trend that began in 2000. A key factor underlying the higher coal prices is an expected decline in coal mining productivity in most areas, but at slower rates than those seen between 2000 and 2011 (EIA 2014a).

Source: EIA, 2012 and 2014a.

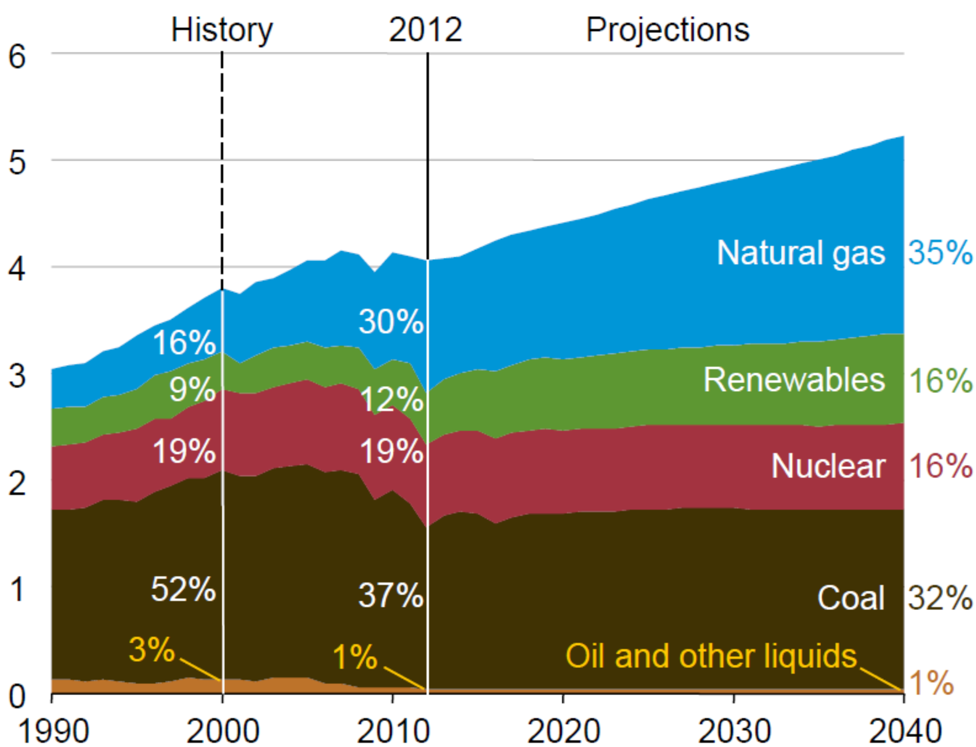
FIGURE 5-25: AVERAGE UNITED STATES COAL PRICES BY RANK, 1965–2040



Source: EIA, 2014a.

FIGURE 5-26: ACTUAL AND PROJECTED COAL PRICES BY SECTION, 2011–2040

Electricity generation currently accounts for 93% of the total United States coal consumption (EIA 2014a) with coking plants, noncommercial industrial and residential/commercial sectors making up the remaining 7%. Although 37% of all electrical power generation came from coal in 2012 (figure 5-27), making it the largest single fuel source, this share is anticipated to decline until 2015 as a result of natural gas retrofitting of power plants resulting from lower natural gas prices. The overall percentage will generally decrease as a result of increased generation by other energy sources until 2040 when it is expected to represent only about 32% of the total electric power generation in the United States. This is down significantly from the high market share of 52% in 2000. Increase in the use of renewable energy sources and natural gas is expected to compensate for the overall reduction in coal use in the electric power sector (EIA 2014a) with natural gas becoming the largest source of electricity generation by 2035.



Source: EIA 2013a.

FIGURE 5-27: ELECTRICITY GENERATION BY FUEL, 1990–2040 (TRILLION KILOWATT HOURS/YEAR)

According to the Energy Information Administration (EIA 2014a), approximately 73% of the new capacity additions needed to meet energy demands through 2040 will be supplied by natural gas. Approximately 51 gigawatts of current coal-fired capacity retirements are anticipated while only 1% of the new capacity is resulting from current construction or new facilities with carbon sequestration capabilities. Likewise, natural gas production is anticipated to continue to increase as a result of technology advances and development of shale deposits with high concentrations of natural gas liquids and crude oil which has a higher value in energy equivalents than dry natural gas (EIA 2014a). The United States is expected to become an overall net exporter of natural gas before 2020. The reduction in coal demand by existing electricity producers along with the lower demand from foreign markets which could result from natural gas exports may further decrease the coal market share in this sector by 2040.

The Clean Air Act Amendment of 1990 places permanent caps of sulfur production at coal fired plants. Proposed amendments will require additional controls of sulfur dioxide and nitrogen oxide emissions that react in the atmosphere to form fine particulates and ground level ozone. Likewise, the Mercury and Air Toxics Standards required fossil-fuel steam electric generators to meet limits based on maximum achievable control technologies. The new standards under Mercury and Air Toxics Standards will become effective by April 2015 and result in the mercury and other emissions contributing to air pollution and potential human health effects be reduced to compliance standards. Coal users have six options to reduce the amount of sulfur, nitrogen, and other toxins emitted into the atmosphere:

- Retrofitting with flue gas desulfurization and denitrification equipment such as scrubbers or catalytic reduction systems.
- Addition of dry sorbent injection systems and activated carbon injection if warranted for mercury control.
- Boiler repowering with other advanced technologies that reduce emissions.
- Transfer or purchase of emissions allowances.
- Reduction of plant use.
- Full or partial switching to lower sulfur fuel.

Reference cases and projections used by the Department of Energy / Energy Information Administration are based on current regulations at the time of the analysis and assume that such rules remain unchanged throughout the projection period. However, future demand for domestic coal could be affected by many factors. These include:

- Implementation of the new US Environmental Protection Agency (EPA) Clean Power Plan regulations released on June 2, 2014, as part of President Obama's Climate Action Plan or equivalent carbon/greenhouse gas reduction or sequestration legislation.
- Implementation of additional cap-and-trade programs for carbon dioxide reduction at fossil-fueled power plants by state or federal agencies such as the Regional Greenhouse Gas Initiative.
- Implementation of additional Clean Air Act Amendment or regulations such as the Mercury and Air Toxics Standards and the Cross-State Air Pollution Rule.
- Changes to the Energy Policy Act of 1992.
- Worker health legislation related to employees of the industry.
- Unanticipated decrease or increase in nuclear capacity at existing facilities.
- Unanticipated expansion or reduction of United States heavy industry (i.e., metals and auto manufacturing).
- Unanticipated changes in the regulatory environment which affects domestic production and pricing of oil and gas such as restrictions in current enhanced recovery techniques or methods.
- Unanticipated changes in world price or supply of oil and natural gas resulting from war, terrorist activities, or additional environmental or pricing regulations by exporting and importing countries.
- EPA interim permit review guidelines for surface coal mining operations as it relates to the Clean Water Act, NEPA, and Executive Order 12898, "Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations."
- Implementation or additional of environmental regulations with regards to waste management at electric utilities such as the proposed Coal Combustion Residuals rule.

Regardless of these factors, the Department of Energy / Energy Information Administration predicts coal will remain an important energy source well into the foreseeable future. Appalachian coal production is expected to continue in decline as existing economically recoverable reserves are depleted and as the demand for cheaper and more accessible coal from the interior and lower sulfur western coals increases.

Supply and Demand Summary

Given the Appalachian region's identified reserves of 47.1 billion tons, the potential loss of coal from the petition area on the regional reserves base is negligible. Based on table 5-52, the entire current Tennessee demonstrated surface mineable reserve accounts for only 0.5% of the total regional reserve base. Similarly, the annual loss of approximately 54 thousand tons of petition area coal represents only 0.03% of the regional production based on the regional 2013 production rate of 188.4 million tons (table 5-52). Any loss of local coal in the regional or national market would be expected to be compensated by other areas in the region outside of the petition area.

At the state and local level, the loss of potential coal production level at 54 thousand tons per year represents a decrease of 4.5% of the total 2013 state production rate. Such a decrease could be considered a slight to moderate impact to the local and state coal production and supply. However, this scenario assumes that other similar coal reserves in the general vicinity are unavailable for extraction and that the trends in production stay relatively constant.

In conclusion, the potential loss of between 43 and 190 million tons of undemonstrated coal resources in the petition area (considering alternatives 1 through 6) represents an insignificant percentage of the national and regional coal supplies at under 1% of the total demonstrated reserve base. Any coal market at the regional or national level could easily be compensated by other areas in the region outside the petition area. Thus, the designation of this area as unsuitable for surface coal mining would have little, if any influence on coal price or supply markets on the national, regional, or state level. Impacts at the local and state levels would be more obvious since petition area coal has historically supplied an average of 15 to 18% of the Tennessee production and is assumed to be a reasonable projection of future levels. However, similar production levels could probably be developed from other areas of the coalfield although this could result in a reduction in revenues to Campbell, Anderson, and potentially Scott Counties.

U.S. Department of the Interior
Office of Surface Mining
Reclamation and Enforcement