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SHORTLEAF PINE INITIATIVE
FINAL PROGRAMMATIC ENVIRONMENTAL ASSESSMENT AND 285-ACRE SITE SPECIFIC REVIEW

Lauderdale County, Alabama and Hardin County, Tennessee

Prepared by:
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Symbols, Acronyms, and Abbreviations

AADT	Annual Average Daily Traffic
ADCNR	Alabama Department of Conservation and Natural Resources
ADEM	Alabama Department of Environmental Management
ADOT	Alabama Department of Transportation
AL	Alabama
APE	Area of Potential Effect
BMP	Best Management Practices
CAA	Clean Air Act
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CO	Carbon Monoxide
CO_2	Carbon Dioxide
CWA	Clean Water Act
dB	Decibel
dBA	A-Weighted Decibel
dbh	Diameter at breast height
EA	Environmental Assessment
EO	Executive Order
EPA	US Environmental Protection Agency
ESA	Endangered Species Act of 1973
FR	Federal Register
GHG	Greenhouse Gas
HUC	Hydrologic Unit Code
HD	Hydrologic Determination
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NO_x	Nitrogen Oxides
NPDES	National Pollutant Discharge Elimination System
NRHP	National Register of Historic Places
NRI	Nationwide Rivers Inventory
OSHA	US Occupational Safety and Health Administration
Pb	Lead
SHPO	State Historic Preservation Officer
SO_2	Sulfur Dioxide
SWPPP	Stormwater Pollution Prevention Plan
TCA	Tennessee Code Annotated
TDEC	Tennessee Department of Environment and Conservation
THC	Tennessee Historical Commission
TN	Tennessee
TVA	Tennessee Valley Authority
TRM	Tennessee River Mile
TWRA	Tennessee Wildlife Resources Agency
US	United States
USACE	US Army Corps of Engineers
USC	United States Code
USDA	US Department of Agriculture
USFWS	US Fish and Wildlife Service
WMA	Wildlife Management Area

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CHAPTER 1 – PURPOSE AND NEED FOR ACTION

1.1 Introduction and Background

Shortleaf pine (*Pinus echinata*) has the largest natural range of any pine species in the Eastern United States (US), but it faces a variety of threats which have caused a decades-long decline (Oswalt 2012, Moser et al. 2007). Early European settlers often described shortleaf pine forests of the Southeast US as mixed-pine forests with open canopies that allowed sunlight to reach the forest floor. It is hard to estimate the geographic range of shortleaf pine that these early settlers may have encountered; the first efforts to quantify the distribution of shortleaf pine began at the end of the 19th century and early 20th century. At that time, shortleaf pine was documented in 24 states (Mattoon 1915a). However, fossil pollen found in Michigan suggests that its range may have once been much larger than currently documented (Fowells 1965). In 1990, the shortleaf pine range was estimated to cover 22 states encompassing 440,000 square miles and was present in a variety of habitats ranging from rocky uplands to wet floodplains (Burns et al. 1990). Over the last 30 years, however, approximately 50 percent of the shortleaf pine ecosystems have been lost due to altered fire regimes, changes in forest management practices, and disease: Oswalt (2012) found a 52 percent decline of shortleaf pine throughout its range between the 1980s and 2010.

Shortleaf pine was an important commercial tree during early European settlement and through the mid-1800s. During this time, shortleaf pine was one of the dominant species of the region. It became an important raw material used in all manner of building construction as well as furniture, flooring, paper manufacturing, boat building, and in the shipping industry (Mattoon 1915a). The widespread harvesting of shortleaf pine through the 1800s dramatically decreased its population across its natural range (Mattoon 1915b). By the early 1900s, shortleaf pine had been essentially driven out of the northern portions of its range, replaced largely by hardwoods and agricultural land uses. Harvesting and agricultural conversion reduced shortleaf pine seed trees while often leaving loblolly pine (*Pinus taeda*) in wetter areas, which served to further reduce the shortleaf pine's ability to regenerate under competition with loblolly pine (Mattoon 1915b). These practices, along with the exclusion of fire, have led to shortleaf dominated forests being constricted to the heart of its natural range.

The most significant declines have been in the states east of the Mississippi River and the majority of current shortleaf pine populations are now found in Arkansas, Oklahoma, Missouri, and Texas. An estimated 71 percent of all shortleaf-dominated forests were identified as large diameter stands and 93 percent of stands were found to be in the large and medium combined size classes (Oswalt 2012). These data show that as harvesting and other mortality factors continue to reduce the extent of the larger size class shortleaf forests, there are very few young forests poised to take their place.

Shortleaf pine is the dominant or codominant species in 47 NatureServe plant communities of which the majority (68 percent) are considered imperiled or critically imperiled (Shortleaf Pine Initiative 2016). These imperiled communities occur throughout the species' range and many are the focus of conservation efforts across the Southeast and Eastern Atlantic states. Many of the communities in which shortleaf pine is a critical component are described as open woodlands. Woodland forests are often characterized as having an open canopy which allows well-developed herbaceous, grass, and shrub components that are

lacking in closed canopy forests. The understory layer in a woodland forest supports many rare plant species that are often dependent on those systems.

A diverse range of wildlife are supported by the open canopies and rich understories of shortleaf pine woodlands, many of which are threatened, endangered, or listed as species of concern. For example, the federally endangered red-cockaded woodpecker (*Picoides borealis*) requires open, mature pine forests (Scott et al. 1977). This species creates nesting cavities in living pines that are often infected with red heart rot fungus (Scott et al. 1977). The suppression of fire and declining shortleaf pine woodlands have caused the extirpation of red-cockaded woodpeckers from Missouri, Kentucky, and Tennessee (Shortleaf Pine Initiative 2016).

Fire frequency is an integral part of the regeneration, establishment, maintenance, structure, and composition of shortleaf pine forest communities (Masters 2007). Shortleaf pine evolved on a landscape that experienced frequent fire and is considered a fire dependent species. Fire frequency varies across the range of shortleaf pine and, in part, defines the varying forest communities that make up shortleaf forests (Flatley et al. 2013). Fire frequency remained relatively unchanged from the time of Native American settlements until the mid-20th century (Flatley et al. 2013). During the mid-20th century, fire suppression became increasingly widespread across the nation and continues today. Fire suppression is a direct cause of the decreasing abundance of shortleaf pine, as well as numerous other fire dependent species across the Eastern US.

1.2 Purpose and Need

The purpose of the proposed action is to protect and enhance unique and important shortleaf pine habitat on 6,011 acres of Tennessee Valley Authority (TVA) lands in Alabama and Tennessee (“the project area”; Figure 1-1) in cooperation with the Alabama Department of Conservation and Natural Resources (ADCNR). Shortleaf pine ecosystems provide an extraordinary diversity of cultural and ecological values across the landscape. The need is to protect and enhance unique and important shortleaf pine habitat throughout the 6,011-acre project area, including approximately 4,648 acres of the Lauderdale Wildlife Management Area (WMA) in Lauderdale County, Alabama, as well as 1,363 acres of TVA land adjacent to the WMA in Hardin County, Tennessee. This action supports and is consistent with TVA’s mission of environmental stewardship and the objectives for wildlife habitat enhancement partnerships in the TVA Natural Resource Plan (TVA 2020).

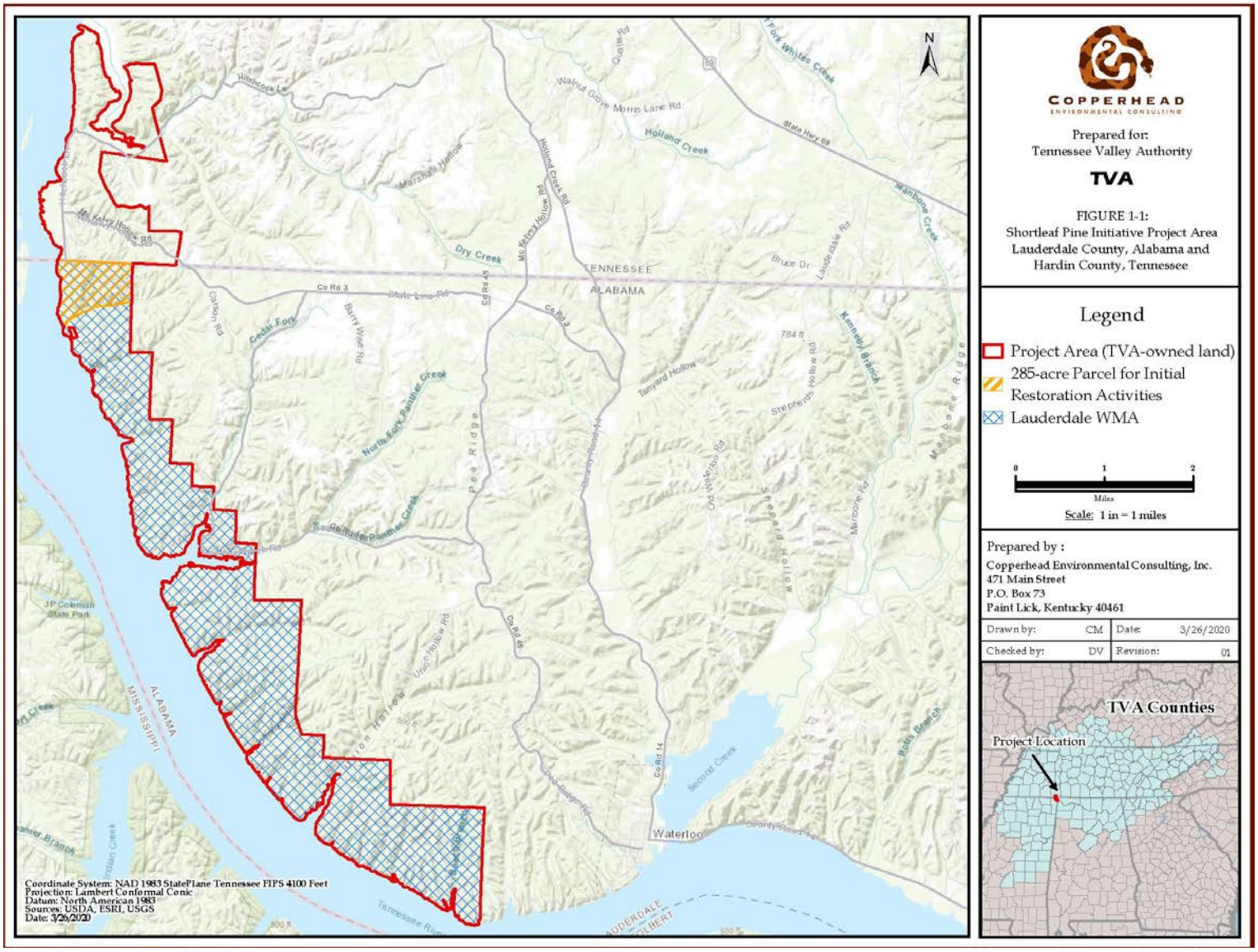

Figure 1-1. Project area.

1.3 Description of the Proposed Action

TVA proposes to authorize and provide funding and support for ADCNR to perform and manage the restoration and reestablishment activities for the shortleaf pine ecosystem on 4,648 acres of TVA lands within the Lauderdale WMA. Additionally, TVA would conduct the management activities on the 1,363-acre TVA parcel in Hardin County, Tennessee. Work would begin on a 285-acre parcel within the Lauderdale WMA. Some of these activities include prescribed burns to remove fire-intolerant species, herbicide applications to remove undesirable species, light grading and earthwork, and other silviculture practices. The appropriate activities for each specific treatment location will be determined based on the best available information and a site-specific environmental review.

Work on each parcel would be planned to begin with a prescribed burn to reduce the duff layer followed by thinning operations. In the initial 285-acre parcel, the potential burn area is approximately 210 acres (Figure 1-2). Most prescribed burns would be conducted in the late winter to early spring and would be low intensity backing fires to remove the duff layer and allow for early successional habitat and seed bed for desired seedlings. Burns would be scheduled on a 2-3 year rotation depending on weather conditions. Any growing season and dormant season prescribed burns would be conducted as needed to meet program objectives (e.g., growing season burn to better control encroaching hardwood regeneration). The planting would be accomplished by natural regeneration.

The thinning operations would be done by mechanical equipment. Existing access would be used where possible, however new access roads may be required to support mobile equipment access. Trees would be physically marked prior to removal to ensure trees are correctly targeted. The thinning operations would be conducted along the ridgetops and down the side slopes where the shortleaf currently grow. Approximately 55 acres of the 285-acre parcel are a shortleaf pine stand type; the exact number of acres to be cleared would be known once the trees are marked in the field. Shortleaf pine and select oaks would remain. Younger mid-story trees would be targeted for removal. The thinning operations would take place year-round depending on weather conditions to help prevent rutting and erosion. Tree thinning crews would use existing roads to the extent possible; new logging roads would be constructed to access felled trees in areas where no current access exists. Logged material would then be trucked to existing commercial sawmills off site. Other silviculture practices would include herbicide treatments conducted on an as-needed basis to control non-native species.

This Environmental Assessment (EA) has two objectives: 1) analyze activities to restore and reestablish shortleaf pine habitat within the described TVA-owned lands at a programmatic level across the 6,011-acre project area, and 2) review site-specific impacts on the 285 acres TVA has identified for initial restoration activities. The analyses in the programmatic National Environmental Policy Act (NEPA) review is valuable in setting out the broad view of environmental impacts and benefits for the proposed alternative and plan. TVA will use results from the programmatic review in the future to analyze site-specific treatments within the overall project area. The 285-acre parcel would be the first TVA-owned land where on-the-ground activities are conducted. Site-specific impacts to this 285 acres are analyzed, including a determination if activities have the potential to significantly affect the environment and applicable mitigation requirements. This initial site-specific environmental review will help TVA understand how to approach additional phases of the project for the remaining project area as part of the Shortleaf Pine Initiative.

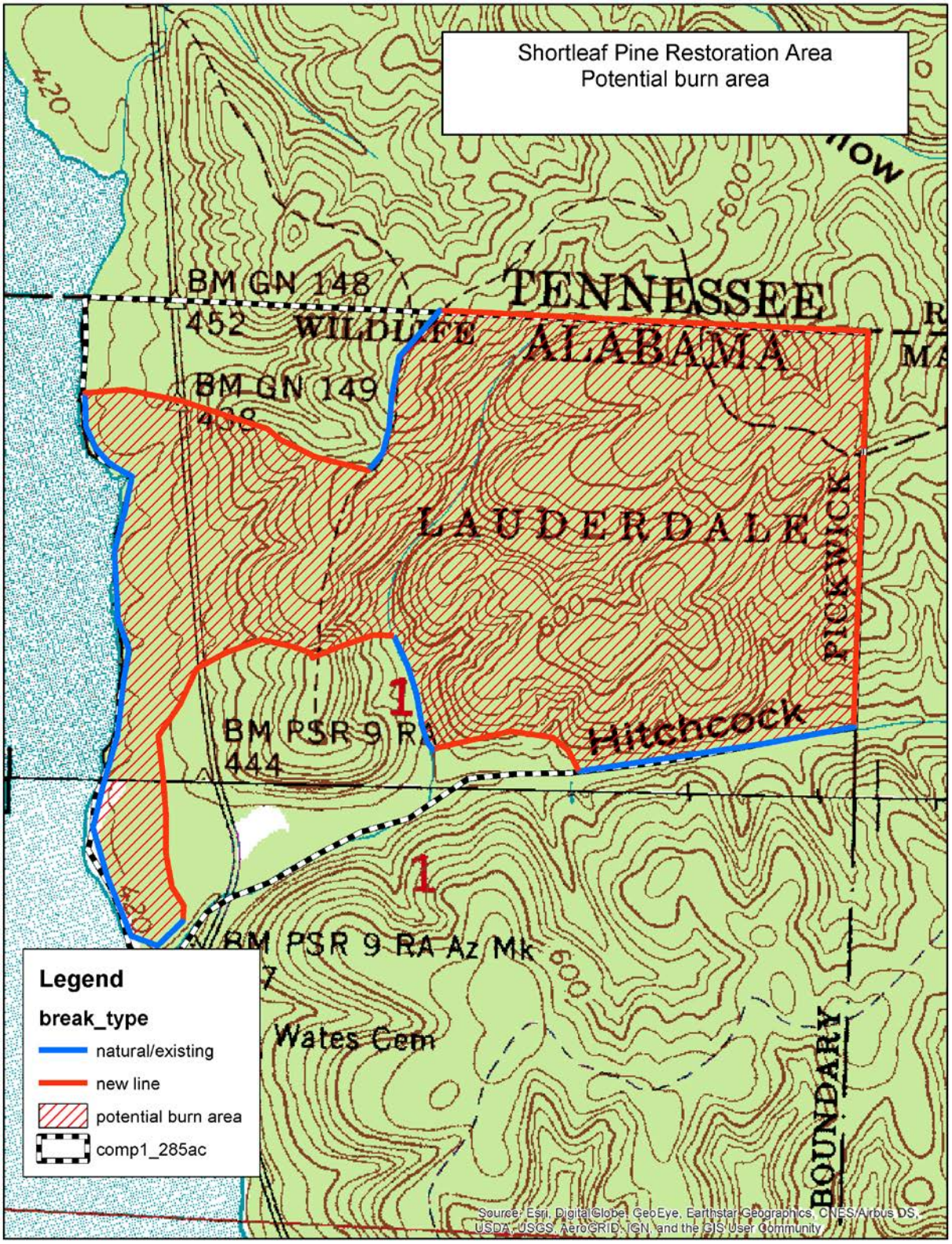

Figure 1-2. Potential burn area for the 285-acre parcel.

1.4 Decision to Be Made

This EA has been prepared to inform TVA decision makers and the public about the environmental consequences of implementing the proposed action. The primary decisions TVA must make are whether to authorize and provide funding and support for ADCNR to perform and manage the restoration and reestablishment activities for the shortleaf pine ecosystem on 4,648 acres of TVA lands within the Lauderdale WMA, and whether TVA should conduct the management activities on the 1,363-acre TVA parcel in Hardin County, Tennessee.

TVA will use this EA to support the decision-making process and to determine whether an Environmental Impact Statement should be prepared or whether a Finding of No Significant Impact may be issued.

1.5 Related Environmental Reviews

Related environmental documents and materials were reviewed concerning this assessment. The contents of these documents help describe the affected properties and are incorporated by reference as appropriate.

Proposed 30-Year Term Easement for Wildlife Management Areas State of Alabama Department of Conservation and Natural Resources Environmental Assessment (June 2002): This EA evaluated the ADCNR request that TVA consolidate four existing easement areas into a single 30-year grant of easement and authorize continued use of adjoining/associated property via revocable license. No changes in the existing land use or operational strategies were proposed. The proposed action simplified property administration, enabled ADCNR to maintain qualification for state and Federal funds, ensured continued tenure sufficient to accommodate long term resource management objectives, and placed the management areas on a single renewal cycle. The 4,648-acre portion of the project area located in Alabama was included in the review of this EA.

Pickwick Reservoir Land Management Plan Final Environmental Assessment (August 2002): This EA evaluated TVA's proposal to update the 1981 Pickwick Reservoir Land Management Plan (1981 Plan) for approximately 19,238 acres of TVA public land on Pickwick Reservoir in Alabama, Mississippi, and Tennessee. The proposed updated Reservoir Land Management Plan (Plan) was used to guide land use approvals, private water use facility permitting, and resource management decisions on Pickwick Reservoir. The proposed Plan allocated land into broad categories, including Project Operations, Sensitive Resource Management, Natural Resource Conservation, Industrial/Commercial Development, Developed Recreation, and Residential Access. The 6,011 acres was included in the review of this EA.

1.6 Scope of the Environmental Assessment

This environmental review is at both a programmatic level across the 6,011-acre project area, as well as a site-specific level for the 285-acre parcel proposed for initial restoration activities.

TVA prepared this EA to comply with NEPA, regulations promulgated by the Council on Environmental Quality (CEQ) and TVA's procedures for implementing NEPA. TVA considered the possible environmental effects of the proposed action and determined that potential effects to the environmental resources listed below were relevant to the decision to be made and assessed the potential impacts on these resources in detail in this EA:

- Air Quality
- Terrestrial Ecology
- Climate Change
- Cultural Resources
- Floodplains
- Managed and Natural Areas
- Parks and Recreation
- Public Health and Safety
- Surface Water and Soil Erosion
- Threatened and Endangered Species
- Transportation
- Wetlands

Given the nature of the project, the following resources are not found in the 6,011-acre project area or would not be impacted by any of the project alternatives. These include:

- *Solid and Hazardous Wastes* – A small volume of herbicide containers would be generated if herbicide use becomes necessary to manage non-native invasives or too much hardwood regeneration occurs. Any waste generated would be managed by the licensed applicator in accordance with federal and state waste management requirements.

- *Navigation* – The Proposed Action would not directly or indirectly affect commercial navigation in the Pickwick Reservoir. Because potential effects were found to be absent, this resource has not been brought forward for further evaluation.

- *Prime Farmland* – The Proposed Action would not cause any irreversible conversion of farmland to nonagricultural uses and therefore would comply with the Farmland Protection Policy Act.

1.7 Necessary Permits or Licenses

All necessary permits, permit modifications, licenses, and approvals required for the activities would be obtained by ADCNR for activities it implements within the 4,648 acres of TVA lands within the Lauderdale WMA and by TVA for the management activities TVA would conduct on the 1,363-acre TVA parcel in Hardin County, Tennessee. TVA anticipates the following may be required for implementing the proposed alternatives:

- ADCNR would obtain a burn permit from the Alabama Forestry Commission (Alabama Administrative Code 9-13-11(d)) for prescribed burns within the Lauderdale WMA. TVA would voluntarily obtain a burn permit from the Tennessee Division of Forestry (Tennessee Code Annotated (TCA) 39-14-306) to conduct prescribed burns on the TVA parcel in Tennessee.

- For activities occurring in Tennessee, an aquatic resource alteration permit (ARAP), 401 Water Quality Certification, and 404 permit from the US Army Corps of Engineers (USACE) would be required for stream crossings and other activities that would involve point source discharges of dredged or fill into Waters of the US or Waters of the State. In Alabama, work that takes place in the above-mentioned

waters may require a Section 404 USACE nationwide/individual permit and a 401 Water Quality Certification from the Alabama Department of Environmental Management (ADEM).

1.8 Public and Agency Outreach

During the preparation of this EA, TVA has consulted with the following federal and state agencies:

- Alabama Historical Commission (AHC)
- ADCNR
- Tennessee Department of Environment and Conservation (TDEC)
- Tennessee Historical Commission (THC)
- Tennessee Wildlife Resources Agency
- USACE
- US Environmental Protection Agency (EPA)
- US Fish and Wildlife Service (USFWS)

The draft EA was made available for public review on May 13, through June 12. During the 30-day comment period, TVA received six submissions from state and federal agencies. Comment summaries and TVA's responses are provided in Appendix E.

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CHAPTER 2 - ALTERNATIVES

Two alternatives are under consideration: the No Action Alternative – Alternative A and the Proposed Action Alternative – Alternative B. Below are descriptions of each alternative under consideration, a table comparing the alternatives, and the identified Preferred Alternative.

2.1 Description of Alternatives

2.1.1 Alternative A – No Action Alternative

Under the No Action Alternative, TVA would not allow nor provide partial funding or support for the enhancement of shortleaf pine habitats within 4,648 acres of TVA-owned land in the Lauderdale WMA in Lauderdale County, Alabama, and a 1,363-acre parcel of TVA-owned land in Hardin County, Tennessee. Existing shortleaf pine habitat would continue to decline, allowing other, opportunistic species to establish and alter the landscape. Thus the No Action Alternative would not meet the purpose and need for action.

2.1.2 Alternative B – Action Alternative

Under the Proposed Action Alternative, TVA would allow and provide funding and support for the enhancement and restoration of shortleaf pine habitats within 4,648 acres of TVA-owned land in the Lauderdale WMA in Lauderdale County, Alabama, and a 1,363-acre parcel of TVA-owned land in Hardin County, Tennessee. A proposed 285-acre parcel in the Lauderdale WMA has been identified for initial restoration activities. This 285-acre parcel is included as a site-specific review to begin restoration activities.

TVA would conduct site-specific surveys to identify specific treatment locations in the remainder of the 6,011-acre project area. The appropriate restoration activities would be identified and shortleaf pine restoration and reintroduction activities would take place.

2.2 Comparison of Alternatives

Table 2-1. Summary and comparison of alternatives by resource area.

Resource Area	Impacts From No Action Alternative	Impacts From Proposed Action Alternative
Air Quality	No impacts.	Minor, short-term impacts during prescribed burning, thinning, and planting operations.
Aquatic Ecology	Long-term adverse impacts from the lack of native shortleaf pine.	Minor, short-term adverse impacts during prescribed burning, thinning, and planting operations. Long-term beneficial impacts.
Vegetation	No impacts.	Minor, short-term adverse impacts. Long-term, beneficial impacts.
Wildlife	No impacts.	Minor short-term adverse impacts. Long-term beneficial impacts.

Resource Area	Impacts From No Action Alternative	Impacts From Proposed Action Alternative
Climate Change	No impacts.	Negligible impact.
Cultural Resources	No effects.	No effects on 285-acre parcel. If National Register of Historic Places (NRHP) eligible or potentially eligible sites are identified during future surveys in the 6,011-acre project area, TVA would either exclude the sites from the Area of Potential Effect (APE) or identify appropriate mitigation measures to address adverse effects.
Floodplains	No impacts.	Minor, short-term adverse impacts.
Managed and Natural Areas	No impacts.	Short-term adverse impacts causing minor erosion, sedimentation, and alteration of existing plant communities. Beneficial long-term impacts from regeneration of native ecological communities.
Parks and Recreation	No impacts.	Minor, short-term adverse impacts during restoration activities. Long-term enhanced recreation opportunities.
Public Health and Safety	No impacts.	Minor, temporary adverse impacts.
Noise	No impacts.	Minor, temporary adverse impacts.
Soil Erosion and Surface Water	No impacts.	Minor, temporary adverse impacts.

Resource Area	Impacts From No Action Alternative	Impacts From Proposed Action Alternative
Threatened and Endangered Species	No impacts.	Impacts to state- and federally listed bats are possible due to suitable roosting tree removal and prescribed burning. Impacts to federally listed bats were addressed in TVA's programmatic consultation with USFWS. Appropriate conservation measures would be applied in accordance with TVA's Bat Strategy. Additional best management practices (BMPs) will be applied to protect bats during forestry operations. With implementation of conservation measures, impacts are not expected to be significant.
Transportation	No impacts.	Minor, temporary adverse impacts.
Wetlands	No impacts.	Minor, indirect adverse impacts.

2.3 The Preferred Alternative

TVA's preferred alternative is Alternative B. This alternative would meet the purpose and need of the project and support the shortleaf pine initiative.

2.4 Identification of Mitigation Measures

Mitigation measures are discussed by resource in Chapter 4. In addition to the requirements of any necessary permits, TVA would implement the following mitigation measures to avoid, minimize, or mitigate potential adverse impacts on the environment. All applicable permits would be acquired; therefore, associated permit-related mitigation measures and BMPs would be implemented to further minimize impacts.

- Erosion controls and other BMPs to reduce storm water runoff would be implemented in accordance with a Stormwater Pollution Prevention Plan (SWPPP) developed in coordination with ADCNR and TDEC. All erosion and sediment controls would be installed, placed, implemented, or constructed in accordance with the provisions of the State of Alabama and Tennessee.
- Spills of oils, fuels, or other potentially hazardous materials would be addressed immediately and BMPs such as secondary containment and spill kits maintained onsite during restoration activities would be used to assure that hazardous substances would not be released to the environment. Activities in Tennessee would be managed in accordance with the Solid and Hazardous Waste Rules and Regulation of the State of Tennessee (TDEC DSWM Rule 0400 Chapters 11 and 12, respectively).

- All prescribed burns will follow measures outlined in burn plans that set forth the details/critical elements for conducting a particular burn treatment for individual parcels (e.g., weather conditions under which the burn will be conducted, number of personnel and duties of each, ignition plan, and the type, amount, and placement of equipment to safely conduct the burn, and escaped fire plan). TVA will coordinate with the appropriate government agencies responsible for burning regulations in Hardin and Lauderdale counties.
- To assist with prescribed burns, VSmoke-GIS will be used to estimate downwind emissions concentrations and visibility.
- Project-related vehicles would comply with applicable local regulations to minimize the spread of loose soil and mud onto the local roadways.
- To comply with Executive Order (EO) 13112 (Invasive Species), disturbed areas would be revegetated with native species to avoid the introduction or spread of invasive species.
- Any needed fill material would be clean and free of contaminants.
- Herbicide application would not be applied near streams; any herbicides applied near stream features would have to be approved for aquatic use and would be used according to label instructions.
- Any improvements in the non-floodway portion of the floodplain (floodway fringe) would be done in such a manner that upstream flood elevations would not be increased by more than 1.0 foot.
- When they become available, Flood Risk would review plans for restoration activities, including grading, earthwork, and access roads for potential loss of flood and power storage.
- A minimum 20-meter buffer would be used to avoid all potentially eligible archeological sites.
- Prior to any work on the property, TVA Cultural Compliance staff will cordon off any NRHP eligible or potentially eligible sites with safety fencing and/or flagging tape to ensure that the sites are avoided.
- TVA Forestry Best Management Practices for Lauderdale WMA (see Appendix A)
- Conservation measures identified in the TVA Bat Strategy Project Screening Form (Appendix B)

CHAPTER 3 – AFFECTED ENVIRONMENT

This chapter describes the Study Area's existing physical, biological, and cultural resources. The Study Area for the project encompasses the approximately 6,011-acre project area in Alabama and Tennessee. As presented in Chapter 2, TVA has evaluated the Proposed Action Alternative and determined that certain environmental resources would not be permanently affected due to the proposed activities. Resources that could potentially be affected by the Proposed Action Alternative, should BMPs not be implemented throughout the project, are considered further in this EA. TVA expects that most of the potentially affected resources would only be minimally affected by the proposed project, and thus, the EA analyses of these resources are concise. The information presented in this chapter establishes the baseline conditions against which comparisons can be made from the potential effects of the alternatives under consideration.

3.1 Physical Environment

3.1.1 Air Quality

The Clean Air Act regulates the emission of air pollutants and, through its implementing regulations, establishes National Ambient Air Quality Standards (NAAQS) for several "criteria" pollutants that are designed to protect the public health and welfare with an ample margin of safety. The criteria pollutants are ozone, particulate matter, carbon monoxide (CO), nitrous oxides (NO_x), sulfur dioxide (SO_2), and lead (Pb).

Specified geographic areas are designated as attainment, nonattainment, or unclassifiable for specific NAAQS. Areas with ambient concentrations of criteria pollutants exceeding the NAAQS are designated as nonattainment areas and new emissions sources in or near these areas are subject to more stringent air permitting requirements.

Lauderdale County, Alabama and its surrounding counties (Colbert and Lawrence counties, Alabama; Tishomingo County, Mississippi; and Hardin, Wayne, and Lawrence counties, Tennessee) along with Hardin County, Tennessee, and its surrounding counties (McNairy, Chester, Henderson, Decatur, and Wayne counties, Tennessee; Lawrence County, Alabama; and Tishomingo and Alcorn counties, Mississippi) are in attainment with applicable NAAQS (USEPA 2020a). Lauderdale County is in compliance with the Alabama ambient air quality standards referenced in the ADEM Administrative Code, Title 335-3 (ADEM Administrative Code 2016). Hardin County is in compliance with Tennessee ambient air quality standards which can be found in Tennessee Air Pollution Control Rules Chapter 1200-03-03.

The proposed project would be subject to both federal and state regulations that impose permitting requirements and specific standards for expected air emissions. These include ADEM Administrative Code, 335-3-4-.02 Fugitive Dust and Fugitive Emissions as well as Fugitive Dust in the Tennessee Air Pollution Control Rules Chapter 1200-03-08.

3.1.2 Climate Change

Gases that trap heat in the atmosphere are called greenhouse gases (GHGs). Gases that contribute to the greenhouse effect include water vapor, carbon dioxide (CO_2), methane (CH_4), and NO_x. Global atmospheric concentrations of CO_2, CH_4, NO_x, and certain manufactured GHGs have all risen significantly over the last few hundred years. Too much of these GHGs can cause Earth's atmosphere to trap more and more heat and affect

climate change. Data trends indicate increasing temperatures, decreasing precipitation, declining cloud cover, and increasing solar radiation in the TVA power service area.

Other activities that increase CO_2 emissions include land or forest clearing and land use changes associated with land development projects; construction activities involving use of fossil-fuel-powered equipment (e.g., bulldozers, loaders, haulers, trucks, generators, etc.); increases in demand for electric power due to greater industrial, residential, or commercial activity; and changes to amounts and patterns of traffic flow. Additionally, development of parks or WMAs and protection of forested areas that absorb and store CO_2 serve to remove excess CO_2 in the atmosphere, a process known as carbon sequestration.

TVA has taken an active role in preparing for the potential impacts of Climate Change, by developing and maintaining its Climate Change Adaptation Plan (TVA 2016). TVA power plant CO_2 emissions have dropped by approximately 47 percent between 2005 and 2017 due to a multitude of emission reduction projects instituted by TVA during this period.

3.1.3 Terrestrial Ecology

3.1.3.1 Aquatic Ecology

In addition to the shoreline of Pickwick Reservoir that forms the western boundary of the 6,011-acre project area, there are aquatic features in both the project area and the 285-acre parcel identified for initial restoration activities. While there are records of federally listed aquatic fauna in nearby Pickwick Reservoir, immediately adjacent to the project area, there are no records of and no suitable habitat for federally listed aquatic species within either the project area or the 285-acre parcel.

3.1.3.2 Vegetation

The project area is located in the Transition Hills Level IV ecoregion, which is a subdivision of Southeastern Plains Level III ecoregion (Griffith et al. 1998). The Transition Hills is comprised of relatively large hills compared to other parts of the Southeastern Plains, but does share characteristics of both the Southeastern Plains and Interior Plateau Level III ecoregion to the east. The Transition Hills are mostly forested where natural communities are dominated by deciduous and mixed evergreen-deciduous forest. Lands that are intensively managed for wood production are covered by evergreen forest that is planted and regularly harvested.

Field surveys were conducted in September 2018 for the proposed 285-acre TVA-owned parcel identified for initial restoration activities. The focus of these surveys was to document plant communities, populations of invasive plants, and to search for possible threatened and endangered plant species. Using the National Vegetation Classification System (Grossman et al. 1998), plant community types observed during field surveys can be classified as a combination of deciduous, mixed evergreen-deciduous, and evergreen forest. No forested areas in the 285-acre parcel had structural characteristics indicative of old growth forest stands (Leverett 1996). The larger project area, which includes TVA-owned land that is managed by ACDNR on the Lauderdale WMA and TVA-managed land in adjacent Hardin County, Tennessee, is also nearly completely forested. Aerial photos suggest that the 285-acre parcel that was surveyed in the field is reasonably representative of the larger project area.

Field surveys indicate that several types of deciduous forest occur on the 285-acre parcel. The species composition and structure of these different forest types is determined by factors including soils, aspect, landscape position, and previous land use. On lower slopes

in areas that were likely more heavily cropped, grazed, or previously developed, forest canopy trees include species that establish and grow quickly. Common trees in these areas include black cherry, boxelder, cherrybark oak, honey locust, sugar maple, sweetgum, yellow-poplar, and to a lesser extent the evergreen species eastern red cedar and loblolly pine. The understory in these forests contains some native herbaceous species like bearded short husk grass, Carolina elephant's foot, Christmas fern, and river oats, but also contains a significant proportion of invasive species like Japanese stiltgrass.

Other deciduous forest types occur in less disturbed portions of the 285-acre parcel. On middle and lower slopes, which are richer than the drier upper slopes, overstory trees often average 24" diameter at breast height (dbh). These hardwood forests support species like American beech, white oak, yellow-poplar, and sugar maple in the overstory and pawpaw and hornbeam in the midstory. The herbaceous layer contains few species. Several small seepage wetlands scattered throughout the site do contain more herbaceous species. These wetlands only cover a few thousand square feet, but do support wetland plants including cinnamon fern, lady fern, netted chain fern, and royal fern, along with green alder, sedges, small green wood orchid, and Virginia water horehound.

Forest stands on the upper slopes and ridge tops often contain mature trees like black oak, chestnut oak, post oak, white oak, and a significant percentage of the native shortleaf pine along with several species of blueberry in the understory. Similar to the more mesic sites, the herbaceous layer contains few species. The structure of these stands is unique in that the canopy is often broken thereby allowing more light to the forest floor. The mixed evergreen-deciduous stands observed during the site survey are nearly identical to these deciduous forests, but contain a greater percentage of shortleaf pine. These are among the target stands for restoration.

Evergreen forest, where evergreen species account for over 75 percent of canopy cover, are found primarily along lower slopes that were heavily disturbed in the past. These areas were likely planted with loblolly pine with the intended goal of a future harvest. These stands are unnatural and possess little conservation value.

EO 13112 directs TVA and other federal agencies to prevent the introduction of invasive species (both plants and animals), control their populations, restore invaded ecosystems, and take other related actions. EO 13751 (Safeguarding the Nation from the Impacts of Invasive Species) amends EO 13112 and directs actions by federal agencies to continue coordinated federal prevention and control efforts related to invasive species. This order incorporates considerations of human and environmental health, climate change, technological innovation, and other emerging priorities into federal efforts to address invasive species.

Some invasive plants have been introduced accidentally, but most were brought here as ornamentals or for livestock forage. Because these robust plants arrived without their natural predators (insects and diseases), their populations spread quickly across the landscape (Miller et al. 2010). No federal noxious weeds were observed within the 285-acre parcel, but several non-native invasive plant species do occur (Table 3-1). Invasive infestation are more pronounced on lower slopes that have been more heavily disturbed in the past compared to middle and upper slopes.

Table 3-1. Invasive plant species observed during field surveys of the 285-acre parcel.

Common Name	Scientific Name
Chinese Lespedeza	*Lespedeza cuneata*
Chinese Privet	*Ligustrum sinense*
Japanese Honeysuckle	*Lonicera japonica*
Japanese Stilitgrass	*Microstegium vimineum*

3.1.3.3 Wildlife

The 6,011-acre project area is predominantly forested. Forest types range from coniferous to mixed-deciduous to deciduous. As vegetative communities change from planted pine to natural regeneration and from riparian areas along Pickwick Reservoir and in drainages up to upland communities ridge tops, wildlife communities using these areas also change somewhat. Overall wildlife communities present in the project area are common to the region as habitats are not unique or uncommon. Mammal species that commonly occur in these habitats include common raccoon, eastern chipmunk, gray fox, fox squirrel, gray squirrel, southern flying squirrel, southern short-tailed shrew, striped skunk, Virginia opossum, white-footed mouse, and white-tailed deer (Whitaker 1996; NatureServe 2019). Bat mist-net surveys performed of the 285-acre parcel in August of 2019 resulted in captures of several common bat species: big brown bat, eastern red bat, and evening bat (Copperhead 2019; see Appendix D). Most individuals captured of these species were either juveniles or reproductively active adults, suggesting that breeding populations of these bat species occur in or near the 285-acre parcel. Bird species that commonly use these habitats include American robin, black-throated blue warbler, black and white warbler, blue-gray gnatcatcher, blue jay, osprey, Carolina chickadee, Carolina wren, eastern wood pewee, hairy woodpecker, indigo bunting, Louisiana water thrush, northern cardinal, northern parula, ovenbird, pine warbler, red-bellied woodpecker, red-eyed vireo, tufted titmouse, white-throated sparrow, and yellow-billed cuckoo (National Geographic 2002; NatureServe 2019).

Reptile and amphibian species that may use these terrestrial communities include American toad, black racer, black rat snake, dusky salamander, eastern box turtle, eastern fence lizard, eastern garter snake, eastern hog-nosed snake, five-line skink, gray treefrog, green frog, leopard frog, ring-necked snake, rough green snake, slimy salamander, and spring peeper (Gibbons and Dorcas 2005; Powel et al. 2016).

The 285-acre parcel for initial restoration activities is representative of the habitat and wildlife communities described above. Review of the TVA Regional Natural Heritage database in September 2019 indicates that three caves exist within three miles of the 285-acre parcel. No records of heron rookeries or osprey nests are known within three miles.

Review of the USFWS Information for Planning and Consultation website in September 2019 resulted in three migratory bird species of conservation concern identified as having the potential to occur in 285-acre parcel: bald eagle, golden eagle, and red-headed woodpecker. Suitable nesting habitat exists in the 285-acre parcel for bald eagle and red-headed woodpecker. Suitable foraging habitat also exists in the 285-acre parcel for red-headed woodpecker. No suitable open areas for foraging or nesting cliffs occur in the 285-acre parcel for golden eagle.

3.1.4 Cultural Resources

Cultural resources include prehistoric and historic archaeological sites, districts, buildings, structures, and objects, as well as locations of important historic events that lack material evidence of those events. Cultural resources that are listed, or considered eligible for listing, on the NRHP are called historic properties. Cultural resources become historic properties when they possess both integrity and significance. A historic property's integrity is based on its location, design, setting, materials, workmanship, feeling, and association. The significance is established when historic properties meet at least one of the following criteria: (a) are associated with important historical events or are associated with the lives of significant historic persons; (b) embody distinctive characteristics of a type, period, or method of construction; (c) represent the work of a master or have high artistic value; or (d) have yielded or may yield information important in history or prehistory.

Section 106 of the National Historic Preservation Act (NHPA) requires federal agencies to consider the effects of their proposed undertakings on historic properties and provide the Advisory Council on Historic Preservation an opportunity to comment on those effects. TVA determined that the Proposed Action Alternative is an "undertaking" as defined by the regulations under NHPA. Once an action is determined to be an undertaking, the regulations require agencies to consider whether the proposed activity has the potential to impact historic properties. If the undertaking is such an activity, then the agency must follow the following steps: (1) involve the appropriate consulting parties; (2) define the APE; (3) identify historic properties in the APE; (4) evaluate possible effects of the undertaking on historic properties in the APE; and (5) resolve adverse effects (36 CFR § 800.4 through 800.13). An APE is defined as the "geographic area or areas within which the undertaking may directly or indirectly cause alterations in the character or use of historic properties, if any such properties exist" (36 CFR § 800.16). TVA defined the APE for this undertaking as the entire 6,011-acre project area. Since activities would consist of timbering and replanting trees, the undertaking would have no visual effect to historic properties.

Section 106 of the NHPA also requires federal agencies to consult with the respective State Historic Preservation Officer (SHPO), federally-recognized Indian tribes and others with a vested interest in the undertaking when proposed federal actions could affect historic and cultural resources, including archaeological resources. In addition to the NHPA, certain types of resources are also protected on federal land under the Archaeological Resources Protection Act and the Native American Graves Protection and Repatriation Act.

The Tennessee Valley region has been an area of human occupation for the last 12,000 years. This includes five broad cultural periods: Paleo-Indian (11,000-8,000 BC), Archaic (8000-1600 BC), Woodland (1600 BC-AD 1000), Mississippian (AD 1000-1700), and Historic (AD 1700-present). Prehistoric land use and settlement patterns vary during each period, but short- and long-term habitation sites are generally located on flood plains and alluvial terraces along rivers and tributaries. Specialized campsites tend to be located on older alluvial terraces and in the uplands. In the early historic period, this location was largely populated by members of the Cherokee and Chickasaw tribes. The influx of European settlers into the region forced cession of Cherokee and Chickasaw lands in the Treaty of 1816. Lauderdale County, Alabama was founded in 1818. It was named for Col. James Lauderdale, a Tennessean killed at the Battle of New Orleans. Hardin County, Tennessee was founded in 1819 and named for Colonel Joseph Hardin, a politician who served as a representative for the State of Franklin and the Tennessee Territorial Assembly. Although he never reached Hardin County, some of the first settlers were his sons, a daughter and their extended families. Hardin and Lauderdale counties were mostly

rural and commerce was centered on agriculture or mills along the many waterways. During the Civil War, allegiances were divided and the counties saw several battles and skirmishes, including the 1862 Battle of Shiloh. Early settlement in the APE was located primarily along the river valley edge and tributary hollows. After the construction of Pickwick Landing Dam and TVA's purchase of the APE, the rural settlements were abandoned and the area returned to a natural state.

The 6,011 acres is mostly rugged upland, but also includes the Tennessee River valley edge and numerous narrow tributary valleys. Historically, settlement was located primarily along the river valley edge and its tributaries. After the construction of Pickwick Landing Dam and TVA's purchase of the APE, the area returned to a wooded, natural state. Prehistoric archaeological sites could be expected to span all of prehistory and would likely be clustered along the valley edge and tributary valleys. Historic period sites may include Native American occupations as well as Euro-American sites. TVA's land acquisition maps, USGS topographic maps, and other maps document numerous Euro-American sites, including rural domestic habitations and supporting outbuildings, mill sites, schools, cemeteries, and others. These sites also cluster in valley or near valley settings, but sites may occur throughout the APE.

3.1.4.1 Archaeological Resources

TVA Cultural Compliance staff conducted a desktop study of available documents pertaining to the APE's potential to contain archaeological sites. This desktop study included TVA's land acquisition maps, other maps, existing archaeological and natural data. A total of 65 sites have been recorded in both the Tennessee and Alabama portions of the APE, mostly as a result of Pickwick Reservoir shoreline surveys over the years (Gage and Herrmann 2009, Meyer 1995). Sixteen new and previously recorded sites were also recently investigated during a survey of 285 acres in the APE. Twelve of the 16 sites were determined to be potentially eligible for the NRHP and 10 of the 12 would constitute the newly proposed Hitchcock Hollow Archaeological District (HHAD; Watkins 2019). The 285-acre parcel would be the first area timbered for the Shortleaf Pine Initiative. Desktop review suggests that many more sites occur throughout the tract.

To review the site specific 285 acres TVA contracted with the Office of Archaeological Research (OAR) at the University of Alabama to conduct a Phase I archaeological survey of the entire 285 acres. Including five previously recorded sites, OAR investigated a total of 16 sites within the APE. All are historic sites dating to the late nineteenth century through TVA's purchase of the property. OAR recommended that twelve of the sites in the APE were potentially eligible for the NRHP. Furthermore, OAR recommended that 10 of the 12 potentially eligible sites should constitute the newly proposed HHAD.

The remainder of the APE has not been systematically surveyed. Due to the size and scope of the project TVA proposes to proceed under phases as provided under 36 CFR § 800.4(b)(2) and § 800.5(a)(3). TVA would review individual parcels as timbering is planned and associated funding becomes available. Prior to any activities, TVA would conduct archaeological surveys, comparable to the initial 285-acre parcel. Specific research designs would be tailored to the natural and cultural setting of the individual timbering parcels and would be consistent with TVA's standard Phase I scope of work. Consultation would be initiated as individual surveys are conducted.

3.1.5 Floodplains

A floodplain is the relatively level land area along a stream or river that is subject to periodic flooding. The area subject to a one-percent chance of flooding in any given year is normally called the 100-year floodplain. The area subject to a 0.2-percent chance of flooding in any given year is normally called the 500-year floodplain. It is necessary to evaluate development in the floodplain to ensure that the project is consistent with the requirements of EO 11988, Floodplain Management.

The project area includes TVA land adjacent to Pickwick Reservoir extending from about Tennessee River miles (TRM) 211.3 to 224.8, right descending bank, on Pickwick Reservoir, within Hardin County, Tennessee, and Lauderdale County, Alabama. The project area also encompasses numerous tributary streams of the Tennessee River, which are discussed in Section 3.1.9.

The 100-year flood elevations on the Tennessee River would exceed the 100-year flood elevations on the various tributary streams because of the much larger size of the Tennessee River drainage basin; therefore, the applicable flood elevations would be those on the Tennessee River. Table 3-2 below lists the flood elevations applicable to the extent of the project area. Within the Lauderdale WMA, the Tennessee River floodplain is depicted as Zone A, and within Hardin County, Tennessee, is depicted as Zone AE with floodway and shown in Figure 3-1. As shown in Figure 3-2, the western edge of the 285-acre parcel in the Lauderdale WMA intersects the 100-year floodplain of the Tennessee River.

Table 3-2. Flood elevations applicable to the Lauderdale WMA.

Tennessee River Mile	Landmark	100-Year Flood Elevation[1]	500-Year Flood Elevation[1]
211.0	Project Beginning / Dry Creek	419.3	419.4
212.0		419.3	419.4
213.0		419.4	419.5
214.0		419.4	419.5
214.2		419.4	419.5
214.3	TN-AL State Line	419.4	419.5
215.0		419.5	419.6
215.2	Tennessee-Tombigbee Waterway	419.5	419.6
216.0		419.5	419.6
217.0		419.5	419.7
217.7		419.5	419.7
218.0		419.6	419.7
218.3		419.6	419.7
219.0		419.6	419.8

Tennessee River Mile	Landmark	100-Year Flood Elevation[1]	500-Year Flood Elevation[1]
220.0		419.7	419.9
220.3	Indian Creek	419.7	420.0
220.4		419.8	420.0
221.0		419.8	420.0
222.0		419.9	420.1
222.4		419.9	420.1
223.0		419.9	420.2
224.7	Bear Creek	420.0	420.3
224.8	Project End	420.0	420.3

Note 1 – elevations referenced to National Geodetic Vertical Datum1929

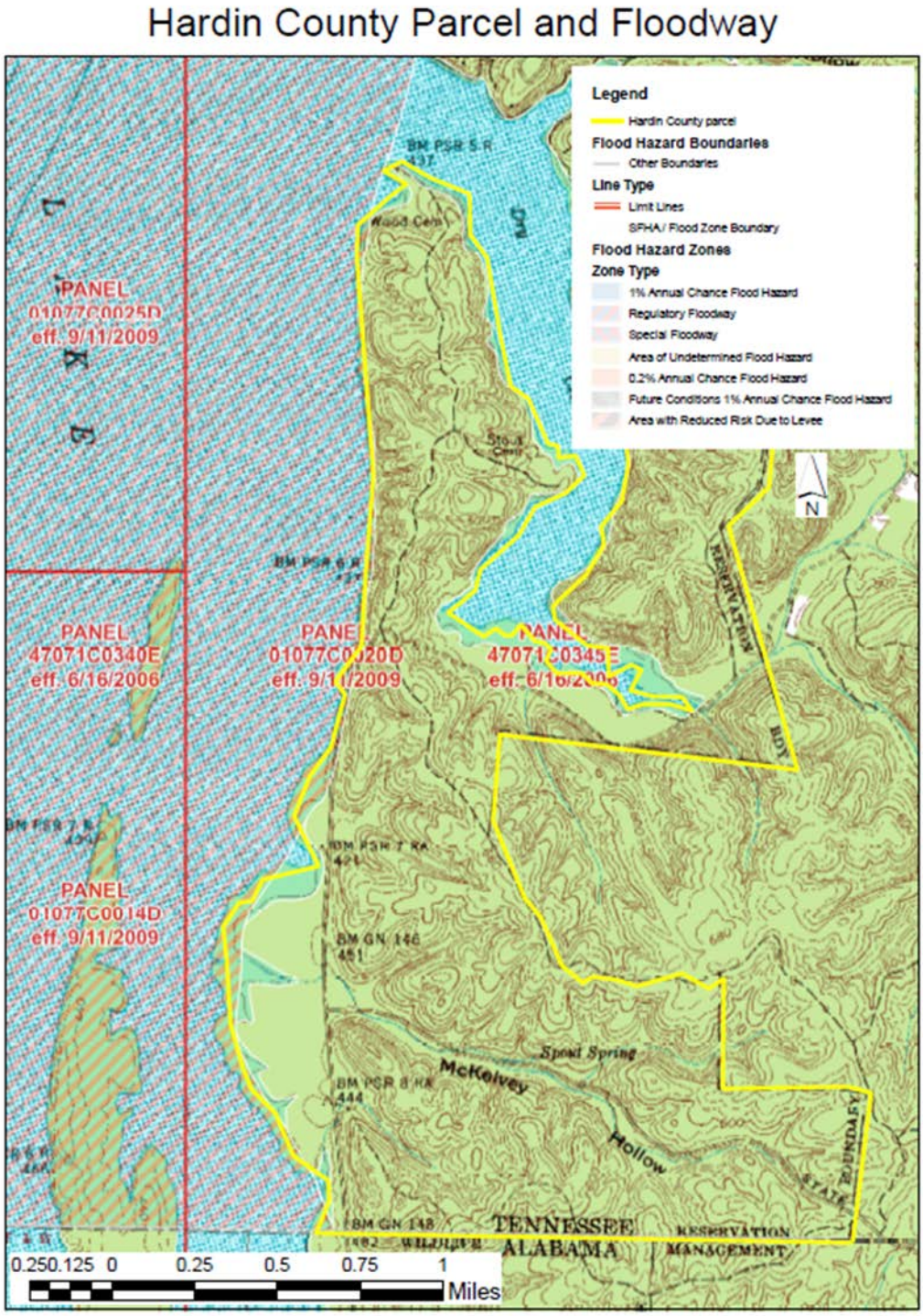

Figure 3-1. Hardin County 285-acre parcel and floodway

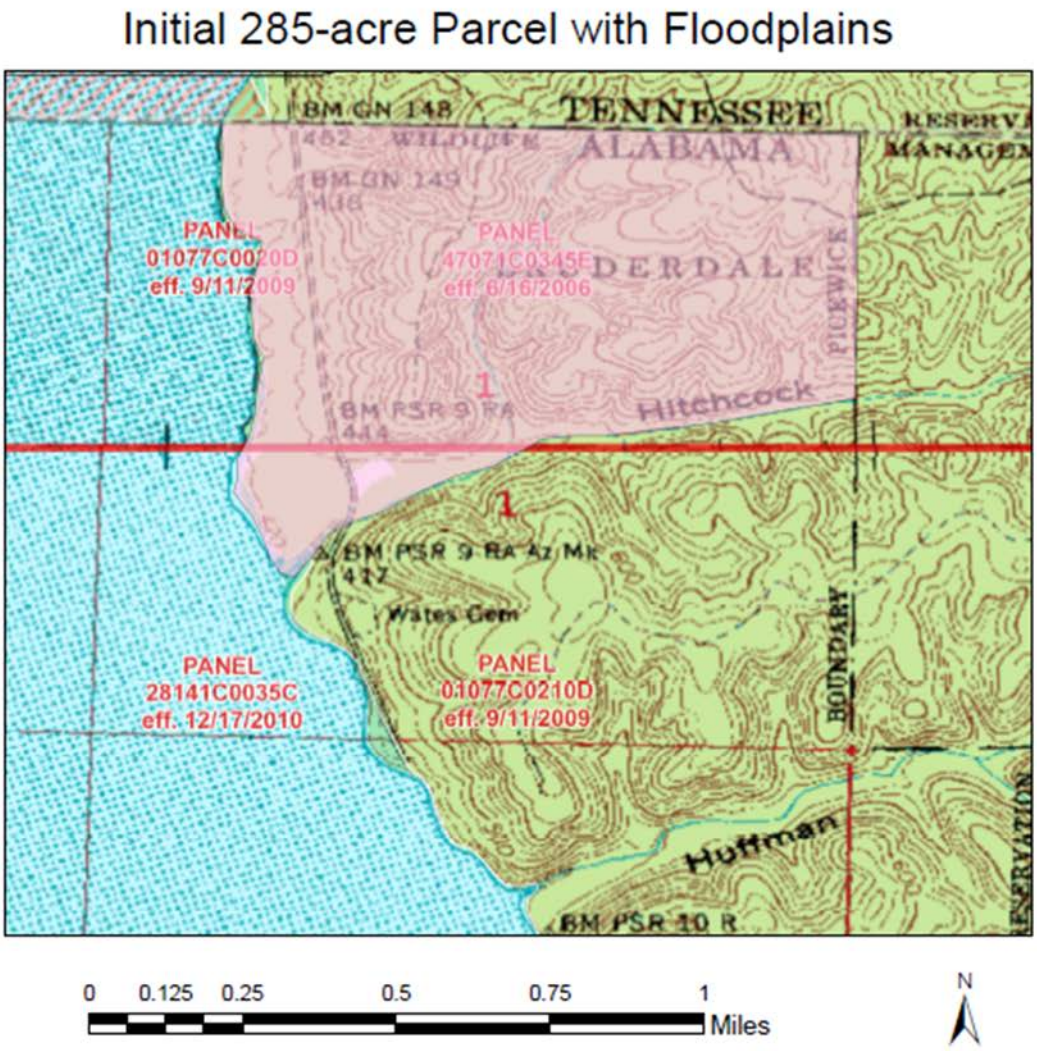

Figure 3-2. Initial 285-acre parcel with floodplains.

3.1.6 Managed and Natural Areas

Natural areas include ecologically significant sites; federal, state, or local park lands; national or state forests; wilderness areas; scenic areas; conservation easements; WMAs; recreational areas; greenways; trails; Nationwide Rivers Inventory streams; and Wild and Scenic Rivers. This section addresses natural areas that are on, immediately adjacent to (within 0.5 miles), or within the region of the project area (5-mile radius).

No natural areas are located immediately adjacent to the project area, but six natural areas occur within 5 miles of the project area (Table 3-3).

Table 3-3. Natural areas located within 5 miles of the project area.

Managed Area Name	Managed Area Type	Proximity (miles)
Lauderdale Wildlife Management Area	Wildlife Management Area	0.00
J.P. Coleman State Park	State Park	1.30
Cooper Falls TVA Habitat Protection Area	Habitat Protection Area	1.52
Dry Creek Wildlife Management Area	Wildlife Management Area	2.24
Pickwick Landing State Park	State Park	2.62
Factory Hollow Registered State Natural Area	Natural Area	4.17

Portions of the project area are within Lauderdale WMA. Comprised of a total of 11,106-acres, the Lauderdale WMA is managed for big and small game hunting as well as wildlife habitat. The remainder of the project area occurs within the boundaries of TVA property that is zoned for Natural Resource Management.

3.1.7 Parks and Recreation

The 6,011-acre project area, including the 285-acre parcel proposed for initial restoration activities, receives substantial dispersed recreational activity including hunting, shoreline fishing, wildlife observation, and hiking.

There are no developed recreation facilities within the 285-acre parcel. However, there is a developed public boat launching ramp within the 6,011-acre project area. It is located on the right descending bank of Pickwick Reservoir at TRM 218.5.

Other developed outdoor recreation areas located in the vicinity of the project area include Grand Harbor Marina, J P Coleman State Park, and Eastport Marina. All of these areas are located at least 1 mile away from the project area and are all situated across the reservoir on the left descending bank.

3.1.8 Public Health and Safety

The 1970 Occupational Safety and Health Act (OSHA) governs occupational health and safety in the private sector as well as in the federal government. OSHA's mission is to ensure safe and healthful working conditions for working men and women by setting and enforcing standards and by providing training, outreach, education, and assistance. Tennessee has an OSHA-approved plan under the Tennessee Occupational and Safety and Health Administration of the Tennessee Department of Labor and Workforce Development. Alabama is under federal OSHA jurisdiction which covers most private-sector workers within the state, but not state or local government workers. TVA also implements its own Safety Standard Programs and Processes which are designed to help personnel be attentive to health and safety concerns and maintain a continuous health and safety culture

through the implementation of safety practices, training, and control measures to reduce or eliminate occupational hazards.

It is TVA's policy that contractors, such as logging companies, have a site-specific health and safety plan in place prior to conducting construction activities at TVA properties. The contractor site-specific health and safety plans address the hazards and controls as well as contractor coordination for various construction tasks.

3.1.9 Noise

Noise is defined as unwanted or unwelcome sound usually caused by human activity and added to the natural acoustic setting of a locale. It is further defined as sound that disrupts normal activities or diminishes the quality of the environment. Community response to noise is dependent on the intensity of the sound source, its duration, the proximity of noise-sensitive land uses and the time of day the noise occurs (i.e., higher sensitivities would be expected during the quieter overnight periods).

Sound is measured in units of decibels (dB) on a logarithmic scale. Therefore, increasing the noise level by 5 dB results in a noise level perceived by the human ear to be twice as loud as the original source. Given that the human ear cannot perceive all pitches or frequencies in the sound range, sound level measurements are typically weighted to correspond to the limits of human hearing, as measured in A-weighted decibels (dBA). A noise change of 3 dBA or less is not normally detectable by the average human ear. An increase of 5 dBA is generally not readily noticeable and a 10-dBA increase is usually felt to be "twice as loud" as before.

The Noise Control Act of 1972, along with its subsequent amendments (Quiet Communities Act of 1978, United States Code (USC) 42 4901-4918), delegates authority to the states to regulate environmental noise and directs government agencies to comply with local community noise statutes and regulations. Although there are no federal, state, or local regulations for community noise in Roane County, USEPA guidelines (1974) recommend that Ldn (day-night average sound level) not exceed 55 dBA for outdoor residential areas. The USEPA noise guideline recommends an Ldn of 55 dBA which is sufficient to protect the public from the effect of broadband environmental noise in typical outdoor and residential areas. These levels are not regulatory goals but are "intentionally conservative to protect the most sensitive portion of the American population" with "an additional margin of safety" (USEPA 1974). The U.S. Department of Housing and Urban Development (HUD) considers an Ldn of 65 dBA or less to be compatible with residential areas (HUD 1985).

Sound from a source spreads out as it travels from the source and the sound pressure level diminishes with distance. In addition to distance attenuation, the air absorbs sound energy. Atmospheric effects (wind, temperature, precipitation) and terrain/vegetation effects also influence sound propagation and attenuation over distance from the source. An individual's sound exposure is determined by measurement of the noise that the individual experiences over a specified time interval.

Operation noise associated with the proposed action would include the use of chainsaws, a feller buncher, skidders, a loader, personal vehicles, and trucks. These types of equipment emit 80 to 85 dBA at a distance of 50 feet (FHWA 2017). Sensitive receptors within 1 mile of the project area and along nearby local roads include scattered rural residences.

3.1.10 Surface Water and Soil Erosion

The project area is located in Hardin County, Tennessee and Lauderdale County, Alabama, and drains to waterways within the Pickwick Lake (06030005) 8-digit Hydrologic Unit Code sub-basin. Aquatic features are located in this project area, but a hydrologic determination was not performed as part of this review. The surface water streams in the project area and the vicinity of this project are listed below in Tables 3-4 and 3-5.

Precipitation in the project area region averages about 58 inches per year. The wettest month is May with approximately 6.7 inches of precipitation, and the driest month is October with 3.9 inches. The average annual air temperature is 58 degrees Fahrenheit, ranging from an annual average of 49 degrees Fahrenheit to 73 degrees Fahrenheit (US Climate Data 2019). Stream flow varies with rainfall and averages about 23.97 inches of runoff per year (i.e., approximately 1.77 cubic feet per second, per square mile of drainage area; USGS 2008).

The federal Clean Water Act (CWA) requires states to identify all waters where required pollution controls are not sufficient to attain or maintain applicable water quality standards and to establish priorities for the development of limits based on the severity of the pollution and the sensitivity of the established uses of those waters. States are required to submit reports to the USEPA. The term “303(d) list” refers to the list of impaired and threatened streams and water bodies identified by the state. The Tennessee River/Pickwick Reservoir is currently listed as impaired for Total Phosphorus due to sources outside of jurisdiction or State on the TDEC 303d list and for nutrients due to agriculture on the ADEM 303d list (ADEM 2018, TDEC 2018). Cypress Creek is also listed as impaired for nutrients due to agriculture and mercury due to atmospheric deposition (ADEM 2018). Table 3-4 provides a listing of local streams within Tennessee (TDEC 2013) and their designated uses and Table 3-5 provides a listing of local streams within Alabama (ADEM 2017) and their designated uses.

Table 3-4. Designations for streams in the vicinity of the project area (Tennessee).

Stream	Use Classification[1]						
	NAV	DOM	IWS	FAL	REC	LWW	IRR
Tennessee River/Pickwick Reservoir	X	X	X	X	X	X	X
Tennessee River Unnamed Tributaries				X	X	X	X
Dry Creek and Tributaries				X	X	X	X
Mill Creek and Tributaries				X	X	X	X
Spout Spring				X	X	X	X

[1] Codes: DOM = Domestic Water Supply; IWS = Industrial Water Supply; FAL = Fish and Aquatic Life; REC = Recreation; LWW = Livestock Watering and Wildlife; IRR = Irrigation, NAV = Navigation

Table 3-5. Designations for streams in the vicinity of the project area (Alabama)

Stream	Use Classification[1]						
	PWS	S	SH	F&W	LWF	A&I	OAW
Tennessee River/Pickwick Reservoir	X	X		X			
Tennessee River Unnamed Tributaries				X			
Hitchcock Branch and Tributaries				X			
Huffman Branch and Tributaries				X			
Shaw Branch and Tributaries				X			
Cedar Fork and Tributaries				X			
Panther Creek and Tributaries				X			
Johnny Creek and Tributaries				X			
Baugh Creek and Tributaries				X			
Beech Branch and Tributaries				X			

[1] Codes: PWS = Public Water Supply; S = Swimming and Other Whole Body Water Contact Sports; SH = Shellfish Harvesting; F&W = Fish and Wildlife; LWF = Limited Warmwater Fishery; A&I = Agricultural and Industrial Water Supply, OAW = Outstanding Alabama Water

3.1.11 Threatened and Endangered Species

3.1.11.1 Vegetation

No state-listed plant species have been previously reported from within a 5-mile vicinity of the project area. No federally listed plants have been documented from Lauderdale County, Alabama, but USFWS lists white fringeless orchid as potentially occurring within the 6,011-acre project area. White fringeless orchid is listed as threatened under the Endangered Species Act (ESA) and is tracked by the state of Alabama as a species of concern. The species occupies acidic seepage wetlands, both in open and forested habitats. An extirpated occurrence of white fringeless orchid has been reported from Tishomingo County, Mississippi, about 4 miles southwest of the project area. No designated critical habitat for plant species occurs within the project area.

Field surveys of the 285-acre TVA-owned parcel did identify two small areas that possess habitat similar to occupied white fringeless orchid sites. A thorough survey of those habitats found other orchid species, but not white fringeless orchid. The species is not present within the 285-acre parcel identified for initial restoration activities but could be present in other portions of the larger project area.

3.1.11.2 Terrestrial Wildlife

Review of the TVA Natural Heritage Project Database in September 2019 indicated that two state or federally listed species were documented within three miles of the project area. The mountain chorus frog was documented in Mississippi and is a state-listed species there, but not in Alabama. One bald eagle nest has been documented within three miles of the project in Tennessee. One state-listed species (southeastern bat) and one federally listed species (gray bat) were captured on site during bat survey efforts (Copperhead 2019; Appendix D). One federally listed terrestrial animal species (Indiana bat) has been reported in Lauderdale County, Alabama, but not within 3 miles of the project area. The USFWS also has determined that the federally listed northern long-eared bat has the potential to occur in Lauderdale County, Alabama.

Table 3-6. Federal and state-listed terrestrial animal species known to or thought to have the potential to occur in Lauderdale County, Alabama, and other species of concern documented within three miles of the project area.[1]

Common Name	Scientific Name	Status[2] Federal	State Rank[3]
Amphibians			
Mountain chorus frog	*Pseudacris brachyphona*	--	-(S3)[4]
Birds			
Bald eagle	*Haliaeetus leucocephalus*	DM	SP(S4B)
Mammals			
Gray bat[5]	*Myotis grisescens*	LE	SP(S2)
Indiana bat[6]	*Myotis sodalis*	LE	SP(S2)
Northern long-eared bat[5]	*Myotis septentrionalis*	LT	SP(S2)
Southeastern bat	*Myotis austroriparius*	--	SP(S2)

[1] Source: TVA Regional Natural Heritage Database and USFWS Information for Planning and Consultation (https://ecos.fws.gov/ipac/), extracted 9/3/2019.
[2] Status Codes: DM = Delisted, recovered, and still being monitored; LE = Listed Endangered; LT = Listed Threatened; SP = State Protected.
[3] Alabama State Ranks: S2 = Imperiled; S3 = Vulnerable; S4 = Apparently Secure; S#B = Rank of breeding population.
[4] This species record occurs in Mississippi where it has a state rank. This species has no state status or ranking in Alabama.
[5] Federally listed species known from Lauderdale County, Alabama but not within three miles of the project area.
[6] Federally listed species that is not yet known from Lauderdale County, Alabama, but is thought to occur here.

Mountain Chorus frogs are found on forested slopes and on hilltops where they hide under objects or underground when not active. While they lay eggs in pools of water at springs, flooded ditches, or ponds, they are often found far from water in non-breeding seasons (Powell et. al 2016; NatureServe 2019). Suitable habitat for this species exists throughout the forest in the project area. Several small springs occur on hillsides that may offer suitable breeding habitat.

Bald eagles are protected under the Bald and Golden Eagle Protection Act (USFWS 2013). This species is associated with larger mature trees capable of supporting its massive nests. These are usually found near larger waterways where the eagles forage (USFWS 2007). While six bald eagle nests are known from Lauderdale County, the closest known nest is found in Hardin County, Tennessee, approximately 0.68 miles from the 285-acre parcel identified for initial restoration activities. This nest has been active since 2011 and was last observed active in early 2019. Foraging habitat for bald eagle exists in Pickwick Reservoir. Suitable nesting trees occur throughout the 285-acre parcel, but no bald eagle nests have been documented.

Southeastern bats roost in caves, buildings, and hollow trees. While caves are preferred roosts, trees are used as roosts when caves are not available. These roost trees are hollow and often over water with triangular basal openings in bottomland hardwood forests (NatureServe 2019). They are often captured near water, over which foraging occurs

(Harvey et al. 2011). Two juvenile southeastern bats were captured during August 2019 bat mist-net surveys of the 285-acre parcel (Copperhead 2019). No other records of this species are known from Lauderdale County. No caves or buildings are known to occur in the 285-acre parcel. The closest cave is approximately 1.3 miles away in Tennessee. Hollow trees near water that are suitable for roosting may occur throughout the forested areas of the 285-acre parcel in ravines and low lying areas near creeks. Foraging habitat and sources of drinking water exist in seeps, creeks, and over Pickwick Reservoir.

Gray bats roost in caves year-round and migrate between summer and winter roosts during spring and fall (Brady et al. 1982, Tuttle 1976a). Bats disperse over bodies of water at dusk where they forage for insects emerging from the surface of the water (Tuttle 1976b). Two post-lactating female gray bats were captured on the 285-acre parcel during mist net surveys in August 2019 (Copperhead 2019). While six hibernacula for gray bats are known in Lauderdale County, the closest known hibernaculum for this species is approximately 9.3 miles away in Mississippi. However, this is a historical winter roosting record as no gray bats have been seen in this mine since the 1960s. The closest known maternity/summer roosting cave is approximately 28.2 miles away. No caves or other gray roosting habitat are known from the 285-acre project area. The closest cave to the 285-acre parcel is approximately 1.3 miles away in Tennessee. It is located within the 6,011-acre project area. No bat species have been reported from this cave. Foraging habitat and sources of drinking water exist in seeps, creeks, and over Pickwick Reservoir.

Indiana bats hibernate in caves in winter and use areas around them for swarming (mating) in the fall and staging in the spring prior to migration to summer habitat. During the summer, Indiana bats roost under the exfoliating bark of dead snags and living trees in mature forests with an open understory and a nearby source of water (Pruitt and TeWinkel 2007, Kurta et al. 2002). Indiana bats form large maternity colonies and are known to change roost trees frequently throughout the season, while still maintaining site fidelity, returning to the same summer roosting areas in subsequent years (Pruitt and TeWinkel 2007). One historical record of Indiana bat is known from Lauderdale County, approximately 58.9 miles away from the project area. Another historical record is known from a mine approximately 9.3 miles away in Mississippi. The closest known extant Indiana bat occurrence is a maternity colony in McNairy County, Tennessee, approximately 13.6 miles away.

The northern long-eared bat predominantly overwinters in large hibernacula such as caves, abandoned mines, and cave-like structures. During the fall and spring it uses entrances of caves and the surrounding forested areas for swarming and staging. In the summer, northern long-eared bats roost individually or in small colonies beneath exfoliating bark or in crevices of both live and dead trees. Roost selection by northern long-eared bat is similar to that of Indiana bat; however northern long-eared bats are thought to be more opportunistic in roost site selection. This species also roosts in abandoned buildings and under bridges. Northern long-eared bats emerge at dusk to forage below the canopy of mature forests on hillsides and roads, and occasionally over forest clearings and along riparian areas (USFWS 2014). The extant record of northern long-eared bats is from a mine approximately 9.3 miles away in Mississippi.

No known caves or suitable winter roosting structures for Indiana bat or northern long-eared bat exist in the 285-acre parcel. Optimal suitable summer roosting habitat occurs throughout the 285 acres in mature live hardwoods (including white oaks and hickories) and snags. Suitable foraging habitat occurs throughout the forest as well as over seeps, creeks, and over the adjacent Pickwick Reservoir. Phase 2 mist net surveys were performed in the

285-acre parcel in August of 2019 and in accordance with the USFWS Range-wide Indiana Bat Survey Guidelines (USFWS 2019). Despite survey efforts that exceeded the guidelines in terms of net nights (28 net nights over 3 calendar nights), no Indiana bats or northern long-eared bats were captured (Copperhead 2019).

3.1.12 Transportation

Public vehicular access within the project area, including the 285-acre parcel identified for initial restoration activities, is limited; many roads are gated and off limits to public use. Those roads open to the public are unpaved and primarily used to access dispersed recreation opportunities within the WMA.

Access to the project area in Alabama is via Lauderdale County Roads 3, 45, and 105. The Alabama Department of Transportation (ALDOT) does not measure Annual Average Daily Traffic (AADT) for these unpaved roads.

As it crosses into Tennessee, Lauderdale County Road 3 becomes McKelvey Hollow Road. This road and Hitchcock Lane provide direct access to the project area in Tennessee. Both are unpaved and connect outside the project areas to Holland Creek Road, a paved road with no center markings which becomes Lauderdale County 14 as it crosses into Alabama. Holland Creek Road had an AADT of 600 in 2018 (TDOT 2020).

The nearest state highway is Alabama State Route (SR) 20, approximately 6 linear miles east-northeast of the project area. SR 20 is a two-lane highway which becomes Tennessee SR 69 when it crosses into Tennessee. AADT in 2018 was 2166 in Alabama (ADOT 2020) and 3,025 in Tennessee (TDOT 2020).

There is a developed boat ramp on Pickwick Reservoir within the project area. It is located on the right descending bank of Pickwick Reservoir at TRM 218.5.

3.1.13 Wetlands

As defined in Section 404 of the CWA, wetlands are those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas. Wetlands and wetland fringe areas can also be found along the edges of many watercourses and impounded waters (both natural and man-made). Wetland habitat provides valuable public benefits including flood storage, erosion control, water quality improvement, wildlife habitat, and recreation opportunities.

The project area is located within the Transition Hills subdivision of the Southeastern Plains Ecoregion. Wetlands are fairly common in the larger ecoregion and are primarily associated with floodplains and poorly drained low-lying areas. Within the Transition Hills region, wetlands are less common, though there are notable small seep and bog areas where the underlying sandstone forces groundwater to the surface (Duncan 2013). Wetlands comprise approximately 10% of land use/land cover in this ecoregion (Sayler et al. 2016).

In the project area, wetlands are present within the floodplains of Huffman Branch, Cedar Fork, Panther Creek, Johnny Creek, Beech Branch, and Dry Creek. Field surveys indicate there are several small seepage wetlands (< 0.01 acres) present within the less disturbed forested areas. These sites are comprised of cinnamon fern, lady fern, netted chain fern,

and royal fern, along with green alder, sedges, small green wood orchid, and Virginia water horehound.

CHAPTER 4 – ENVIRONMENTAL CONSEQUENCES

The anticipated potential effects of implementing the No Action Alternative and the Action Alternative are described below for each resource. The No Action Alternative is analyzed in the EA to establish a baseline for analyzing the environmental impacts of the Proposed Action Alternative in accordance with NEPA regulations.

4.1 Physical Environment

4.1.1 Air Quality

4.1.1.1 Alternative A

Under the No Action Alternative, there would be no changes to the existing air quality conditions and no new impacts on air quality.

4.1.1.2 Alternative B

Air quality impacts would result from prescribed burns, thinning operations, the staging and operation of vehicles used for light grading and earthwork related to silviculture practices, equipment, materials, and workers' personal vehicles. The restoration and shortleaf pine reestablishment activities would vary based on site-specific evaluation of individual parcels, and air emissions would correspondingly vary (i.e., depending on length and intensity of activities).

Transient air pollutant emissions would occur during an approximately six-month time period for the timber sale of the 285-acre parcel. Construction-related air quality impacts would primarily result from the staging of construction vehicles, equipment, and supplies and the operation of construction vehicles and equipment and workers' personal vehicles. Initial activities in the 285-acre parcel would include timber harvesting with the use of a feller buncher, 2 or 3 skidders, a loader, a service truck, and vehicles for the estimated up to 7 workers on site each day. An average of 3 to 5 truck trips per day will be used to transport logs to an existing off-site commercial sawmill. Burn crews or other restoration crews would similarly utilize a variety of vehicles during the course of their work. On average, up to 10 vehicles would be traveling to the 285-acre project area each day. Restoration activities on subsequent parcels within the 6,011-acre project area would require the use of similar types and numbers of vehicles. TVA would encourage the use of proper vehicle maintenance, new emissions control technologies, and fuels along with the minimization of unnecessary heavy duty vehicle idling, and where possible through using newer trucks for long haul off-site transport to help mitigate emissions during activities.

Combustion of gasoline and diesel fuels by internal combustion engines (e.g., vehicles, generators, construction equipment, etc.) would generate local emissions of PM, NO_x, CO, volatile organic compounds, and SO_2. Emissions associated with logging equipment, chainsaws, logging trucks, and skid loaders are expected to result in negligible impacts to air quality because there would be relatively few emissions sources (e.g., trucks, private vehicles) used during construction and use would be temporary. Overall, vehicles associated with restoration activities are not anticipated to contribute to the listing of either county as a non-attainment area under the Clean Air Act.

Prescribed fires produce smoke when wood and other organic materials (fuels) burn. Smoke primarily consists of CO, CO_2, water vapor, hydrocarbons, and other organic chemicals, NO_x, trace minerals, and PM. SO_2 emissions are anticipated to be negligible. Air

quality impacts from prescribed burning would depend on both human factors (e.g., intensity of prescribed burns, control measures) and natural factors such as wind speed and direction.

The planned prescribed burning would increase PM in the air thus reducing atmospheric visibility. It would also reduce air quality by emitting CO and hydrocarbons but would not violate air quality standards. Due to the rural nature of the area, smoke is not anticipated to affect sensitive receptors in the area.

To minimize potential air impacts from prescribed burning, a specific prescribed burn plan would be developed for individual parcels. Proper firing techniques and the timing of the prescribed burn would limit the generation and impacts from smoke. These effects on air quality are expected to be brief, intermittent and confined to the time of the burn. TVA also would plan and coordinate open burning with the local and state air programs and fire control agencies before undertaking any burning activities.

In addition to the air emissions associated with workforce mobilization, the use of mechanical thinning operations would also result in emissions. Equipment operation would produce small increases in emissions from combustion engines and particulates from thinning activities and localized land disturbance. Such emissions, however, are localized, minor, and temporary.

In addition to the air emissions associated with workforce mobilization, broadcast herbicide application methods may incrementally increase air emissions. Such emissions, regardless of application technique, would be localized and temporary. Therefore, impacts to air quality and climate change from herbicide application are minor and temporary.

As restoration begins at each parcel, there would be a temporary, short-term increase in the number of vehicles on public roadways used to access the project area. Once in the project area, these vehicles would often travel on dirt roads. Restoration measures entail the use of either manual or mechanical tools to seed disturbed areas. Such measures entail minor air emissions similar to those described for mechanical thinning operations. Therefore, impacts to air quality from restoration activities are minor and temporary.

Vehicular traffic over paved county roads and unpaved roads within the project area would result in the emission of fugitive dust during active management periods. Particulate matter and fugitive dust also would be emitted from activities that disturb the soil, such as creating/improving roads for equipment access or the chopping of vegetation. Based on analyses conducted at other construction sites, it is expected that the largest fraction (greater than 95 percent by weight) of fugitive dust emissions would be deposited within the project boundaries. To minimize air impacts, TVA requires all contractors to keep equipment properly maintained and to use BMPs to minimize fugitive dust.

Overall, the potential impacts to air quality from Alternative B on local and regional air quality would be temporary, intermittent, and minimal.

Cumulative effects to local and regional air quality would be minor, short-term and adverse, depending on timing and the extent of other emissions from other sources such as automobile or boating emissions that would coincide with prescribed burns, mechanical thinning operations, herbicide spraying, and reestablishment activities.

4.1.2 Climate Change

4.1.2.1 Alternative A

Under the No Action Alternative, no new emissions of GHGs are anticipated and therefore, this alternative would not impact climate change.

4.1.2.2 Alternative B

Airborne emissions from prescribed burns include CO, CO_2, volatile organics (as CH_4), and NO_x (USEPA AP-42, 2020). Ninety percent of the emissions from prescribed burns/forest fires are CO_2 and water vapor (USDA 1976). Additional CO_2 emissions would occur from vehicles and equipment used during prescribed burn operations.

CO_2 emissions also would occur during mechanical thinning operations and reestablishment activities. Mechanical thinning operation-related CO_2 emissions would be primarily related to the combustion of gasoline and diesel fuels by internal combustion engines (e.g., vehicles, chainsaws, construction equipment, etc.).

Reductions in carbon sequestration from individual method application are negligible in the context of the regional setting. Therefore, impacts to climate change from mechanical thinning operations are minor and temporary.

In addition, removal of approximately 285 acres of forest cover would contribute to GHG emissions because when forests are cleared, stored CO_2 may be released into the atmosphere. The tree removal would also reduce the long-term potential of the trees to continue storing CO_2. Over time, additional forested areas would be cleared in the larger 6,011-acre parcel. The total amount of these GHG emissions would be small and would be spread out during the rehabilitation and restoration operations. Over time, as short-leaf pine trees were planted, carbon sequestration would increase in these areas.

The total amount of these GHG emissions would be small and would last for a short time (< 8 months for the 285-acre restoration parcel as well as for parcels in the larger 6,011-acre parcel). These emissions would not adversely affect regional GHG levels with no discernable link or effect to changes in global climate. Therefore, this alternative would not result in noticeable impacts on climate change.

TVA would continue to monitor climatic effects as they occur and continue to update its plans and policies as evidence of changing climate conditions continues to be gathered and as the forecasting capabilities continue to evolve.

4.1.3 Terrestrial Ecology

4.1.3.1 Aquatic Ecology

For both the project area and the 285-acre parcel, prescribed burns would temporarily increase sediment and nutrient loads in streams and as a result could slightly increase pH levels in streams for short periods. However, most prescribed fires in eastern forests are low intensity and low severity and cause minimal changes to forest soil properties, leading to minimal adverse impacts that might exacerbate soil erosion and adversely affect streams. In some cases, prescribed fire has been shown to enhance water quality in the region. Mechanical equipment used during thinning operations, as well as light grading and earthwork, may also temporarily increase sedimentation in streams. Streams would not be affected by herbicide application as they would not be applied near streams; any herbicides applied near stream features would have to be approved for aquatic use and would be used

according to label instructions. Additional parcels slated for future shortleaf pine restoration would be reviewed for site-specific features.

4.1.3.1.1 Alternative A

Under the No Action Alternative, streams within the project area would continue to function but may gradually degrade as they resemble less how the landscape would have been during pre-colonial times when shortleaf pine savannas dominated the landscape.

4.1.3.1.2 Alternative B

Aquatic features in the project area, including the 285-acre parcel, would not be adversely impacted over the long term by shortleaf pine restoration activities, but may experience temporary, indirect adverse impacts as a result of prescribed burning, thinning, and planting operations. Over the long term, there would be beneficial impacts from the improved ecological conditions as each parcel of the project area undergoes restoration activities.

4.1.3.2 Vegetation

4.1.3.2.1 Alternative A

Under the No Action Alternative, the forest within the project area would remain in its current condition and restoration activities would not affect plant life because no project-related work would occur. Changes to local plant communities resulting from natural processes and human-related disturbance would continue to occur, but the changes would not result from the proposed project. All invasive species found in the project area are common throughout the region and implementation of the No Action Alternative would not change this situation.

4.1.3.2.2 Alternative B

Removal of selected trees within individual restoration units would result in short-term disturbance and would temporarily disrupt the plant communities affected, but this negative short-term effect would be offset by the long-term, beneficial impacts of the proposed work. The shortleaf pine ecosystem has lost more than 50 percent of its former acreage in the last 30 years, with most of the decline occurring east of the Mississippi River (Shortleaf Pine Initiative 2019). These fire-adapted communities, which support a rich array of native plants and animal species, are increasingly rare on the landscape and would be lost without a concerted effort from conservation entities. Removal of non-fire adapted species and introducing fire back onto the landscape would have long-term positive benefits and, if implemented across a substantial component of the proposed restoration area, the proposed project would be a regionally significant conservation initiative. Any future restoration units would undergo a site-specific review to ensure proposed actions do not adversely affect plant communities on-site.

Many forest stands within the 285-acre parcel have a relatively small component of invasive terrestrial plants, but other areas have a substantial component of non-native plants. In general, these plants are common in Alabama and Tennessee. Adoption of the Proposed Action Alternative could temporarily promote these non-native species, but the proposed project does plan to assess infestations and control them if necessary. Regardless, the proposed project would not change the abundance of these nuisance species at the county, regional, or state level.

4.1.3.3 Wildlife

4.1.3.3.1 Alternative A

Under the No Action Alternative, soil would remain in its current state and forests would continue to regenerate likely leading to an additional decline in shortleaf pines in the project area. This would not result in a change in wildlife composition as the forest has already been converted to mixed deciduous. Current communities of terrestrial animals and their habitats would not be affected under the No Action Alternative.

4.1.3.3.2 Alternative B

Selective thinning and prescribed burning of the forest would result in the displacement of any wildlife (primarily common, habituated species) currently using the area. Direct effects to some individuals may occur if those individuals are immobile during the time of habitat removal or burning. This could be the case if activities took place during breeding/nesting seasons (e.g., eggs, babies, nestlings). Habitat removal likely would disperse mobile wildlife into surrounding areas in an attempt to find new food sources, shelter sources, and to reestablish territories. Thinning would generally occur on upper slopes and hilltops where remnant shortleaf pines remain. Low intensity prescribed burning would occur in these areas as well. Natural fire breaks would be used to control prescribed burns. It is expected that wetter areas in ravines would cause the fires to die out. Ravines and lower slopes therefore would provide shelter for species displaced by these activities. When and where feasible, the project would attempt to minimize impacts to wildlife by avoiding the proposed activities during summer months when many species are having young. BMPs would also be followed in order to minimize impacts to wildlife, in particular bats, while achieving the goal of shortleaf pine restoration. When and where feasible the project has agreed to avoid thinning and prescribed burning activities in the months of May, June, and July in areas of suitable summer roosting bat habitat. It is during these months that most tree roosting bat species are most sensitive to disturbance due to non-volant pups roosting in trees. See Appendix A for a list of TVA's Forestry BMPs that would minimize short- and long-term adverse impacts on tree-roosting bats.

The proposed action would ultimately convert portions of the 285-acre parcel back to a shortleaf pine relatively open canopy with native grass ground cover. This shift in vegetative habitat would result in a shift in the wildlife community. Wildlife currently using the 285-acre parcel are common to the region. Within the parcel, individuals would be able to seek shelter and potentially reestablish territories in sections of the parcel not impacted by thinning and burning. Across the 6,011-acre project area, habitat for these common wildlife species currently using the mixed deciduous habitat would be reduced. At the same time, a more diverse assemblage of wildlife would be created with the addition of the shortleaf pine community. Species richness and diversity of small mammals and birds would increase. This shift would provide habitat for more specialized small mammals like the golden mouse. This shortleaf pine community would provide habitat for species of sparrows, nuthatches, and warblers that have become less common due to habitat loss. Shortleaf pine habitats maintained with routine fire would continue to provide high-quality foraging habitat for larger mammals such as white-tailed deer (Masters 2007).

Breeding birds that are likely to benefit from this forest conversion effort include Bachman's sparrow, brown headed nuthatch, chipping sparrow, eastern wood-pewee, indigo bunting, northern bobwhite, pine warbler, prairie warbler, red-cockaded woodpecker, and red-headed woodpecker (Masters 2007). The USFWS lists the red-headed woodpecker as a migratory bird species of conservation concern in this region. Other species listed by

USFWS as migratory birds of conservation concern are bald eagle and golden eagle. Suitable habitat for golden eagle would not be impacted by the proposed actions. See Section 4.1.10.2 for an assessment of impacts to bald eagles.

Cumulative effects to the common wildlife community in the 285-acre parcel would be negligible due to the relatively small size of the impacts across the larger landscape where habitat is plentiful. Effects over the entire project area would ultimately benefit wildlife communities by providing a more diverse habitat where terrestrial animal specialists can thrive. Species richness and diversity of small mammals and birds across the larger project area is expected to increase due to the proposed actions. Any future restoration units would undergo a site-specific review to ensure proposed actions do not adversely affect wildlife communities on site.

4.1.4 Cultural Resources

4.1.4.1 Alternative A

Under the No Action Alternative, there would be no effects to historic properties.

4.1.4.2 Alternative B

Under the Proposed Action Alternative, TVA would conduct phased compliance as provided under 36 CFR § 800.4(b)(2) and § 800.5(a)(3). TVA initiated consultation with the Alabama and Tennessee SHPOs in letters dated March 25, 2020, outlining proposed plans for phased compliance. The Alabama SHPO concurred with TVA's plan in a letter dated April 17, 2020; the Tennessee SHPO also concurred with TVA's plan in a letter dated March 26, 2020. Pursuant to 36 CFR § 800.3(f)(2), in letters dated March 26, 2020, TVA also consulted with federally recognized Indian tribes in regard to this plan. TVA received responses from Cherokee Nation and the Chickasaw Nation; neither objected to TVA's plans.

In response to the results of the initial 285-acre Phase I survey, TVA modified the project area so that it excluded the 12 potentially eligible sites, the proposed HHAD, and a 20 meter buffer area surrounding the sites and the proposed district. TVA consulted with the Alabama SHPO office in a letter dated January 23, 2019 regarding the findings of the OAR survey and outlining TVA's plans to modify the project area to exclude the potentially eligible sites, the proposed district, and the 20 meter buffer area. With the revised APE, TVA determined that the proposed undertaking would have no effects to historic properties. In a letter dated February 4, 2019, the Alabama SHPO concurred with TVA's finding of no effect. Pursuant to 36 CFR § 800.3(f)(2), in letters dated January 23, 2019, TVA consulted with federally recognized Indian tribes regarding historic properties within the APE that may be of religious and cultural significance and are eligible for the NRHP. TVA received responses from Cherokee Nation, the Chickasaw Nation, the Muscogee (Creek) Nation, the Shawnee Tribe, and the United Keetoowah Band of Cherokee Indians of Oklahoma. None objected to the project.

If eligible or potentially eligible sites are identified during future surveys, TVA would either exclude the sites from the APE or identify appropriate mitigation measures to address adverse effects. Exclusion measures would be consistent with those outlined for the initial 285 acre timber parcel. Final assessments of site significance and the need for exclusion or mitigation would be determined during consultation with SHPOs, federally recognized tribes and other interested parties.

4.1.5 Floodplains

As a federal agency, TVA adheres to the requirements of EO 11988, Floodplain Management. The objective of EO 11988 is "…to avoid to the extent possible the long- and short-term adverse impacts associated with the occupancy and modification of floodplains and to avoid direct and indirect support of floodplain development wherever there is a practicable alternative" (EO 11988, Floodplain Management). The EO is not intended to prohibit floodplain development in all cases, but rather to create a consistent government policy against such development under most circumstances (U.S. Water Resources Council 1978). The EO requires that agencies avoid the 100-year floodplain unless there is no practicable alternative.

4.1.5.1 Alternative A

Under the No Action Alternative, there would be no new impacts to floodplains and their natural and beneficial values because there would be no changes to the local floodplains.

4.1.5.2 Alternative B

Restoration of the 6,011-acre project area would include reestablishment activities that could occur anywhere from the downstream boundary of the project area at TRM 211.0 to the upstream boundary of the project area at TRM 224.8 and would consist of some combination of prescribed burns, application of herbicides, light grading and earthwork, thinning of trees, and construction of access roads. Prescribed burns, application of herbicides, and thinning of trees would result in no impacts to floodplains, which would be consistent with EO 11988.

Light grading and earthwork, as well as construction of access roads, could potentially be located within 100-year floodplains. Light grading and earthwork could be done to support the growth of shortleaf pine trees, which would be considered an agricultural use of the floodplain. Light grading and earthwork could also be done to support construction of access roads. Consistent with EO 11988, agriculture and roads are considered to be repetitive actions in the 100-year floodplain that should result in minor impacts (TVA 1981). To minimize adverse impacts, any road construction or improvements in the non-floodway portion of the floodplain (floodway fringe) would be done in such a manner that upstream flood elevations would not be increased by more than 1.0 foot.

Net fill below the 500-year flood elevation, resulting from restoration and reestablishment activities or construction of access roads, or both, would result in lost flood storage and potentially lost power storage within Pickwick Reservoir. When individual projects are proposed, TVA would consider potential loss of flood and power storage at that time.

Hardin County, Tennessee, participates in the National Flood Insurance Program (NFIP) and any development must be consistent with its floodplain ordinance. As shown in Figure 3-1, the western edge of the 1,363-acre parcel in Hardin County, Tennessee intersects the Tennessee River floodway. To prevent an obstruction in the floodway resulting from road construction: (1) any fill, gravel or other modifications in the floodway that extend above the pre-construction grade would be removed after completion of the project; (2) this excess material would be spoiled outside of the published floodway; and (3) the area would be returned to its pre-construction condition. By preventing an obstruction in the floodway, the project would comply with the NFIP and therefore be consistent with EO 11988.

Work would begin in the 285-acre parcel identified for initial restoration activities. As discussed for the project area above, light grading and earthwork, as well as construction of

access roads, could potentially be located within 100-year floodplains. Light grading and earthwork would support the growth of shortleaf pine trees, which would be considered an agricultural use of the floodplain, or it would support construction of access roads. Consistent with EO 11988, agriculture and roads are considered to be repetitive actions in the 100-year floodplain that should result in minor impacts (TVA 1981). To minimize adverse impacts, any road construction or improvements in the floodplain would be done in such a manner that upstream flood elevations would not be increased by more than 1.0 foot.

Detailed plans for restoration activities, including grading, earthwork, and access roads have not been developed at this time. However, Flood Risk would review plans when they are available for potential loss of flood and power storage.

By adhering to the mitigation measures outlined in Section 2.4, the proposed project, including restoration and reestablishment activities in the 6,011-acre project area and the 285-acre parcel in the Lauderdale WMA, would have no significant impact on the natural and beneficial values of floodplains.

4.1.6 Managed and Natural Areas

4.1.6.1 Alternative A

Under the No Action Alternative, there would be no changes to current conditions and trends at nearby natural areas and therefore no effects upon natural areas.

4.1.6.2 Alternative B

While overall impacts to natural areas would be beneficial, there would be short-term, site-specific direct impacts, including erosion, sedimentation, and alteration of existing plant communities. The use of standard BMPs would minimize erosion and associated sedimentation to an insignificant level. Overall, changes in existing plant communities would alter wildlife habitat, allowing regeneration of native ecological communities and resulting in long-term beneficial impacts to managed and natural areas.

With the exception of Lauderdale WMA, all of the natural areas listed in Table 3-3 are located a sufficient distance away such that direct, indirect, and cumulative impacts to natural areas are not expected.

4.1.7 Parks and Recreation

4.1.7.1 Alternative A

Under the No Action Alternative, there would be no change in public use of the boat launching ramp or dispersed recreation activities within the project area.

4.1.7.2 Alternative B

Restoration activities could cause temporary shifts in dispersed outdoor recreational activities to other lands located adjacent to this parcel. However, the overall short-term impact should be minor because work will occur in one parcel at a time. Over the long term, restoration activities should result in enhanced opportunities for some dispersed recreation activities such as nature observation and hunting. These impacts would occur as restoration in each parcel in the project area is completed.

Because other developed recreation areas in the general vicinity are located a minimum of 1 mile away from the project area and are across the reservoir, no measurable project-related impacts on these recreation areas are expected.

4.1.8 Public Health and Safety

4.1.8.1 Alternative A

Under the No Action Alternative, there would be no changes in public health and safety risks in the project area.

4.1.8.2 Alternative B

Possible human and environmental health hazards associated with implementing the proposed action include smoke inhalation during prescribed burning, herbicide exposure during application, injury during mechanical thinning and silvicultural practices, as well as public road safety risks. TVA requires contractors to have site-specific health and safety plans before working on TVA properties.

Prescribed burns are generally cool, low-intensity burns that minimize risks to life and property (Haikerwal et al. 2015). Risks associated with this activity during implementation of the proposed action are primarily in the form of wildfire smoke and particulate inhalation. Particulate matter (PM) is considered one of the six criteria pollutants by the 2012 NAAQS regulated under the CAA and implemented by the EPA. Fine particulates can cause human health effects such as burning eyes, scratchy throat, headaches, and irregular heartbeats; worsen illnesses associated with the heart and lungs such as asthma, chronic obstructive pulmonary disease, and heart disease resulting in heart attacks, decreased lung function, and potentially premature deaths (USEPA 2020b). Prescribed burning would be conducted primarily by state personnel (i.e., ADCNR) with possible assistance from TVA and partners such as state forestry commission employees and trained and certified non-governmental organization employees. Any personnel involved with the prescribed burn would be trained to their agency standards. Additionally, a burn plan will be issued by state personnel which would detail health and safety regulations for the fire crew and appropriate burn conditions to minimize risks for public health and safety. Public burn notices would be issued per federal, state, and local regulations. As a result, adverse impacts would be minor.

Herbicide use in the US is controlled under the Federal Insecticide, Fungicide, and Rodenticide Act which is regulated under the EPA. Herbicides undergo human and environmental risk assessments which can determine whether or not herbicides, and their associated chemicals, can be placed on the US market. While all pesticides are considered toxic at least to some degree, the risks to humans and the environment are largely dependent on the toxicity of the chemicals used as well as the degree of exposure to the pesticide. Persons and animals with certain health sensitivities (i.e., children, pregnant, and elderly persons) may be at additional risk. Potential methods for forest management that use herbicides include, but are not limited to, hack and squirt, stem injection, cut stump, basal bark spraying, foliar spraying, and basal soil spraying. Herbicide work would be performed by state personnel or by a contractor following the manufacturer's label instructions under the supervision of a licensed applicator. Herbicide use is only anticipated to be used to control non-native invasive species. Areas that have been treated using herbicides may be designated with signage to inform employees and the public when it is safe to enter again. If the need arises to burn herbicide designated areas, burning would take place following the label(s) instructions to minimize the potential for harmful vapors.

The potential for off-site consequences and emergency response planning are coordinated with local emergency management agencies. Access to any parcel where restoration activities are occurring will be limited to the public for their safety due to the nature of the work being performed. There is potential that logging trucks and other vehicles and machinery using public roads to access the site may track dirt, debris, mud, and other natural earth materials onto paved public roads which could have a temporary, localized, and minor adverse impact on road safety.

4.1.9 Noise

4.1.9.1 Alternative A

Under the No Action Alternative, there would be no changes in noise levels in the project area and no adverse impacts on sensitive receptors.

4.1.9.2 Alternative B

Sources of noise during implementation of the proposed action would include mechanical thinning activities and vehicle transportation. The project area and surrounding properties are rural, with scattered residences along nearby county roads. Noise during mechanical thinning (e.g., from chainsaws, feller bunchers, and other logging equipment) would be temporary, as crews will conduct these activities in phases throughout the project area, starting with the 285-acre parcel. Thinning would occur during workdays in daylight hours and would occur on TVA-owned lands, including the WMA. Adverse impacts on nearby residents would be temporary and intermittent. Because of the distance between the activities and residences, impacts would be minor in intensity. There would also be a temporary increase in vehicle travel on local roads, including personal vehicles for workers and trucks transporting logged materials to offsite commercial sawmills. This would be up to an estimated 15 additional trips each workday while each portion of the project area undergoes restoration activities (assuming 10 personal vehicles and up to 5 logging truck trips per day, each way). Because of the relatively small increase in vehicle travel, noise impacts would be minor.

4.1.10 Surface Water and Soil Erosion

4.1.10.1 Alternative A

The No Action Alternative would minimize any direct or indirect impacts from forestry management on these lands, but it also has the potential to be detrimental to streams by not preserving and providing rehabilitation of the native shortleaf pine ecosystem.

4.1.10.2 Alternative B

4.1.10.2.1 Surface Runoff

Forestry activities have the potential to temporarily affect surface water via storm water runoff. Soil erosion and sedimentation can clog small streams and threaten aquatic life. TVA would comply with all appropriate state and federal permit requirements. Appropriate BMPs would be followed, and all proposed project activities would be conducted in a manner to ensure that any spills or leaks are contained, and the introduction of contaminants to the receiving waters would be minimized. In both Tennessee and Alabama, silvicultural activities that are considered nonpoint source do not require NPDES permits, however guidelines, including the use of BMP for these activities, do need to be followed. Additionally, in Tennessee an ARAP/ 401 Water Quality Certifications and 404 USACE would be required for stream crossings and other activities that would involve point source discharges of dredged or fill into Waters of the US or Waters of the State. In Alabama, work that takes place in the above mentioned waters may require a 404 USACE

nationwide/individual permit and a 401 Water Quality Certifications from ADEM. Exemptions of these permitting requirements may apply, but would need to be determined.

Additional resources for BMPs are described in the Guide to Forestry, Best Management Practices in Tennessee (TDADOF 2003) and Alabama's Best Management Practices for Forestry (AFC 2007). These resources would be used to avoid contamination of surface water in the project area. Proper implementation of controls would be expected to result in only minor, temporary adverse impacts to surface waters.

4.1.10.2.2 Site Preparation and Planting

Site preparation is used to control competing vegetation associated with forest stand regeneration. Many site preparation techniques expose soil and can cause soil erosion. The site preparation technique used depends on soils, slope, condition of the site, natural vegetation, tree species, and cost. Prescribed burns would potentially be used as a part of these site preparation and maintenance. Prescribed burns are meant to consume portions of the underbrush without altering the soil. When conducted properly, only potential minimal increases in erosion control would be expected. Hot fires or those on steep slopes have a greater potential to significantly increase erosion (TDADOF 2003).

4.1.10.2.3 Chemical controls

Improper use of herbicides to control vegetation could result in runoff to streams and subsequent aquatic impacts. Therefore any pesticide/herbicide use as part of site preparation or maintenance activities would have to comply with the appropriate silvicultural activity guidelines. In areas requiring chemical treatment, only USEPA-registered and TVA approved herbicides would be used in accordance with label directions designed in part to restrict applications near receiving waters and to prevent unacceptable aquatic impacts. Proper implementation and application of these products would be expected to have no significant impacts to surface waters.

4.1.10.2.4 Equipment Washing and Dust Control

Equipment washing and dust control discharges would be handled in accordance with BMPs described in the State Forestry BMP Manuals.

Both direct and indirect impacts to surface water resources would be expected with these restoration activities including providing access, site preparation, planting, thinning and general maintenance activities on the sites. However, with the proper implementation of BMPs and good housekeeping practices, impacts would be expected to result in only minor, temporary impacts to surface waters.

4.1.11 Threatened and Endangered Species

4.1.11.1 Vegetation

4.1.11.1.1 Alternative A

Under the No Action Alternative, there would be no project-related impacts on federally listed plants, designated critical habitat, or state-listed plants species. No federally listed plants, designated critical habitat, or state-listed plants are known to occur in the project area. Changes to local plant communities resulting from natural ecological processes and human-related disturbance would continue to occur, but the changes would be unrelated to adoption of the No Action Alternative.

4.1.11.1.2 Alternative B

No impacts are anticipated to state or federally listed plants because those resources do not occur on the initial 285-acre restoration parcel. Designated critical habitat for federally listed plants does not occur on the wider restoration area either and would not be affected even if restoration efforts are implemented on a wider scale at some future time. State-listed plants and the federally listed white fringeless orchid could be present on other parts of the restoration area that have not yet been surveyed in the field. Field surveys for listed species would be conducted on any future restoration unit before work begins. This would ensure that TVA does not significantly affect state or federally listed species. If future field surveys did identify federally listed plants within a proposed restoration unit, TVA would consult with the USFWS as required by Section 7(a)(2) of the ESA.

Several measures would minimize adverse impacts on federally listed bats over the short and long term. The cave within the 6,011-acre project area would be surveyed prior to beginning restoration activities on the parcel in which it is located and appropriate BMPs may be applied to restoration activities in that parcel. Implementation of TVA's Forestry BMPs in Appendix A would likewise minimize impacts by establishing practices for retaining certain live trees and snags and implementing seasonal activities to avoid adverse impacts during bats' growing season and dormant season.

4.1.11.2 Wildlife

4.1.11.2.1 Alternative A

Under the No Action Alternative, soil would remain in its current state and forests would continue to regenerate likely leading to an additional decline in shortleaf pines in the project area. This would not result in a change in the existing wildlife composition as the forest has already been largely converted from shortleaf pine to other types of forest. Threatened and Endangered terrestrial animals and their habitats would not be affected under the No Action Alternative.

4.1.11.2.2 Alternative B

Six species were addressed in this review based on records within three miles of the 285-acre parcel or the potential for the species to occur in the larger project area. All of these species have the potential to utilize the project area. No bald eagle nests would be impacted by the proposed actions, as the closest extant nest is approximately 0.68 miles away. Proposed actions are greater than 660 feet from the nest which adheres to the National Bald Eagle Management Guidelines. Following the proposed actions, ample nesting trees would still be present in the project area. BMPs would be used to avoid or minimize impacts (e.g., sedimentation) in Pickwick Reservoir used by bald eagles for foraging. Conservation measures and forestry BMPs would minimize the potential for smoke created by prescribed burning to impact the nest. Bald eagles would not be significantly impacted by proposed actions.

While no records of mountain chorus frogs are known from Lauderdale County, Alabama, habitat is present for this species throughout the project area on forested hillsides and at small seepages scatted throughout the site. The range of this species also includes the project area; therefore they do have the potential to occur here and be impacted by proposed actions. Suitable forested hillsides occur throughout the 285-acre parcel while seepages identified during field surveys generally occurred mid-way down forested slopes. Proposed thinning operations would be concentrated towards hilltops where remnant shortleaf pines remain. While prescribed burns would also be directed at these hilltops, they

do have the potential to spread further downhill to natural firebreaks (wet areas). Direct effects to some individuals may occur. Mobile individuals would attempt to flee the area if disturbed, however this small frog would not always be able to travel far enough at a fast enough pace to outrun logging operations or prescribed burns. Thinning operations are not anticipated in seepage areas because shortleaf pines do not occur here, and thinning is less likely to occur further down slope. Prescribed burns would not remove seepages from the landscape either; therefore breeding habitat would be maintained. Following the proposed actions, hilltops and areas targeted for restoration would no longer provide potential habitat for mountain chorus frogs. However ample suitable habitat would remain on hillsides and in ravines/drainages. Habitat removal likely would disperse mobile individuals into surrounding areas in an attempt to find new food sources, shelter sources, and to reestablish territories. Due to the lack of known records of this species in the 285-acre parcel, targeted locations of proposed thinning/burning actions on the landscape thereby avoiding breeding habitat and much of the suitable upland habitat, and the abundance of similarly suitable habitat adjacent to proposed actions, proposed actions are not expected to significantly impact populations of mountain chorus frog.

No caves or other hibernacula for gray bat, Indiana bat, northern long-eared bat, or southeastern bat exist in the 285-acre parcel or would be impacted by the proposed actions. Suitable summer roosting habitat for Indiana bat, northern long-eared bat, and southeastern bat occurs throughout the 285-acre parcel in trees with suitable roosting characteristics near water sources. Creeks, seeps, and the adjacent Pickwick Reservoir offer foraging habitat and sources of drinking water for all four bat species within and adjacent to the project area.

Surveys performed in accordance with the USFWS 2019 Range-Wide Indiana Bat Survey Guidelines captured gray bat and southeastern bat but no Indiana bat or northern long-eared bat. Captures of reproductive adult and juvenile gray bats and southeastern bats suggest breeding populations of these species may occur on or adjacent to the 285-acre parcel. However, no caves are known to occur on the 285-acre parcel and gray bats are known to travel long distances to forage. Therefore, it is likely that gray bats are only using the 285-acre parcel for foraging. Foraging distances of southeastern bats are not well studied. Roost trees for this species often occur in low, wet areas along creeks where no thinning is proposed and where prescribed burns would burn out. Although possible, direct impacts to southeastern bats roosting in trees is less likely due the distance from proposed actions and likely roosts.

A number of activities associated with the proposed project were addressed in TVA's programmatic consultation with the USFWS on routine actions and federally listed bats in accordance with ESA Section 7(a)(2) and completed in April 2018. For those activities with potential to affect bats, TVA committed to implementing specific conservation measures. These activities and associated conservation measures are identified on page 5 of the TVA Bat Strategy Project Screening Form (Appendix B) for the initial 285-acre parcel. For each subsequent parcel within the 6,011- acre project area, TVA would complete a separate Bat Strategy Project Screening Form prior to initiating restoration activities and follow the conservation measures identifies in the Form. In addition, the forestry BMPs in Appendix A would be followed during restoration activities across the 6,011-acre project area. As a part of these BMPs, the project has agreed to avoid thinning and prescribed burning activities in areas of potentially suitable habitat for federally listed bats in the months of May, June, and July when and where feasible across the project area. It is during this time that most tree roosting bat species are most sensitive due to non-volant pups roosting in trees. Due to the

use of BMPs, application of identified conservation measures, negative survey results for Indiana and northern long-eared bat, lack of known roosting habitat for gray bat, and likely avoidance of roost trees for southeastern bat, TVA has determined that proposed actions are not likely to significantly impact gray bat, Indiana bat, northern long-eared bat, or southeastern bat.

4.1.12 Transportation

4.1.12.1 Alternative A

Under the No Action Alternative, there would be no project-related changes to the transportation network or traffic in the project area or 285-acre parcel identified for initial restoration activities.

4.1.12.2 Alternative B

An increase in vehicular traffic in the project area is anticipated as the proposed action is implemented, beginning in the 285-acre parcel identified for initial restoration activities. Initial activities would include timber harvesting with the use of a feller buncher, 2 or 3 skidders, a loader, a service truck, and vehicles for the estimated up to 7 workers on site each day. An average of 3 to 5 truck trips per day will be used to transport logs to an existing off-site commercial sawmill. Burn crews or other restoration crews would similarly utilize a variety of vehicles during the course of their work. On average, up to 10 vehicles would be traveling to the 285-acre parcel each day. Restoration activities on subsequent parcels within the 6,011-acre project area would require the use of similar types and numbers of vehicles. As restoration begins at each parcel, there would be a temporary, short-term increase in the number of vehicles on public roadways used to access the project area. Once in the project area, these vehicles would often travel on dirt roads that are closed to the public and therefore would not adversely impact transportation and associated access within the WMA. Because the number of vehicles would be relatively small compared to AADT levels on nearby county and state roads, impacts would be minor. Impacts across the project area as restoration activities are conducted on other parcels would be of similar intensity and duration because the activities and number and type of vehicles used would be similar to those in the 285-acre parcel.

4.1.13 Wetlands

4.1.13.1 Alternative A

Under the No Action Alternative, wetland alterations resulting from natural processes and anthropogenic disturbances would continue to occur, but the changes would not result from the proposed project.

4.1.13.2 Alternative B

Small seepage wetlands are present within the 285-acre parcel identified for initial restoration activities; these areas will be avoided by burn activities and therefore see no impacts. For subsequent phases of the project, TVA would conduct site-specific field surveys to identify wetlands. These areas would be avoided, as wetland habitats are not target areas for shortleaf pine restoration. Direct wetland impacts associated with vegetation removal and placement of fill would not occur. Indirect wetland impacts related to sedimentation from upslope activities would be minimized to an insignificant level via the use of standard BMPs.

4.2 Cumulative Impacts

CEQ regulations for implementing the procedural provisions of NEPA, as amended (42 USC § 321 et seq.), define cumulative impact as "…the impact on the environment which

results from the incremental impact of the action when added to other past, present and reasonably foreseeable future actions regardless of what agency (federal or nonfederal) or person undertakes such other actions" (40 CFR § 1508.7). TVA evaluated a range of environmental resource issues for inclusion in the cumulative effects analysis. Cumulative impacts are an important part of the environmental analysis because they allow decision makers to evaluate not only the impacts of an individual proposed project but the overall impacts on a specific resource, ecosystem, or human community over time from several different projects.

4.2.1 Geographic Area of Analysis

The geographic area over which past, present, and future actions could reasonably contribute to cumulative effects is variable and dependent on the resource evaluated. Based upon the defined list of resources potentially affected by cumulative effects, the lands and water resources within a 5-mile radius of the 6,011-acre project area were considered appropriate for consideration in this analysis. The only exception is for transportation, which uses a geographic area of analysis comprised of the road network within 15 linear miles of the project area; this area accounts for the need for transporting logged material off-site.

4.2.2 Identification of 'Other Actions'

TVA is not aware of any other projects occurring in the vicinity of the project area with the potential to contribute to cumulative impacts. There are no other actions proposed that would result in additional direct or cumulative impacts when combined with the Proposed Action Alternative.

4.2.3 Analysis of Cumulative Effects

To address cumulative impacts, the existing affected environment surrounding the project area was considered in conjunction with the environmental impacts presented in Chapter 4. There would be no cumulative impacts on resources for which no direct or indirect impacts were identified in Chapter 4, including aquatic ecology, wildlife, cultural resources, floodplains, soil erosion and surface water, and threatened and endangered plant species.

As described in the Chapter 4 analysis, the proposed shortleaf pine restoration project would not substantially impact terrestrial wildlife or threatened and endangered wildlife with the implementation of BMPs and conservation measures.

The project would result in some beneficial impacts on vegetation once restoration is complete by the proposed removal of non-fire adapted species and introducing fire back onto the landscape, and, if implemented across a substantial component of the proposed restoration area, the proposed project would be a regionally significant conservation initiative. The project would result in some beneficial impacts on wildlife and managed and natural areas by providing a more diverse habitat where terrestrial animal species can thrive and regional habitat improvement. The project would result in some beneficial impacts on recreation activities by enhanced opportunities for some dispersed recreation activities such as nature observation and hunting. There would be temporary, minor, adverse cumulative impacts on transportation, particularly during logging activities when logged materials would be trucked to existing commercial sawmills. Wetland impacts on wetlands would be limited and temporary in nature, due to implementation of BMPs and compliance measures. No cumulative air quality impacts are expected because of the short intermittent duration of the prescribed burns, mechanical thinning, and reestablishment

activities and the limited emissions from other sources such as automobile or boating in the area.

4.3 Unavoidable Adverse Environmental Impacts

Unavoidable adverse effects on air quality and the local sound environment would result from temporary operation of the proposed project. Operational effects on air quality and the sound environment would result from employee traffic, logging materials transportation, and similar activity including incidental operational noise from equipment and machinery. No adverse effects to other resources evaluated in this assessment are anticipated

4.4 Relationship of Short-Term Uses and Long-Term Productivity

This EA analyzes the potential environmental effects of the shortleaf pine restoration activities. The shortleaf pine restoration activities would include a mix of restoration activities such as prescribed burns to remove fire intolerant species, herbicide applications to remove undesirable species, light grading and earth work, and/or other silviculture practices. These activities will occur in phases throughout the 6,011-acre project area, beginning with the 285-acre parcel that has been identified for initial restoration activities.

Short-term use of the environment to achieve the results of the proposed project requires use of land and construction materials, use of existing roadways, and correlative, but temporary, increases in emissions from operations and materials transportation vehicles, as well as increased noise and vibration from operation-related activity. Most operational effects can be mitigated through various BMPs including practices which reduce noise and air quality effects.

The shortleaf pine restoration would use land designated for industrial use located within the Lauderdale WMA. The project location is an undeveloped area consistent with the surrounding landscape. Restoration activities would not significantly alter the landscape from forested, rather an alteration of species composition as discussed in Chapters 3 and 4. Consequently, effects on vegetation may be considered permanent. In order to achieve desired conditions, operational effects would be short-term.

There would be a temporary increase in local revenue generation from temporary logging operation jobs.

The long-term productivity of existing surrounding forests and waterways is expected to continue including unimpeded habitat utilization by resident and migratory species. No increases to species mortality are expected nor will there be a loss of wetlands or other Waters of the US as a result of the proposed action.

4.5 Irreversible and Irretrievable Commitments of Resources

A commitment of a resource is considered to be ‘irreversible’ when the primary or secondary effects from its use limit future options for its use. An ‘irretrievable’ commitment refers to the use or consumption of a resource that is neither renewable nor recoverable for use by future generations.

The operations involved in the shortleaf pine restoration would require the consumption of diesel and other fuels, natural vegetation, as well as chemicals, if needed, for herbicide treatment.

CHAPTER 5 – LIST OF PREPARERS

5.1 NEPA Project Management

Name:	**J. Taylor Cates**
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Project Role:	TVA NEPA Project Manager
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Name:	**Drew Vankat (Copperhead Environmental Consulting, Inc.)**
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Project Role:	Project Manager, NEPA Coordinator, Transportation
Experience:	13 years in NEPA compliance and environmental planning.

5.2 Other Contributors

Name	**Mike Angst**
Education:	M.A., Anthropology
Project Role:	Archaeologist
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Name	**Adam Datillo**
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Name:	**Elizabeth B. Hamrick**
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Name	**Robert Marker**
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Name:	**Carrie Williamson, P.E., CFM**
Education:	M.S., Civil Engineering; B.S., Civil Engineering; Professional Engineer, Certified Floodplain Manager
Project Role:	Floodplains and Flood Risk
Experience:	7 years in Floodplains and Flood Risk; 3 years in River Forecasting; 11 years in Compliance Monitoring

Name:	**Kim Pilarski-Hall**
Education:	M.S., Geography, Minor Ecology
Project Role:	Natural Areas and Wetlands
Experience:	21 years in Wetlands Assessment and Delineation

Name:	**Kelsie Eshler (Copperhead Environmental Consulting, Inc.)**
Education:	B.A., Environmental Earth Science
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Name:	**Marty Marchaterre (Copperhead Environmental Consulting, Inc.)**
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Name	**Piper Roby (Copperhead Environmental Consulting, Inc.)**
Education:	B.A., Biology; M.S., Biology; PhD, Animal Sciences
Project Role:	Technical Editing
Experience:	19 years of experience with ecological reporting and editing.

CHAPTER 6 – ENVIRONMENTAL ASSESSMENT RECIPIENTS

6.1 Federal Agencies

Environmental Protection Agency

U.S. Fish and Wildlife Service

U.S. Army Corps of Engineers

USDA, Natural Resources Conservation Service

6.2 Federally Recognized Tribes

Absentee Shawnee Tribe of Indians of Oklahoma

Alabama-Coushatta Tribe of Texas

Alabama Quassarte Tribal Town

Cherokee Nation

The Chickasaw Nation

Eastern Band of Cherokee Indians

Eastern Shawnee Tribe of Oklahoma

Jena Band of Choctaw Indians

Kialegee Tribal Town

The Muscogee (Creek) Nation

Poarch Band of Creek Indians

The Seminole Nation of Oklahoma

Shawnee Tribe

Thlopthlocco Tribal Town

United Keetoowah Band of Cherokee Indians in Oklahoma

6.3 State Agencies

Tennessee Department of Agriculture

Tennessee Department of Environment and Conservation

Tennessee Department of Transportation

Tennessee Historical Commission

Tennessee Forestry Commission

Tennessee Wildlife Resources Agency

Alabama Department of Natural Resources and Conservation

Alabama Department of Environmental Management

Alabama Forestry Commission

Alabama Historical Commission

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Appendix A – TVA Forestry Best Management Practices for Lauderdale WMA

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TVA - Forestry Best Management Practices
Lauderdale Wildlife Management Area

Timber Harvest

- Retain at least 16 live trees > 9" diameter at breast height (DBH) per acre (with at least 6 trees/acre of the largest available trees of species favored by roosting bats). Trees targeted would be exceptionally high-quality potential roost trees (e.g., large snags or large-diameter live trees with lots of exfoliating bark, trees with cavities, basal openings, or hollowing of the bole).
- Retain all snags standing that are greater than 3 inches in DBH. Exceptions may be made where human safety or property may be jeopardized.
- Retain live leave-tree groups (reserve islands) around high-quality roosting snags to provide partial shade during summer and to protect them from windthrow and being accidently knocked down during harvest operations.
- Within mature forests, maintain or encourage a diversity of composition and structure (e.g., variable overstory basal area and midstory densities).
- In areas with continuous canopy cover, maintain a small (<2 hectare (ha)) forest opening with abundant snags.
- Protect and maintain forest cover and snags in riparian areas. Maintain continuous canopy cover over water sources.
- During harvest, timber harvest crews will avoid damaging marked retained trees/snags. Crews will avoid felling harvested trees toward these potential roost trees. They will also avoid skidding harvested trees within 25 feet of these potential roost trees. It will be emphasized that even minimal contact between harvested trees and marked roost trees could remove bark from a tree, which would be considered "damage".
- Snags may be removed for safety reasons (snag near road, etc.), if snag is less than 10 inches in diameter OR snag is removed outside of pupping season (May 1 – July 15).
- Snags > 10 inches in diameter may not be removed during non-volant/pupping season unless approved by ADCNR or TVA.

Prescribed Fire

Growing Season/Pup season

- Unless ecological or silvicultural objectives require growing-season burns, conduct prescribed burns during the dormant season. Avoid burning during the pupping season (May 1st - July 31st), when feasible.
- If fire during the non-volant/pupping season (May 1st - July 15th) is required, then choose weather conditions and ignition techniques that reduce fire intensity and transfer heat across the stand instead of vertically. This dissipates heat before it reaches mean bat roosting height of 30 feet (e.g. avoid low humidity burn days and days with light winds. Also, try to stay with backing fires to keep intensity low).
- Before implementing a prescribed burn during the non-volant/pupping season (May 1st - July 15th) rake or use a leaf blower around the base of all snags suitable for

use by listed bats as maternity roosts (diameter of 10 inches or greater with loose bark) within the treatment area. Removing debris around the base of the snag to expose bare soil will extend the life of the snag by decreasing the chance it will burn.

- During spring and fall when bats are roosting in trees, try to minimize use of intense burns when temperatures are <10 °C (50 °F) or when winds <8 kph (5 mph). Conduct spring and fall burns during afternoons when ambient temperatures are greatest. During warmer temperatures, bats roosting in trees are more likely to be awake and able to escape faster if disturbed.

Dormant Season

- Some bat species are known to roost and hibernate in leaf litter. To avoid adverse effects to these species, dormant-season burns should occur on clear days when ambient temperatures are > 40ºF and, when the previous night's temperatures fall below freezing. Ideally, fires should be ignited in late morning to afternoon. These actions allow litter to warm and increase the chances of escape by litter-hibernating species.

Fire Breaks

- During fire break/fuel break construction, build breaks so that any suitable large snags (> 10 inches with loose bark) within the fire lane footprint are left outside the treatment area (Plow around toward the inside of the treatment area). This will allow them to remain standing without becoming a future fire jump hazard during prescribed burning.
- Where practical, remove hazard trees and construct fire-lines during winter to reduce chances of removing occupied roost trees or disturbing maternity colonies.

References

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Appendix B – TVA Bat Strategy Project Screening Form

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Project Review Form - TVA Bat Strategy *(06/2019)*

*This form should **only** be completed if project includes activities in Tables 2 or 3 (STEP 2 below). This form is not required if project activities are limited to Table 1 (STEP 2) or otherwise determined to have no effect on federally listed bats. If so, include the following statement in your environmental compliance document (e.g., add as a comment in the project CEC): "Project activities limited to Bat Strategy Table 1 or otherwise determined to have no effect on federally listed bats. Bat Strategy Project Review Form NOT required." This form is to assist in determining required conservation measures per TVA's ESA Section 7 programmatic consultation for routine actions and federally listed bats.*[1]

Project Name: Shortleaf Pine Initiative - Lauderdale County AL - Project No. 415949 **Date:** 7/16/2018

Contact(s): Josh Burnette **CEC#:** **Project ID:** 415949

Project Location (City, County, State): Lauderdale County AL

Project Description:

TVA proposes to support the reestablishment and restoration of Shortleaf pine habitats on 6,011 acres of TVA lands, including 4,648 acres within the Lauderdale Wildlife Management Area (WMA). This review includes a site-specific review of a 285-acre parcel within the WMA. Tree felling/thinning and prescribed burning would occur in targeted areas to promote Shortleaf growth.

SECTION 1: PROJECT INFORMATION - ACTION AND ACTIVITIES

STEP 1) Select TVA Action. If none are applicable, contact environmental support staff, Environmental Project Lead, or Terrestrial Zoologist to discuss whether form (i.e., application of Bat Programmatic Consultation) is appropriate for project:

- [x] 1 Manage Biological Resources for Biodiversity and Public Use on TVA Reservoir Lands
- [ ] 2 Protect Cultural Resources on TVA-Retained Land
- [ ] 3 Manage Land Use and Disposal of TVA-Retained Land
- [ ] 4 Manage Permitting under Section 26a of the TVA Act
- [ ] 5 Operate, Maintain, Retire, Expand, Construct Power Plants
- [ ] 6 Maintain Existing Electric Transmission Assets
- [ ] 7 Convey Property associated with Electric Transmission
- [ ] 8 Expand or Construct New Electric Transmission Assets
- [ ] 9 Promote Economic Development
- [ ] 10 Promote Mid-Scale Solar Generation

STEP 2) Select all activities from Tables 1, 2, and 3 below that are included in the proposed project.

TABLE 1. Activities with no effect to bats. Conservation measures & completion of bat strategy project review form NOT required.

[x] 1. Loans and/or grant awards	[ ] 8. Sale of TVA property	[ ] 19. Site-specific enhancements in streams and reservoirs for aquatic animals
[ ] 2. Purchase of property	[ ] 9. Lease of TVA property	[ ] 20. Nesting platforms
[ ] 3. Purchase of equipment for industrial facilities	[ ] 10. Deed modification associated with TVA rights or TVA property	[ ] 41. Minor water-based structures (this does not include boat docks, boat slips or piers)
[ ] 4. Environmental education	[ ] 11. Abandonment of TVA retained rights	[ ] 42. Internal renovation or internal expansion of an existing facility
[ ] 5. Transfer of ROW easement and/or ROW equipment	[ ] 12. Sufferance agreement	[ ] 43. Replacement or removal of TL poles
[ ] 6. Property and/or equipment transfer	[ ] 13. Engineering or environmental planning or studies	[ ] 44. Conductor and overhead ground wire installation and replacement
[ ] 7. Easement on TVA property	[ ] 14. Harbor limits delineation	[ ] 49. Non-navigable houseboats

TABLE 2. Activities not likely to adversely affect bats with implementation of conservation measures. Conservation measures and completion of bat strategy project review form REQUIRED; review of bat records in proximity to project NOT required.

☐ 18. Erosion control, minor	☐ 57. Water intake - non-industrial	☐ 79. Swimming pools/associated equipment
☐ 24. Tree planting	☐ 58. Wastewater outfalls	☐ 81. Water intakes – industrial
☐ 30. Dredging and excavation; recessed harbor areas	☐ 59. Marine fueling facilities	☐ 84. On-site/off-site public utility relocation or construction or extension
☐ 39. Berm development	☐ 60. Commercial water-use facilities (e.g., marinas)	☐ 85. Playground equipment - land-based
☐ 40. Closed loop heat exchangers (heat pumps)	☐ 61. Septic fields	☐ 87. Aboveground storage tanks
☐ 45. Stream monitoring equipment - placement and use	☐ 66. Private, residential docks, piers, boathouses	☐ 88. Underground storage tanks
☐ 46. Floating boat slips within approved harbor limits	☐ 67. Siting of temporary office trailers	☐ 90. Pond closure
☐ 48. Laydown areas	☐ 68. Financing for speculative building construction	☐ 93. Standard License
☐ 50. Minor land based structures	☐ 72. Ferry landings/service operations	■ 94. Special Use License
☐ 51. Signage installation	☐ 74. Recreational vehicle campsites	☐ 95. Recreation License
☐ 53. Mooring buoys or posts	☐ 75. Utility lines/light poles	☐ 96. Land Use Permit
☐ 56. Culverts	☐ 76. Concrete sidewalks	

Table 3: Activities that may adversely affect federally listed bats. Conservation measures AND completion of bat strategy project review form REQUIRED; review of bat records in proximity of project REQUIRED by OSAR/Heritage eMap reviewer or Terrestrial Zoologist.

☐ 15. Windshield and ground surveys for archaeological resources	■ 34. Mechanical vegetation removal, includes trees or tree branches > 3 inches in diameter	☐ 69. Renovation of existing structures
☐ 16. Drilling	■ 35. Stabilization (major erosion control)	☐ 70. Lock maintenance/ construction
☐ 17. Mechanical vegetation removal, does not include trees or branches > 3" in diameter (in Table 3 due to potential for woody burn piles)	☐ 36. Grading	☐ 71. Concrete dam modification
■ 21. Herbicide use	☐ 37. Installation of soil improvements	☐ 73. Boat launching ramps
☐ 22. Grubbing	☐ 38. Drain installations for ponds	☐ 77. Construction or expansion of land-based buildings
■ 23. Prescribed burns	☐ 47. Conduit installation	☐ 78. Wastewater treatment plants
■ 25. Maintenance, improvement or construction of pedestrian or vehicular access corridors	☐ 52. Floating buildings	☐ 80. Barge fleeting areas
☐ 26. Maintenance/construction of access control measures	☐ 54. Maintenance of water control structures (dewatering units, spillways, levees)	☐ 82. Construction of dam/weirs/ levees
☐ 27. Restoration of sites following human use and abuse	☐ 55. Solar panels	☐ 83. Submarine pipeline, directional boring operations
☐ 28. Removal of debris (e.g., dump sites, hazardous material, unauthorized structures)	☐ 62. Blasting	☐ 86. Landfill construction
☐ 29. Acquisition and use of fill/borrow material	☐ 63. Foundation installation for transmission support	☐ 89. Structure demolition
☐ 31. Stream/wetland crossings	☐ 64. Installation of steel structure, overhead bus, equipment, etc.	☐ 91. Bridge replacement
☐ 32. Clean-up following storm damage	☐ 65. Pole and/or tower installation and/or extension	☐ 92. Return of archaeological remains to former burial sites
☐ 33. Removal of hazardous trees/tree branches		

STEP 3) Project includes one or more activities in Table 3? ○ **YES (Go to Step 4)** ○ **NO (Go to Step 13)**

STEP 4) Answer questions *a* through *e* below (applies to projects with activities from Table 3 ONLY)

a) Will project involve continuous noise (i.e., ≥ 24 hrs) that is greater than 75 decibels measured on the A scale (e.g., loud machinery)?
- (•) **NO** (NV2 does not apply)
- ( ) **YES** (NV2 applies, subject to records review)

b) Will project involve entry into/survey of cave?
- (•) **NO** (HP1/HP2 do not apply)
- ( ) **YES** (HP1/HP2 applies, subject to review of bat records)

c) If conducting **prescribed burning** (**activity 23)**, estimated acreage**:** 285 and timeframe(s) below; ☐ **N/A**

STATE	SWARMING	WINTER	NON-WINTER	PUP
GA, KY, TN	☐ Oct 15 - Nov 14	☐ Nov 15 - Mar 31	☐ Apr 1 - May 31, Aug 1- Oct 14	☐ Jun 1 - Jul 31
VA	☐ Sep 16 - Nov 15	☐ Nov 16 - Apr 14	☐ Apr 15 - May 31, Aug 1 – Sept 15	☐ Jun 1 - Jul 31
AL	■ Oct 15 - Nov 14	■ Nov 15 - Mar 15	☐ Mar 16 - May 31, Aug 1 - Oct 14	☐ Jun 1 - Jul 31
NC	☐ Oct 15 - Nov 14	☐ Nov 15 - Apr 15	☐ Apr 16 - May 31, Aug 1 - Oct 14	☐ Jun 1 - Jul 31
MS	☐ Oct 1 - Nov 14	☐ Nov 15 - Apr 14	☐ Apr 15 - May 31, Aug 1 – Sept 30	☐ Jun 1 - Jul 31

d) Will the project involve vegetation piling/burning?
- ( ) **NO** (SSPC4/ SHF7/SHF8 do not apply)
- (•) **YES** (SSPC4/SHF7/SHF8 applies, subject to review of bat records)

e) If **tree removal (activity 33 or 34)**, estimated amount: 200 (•)**ac** ( )**trees** ( )**N/A**

STATE	SWARMING	WINTER	NON-WINTER	PUP
GA, KY, TN	☐ Oct 15 - Nov 14	☐ Nov 15 - Mar 31	☐ Apr 1 - May 31, Aug 1- Oct 14	☐ Jun 1 - Jul 31
VA	☐ Sep 16 - Nov 15	☐ Nov 16 - Apr 14	☐ Apr 15 - May 31, Aug 1 – Sept 15	☐ Jun 1 - Jul 31
AL	■ Oct 15 - Nov 14	■ Nov 15 - Mar 15	■ Mar 16 - May 31, Aug 1 - Oct 14	■ Jun 1 - Jul 31
NC	☐ Oct 15 - Nov 14	☐ Nov 15 - Apr 15	☐ Apr 16 - May 31, Aug 1 - Oct 14	☐ Jun 1 - Jul 31
MS	☐ Oct 1 - Nov 14	☐ Nov 15 - Apr 14	☐ Apr 15 - May 31, Aug 1 – Sept 30	☐ Jun 1 - Jul 31

If warranted, does project have flexibility for bat surveys (May 15-Aug 15): ( ) **MAYBE** (•) **YES** ( ) **NO**

**** For **PROJECT LEADS** whose projects will be reviewed by a Heritage Reviewer (Natural Resources Organization only), **STOP HERE**. Click File/ Save As, name form as "ProjectLead_BatForm_CEC-or-ProjectIDNo_Date", and submit with project information. Otherwise continue to Step 5. ****

SECTION 2: REVIEW OF BAT RECORDS (applies to projects with activities from Table 3 ONLY)

STEP 5) Review of bat/cave records conducted by Heritage/OSAR reviewer?

(•) **YES** ( ) **NO** (Go to Step 13)

Info below completed by:				
☐ **Heritage Reviewer**	(name)		Date	
☐ **OSAR Reviewer**	(name)		Date	
■ **Terrestrial Zoologist**	(name)	Elizabeth Hamrick	Date	Apr 22, 2020

Gray bat records: ☐ None ☒ Within 3 miles* ☐ Within a cave* ☐ Within the County

Indiana bat records: ☐ None ☒ Within 10 miles* ☐ Within a cave* ☐ Capture/roost tree* ☒ Within the County

Northern long-eared bat records: ☒ None ☐ Within 5 miles* ☐ Within a cave* ☐ Capture/roost tree* ☐ Within the County

Virginia big-eared bat records: ☒ None ☐ Within 6 miles* ☐ Within the County

Caves: ☐ None within 3 mi ☒ Within 3 miles but > 0.5 mi ☐ Within 0.5 mi but > 0.25 mi* ☐ Within 0.25 mi but > 200 feet* ☐ Within 200 feet*

Bat Habitat Inspection Sheet completed? (•) **NO** ( ) **YES**

Amount of SUITABLE habitat to be removed/burned (may differ from STEP 4e): 200 **(**(•)**ac** ( )**trees)*** ( )**N/A**

STEP 6) Provide any additional notes resulting from Heritage Reviewer records review in Notes box below then . . . . . Go to Step 13

Notes from Bat Records Review (e.g., historic record; bats not on landscape during action; DOT bridge survey with negative results):

Mist net surveys were performed by Copperhead consulting in summer 2019 in accordance with USFWS Indiana bat survey guidelines. Reproductive adult and juvenile gray bats were captured. No Indiana bats or NLEB were captured during these surveys. The hibernaculum record <10 mi away for NLEB and Indiana bat is no longer extant (mine collapsed).

STEPS 7-12 To be Completed by Terrestrial Zoologist (if warranted):

STEP 7) Project will involve:

- ☐ Removal of suitable trees within 0.5 mile of P1-P2 Indiana bat hibernacula or 0.25 mile of P3-P4 Indiana bat hibernacula or any NLEB hibernacula.
- ☐ Removal of suitable trees within 10 miles of documented Indiana bat (or within 5 miles of NLEB) hibernacula.
- ☐ Removal of suitable trees > 10 miles from documented Indiana bat (> 5 miles from NLEB) hibernacula.
- ☐ Removal of trees within 150 feet of a documented Indiana bat or northern long-eared bat maternity roost tree.
- ☐ Removal of suitable trees within 2.5 miles of Indiana bat roost trees or within 5 miles of Indiana bat capture sites.
- ☐ Removal of suitable trees > 2.5 miles from Indiana bat roost trees or > 5 miles from Indiana bat capture sites.
- ☐ Removal of documented Indiana bat or NLEB roost tree, if still suitable.
- ☒ N/A

STEP 8) Presence/absence surveys were/will be conducted: ○ **YES** ○ **NO** ○ **TBD**

STEP 9) Presence/absence survey results, on Aug 9, 2019 ◉ **NEGATIVE** ○ **POSITIVE** ○ **N/A**

STEP 10) Project ○ **WILL** ◉ **WILL NOT** require use of Incidental Take in the amount of _____ ○ **acres or** ○ **trees** proposed to be used during the ○ **WINTER** ○ **VOLANT SEASON** ○ **NON-VOLANT SEASON** ◉ **N/A**

STEP 11) Available Incidental Take (prior to accounting for this project) as of _____

TVA Action	Total 20-year	Winter	Volant Season	Non-Volant Season
1 Manage Biological Resources for Biodiversity and Public Use on TVA Reservoir Lands				

STEP 12) Amount contributed to TVA's Bat Conservation Fund upon activity completion: $ _____ OR ◉ **N/A**

TERRESTRIAL ZOOLOGISTS, after completing SECTION 2, review Table 4, modify as needed, and then complete section for Terrestrial Zoologists at end of form.

SECTION 3: REQUIRED CONSERVATION MEASURES

STEP 13) Review Conservation Measures in Table 4 and ensure those selected are relevant to the project. If not, manually override and uncheck irrelevant measures, and explain why in ADDITIONAL NOTES below Table 4.

Did review of Table 4 result in ANY remaining Conservation Measures in **RED**?

- ○ **NO** (Go to Step 14)
- ◉ **YES** (STOP HERE; Submit for Terrestrial Zoology Review. Click File/Save As, name form as "ProjectLead_BatForm_CEC-or-ProjectIDNo_Date", and submit with project information).

Table 4. TVA's ESA Section 7 Programmatic Bat Consultation Required Conservation Measures

The Conservation Measures in Table 4 are automatically selected based on your choices in Tables 2 and 3 but can be manually overridden, if necessary. To Manually override, press the button and enter your name.

Manual Override

Name: Elizabeth Hamrick

Check if Applies to Project	Activities Subject To Conservation Measure	Conservation Measure Description
		NV1 - Noise will be short-term, transient, and not significantly different from urban interface or natural events (i.e., thunderstorms) that bats are frequently exposed to when present on the landscape.
		NV2 - Drilling, blasting, or any other activity that involves continuous noise (i.e., longer than 24 hours) disturbances greater than 75 decibels measured on the A scale (e.g., loud machinery) **within a 0.5 mile radius of documented winter and/or summer roosts** (caves, trees, unconventional roosts) will be conducted when bats are absent from roost sites.
		NV3 - Drilling or blasting **within a 0.5 mile radius of documented cave** (or unconventional) roosts will be conducted in a manner that will not compromise the structural integrity or alter the karst hydrology of the roost site.
		NV4 - Drilling or blasting **within 0.5 miles of a documented roost site** (cave, tree, unconventional roost) that needs to occur when bats are present will first involve development of project-specific avoidance or minimization measures in coordination with the USFWS.
		HP1 - Site-specific cases in which potential impact of human presence is heightened (e.g., conducting environmental or cultural surveys within a roost) will be closely coordinated with staff bat biologists to avoid/ minimize impacts below any potential adverse effect. Any take from these activities would be covered by TVA's Section 10 permit.
		HP2 - Entry into roosts known to be occupied by federally listed bats will be communicated to the USFWS when impacts to bats may occur if not otherwise communicated (i.e., via annual monitoring reports per TVA's Section 10 permit). Any take from these activities would be covered by TVA's section 10 permit.
		SHF1 - Fire breaks will be used to define and limit burn scope.
		SHF2 - Site-specific conditions (e.g., acres burned, transport wind speed, mixing heights) will be considered to ensure smoke is limited and adequately dispersed away from caves so that smoke does not enter cave or cave-like structures.
		SHF3 - Acreage will be divided into smaller units to keep amount of smoke at any one time or location to a minimum and reduce risk for smoke to enter caves.
		SHF4 - If burns need to be conducted during April and May, when there is some potential for bats to present on the landscape and more likely to enter torpor due to colder temperatures, burns will only be conducted if the air temperature is 55° or greater, and preferably 60° or greater.
		SHF5 - Fire breaks will be plowed immediately prior to burning, will be plowed as shallow as possible, and will be kept to minimum to minimize sediment.
		SHF6 - Tractor-constructed fire lines will be established **greater than 200 feet from cave entrances**. Existing logging roads and skid trails will be used where feasible to minimize ground disturbance and generation of loose sediment.
		SHF7 - Burning will only occur if site specific conditions (e.g. acres burned, transport wind speed, mixing heights) can be modified to ensure that smoke is adequately dispersed away from caves or cave-like structures. This applies to prescribed burns and burn piles of woody vegetation.

	SHF8 - Brush piles will be burned a **minimum of 0.25 mile from documented, known, or obvious caves or cave entrances** and otherwise in the center of newly established ROW when proximity to caves on private land is unknown.
	SHF9 - A **0.25 mile buffer of undisturbed forest** will be maintained around documented or known gray bat maternity and hibernation colony sites, documented or known Virginia big-eared bat maternity, bachelor, or winter colony sites, Indiana bat hibernation sites, and northern long-eared bat hibernation sites. Prohibited activities within this buffer include cutting of overstory vegetation, construction of roads, trails or wildlife openings, and prescribed burning. Exceptions may be made for maintenance of existing roads and existing ROW, or where it is determined that the activity is compatible with species conservation and recovery (e.g., removal of invasive species).
	TR1* - Removal of potentially suitable summer roosting habitat during time of potential occupancy has been quantified and minimized programmatically. TVA will track and document alignment of activities that include tree removal (i.e., hazard trees, mechanical vegetation removal) with the programmatic quantitative cumulative estimate of seasonal removal of potential summer roost trees for Indiana bat and northern long-eared bat. Project will therefore communicate completion of tree removal to appropriate TVA staff.
	TR2 - Removal of suitable summer roosting habitat **within 0.5 mile of Priority 1/Priority 2 Indiana bat hibernacula, or 0.25 mile of Priority 3/Priority 4 Indiana bat hibernacula or any northern long-eared bat hibernacula** will be prohibited, regardless of season, with very few exceptions (e.g., vegetation maintenance of TL ROW immediately adjacent to a known cave).
	TR3* - Removal of suitable summer roosting habitat within documented bat habitat (i.e., within 10 miles of documented Indiana bat hibernacula, within 5 miles of documented northern long-eared bat hibernacula, within 2.5 miles of documented Indiana bat summer roost trees, within 5 miles of Indiana bat capture sites, within 1 mile of documented northern long-eared bat summer roost trees, within 3 miles of northern long-eared bat capture sites) will be tracked, documented, and included in annual reporting. Project will therefore communicate completion of tree removal to appropriate TVA staff.
	TR4* - Removal of suitable summer roosting habitat within potential habitat for Indiana bat or northern long-eared bat will be tracked, documented, and included in annual reporting. Project will therefore communicate completion of tree removal to appropriate TVA staff.
	TR5 - Removal of any trees **within 150 feet of a documented Indiana bat or northern long-eared bat maternity summer roost tree** during non-winter season, range- wide pup season or swarming season (if site is within known swarming habitat), will first require a site-specific review and assessment. If pups are present in trees to be removed (determined either by mist netting and assessment of adult females, or by visual assessment of trees following evening emergence counts), TVA will coordinate with the USFWS to determine how to minimize impacts to pups to the extent possible. May include establishment of artificial roosts before removal of roost tree(s).
	TR6 - Removal of a documented Indiana bat or northern long-eared bat roost tree that is still suitable and that needs to occur during non-winter season, range-wide pup season, or swarming season (if site is within known swarming habitat) will first require a site-specific review and assessment. If pups are present in trees to be removed (determined either by mist netting and assessment of adult females, or by visual assessment of trees following evening emergence counts), TVA will coordinate with USFWS to determine how to minimize impacts to pups to the extent possible. This may include establishment of artificial roosts before removal of roost tree(s).
	TR7 (**Existing Transmission ROW only**) - **Tree removal within 100 feet of existing transmission ROWs will be limited to hazard trees**. On or adjacent to TLs, a hazard tree is a tree that is tall enough to fall within an unsafe distance of TLs under maximum sag and blowout conditions and/or are also dead, diseased, dying, and/or leaning. Hazard tree removal includes removal of trees that 1) currently are tall enough to threaten the integrity of operation and maintenance of a TL or 2) have the ability in the future to threaten the integrity of operation and maintenance of a TL.
	TR8 (**TVA Reservoir Land only**) - Requests for removal of hazard trees on or adjacent to TVA reservoir land will be inspected by staff knowledgeable in identifying hazard trees per International Society of Arboriculture and TVA's checklist for hazard trees. Approval will be limited to trees with a defined target.
	TR9 - If removal of suitable summer roosting habitat occurs when bats are present on the landscape, a funding contribution (based on amount of habitat removed) towards future conservation and recovery efforts for federally listed bats would be carried out. Project can consider seasonal bat presence/absence surveys (mist netting or emergence counts) that allow for positive detections without resulting in increased constraints in cost and project schedule. This will enable TVA to contribute to increased knowledge of bat presence on the landscape while carrying out TVA's broad mission and responsibilities.

	AR1 - Projects that involve structural modification or demolition of buildings, bridges, and potentially suitable box culverts, will require assessment to determine if structure has characteristics that make it a potentially suitable unconventional bat roost. If so a survey to determine if bats may be present will be conducted. Structural assessment will include: o Visual check that includes an exhaustive internal/external inspection of building to look for evidence of bats (e.g., bat droppings, roost entrance/exit holes); this can be done at any time of year, preferably when bats are active. o Where accessible and health and safety considerations allow, a survey of roof space for evidence of bats (e.g., droppings, scratch marks, staining, sightings), noting relevant characteristics of internal features that provide potential access points and roosting opportunities. Suitable characteristic may include: gaps between tiles and roof lining, access points via eaves, gaps between timbers or around mortise joints, gaps around top and gable end walls, gaps within roof walling or around tops of chimney breasts, and clean ridge beams. o Features with high-medium likelihood of harboring bats but cannot be checked visually include soffits, cavity walls, space between roof covering and roof lining. o Applies to box culverts that are at least 5 feet (1.5 meters) tall and with one or more of the following characteristics. Suitable culverts for bat day roosts have the following characteristics: • Location in relatively warm areas • Between 5-10 feet (1.5-3 meters) tall and 300 ft (100 m) or more long • Openings protected from high winds • Not susceptible to flooding • Inner areas relatively dark with roughened walls or ceilings • Crevices, imperfections, or swallow nests o Bridge survey protocols will be adapted from the Programmatic Biological Opinion for the Federal Highway Administration (Appendix D of USFWS 2016c, which includes a Bridge Structure Assessment Guidance and a Bridge Structure Assessment Form). o Bat surveys usually are NOT needed in the following circumstances: • Domestic garages /sheds with no enclosed roof space (with no ceiling) • Modern flat-roofed buildings • Metal framed and roofed buildings • Buildings where roof space is regularly used (e.g., attic space converted to living space, living space open to rafters) or where all roof space is lit from skylights or windows. Large/tall roof spaces may be dark enough at apex to provide roost space
	AR2 - Additional bat P/A surveys (e.g., emergence counts) conducted if warranted (i.e., when AR1 indicates that bats may be present).
	AR3 - Bridge survey protocols will be implemented, either by permittee (e.g., state DOT biologists) or qualified personnel. If a bridge is determined to be in use as an unconventional roost, subsequent protocols will be implemented.
	AR4 - Removal of buildings with suitable roost characteristics within six miles of known or presumed occupied roosts for Virginia big-eared bat would occur between Nov 16 and Mar 31. Buildings may be removed other times of the year once a bat biologist evaluates a buildings' potential to serve as roosting habitat and determines that this species is not present and/or is not using structure(s).

SSPC1 (**Transmission only**) - Transmission actions and activities will continue to Implement A Guide for Environmental Protection and Best Management Practices for Tennessee Valley Authority Construction and Maintenance Activities. This focuses on control of sediment and pollutants, including herbicides. Following are key measures:

- BMPs minimize erosion and prevent/control water pollution in accordance with state-specific construction storm water permits. BMPS are designed to keep soil in place and aid in reducing risk of other pollutants reaching surface waters, wetlands and ground water. BMPs will undertake the following principles:
  - Plan clearing, grading, and construction to minimize area and duration of soil exposure.
  - Maintain existing vegetation wherever and whenever possible.
  - Minimize disturbance of natural contours and drains.
  - As much as practicable, operate on dry soils when they are least susceptible to structural damage and erosion.
  - Limit vehicular and equipment traffic in disturbed areas. Keep equipment paths dispersed or designate single traffic flow paths with appropriate road BMPs to manage runoff.
  - Divert runoff away from disturbed areas.
  - Provide for dispersal of surface flow that carries sediment into undisturbed surface zones with high infiltration capacity and ground cover conditions.
  - Prepare drainage ways and outlets to handle concentrated/increased runoff.
  - Minimize length and steepness of slopes. Interrupt long slopes frequently.
  - Keep runoff velocities low and/or check flows.
  - Trap sediment on-site.
  - Inspect/maintain control measures regularly & after significant rain.
  - Re-vegetate and mulch disturbed areas as soon as practical.
- Specific guidelines regarding sensitive resources and buffer zones:
  - Extra precaution (wider buffers) within SMZs is taken to protect stream banks and water quality for streams, springs, sinkholes, and surrounding habitat.
  - BMPs are implemented to protect and enhance wetlands. Select use of equipment and seasonal clearing is conducted when needed for rare plants; construction activities are restricted in areas with identified rare plants.
  - Standard requirements exist to avoid adverse impacts to caves, protected animals, unique/ important habitat (e.g., cave buffers, restricted herbicide use, seasonal clearing of suitable habitat).

SSPC2 - Operations involving chemical/fuel storage or resupply and vehicle servicing will be handled outside of riparian zones (streamside management zones) in a manner to prevent these items from reaching a watercourse. Earthen berms or other effective means are installed to protect stream channel from direct surface runoff. Servicing will be done with care to avoid leakage, spillage, and subsequent stream, wetland, or ground water contamination. Oil waste, filters, other litter will be collected and disposed of properly. Equipment servicing and chemical/fuel storage will be limited to locations greater than 300-ft from sinkholes, fissures, or areas draining into known sinkholes, fissures, or other karst features.

SSPC3 (**Power Plants only**) - Power Plant actions and activities will continue to implement standard environmental practices. These include:

- Best Management Practices (BMPs) in accordance with regulations:
  - Ensure proper disposal of waste, ex: used rags, used oil, empty containers, general trash, dependent on plant policy
  - Maintain every site with well-equipped spill response kits, included in some heavy equipment
  - Conduct Quarterly Internal Environmental Field Assessments at each sight
  - Every project must have an approved work package that contains an environmental checklist that is approved by sight Environmental Health & Safety consultant.
  - When refueling, vehicle is positioned as close to pump as possible to prevent drips, and overfilling of tank. Hose and nozzle are held in a vertical position to prevent spillage
- Construction Site Protection Methods
  - Sediment basin for runoff - used to trap sediments and temporarily detain runoff on larger construction sites
  - Storm drain protection device
  - Check dam to help slow down silt flow
  - Silt fencing to reduce sediment movement
- Storm Water Pollution Prevention (SWPP) Pollution Control Strategies
  - Minimize storm water contact with disturbed soils at construction site
  - Protect disturbed soil areas from erosion
  - Minimize sediment in storm water before discharge
  - Prevent storm water contact with other pollutants
  - Construction sites also may be required to have a storm water permit, depending on size of land disturbance (>1ac)
- Every site has a Spill Prevention and Control Countermeasures (SPCC) Plan and requires training. Several hundred pieces of equipment often managed at the same time on power generation properties. Goal is to
  - Minimize fuel and chemical use Ensure proper disposal of waste, ex: used rags, used oil, empty containers, general trash, dependent on plant policy
  - Maintain every site with well-equipped spill response kits, included in some heavy equipment
  - Conduct Quarterly Internal Environmental Field Assessments at each sight
  - Every project must have an approved work package that contains an environmental checklist that is approved by sight Environmental Health & Safety consultant.
  - When refueling, vehicle is positioned as close to pump as possible to prevent drips, and overfilling of tank. Hose and nozzle are held in a vertical position to prevent spillage
- Construction Site Protection Methods
  - Sediment basin for runoff - used to trap sediments and temporarily detain runoff on larger construction sites
  - Storm drain protection device
  - Check dam to help slow down silt flow
  - Silt fencing to reduce sediment movement
- Storm Water Pollution Prevention (SWPP) Pollution Control Strategies
  - Minimize storm water contact with disturbed soils at construction site
  - Protect disturbed soil areas from erosion
  - Minimize sediment in storm water before discharge
  - Prevent storm water contact with other pollutants
  - Construction sites also may be required to have a storm water permit, depending on size of land disturbance (>1ac)
- Every site has a Spill Prevention and Control Countermeasures (SPCC) Plan and requires training. Several hundred pieces of equipment often managed at the same time on power generation properties. Goal is to minimize fuel and chemical use

SSPC4 (**Transmission only**) - Woody vegetation burn piles associated with transmission construction will be placed in the center of newly established ROWs to minimize wash into any nearby undocumented caves that might be on adjacent private property and thus outside the scope of field survey for confirmation. Brush piles will be burned a **minimum of 0.25 miles from documented caves** and otherwise in the center of newly established ROW when proximity to caves on private land is unknown.

	SSPC5 (**26a, Solar, Economic Development only**) - Section 26a permits and contracts associated with solar projects, economic development projects or land use projects include standards and conditions that include standard BMPs for sediment and contaminants as well as measures to avoid or minimize impacts to sensitive species or other resources consistent with applicable laws and Executive Orders.
	SSPC6 - Herbicide use will be avoided **within 200 ft of portals associated with caves, cave collapse areas, mines and sinkholes** are capable of supporting cave-associated species. Herbicides are not applied to surface water or wetlands unless specifically labeled for aquatic use. Filter and buffer strips will conform at least to federal and state regulations and label requirements.
	SSPC7 - Clearing of vegetation **within a 200-ft radius of documented caves** will be limited to hand or small machinery clearing only (e.g., chainsaws, bush-hog, mowers). This will protect potential recharge areas of cave streams and other karst features that are connected hydrologically to caves.
	L1 - Direct temporary lighting away from suitable habitat during the active season.
	L2 - Evaluate the use of outdoor lighting during the active season and seek to minimize light pollution when installing new or replacing existing permanent lights by angling lights downward or via other light minimization measures (e.g., dimming, directed lighting, motion-sensitive lighting).

[1]Bats addressed in consultation (02/2018), which includes gray bat (listed in 1976), Indiana bat (listed in 1967), northern long-eared bat (listed in 2015), and Virginia big-eared bat (listed in 1979).

Hide All Unchecked Conservation Measures

- ○ HIDE
- ◉ UNHIDE

Hide Table 4 Columns 1 and 2 to Facilitate Clean Copy and Paste

- ◉ HIDE
- ○ UNHIDE

NOTES (additional info from field review, explanation of no impact or removal of conservation measures).

Negative presence/absence survey results removes conservation measures associated with tracking and documenting removal of potentially suitable habitat. No Take is used.

STEP 14) Save completed form (Click File/Save As, name form as "ProjectLead_BatForm_CEC-or-ProjectIDNo_Date") in project environmental documentation (e.g. CEC, Appendix to EA) AND send a copy of form to batstrategy@tva.gov
Submission of this form indicates that Project Lead/Applicant:

[ ] (name) is (or will be made) aware of the requirements below.

- Implementation of conservation measures identified in Table 4 is required to comply with TVA's Endangered Species Act programmatic bat consultation.
- TVA may conduct post-project monitoring to determine if conservation measures were effective in minimizing or avoiding impacts to federally listed bats.

For Use by Terrestrial Zoologist Only

☒ Terrestrial Zoologist acknowledges that Project Lead/Contact (name) Josh Burnette has been informed of any relevant conservation measures and/or provided a copy of this form.

☐ For projects that require use of Take and/or contribution to TVA's Bat Conservation Fund, Terrestrial Zoologist acknowledges that Project Lead/Contact has been informed that project will result in use of Incidental Take [ ] ○ ac ○ trees and that use of Take will require $ [ ] contribution to TVA's Conservation Fund upon completion of activity (amount entered should be $0 if cleared in winter).

For Terrestrial Zoology Use Only. Finalize and Print to Noneditable PDF.

Appendix C – Agency Coordination and Consultation

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Tennessee Valley Authority, 400 West Summit Hill Drive, Knoxville, TN 37902

January 23, 2019

Ms. Lee Anne Wofford
Deputy State Historic Preservation Officer
Alabama Historical Commission
468 South Perry Street
Montgomery, Alabama 36130-0900

Dear Ms. Wofford:

TENNESSEE VALLEY AUTHORITY (TVA), SHORTLEAF PINE INITIATIVE, LAUDERDALE COUNTY, ALABAMA

In conjunction with the Alabama Department of Conservation and Natural Resources (ADCNR), TVA proposes to partially fund the reestablishment and restoration of shortleaf pine habitats on TVA fee-owned land within the Lauderdale Wildlife Management Area (WMA). This program would protect and enhance unique and important habitat throughout the WMA. The proposal supports, and is consistent with, TVA's mission of environmental stewardship and the objectives for wildlife habitat enhancement partnerships in the TVA Natural Resources Plan (2011). Reestablishment and restoration would include multiple activities including:

- Thinning operations – thinning of targeted shortleaf pine and select oaks would be conducted with mechanical equipment along the ridgetops and approximately one-half way down sideslopes. Work could take place year round, depending on weather conditions in order to reduce rutting and erosion
- Prescribed burns – most burns would be conducted in the late winter/early spring (Feb-Apr) and would be low intensity backing fires to remove duff layer allowing for early successional habitat and seed bed for oak/shortleaf seedlings. Burns are scheduled on a 2-3 year rotation depending on weather.
- Herbicide Treatments - only on an as needed basis to control non-native invasive species

The project proposes to conduct an Environmental Assessment (EA) of the TVA owned 6,196 acre area from a programmatic level and TVA proposes to proceed under phases as provided under 36 CFR § 800.4(b)(2) and § 800.5(c)(1).

Currently, a 285 acre parcel has been identified to start restoration activities. This initial parcel is located in the north ½ of Section 1, T1S R16W, on the right descending bank of the Tennessee River (Pickwick Reservoir) at TR Mile 214.3-215 in Lauderdale County, Alabama.

TVA considers the area of potential effects (APE) to be the entire 285 acre parcel (see attached map and Figure 1 in the accompanying report).

Portions of the western edge of the APE have been previously surveyed, and five historic sites were identified along McKelvey Hollow Road (Alabama Online Cultural Resources Database [AOCRD]; Meyer 1995). Sites 1Lu293, 1Lu294, 1Lu295, 1Lu517, and 1Lu519 were all described as late-nineteenth/early-twentieth century sites. Three of the four were considered ineligible for the National Register of Historic Places (NRHP). Site 1Lu517 was considered potentially eligible for the NRHP (AOCRD; Meyer 1995:82, 85). The remainder of the APE has not been surveyed. In order to inventory cultural resources within the APE, TVA contracted with the Office of Archaeological Research (OAR) at the University of Alabama to conduct a Phase I archaeological survey of the entire 285 acres. Please find attached the resulting report entitled *A Cultural Resources Survey for the Proposed Shortleaf Pine Initiative in Lauderdale County, Alabama*.

Including the five previously recorded sites, the survey investigated a total of 18 sites within and adjacent to the APE. All are historic sites, likely dating to the late-nineteenth and early-twentieth centuries. Nine of the new sites, (1Lu765, 1Lu766, 1Lu767, 1Lu769, 1Lu770, 1Lu771, 1Lu774, 1Lu775, and 1Lu777) and three previously recorded sites (1Lu293, 1Lu295, and 1Lu517) have all been incorporated into the newly defined Hitchcock Hollow Archaeological District (HHAD). Most are depicted on a 1935 TVA land acquisition map that shows a small community of residential and commercial properties in the hollow (see Figure 4 in the accompanying report).

Although artifact density is consistently low on the sites, the landform and the sites appear to be little changed since TVA purchased the property. Therefore, site integrity appears to be high. As a result of this survey, OAR recommends that sites 1Lu293, 1Lu517, 1Lu765, 1Lu766, 1Lu767, 1Lu769, 1Lu770, 1Lu771, 1Lu773, 1Lu774, 1Lu775, 1Lu776, and 1Lu777 are potentially eligible for the NRHP and should be avoided. Sites 1Lu295 and 1Lu775 are immediately adjacent to, but outside of, the APE. OAR has recommended that the sites are potentially eligible for the NRHP and should be avoided. Sites 1Lu294, 1Lu519, 1Lu768, and 1Lu772 were recommended ineligible for the NRHP. TVA has reviewed the enclosed report and, with the exception of sites 1Lu295 and 1Lu775, agrees with the recommendations of the authors. While TVA does not necessarily disagree with OAR's recommendation for sites 1Lu295 and 1Lu775, additional archaeological and archival work will be necessary to determine their significance. Regardless, the sites are outside of the APE and will not be affected by the project.

In response to the results of this survey and recommendations, TVA has modified their proposed activities for the shortleaf pine initiative and will avoid all potentially eligible sites and the HHAD (plus a 20m buffer as shown on Figure 1). Prior to any work on the property, TVA Cultural Compliance staff will cordon off sites with safety fencing and/or flagging tape to ensure that the sites are avoided. Thus, the APE has been revised to exclude those areas and TVA finds that that proposed undertaking will have no effects to historic properties. Pursuant to 36 CFR Part 800.4(d)(1), we are seeking your concurrence with TVA's finding of no effect.

Pursuant to 36 CFR Part 800.3(f)(2), TVA is consulting with federally recognized Indian tribes regarding properties within the proposed project's APE that may be of religious and cultural significance to them and eligible for the NRHP.

If you have any questions or comments, please contact Michael Angst by email, mgangst@tva.gov or by phone, (865) 632-6257.

Sincerely,

Clinton E. Jones
Manager
Cultural Compliance

MGA:ABM
Enclosures

References Cited

Meyer, Catherine C.
1995 *Cultural Resources in the Pickwick Reservoir*. Submitted to the Tennessee Valley Authority by Office of Archaeological Services, University of Alabama Museums, Moundville, Alabama.

INTERNAL COPIES NOT TO BE INCLUDED WITH OUTGOING LETTER:

Michael G. Angst, WT 11C-K
Lana D. Bean, WT 10 C-K
Joshua A. Burnette, FAB 1A-GVA
Michael C. Easley, BRF 1A-CTT
Patricia B. Ezzell, WT 7C-K
Susan R. Jacks, WT 11C-K
Paul J. Pearman, BR 4A-C
M. Susan Smelley, BR 4A-C
ECM, WT CA-K

Note to Reader: Figure 1 redacted to protect confidential location of archaeological resources

ALABAMA HISTORICAL COMMISSION

468 South Perry Street
P.O. Box 300900
Montgomery, Alabama 36130-0900
334-242-3184 / Fax: 334-240-3477

Lisa D. Jones
Executive Director
State Historic Preservation Officer

February 4, 2019

Clinton Jones
Tennessee Valley Authority
400 West Summit Hill Drive
Knoxville, TN 37902

Re: AHC 2019-0458
Shortleaf Pine Initiative
Lauderdale County

Dear Mr. Jones:

Upon review of the above referenced project, we concur with Tennessee Valley Authority's determination that the proposed project activities will have no effect on any cultural resources listed in or eligible for the National Register of Historic Places (NRHP) provided that archaeological sites 1Lu293, 1Lu295, 1Lu517, 1Lu765-767, 1Lu769-771, and 1Lu773-777 are avoided and protected from project activities.

However, should artifacts or archaeological features be encountered during project activities, work shall cease and our office shall be consulted immediately. Artifacts are objects made, used or modified by humans. They include but are not excluded to arrowheads, broken pieces of pottery or glass, stone implements, metal fasteners or tools, etc. Archaeological features are stains in the soil that indicate disturbance by human activity. Some examples are post holes, building foundations, trash pits and even human burials. **This stipulation shall be placed on the construction plans to insure contractors are aware of it.**

We appreciate your commitment to helping us preserve Alabama's historic archaeological and architectural resources. Should you have any questions, please contact Eric Sipes at 334.230.2667 or Eric.Sipes@ahc.alabama.gov. Have the AHC tracking number referenced above available and include it with any future correspondence.

Sincerely,

Lee Anne Wofford

Lee Anne Wofford
Deputy State Historic Preservation Officer

LAW/EDS/amh

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Office of the Chief

Bill John Baker
Principal Chief
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S. Joe Crittenden
Deputy Principal Chief
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February 6, 2019

Marianne Shuler
Tennessee Valley Authority
400 West Summit Hill Drive
Knoxville, TN 37902

Re: Shortleaf Pine Initiative, Lauderdale County, Alabama

Ms. Marianne Shuler:

The Cherokee Nation (Nation) is in receipt of your correspondence about and report for **Shortleaf Pine Initiative, Lauderdale County, Alabama**, and appreciates the opportunity to provide comment upon this project. Please allow this letter to serve as the Nation's interest in acting as a consulting party to this proposed project.

The Nation maintains databases and records of cultural, historic, and pre-historic resources in this area. Our Historic Preservation Office reviewed this project, cross referenced the project's legal description against our information, and found instances where this project intersects or adjoins such resources. However, in reviewing the project summary and related report, this Office does not object to the project proceeding as long as the following recommendations are observed:

- The Nation concurs that Sites 1LU293, 1LU517, 1LU765, 1LU766, 1LU767, 1LU769, 1LU770, 1LU771, 1LU773, 1LU774, 1LU775, 1LU776, and 1LU777 are potentially eligible to be listed in the National Register of Historic Places. Thus, the Nation concurs with the provided work plan to avoid these aforementioned sites throughout the course of the proposed project;

- The Nation requests that Tennessee Valley Authority (TVA) re-contact this Office for additional consultation if there are any changes to the scope of or activities within the Area of Potential Effect (APE);

- The Nation requests that TVA halt all project activities immediately and re-contact our Offices for further consultation if items of cultural significance are discovered during the course of this project; and

- The Nation requests that TVA conduct appropriate inquiries with other pertinent Tribal and Historic Preservation Offices regarding historic and prehistoric resources not included in the Nation's databases or records.

If you require additional information or have any questions, please contact me at your convenience. Thank you for your time and attention to this matter.

Wado,

Elizabeth Toombs, Tribal Historic Preservation Officer
Cherokee Nation Tribal Historic Preservation Office
elizabeth-toombs@cherokee.org
918.453.5389

February 22, 2019

Ms. Marianne Shuler, Senior Specialist
Archaeologist and Tribal Liaison
Cultural Compliance
Tennessee Valley Authority
400 West Summit Hill Drive
460 WT 7D-K
Knoxville, TN 37902

Dear Ms. Shuler:

Thank you for the letters of notification of the proposed projects delineated in the attached table. We accept the invitation to consult under Section 106 of the National Historic Preservation Act.

The Chickasaw Nation supports the proposed undertakings and is not presently aware of any specific historic properties, including those of traditional religious and cultural significance, in the project areas. In the event the agency becomes aware of the need to enforce other statutes we request to be notified under ARPA, AIRFA, NEPA, NAGPRA, NHPA and Professional Standards.

Your efforts to preserve and protect significant historic properties are appreciated. If you have any questions, please contact Ms. Karen Brunso, tribal historic preservation officer, at (580) 272-1106, or at karen.brunso@chickasaw.net.

Sincerely,

Lisa John, Secretary
Department of Culture and Humanities

cc: mmshuler@tva.gov

Enclosure

Project Description	Location
[redacted]	[redacted]
[redacted]	[redacted]
[redacted]	[redacted]
[redacted]	[redacted]
[redacted]	[redacted]
Proposed funding for the Alabama Department of Conservation and Natural Resources for reestablishment and restoration of shortleaf pine habituated in the Lauderdale Wildlife Management Area.	Lauderdale County, Alabama
[redacted]	[redacted]
[redacted]	[redacted]
[redacted]	[redacted]
[redacted]	[redacted]

Note to Reader: Confidential information in above table has been redacted

Angst, Michael G

From: Shuler, Marianne M
Sent: Tuesday, March 5, 2019 5:06 PM
To: McCampbell, Amy Boardman; Angst, Michael G
Subject: FW: TVA-ShortleafPineInitiative-LauderdaleCoAL-TRIBAL-23Jan2019

From: Section106 <Section106@mcn-nsn.gov>
Sent: Monday, March 04, 2019 4:42 PM
To: Shuler, Marianne M <mmshuler@tva.gov>
Subject: RE: TVA-ShortleafPineInitiative-LauderdaleCoAL-TRIBAL-23Jan2019

TVA External Message. Please use caution when opening.

Marianne Shuler
Senior Specialist, Archaeologist, Tribal Liaison
Cultural Compliance
Tennessee Valley Authority (TVA)
400 W Summit Hill Drive
Knoxville, Tennessee 37902

Ms. Shuler,

Thank you for the correspondence regarding the proposed reestablishment and restoration of shortleaf pine habitats and related activities project. The project area located in Lauderdale County, Tennessee is within our historic area of interest. The Muscogee (Creek) Nation is unaware of any Muscogee cultural or sacred sites located within the immediate project area, We concur that there should be no effects to any known historic/cultural properties and that work should proceed as planned. However, as the project is located in an area that is of general historic interest to the Tribe, we request that work be stopped and our office contacted immediately if any Native American cultural materials are encountered. This stipulation should be placed on the construction plans to insure contactors are aware of it. Please feel free to contact me with any further questions or concerns.

Ms. Corain Lowe-Zepeda
Historic and Cultural Preservation Department, THPO
Muscogee (Creek) Nation
P. O. Box 580
Okmulgee, OK 74447
T 918.732.7835
clowe@mcn-nsn.gov

From: Shuler, Marianne M [mailto:mmshuler@tva.gov]
Sent: Wednesday, January 23, 2019 1:22 PM
To: 106NAGPRA@astribe.com; 'Bryant Celestine (celestine.bryant@mail.actribe.org)'; 'AQhpo@mail.com'; jlowe@alabama-quassarte.org; Elizabeth Toombs; 'HPO@chickasaw.net'; Linda Langley; Stephen Yerka; 'BBarnes@estoo.net'; 'ashively@jenachoctaw.org'; 'dc13.dc4@gmail.com'; 'David.Cook@kialegeetribe.net'; Section106; THPO; Theodore Isham; tonya@shawnee-tribe.com; THPO; cwolfe@ukb-nsn.gov
Cc: Russell Townsend; Corain Lowe; Sheila Bird
Subject: TVA-ShortleafPineInitiative-LauderdaleCoAL-TRIBAL-23Jan2019

Good Afternoon
By this email I am sending the attached letter regarding TVA's proposal to partially fund the reestablishment and restoration of shortleaf pine habitats in partnership with the Alabama Department of Conservation and Natural Resources on TVA fee owned land in the Lauderdale Wildlife Management Area.

Please let me know by February 22, 2019 if you have any questions on the proposed undertaking.

Thanks
Marianne

Marianne Shuler
Senior Specialist, Archaeologist & Tribal Liaison
Cultural Compliance

Tennessee Valley Authority
400 W. Summit Hill Drive
Knoxville, TN 37902

865-632-2464 (w)
mmshuler@tva.gov

Angst, Michael G

From: Shuler, Marianne M
Sent: Wednesday, February 20, 2019 4:44 PM
To: McCampbell, Amy Boardman; Angst, Michael G
Subject: FW: TVA-ShortleafPineInitiative-LauderdaleCoAL-TRIBAL-23Jan2019

From: tonya@shawnee-tribe.com <tonya@shawnee-tribe.com>
Sent: Wednesday, February 20, 2019 11:45 AM
To: Shuler, Marianne M <mmshuler@tva.gov>
Subject: RE: TVA-ShortleafPineInitiative-LauderdaleCoAL-TRIBAL-23Jan2019

TVA External Message. Please use caution when opening.

This letter is in response to the above referenced project.

The Shawnee Tribe's Tribal Historic Preservation Department concurs that no known historic properties will be negatively impacted by this project.

We have no issues or concerns at this time, but in the event that archaeological materials are encountered during construction, use, or maintenance of this location, please re-notify us at that time as we would like to resume immediate consultation under such a circumstance.

If you have any questions, you may contact me via email at tonya@shawnee-tribe.com

Thank you for giving us the opportunity to comment on this project.

Sincerely,

Tonya Tipton
Shawnee Tribe-THPO
29 S Highway 69A
Miami, OK 74354
Phone:(918)542-2441
Fax: (918)542-2922
Cell: (918)961-0373
tonya@shawnee-tribe.com

From: Shuler, Marianne M <mmshuler@tva.gov>
Sent: Wednesday, January 23, 2019 1:22 PM
To: 106NAGPRA@astribe.com; 'Bryant Celestine (celestine.bryant@mail.actribe.org)'

<celestine.bryant@mail.actribe.org>; 'AQhpo@mail.com' <AQhpo@mail.com>; jlowe@alabama-quassarte.org; Elizabeth Toombs <elizabeth-toombs@cherokee.org>; 'HPO@chickasaw.net' <HPO@chickasaw.net>; Linda Langley <LLangley@coushatta.org>; Stephen Yerka <syerka@nc-cherokee.com>; 'BBarnes@estoo.net' <BBarnes@estoo.net>; 'ashively@jenachoctaw.org' <ashively@jenachoctaw.org>; 'dc13.dc4@gmail.com' <dc13.dc4@gmail.com>; 'David.Cook@kialegeetribe.net' <David.Cook@kialegeetribe.net>; Section106 <Section106@mcn-nsn.gov>; THPO <THPO@pci-nsn.gov>; Theodore Isham <isham.t@sno-nsn.gov>; tonya@shawnee-tribe.com; THPO <thpo@tttown.org>; cwolfe@ukb-nsn.gov
Cc: Russell Townsend <RussellT@nc-cherokee.com>; 'Corain Lowe (CLowe@mcn-nsn.gov)' <CLowe@mcn-nsn.gov>; Sheila Bird <sbird@ukb-nsn.gov>
Subject: TVA-ShortleafPineInitiative-LauderdaleCoAL-TRIBAL-23Jan2019

Good Afternoon
By this email I am sending the attached letter regarding TVA's proposal to partially fund the reestablishment and restoration of shortleaf pine habitats in partnership with the Alabama Department of Conservation and Natural Resources on TVA fee owned land in the Lauderdale Wildlife Management Area.

Please let me know by February 22, 2019 if you have any questions on the proposed undertaking.

Thanks
Marianne

Marianne Shuler
Senior Specialist, Archaeologist & Tribal Liaison
Cultural Compliance

Tennessee Valley Authority
400 W. Summit Hill Drive
Knoxville, TN 37902

865-632-2464 (w)
mmshuler@tva.gov

United Keetoowah Band
Of Cherokee Indians in Oklahoma
Office of Historic Preservation
P.O. Box 746 • Tahlequah, OK 74465
18263 W Keetoowah Circle • Tahlequah, OK 74464
Phone: (918) 871-2800 • Fax: (918) 414-4000
www.ukb-nsn.gov

2/26/2019

RE: Shortleaf Pine Initiative, Lauderdale County, Alabama

To Whom It May Concern:

Thank you for consulting with the United Keetoowah Band of Cherokee Indians in Oklahoma (UKB). This response is regarding the request from your office for a review of the project listed above. We have reviewed the information provided in your letter of January 23, 2019. We find after review of the information we concur with your findings of no adverse effect.

We remain interested in further communication regarding this project due to the location. The UKB people have a documented historical presence in Lauderdale County, Alabama. While there are no documented village sites within the project site or within a close proximity outside the project site, there still remains the potential of finding unknown sites in and surrounding the project location.

It is further advised that if the area of potential effect changes or in the event of an inadvertent discovery of human remains or other cultural items that we receive notification within 48 hours. As well, any inadvertent discovery of human remains or other cultural resources should remain in situ until consultation with interested tribes and agencies is undertaken.

Please note that these comments are based on information available to us at the time of the project review. We reserve the right to revise our comments as information becomes available. If you have any questions or concerns, please contact our Tribal Archaeologist/NAGPRA Coordinator, Erin Thompson at (918) 871-2838 or by email ethompson@ukb-nsn.gov.

Best Regards,

Sheila Bird
Director of Natural Resources
NAGPRA and THPO
United Keetoowah Band of Cherokee Indians
Office (918) 871-2852 Fax (918) 414-4052

Appendix D – Listed Bat Presence/Probable Absence Survey

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Listed bat presence/probable absence survey for the TVA shortleaf pine restoration project, Lauderdale County, AL

Liz Hamrick

Terrestrial Zoologist

Tennessee Valley Authority

400 W Summit Hill Dr. WT 11C-K

Knoxville, TN 37902

20 August 2019

COPPERHEAD ENVIRONMENTAL CONSULTING, INC.
P.O. BOX 73 ■ 471 MAIN STREET ■ PAINT LICK, KENTUCKY 40461
(859) 925-9012 OFFICE (859) 925-9816 FAX

www.copperheadconsulting.com

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Appendices

PROJECT INTRODUCTION

Copperhead Environmental Consulting, Inc. (Copperhead) was contracted by the Tennessee Valley Authority (TVA) to conduct a presence/probable absence (P/A) mist-net survey for Indiana bat (*Myotis sodalis*) and northern long-eared bat (*Myotis septentrionalis*) for the shortleaf pine restoration project in Lauderdale County, Alabama. A Study Plan was submitted to the US Fish and Wildlife Service (USFWS) Daphne Field Office on 10 July 2019 and concurrence was received on 19 July 2019. Surveys were conducted under Copperhead's USFWS Permit #TE94849B-1 and Alabama Department of Natural Resources Scientific Collecting Permit #2019076239468680.

METHODS

Site Selection/Mist-Netting

Mist-netting was implemented to determine P/A in accordance with USFWS "2019 Range-wide Indiana Bat Summer Survey Guidelines." Surveys were conducted 7-9 August 2019. Twenty-eight (28) net nights (*nn*) were completed, exceeding the minimum level of effort outlined in the guidelines for a 123-acre project (9 *nn*/123 acres of impacted forested habitat). Mist-net site locations were chosen after field reconnaissance of the project (Table 1 and Appendix A, Figure 1). Mist-net site photographs are provided in Appendix B.

Mist-nets were set to maximize coverage of flight paths used by bats along suitable travel corridors or foraging areas. Placement of mist-nets was based on the extent of canopy cover, presence of an open flyway, and forest conditions near the site. Actual location and orientation of each net was determined in the field by qualified biologists. Mist-net sites consisted of 4 to 5 mist-nets monitored for 2 nights to achieve the 27 *nn* minimum. Nets were deployed at sunset each night, left open for at least 5 hours, checked every 10 minutes, and disturbance near the nets was kept to a minimum. Weather data, including temperature, wind speed, and cloud cover, was recorded for each site on an hourly basis to ensure compliance with the mist-netting guidelines (e.g., temperature during survey greater than 50°F).

Bats were released unharmed near the point of capture. Biological and morphometric data (e.g., species, sex, age class, reproductive condition, mass, and forearm length) were recorded on data sheets for each individual. In addition, the height and the specific net set of capture were recorded for each bat. Processing of bats was completed within 30 minutes from the time a bat was removed from the net.

Table 1. Survey site locations for the TVA shortleaf pine restoration project, Lauderdale County, AL.

Site No.	Description	Dates (2019)	Latitude	Longitude
sp1	Hitchcock Lane and ATV trail	7&8 August	35.006900	-88.180300
sp2	Hitchcock Lane	7&9 August	36.388310	-88.179551
sp3	Hitchcock Lane and creek	8&9 August	35.000871	-88.179404

White-Nose Syndrome Protocol

To minimize the transmission of White-nose Syndrome (WNS) between captured bats, all netting and field activities followed the most recent guidelines established by USFWS. All hard, non-porous netting equipment was sanitized with Isopropyl alcohol wipes prior to arrival and after each survey night; all other equipment was submersed in hot water (131°F) for a minimum of 20 minutes. Individual bats were kept in unused paper bags while waiting for processing. Disposable latex gloves were worn over sanitized handling gloves and changed or sanitized following the handling of each bat. All non-disposable equipment (e.g., Pesola scales, rulers, calipers, etc.) coming into contact with bats was sanitized immediately following the handling of each bat. Bats were evaluated for potential WNS infection through wing scoring following the "*Wing-Damage Index Used for Characterizing Wing Condition of Bats Affected by White-nose Syndrome*" (Reichard and Kunz 2009).

RESULTS

Bat Captures

Twenty-three (23) bats of 5 species, including 2 federally listed gray bats (*Myotis grisescens*) were captured during the mist-net survey (Table 2). Completed mist-net data sheets are provided in Appendix C.

Table 2. Summary of bat captures by species, age, sex, and reproductive condition for the TVA shortleaf pine restoration project, Lauderdale County, AL.

Species	Adult Male		Adult Female				Juvenile		UNKN	Total
	NR	SCR	PG	L	PL	NR	Male	Female		
Lasiurus borealis	1	5	-	-	1	4	-	1	1	**13**
Eptesicus fuscus	-	1	-	-	2	-	-	2	-	**5**
Nycticeius humeralis	-	1	-	-	-	-	-	-	-	**1**
Myotis grisescens	-	-	-	-	2	-	-	-	-	**2**
Myotis austroriparious	-	-	-	-	-	-	1	1	-	**2**
Total	1	7	-	-	5	4	1	4	1	23

NR = non-reproductive; SCR = scrotal; L = lactating; PG = pregnant; PL = post lactating, UNKN = unknown (escape at net)

Habitat

The survey area was in the northwest corner of the county within the Lauderdale State Wildlife Management Area. Land cover at all survey sites was considered optimal as the areas were largely forested with connections to contiguous forest in all directions. Forest structure was also classified as optimal at all sites as there were mature trees with diverse age classes. Dominate tree species at all sites included American sycamore (*Platanus occidentalis*), red maple (*Acer rubrum*), shortleaf pine (*Pinus echinata),* and sweet gum (*Liquidambar styraciflua*). Water resources were optimal at all sites and included Pickwick Lake and associated tributaries. Roost habitat was moderate at all sites with snags or trees with sloughing bark between 5 -15 inches diameter at breast height present.

CONCLUSIONS

The mist-net survey effort (28 *nn* over 3 calendar nights) exceeds the suggested level of effort and was conducted under the appropriate weather conditions (USFWS 2019) to determine P/A of Indiana and northern long-eared bats during the maternity season. No Indiana or northern long-eared bats were captured during the survey, indicating that these species are not likely present within the project area during the maternity season or are present in numbers too low to be detected by approved USFWS protocols. Based on the negative results of the mist-net survey,

project development may affect but is not likely to adversely affect summer populations of Indiana or northern long-eared bats.

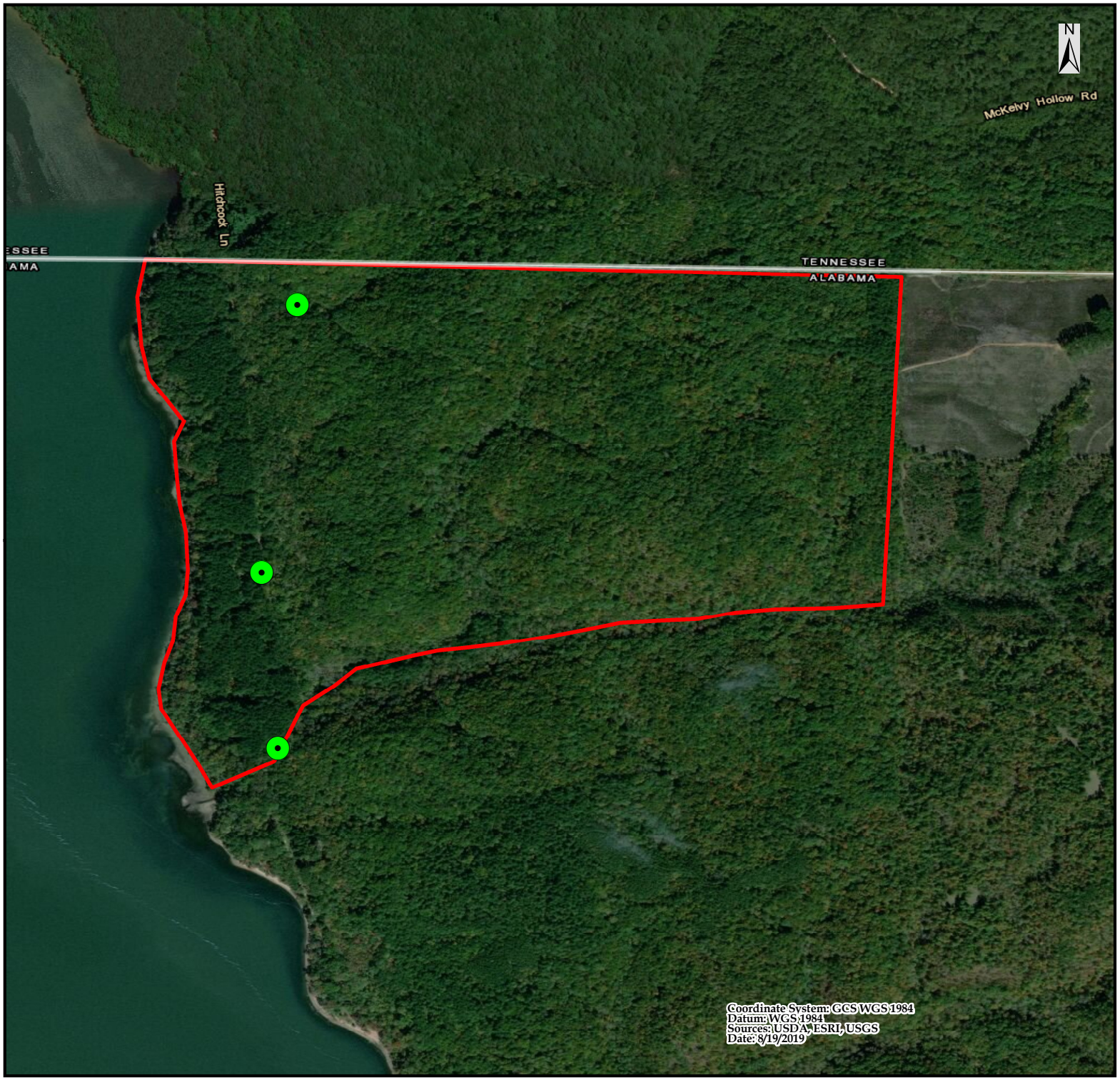
LITERATURE CITED

Reichard, J. D. and T. H. Kunz. 2009. *White-nose syndrome inflicts lasting injuries to the wings of little brown myotis* (*Myotis lucifugus)*. Acta Chiropterologica, 11(2) 457-464.

(USFWS) U.S. Fish and Wildlife Service. 2019. 2019 *Range-Wide Indiana Bat Summer Survey Guidelines*.

Appendix A:

Mist-net Site Locations for TVA Shortleaf Pine Restoration Project, Lauderdale County, AL



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Prepared for:
U.S. Fish and Wildlife Service

USFW

Figure 1: Mist-net
Site Location for the
TVA shortleaf pine restoration project,
Lauderdale County, AL

Legend

- Mist-net Site Location
- Project Boundary

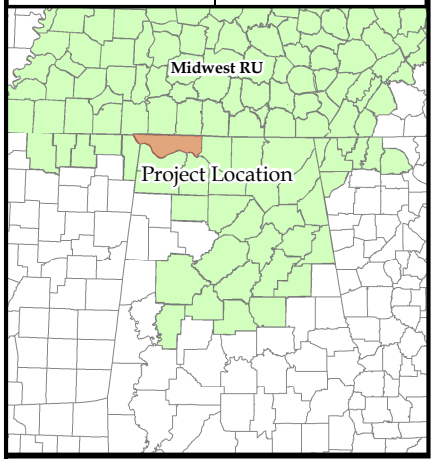
0 500 1,000
Feet

Scale: 1 in = 1,000 ft

Prepared by :

Copperhead Environmental Consulting, Inc.
3908 Gallatin Pike
Nashville, TN 37216

Drawn by:	STS	Date:	8/19/2019
Checked by:	DV	Revision:	



Source: U:\Copperhead\Active Projects\856 TVA_Rx Burn Mist-net Survey, AL\Maps_GIS\Shortleaf Rx Report_Map.mxd

Appendix B: Mist-net Site Photographs

COPPERHEAD ENVIRONMENTAL CONSULTING	**Listed Bat Presence/Probable Absence Survey for TVA Shortleaf Pine Restoration Project, Lauderdale County, AL.** **Photographic Record**	
Project No.: **856**	**County:** **Lauderdale**	**Client:** **TVA**

Photo: sp1, Net A	
Dates: 7-8 August 2019	
Location: Lauderdale Co., 35.006799, -88.179011	
Habitat: Corridor	
Description: Forest Corridor on ATV trail	

Photo: sp1, Net B	
Dates: 7-8 August 2019	
Location: Lauderdale Co., 35.006846, -88.179453	
Habitat: Corridor	
Description: Forest Corridor on ATV trail	

Photo: sp1, Net C	
Dates: 7-8 August 2019	
Location: Lauderdale Co., 35.006875, -88.180184	
Habitat: Corridor	
Description: ATV trail	

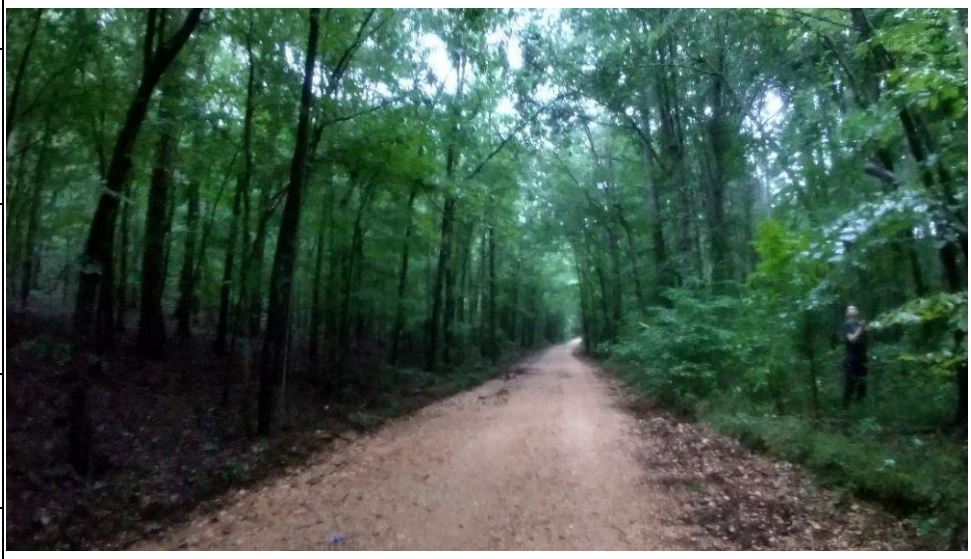
Photo: sp1, Net D	
Dates: 7-8 August 2019	
Location: Lauderdale Co., 35.006029, -88.180332	
Habitat: Corridor	
Description: Hitchcock Lane	

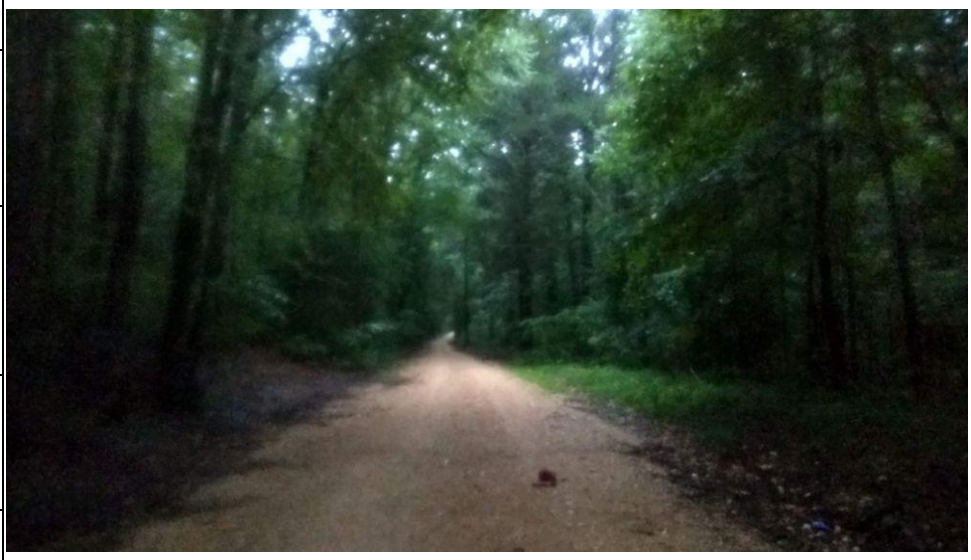
Photo: sp1, Net E	
Dates: 7-8 August 2019	
Location: Lauderdale Co., 35.006999, -88.180416	
Habitat: Corridor	
Description: Hitchcock Lane	

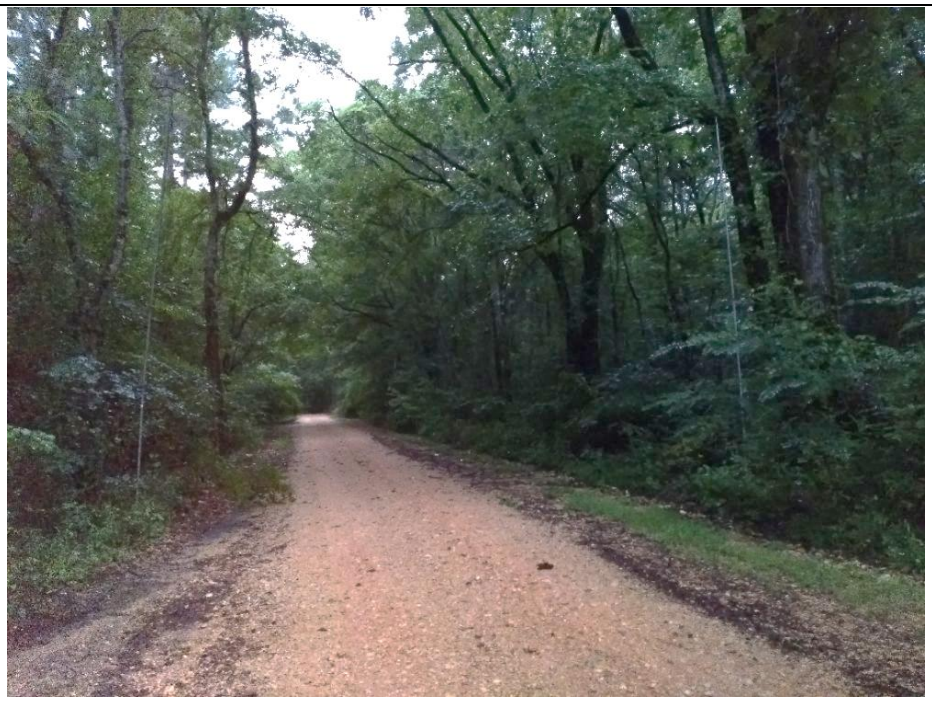
Photo: sp2, Net A **Dates:** 7 & 9 August 2019 **Location:** Lauderdale Co., 35.001449, -88.179721 **Habitat:** Corridor **Description:** Hitchcock Lane	

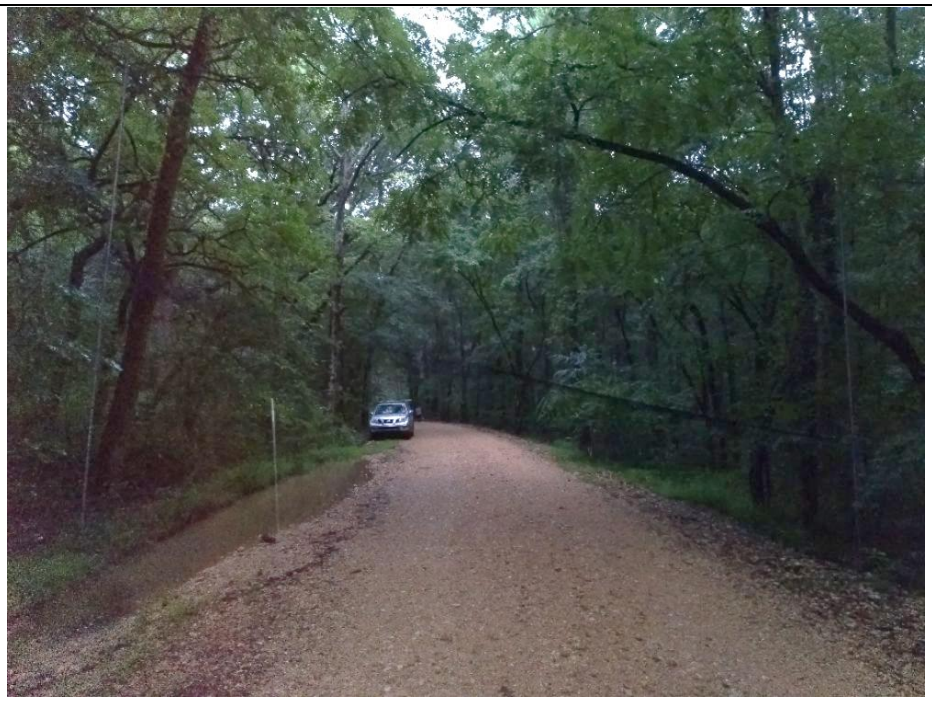
Photo: sp2, Net B **Dates:** 7 & 9 August 2019 **Location:** Lauderdale Co., 35.00101, -88.179383 **Habitat:** Corridor **Description:** Hitchcock Lane	

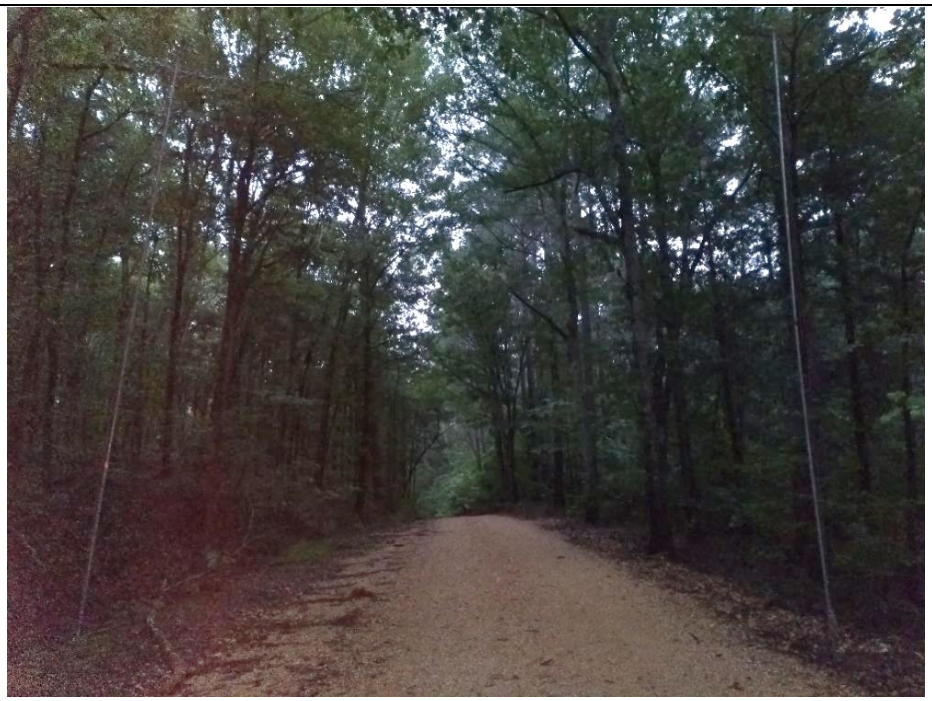
Photo: sp2, Net C **Dates:** 7 & 9 August 2019 **Location:** Lauderdale Co., 35.000652, -88.179553 **Habitat:** Corridor **Description:** Hitchcock Lane	

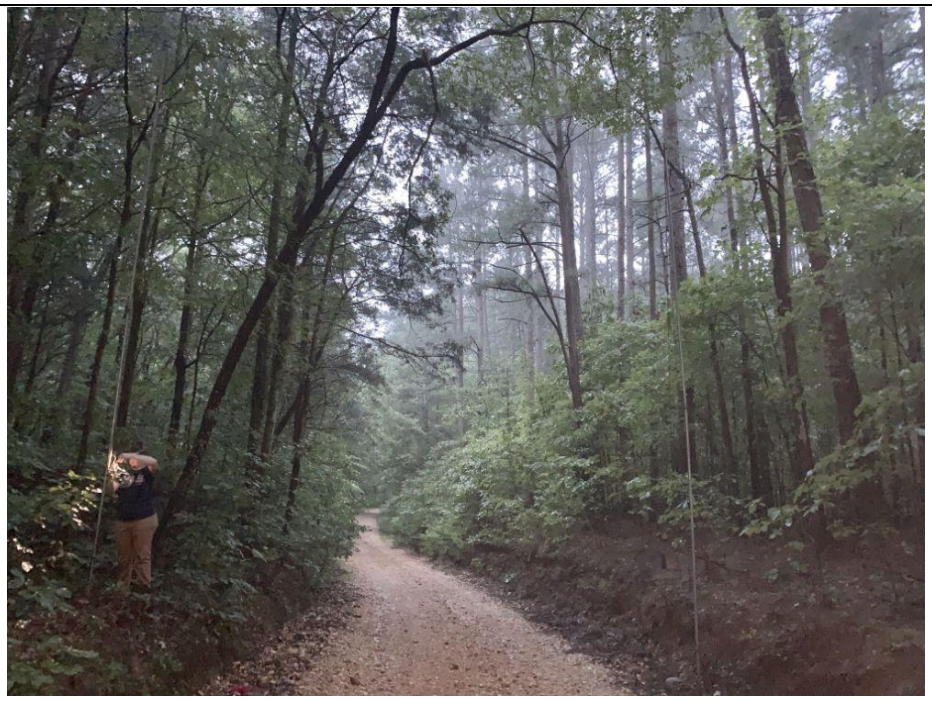
Photo: sp2, Net D **Dates:** 7 & 9 August 2019 **Location:** Lauderdale Co., 34.999889, -88.179061 **Habitat:** Corridor **Description:** Hitchcock Lane	

Photo: sp2, Net E **Dates:** 7 August 2019 **Location:** Lauderdale Co., 35.000447, -88.179618 **Habitat:** Edge **Description:** Hitchcock Lane	

Photo: sp3, Net A **Dates:** 8-9 August 2019 **Location:** Lauderdale Co., 34.998323, -88.179015 **Habitat:** Corridor **Description:** Hitchcock Lane	

Photo: sp3, Net B **Dates:** 8-9 August 2019 **Location:** Lauderdale Co., 34.998137, -88.179015 **Habitat:** Corridor **Description:** Hitchcock Lane	

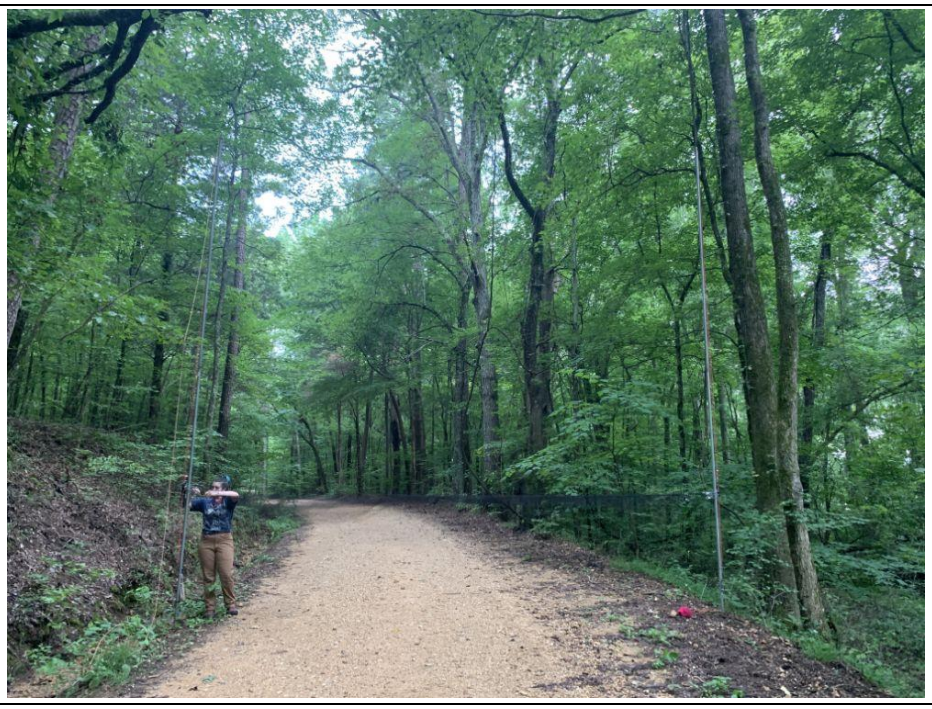
Photo: sp3, Net C **Dates:** 8-9 August 2019 **Location:** Lauderdale Co., 34.997549, -88.179545 **Habitat:** Corridor **Description:** Hitchcock Lane	

Photo: sp3, Net D **Dates:** 8-9 August 2019 **Location:** Lauderdale Co., 34.997979, -88.179498 **Habitat:** Creek **Description:** Hitchcock Branch	

Photo: sp3, Net E **Dates:** 8 August 2019 **Location:** Lauderdale Co., 34.997836, -88.179739 **Habitat:** Creek **Description:** Hitchcock Branch	

Appendix C: Mist-net Data Sheets

Mist Netting Data Form 2017

Sheet 1 of 1

Site No. SP2 Project.Phase# 85601 Project Name TVA Shoffear Pkwy Dates 7+9 August 2019

Site Location Hitchcock Ln Habitat Type* Bottomland Forest

County Lauderdale State AL Permitee S. Patterson + W. Seiter Technician(s) A McKay, K Donahue

Lat/Lon or UTM (circle one): N/Easting 35.000871 W/Northing -86.179551 UTM Zone — Datum NAD-83

COPPERHEAD ENVIRONMENTAL CONSULTING

#	Date	Time	Species	Age	Sex	Repro	Mass (g)	RFA (mm)	Net	Height (m)	WDI	Band# Type AL-WFF	Freq.	Comments
1	7AUG	7015	LABO	A	M	TD	9.0	37	A	3	0			
2	"	1020	LABO	A	F	NR	11.5	40	B	4.5	0			
3	"	2030	LABO	A	F	NR	9.75	41	B	4	0			
4	"	7030	LABO	—	—	—	—	—	D	3.5	—			escape
5	"	2100	LABO	A	F	NR	9.75	41	C	4	0			recap #3
1	9AUG	2190	MYGR	A	F	PL	9.75	47	B	5	0	A0723		
2	"	2250	EPFU	A	M	TD	10.5	45	A	4	0			
3	"	0030	LABO	A	F	NR	12.0	43	B	1.5	0			

Date	Moon%	Moon rise	Moon set	Sunrise	Sunset
7AUG	54	1320	0027	0600	1949
8AUG	71	1525	0148	0608	1947

Date	Time	Temp (°F)	Sky	Wind	Comments
7AUG	1949	73	5	0	
"	2049	72	5	0	
"	2149	72	2	0	
"	2249	72	0	0	
"	2349	71	0	0	
"	0049	71	0	0	
9AUG	1947	82	2	0	
"	2047	79	2	0	
"	2147	78	1	0	
"	2247	78	0	0	
"	2347	78	0	0	
"	0047	78	1	1	

Sky Code	
0	Clear
1	Few Clouds
2	Partly Cloudy
3	Cloudy or overcast
4	Fog or smoke
5	Drizzle or light rain
6	Heavy rain - thunder storm

Beaufort Wind Scale	
0	Calm: <1 mph
1	Light air: 1-3 mph
2	Light breeze: 4-6 mph
3	Gentle breeze: 7-10 mph
4	Moderate breeze: 11-16 mph

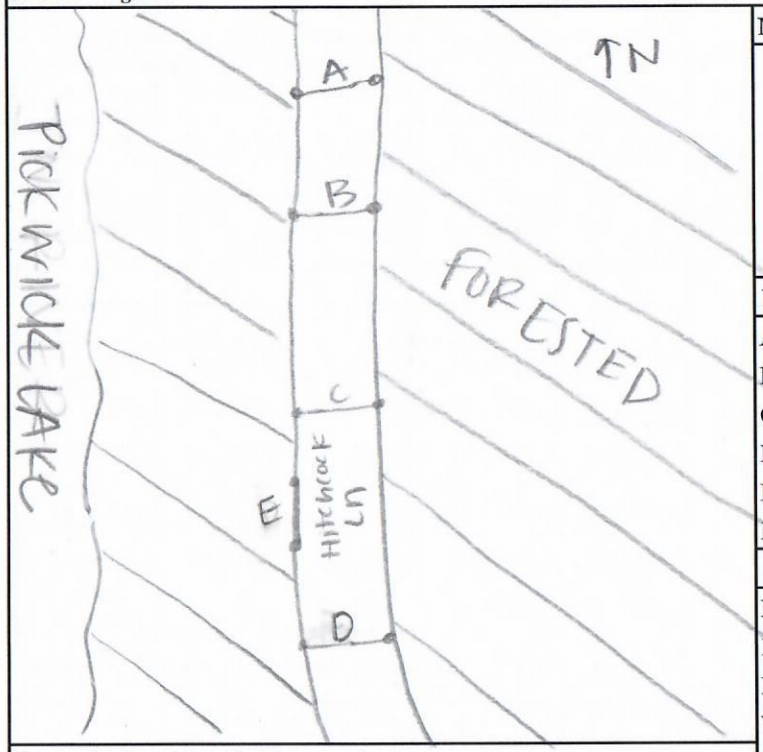
Species Abbreviations: *Corynorhinus rafinesquii* (CORA); *Corynorhinus t. virginianus* (COVI); *Eptesicus fuscus* (EPFU); *Lasiurus borealis* (LABO); *Lasiurus cinereus* (LACI); *Lasiurus seminolus* (LASE); *Lasionycteris noctivagans* (LANO); *Myotis austroriparius* (MYAU); *Myotis grisescens* (MYGR); *Myotis leibii* (MYLE); *Myotis lucifugus* (MYLU); *Myotis septentrionalis* (MYSE); *Myotis sodalis* (MYSO); *Nycticeius humeralis* (NYHU); *Perimyotis subflavus* (PESU); *Tadarida brasiliensis* (TABR)

Other Abbreviations: Male: M; Female: F; Pregnant: P; Lactating: L; Post Lactating: PL; Testes Descended: TD; Non Repro: N; Unknown: U

*** Habitat Type:** Creek/riparian; Bottomland forest; Upland forest; Pond; Cave entrance; Mine portal; Bridge; Structure; Field edge; Open field; Other

Site No. SP2 Project.Phase# 856 01 Project Name TVA Shortleaf Pine RX Dates 7+9 August 2019

Net Site Diagram



Net height x net length (m)			Dates
A =	52 x	9	7+9 Aug
B =	52 x	9	7+9 Aug
C =	52 x	6	7+9 Aug
D =	52 x	6	7+9 Aug
E =	24 x	4	7 Aug
F =	x		

Net Set GPS Location (UTM or Lat/Long)		
A =	35.001449	-88.179721
B =	35.00101	-88.179383
C =	35.000652	-88.179553
D =	34.999889	-88.179061
E =	35.000947	-88.179618
F =		

Transmitters			
Band#		Band#	
Freq.		Freq.	
Brand		Brand	
Weight		Weight	
#days		#days	

Net Set by Habitat						
Habitat	A	B	C	D	E	F
Corridor	X	X	X	X	X	
Road Rut						
Creek						
River						
Pond						
Forest Gap						
Cave						
Mine						
Tree						
Other: list				X edge	X edge	

Date	Time nets up	Time nets down
7 Aug	1950	0050
9 Aug	1947	0047

Dominant Vegetation

1. Acer rubrum
2. Juglans nigra
3. Liquidambar styraciflua
4. Quercus alba
5. Quercus marilandica
6. Pinus echinata

Potential listed bat habitat at site:

2 **Roost habitat**: **1. Poor**: No or few snags >= ~5" DBH with sloughing bark or other usable roost features (cracks, crevices, etc) **2. Moderate**: Snags with sloughing bark or other roost features present ~5-15 inch DBH within 1000 feet of forested areas. **3. Optimal**: Snags with sloughing bark or other roost features present >~15 inch DBH within 1000 feet of forested areas.

3 **Water Resources**: **1. Poor**: bat drinking resources not present at the site. **2. Moderate**: Ephemeral or intermittent streams or ponded areas present but too cluttered to allow many bats to drink easily or simultaneously. No corridors, openings or canopy gaps allow bats easy access to the resource. **3. Optimal**: Streams or ponds (including road ruts) present that appear to offer drinking resource throughout the majority of the summer. Flyways to resources are available.

3 **Forest Structure**: (if hardwoods are absent or nearly absent or if stand is monoculture, area automatically qualifies as a 1: poor).
1. Poor: Habitat even aged and young. Trees smaller than 5 inch DBH. Understory growth cluttered and restricts flying/foraging **2. Moderate**: some diversity in age of trees in the stand. Trees 5 to 15 inches present. Understory clutter dominant but not ubiquitous. Trees greater than 15" DBH may be present but rare. **3. Optimal**: Mature forest. Diverse age classes of trees present. Trees > 15 inch DBH frequent. Varying tree height and treefalls allow for frequent small openings and gaps that facilitate bat foraging.

3 **Land Cover**: **1. Poor**: Area surrounding site predominantly un-forested. Few mature trees present not connected to other areas of trees.
2. Moderate: Trees present in the form of small woodlots and wooded fence rows. Little connection to adjacent forested areas.
3. Optimal: Area is largely forested. Wooded stands are connected to other wooded stands via wooded stream, fence row, or other wooded corridor.

Comments:

Mist Netting Data Form 2017

Sheet_____ of_____

Site No. SP1 Project.Phase# 856.01 Project Name TVA Shortleaf Pine Dates 7 Aug 19 - 8 Aug 19

Site Location ATV Trail off Hickory Rd Habitat Type* Bottomland Forest

County Lauderdale State AL Permitee W. Seiter Technician(s) K. Penatuc

Lat/Lon or UTM (circle one): N/Easting 35.0069 W/Northing -88.1803 UTM Zone — Datum NAD 83

COPPERHEAD ENVIRONMENTAL CONSULTING

#	Date	Time	Species	Age	Sex	Repro	Mass (g)	RFA (mm)	Net	Height (m)	WDI	Band# Type AL-WFF	Freq. _____	Comments
1	7 Aug 19	2030	EPFU	J	F	N	18.0	48.0	E	1	0	—	—	—
2	7Aug 19	2030	EPFU	A	F	PL	21.0	49.0	E	2	0	—	—	—
3	7Aug 19	0020	MYAU	J	F	NR	7.25	35.0	D	1	0	A0721	—	—
4	7Aug 19	0020	LABO	J	F	N	9.5	41.0	E	3	0	—	—	—
1	8 Aug	2115	LABO	A	F	PL	14.25	41.0	D	2.5	0	—	—	—
2	8 Aug	2330	EPFU	J	F	NR	17.25	48.0	E	2.0	0	—	—	—
3	8 Aug	0005	MYAU	J	M	NR	5.5	34	E	2.5	0	A0722	—	—
4	8Aug	0034	LABO	A	M	TD	8.75	38	D	4.0	0	—	—	—
5	8 Aug	0050	LABO	A	M	TD	9.5	41	E	6.0	0	—	—	—

Date	Moon%	Moon rise	Moon set	Sunrise	Sunset
7Aug	50	1322	0028	0606	1951
8Aug	61	1425	0106	0607	1950

Date	Time	Temp (°F)	Sky	Wind	Comments
7Aug	2000	73	5	1	—
7Aug	2100	72	5	2	—
7Aug	2200	72	2	1	—
7Aug	2300	72	2	0	—
7Aug	0000	71	0	0	—
7Aug	0100	71	0	0	—
8Aug	2000	78	2	0	—
8Aug	2100	77	3	0	—
8Aug	2200	77	3	0	—
8Aug	2300	77	2	0	—
8Aug	0000	77	1	0	—
8Aug	0100	77	2	0	—

Sky Code	
0	Clear
1	Few Clouds
2	Partly Cloudy
3	Cloudy or overcast
4	Fog or smoke
5	Drizzle or light rain
6	Heavy rain - thunder storm

Beaufort Wind Scale	
0	Calm: <1 mph
1	Light air: 1-3 mph
2	Light breeze: 4-6 mph
3	Gentle breeze: 7-10 mph
4	Moderate breeze: 11-16 mph

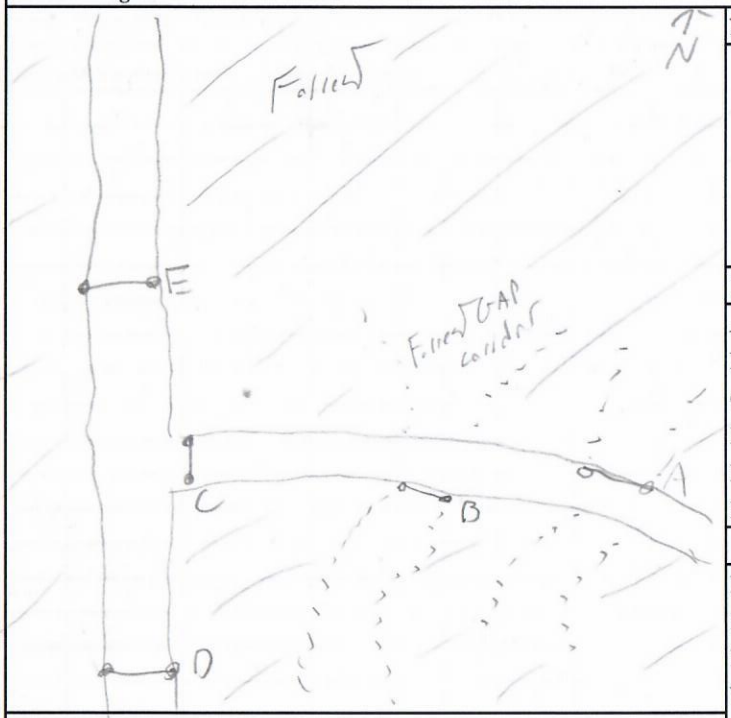
Species Abbreviations: *Corynorhinus rafinesquii* (CORA); *Corynorhinus t. virginianus* (COVI); *Eptesicus fuscus* (EPFU); *Lasiurus borealis* (LABO); *Lasiurus cinereus* (LACI); *Lasiurus seminolus* (LASE); *Lasionycteris noctivagans* (LANO); *Myotis austroriparius* (MYAU); *Myotis grisescens* (MYGR); *Myotis leibii* (MYLE); *Myotis lucifugus* (MYLU); *Myotis septentrionalis* (MYSE); *Myotis sodalis* (MYSO); *Nycticeius humeralis* (NYHU); *Perimyotis subflavus* (PESU); *Tadarida brasiliensis* (TABR)

Other Abbreviations: Male: M; Female: F; Pregnant: P; Lactating: L; Post Lactating: PL; Testes Descended: TD; Non Repro: N; Unknown: U

*** Habitat Type:** Creek/riparian; Bottomland forest; Upland forest; Pond; Cave entrance; Mine portal; Bridge; Structure; Field edge; Open field; Other

Site No. SP7 Project.Phase# 8560.01 Project Name TVA Shortleaf Pine Dates 7 Aug 19 - 8 Aug 19

Net Site Diagram



Net height x net length (m)			Dates
A =	5.2	x 12	7 Aug - 8 Aug
B =	5.2	x 6	7 Aug - 8 Aug
C =	5.2	x 4	7 Aug - 8 Aug
D =	5.2	x 9	7 Aug - 8 Aug
E =	7.8	x 9	7 Aug - 8 Aug
F =		x	

Net Set GPS Location (UTM or Lat/Long)		
A =	35.006799	-88.179011
B =	35.006946	-88.179453
C =	35.006875	-88.180184
D =	35.006029	-88.180332
E =	35.006999	-88.180416
F =		

Transmitters			
Band#		Band#	
Freq.		Freq.	
Brand		Brand	
Weight		Weight	
#days		#days	

Net Set by Habitat						
Habitat	A	B	C	D	E	F
Corridor	X	X	X	X	X	
Road Rut						
Creek						
River						
Pond						
Forest Gap						
Cave						
Mine						
Tree						
Other: list						

Date	Time nets up	Time nets down
7 Aug	1951	0051
8 Aug	1950	0050

Dominant Vegetation

1. P. echinata
2. P. taeda
3. L. styraciflua
4. Q. alba
5. J. virginiana
6. V. rubra

Potential listed bat habitat at site:

2 **Roost habitat**: **1. Poor**: No or few snags >= ~5" DBH with sloughing bark or other usable roost features (cracks, crevices, etc) **2. Moderate**: Snags with sloughing bark or other roost features present ~5-15 inch DBH within 1000 feet of forested areas. **3. Optimal**: Snags with sloughing bark or other roost features present >~15 inch DBH within 1000 feet of forested areas.

3 **Water Resources**: **1. Poor**: bat drinking resources not present at the site. **2. Moderate**: Ephemeral or intermittent streams or ponded areas present but too cluttered to allow many bats to drink easily or simultaneously. No corridors, openings or canopy gaps allow bats easy access to the resource. **3. Optimal**: Streams or ponds (including road ruts) present that appear to offer drinking resource throughout the majority of the summer. Flyways to resources are available.

3 **Forest Structure**: (if hardwoods are absent or nearly absent or if stand is monoculture, area automatically qualifies as a 1: poor).
1. Poor: Habitat even aged and young. Trees smaller than 5 inch DBH. Understory growth cluttered and restricts flying/foraging **2. Moderate**: some diversity in age of trees in the stand. Trees 5 to 15 inches present. Understory clutter dominant but not ubiquitous. Trees greater than 15" DBH may be present but rare. **3. Optimal**: Mature forest. Diverse age classes of trees present. Trees > 15 inch DBH frequent. Varying tree height and treefalls allow for frequent small openings and gaps that facilitate bat foraging.

3 **Land Cover**: **1. Poor**: Area surrounding site predominantly un-forested. Few mature trees present not connected to other areas of trees.
2. Moderate: Trees present in the form of small woodlots and wooded fence rows. Little connection to adjacent forested areas.
3. Optimal: Area is largely forested. Wooded stands are connected to other wooded stands via wooded stream, fence row, or other wooded corridor.

Comments:

Mist Netting Data Form 2017

Sheet 1 of 1

Site No. SP3 Project.Phase# 856.01 Project Name Shortleaf Pine RX burn Dates 8-9 August 2017

Site Location Hitchcock Ln + Hitchcock Branch Habitat Type* Bottomland forest

County Lauderdale State AL Permitee S Patterson Technician(s) A McKay

Lat/Lon or UTM (circle one): N/Easting 34.997931 W/Northing -88.179404 UTM Zone — Datum NAD 83

COPPERHEAD ENVIRONMENTAL CONSULTING

#	Date	Time	Species	Age	Sex	Repro	Mass (g)	RFA (mm)	Net	Height (m)	WDI	Band# Type NL WFF	Freq. —	Comments
1	BMG	0003	MYGR	A	F	PL	10.5	45	B	4	0	0913	—	
2		0035	LABO	A	M	TD	10.25	42	A	2	0			
3		0035	LABO	A	M	NR	11.0	42	A	4.5	0			
4		0035	EPFU	A	F	PL	20.0	50	A	2.5	0			
1	9MG	20:33	LABO	A	M	TD	9	43	A	3.25	0		—	
2		21:08	NYHU	A	M	TD	9.25	37	B	2.5	0		—	

Date	Moon%	Moon rise	Moon set	Sunrise	Sunset
BMG	61	1425	0028	0607	1950
9MG	79	1624	0148	0609	1946

Date	Time	Temp (°F)	Sky	Wind	Comments
BMG	1950	79	0	0	
	2050	77	0	0	
	2150	76	0	0	
	2250	75	0	0	
	2350	75	0	0	
	0050	77	2	0	
9MG	1950	81	1	0	
	2050	78	1	0	
	2150	77	0	0	
	2250	77	0	0	
	2350	76	0	0	
	0050	76	0	0	

Sky Code

0	Clear
1	Few Clouds
2	Partly Cloudy
3	Cloudy or overcast
4	Fog or smoke
5	Drizzle or light rain
6	Heavy rain - thunder storm

Beaufort Wind Scale

0	Calm: <1 mph
1	Light air: 1-3 mph
2	Light breeze: 4-6 mph
3	Gentle breeze: 7-10 mph
4	Moderate breeze: 11-16 mph

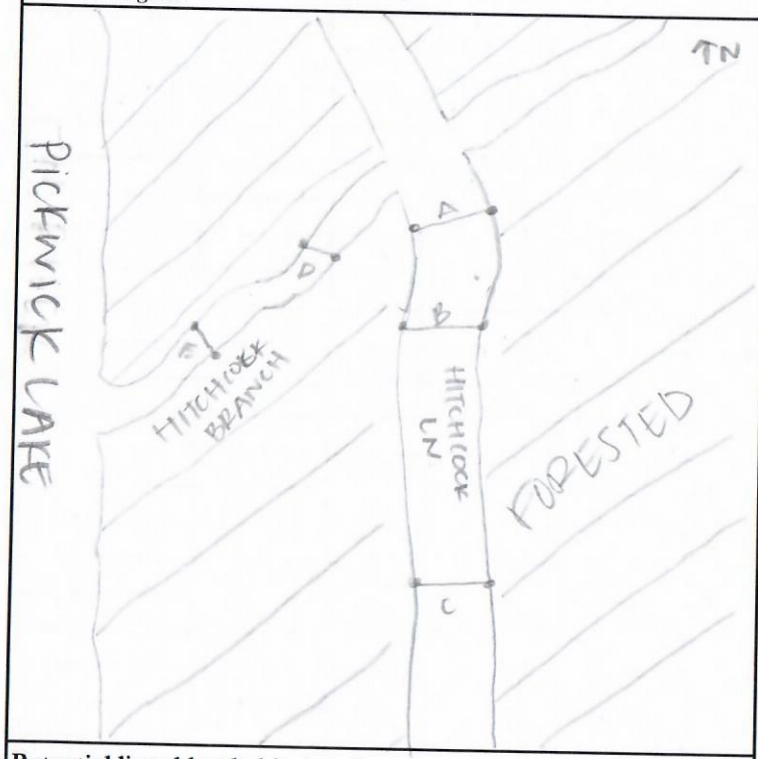
Species Abbreviations: *Corynorhinus rafinesquii* (CORA); *Corynorhinus t. virginianus* (COVI); *Eptesicus fuscus* (EPFU); *Lasiurus borealis* (LABO); *Lasiurus cinereus* (LACI); *Lasiurus seminolus* (LASE); *Lasionycteris noctivagans* (LANO); *Myotis austroriparius* (MYAU); *Myotis grisescens* (MYGR); *Myotis leibii* (MYLE); *Myotis lucifugus* (MYLU); *Myotis septentrionalis* (MYSE); *Myotis sodalis* (MYSO); *Nycticeius humeralis* (NYHU); *Perimyotis subflavus* (PESU); *Tadarida brasiliensis* (TABR)

Other Abbreviations: Male: M; Female: F; Pregnant: P; Lactating: L; Post Lactating: PL; Testes Descended: TD; Non Repro: N; Unknown: U

*** Habitat Type:** Creek/riparian; Bottomland forest; Upland forest; Pond; Cave entrance; Mine portal; Bridge; Structure; Field edge; Open field; Other

Site No. SP3 Project.Phase# 856.01 Project Name SHOWKAT PINE RX BURN Dates 8-9 AUG 2019

Net Site Diagram



Net height x net length (m)			Dates
A =	5.2 x	9	8 9 AUG
B =	5.2 x	9	8-9 AUG
C =	5.2 x	6	8-9 AUG
D =	5.2 x	6	8-9 AUG
E =	2.9 x	4	8 AUG
F =	x		

Net Set GPS Location (UTM or Lat/Long)		
A =	34.998323	-88.179015
B =	34.998137	-88.179226
C =	34.997549	-88.179545
D =	34.997979	-88.179498
E =	34.997836	-88.179737
F =		

Transmitters			
Band#		Band#	
Freq.		Freq.	
Brand		Brand	
Weight		Weight	
#days		#days	

Net Set by Habitat						
Habitat	A	B	C	D	E	F
Corridor	X	X	X			
Road Rut				X	X	
Creek						
River						
Pond						
Forest Gap						
Cave						
Mine						
Tree						
Other: list						

Date	Time nets up	Time nets down
8 AUG	1950	0050
9 AUG	1950	0050

Dominant Vegetation

1. Platanus occidentalis
2. Liquidambar styraciflua
3. Pinus echinata
4. Acer rubrum
5.
6.

Potential listed bat habitat at site:

2 **Roost habitat**: **1. Poor**: No or few snags >= ~5" DBH with sloughing bark or other usable roost features (cracks, crevices, etc) **2. Moderate**: Snags with sloughing bark or other roost features present ~5-15 inch DBH within 1000 feet of forested areas. **3. Optimal**: Snags with sloughing bark or other roost features present >~15 inch DBH within 1000 feet of forested areas.

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Comments:

Appendix E – Responses to Comments

Commenter	Comment Summary	TVA Response
United States Fish and Wildlife Service	The Service has no concerns or objections to the TVA fulfilling the requirements of the Endangered Species Act of 1973, as amended, by utilizing the programmatic consultation.	Comment noted. As stated in the comment, TVA would implement the programmatic bat consultation and its 2019 TVA Bat Strategy Review for this project.
Tennessee Wildlife Resources Agency - Dry Creek Wildlife Management Area	I support the action alternative to restore and manage short-leaf pine habitats on TVA lands.	Comment noted. Thank you for your input.
Tennessee Wildlife Resources Agency - Dry Creek Wildlife Management Area	Additional actions beyond habitat management are needed by TVA to protect the natural resources, wildlife habitat, and water quality on these lands. Unregulated off-road vehicle traffic currently taking place on TVA land has caused extensive habitat destruction.	Comment noted. TVA uses signage, web-based materials, staff and trained volunteers to discourage ORV use in non-designated areas. TVA's 2020 Natural Resources Plan includes multiple programs that can help address ORV use on TVA lands (e.g., Developed Recreation Management, Dispersed Recreation Management, Trails Management, and Recreation Partnerships programs). TVA encourages coordination with partner agencies to identify and respond to unauthorized activities. Specific issues with TVA-managed public lands and facilities may be reported to the TVA Public Lands Information Center at plic@tva.gov or 800-882-5263 (800-TVA-LAND).
Tennessee Wildlife Resources Agency - Dry Creek Wildlife Management Area	TVA needs to coordinate with the other landowners on Hitchcock lane to get the road officially abandoned by Hardin County highway department since the county does not maintain it. This would allow the gating and closure of Hitchcock lane to vehicle traffic and the protection of the stream and other resources in the area.	Comment noted. TVA encourages coordination with partner agencies to identify and respond to unauthorized activities. TVA appreciates notification of the possible benefits associated with closure of Hitchcock Lane, although that action is outside of the scope of this Environmental Assessment.
Tennessee Wildlife Resources Agency - Dry Creek Wildlife Management Area	TVA needs to repair their barriers, cables, and guard rails intended to block off-road vehicle traffic that have been heavily vandalized and left in disrepair for years.	Comment noted. Specific issues with TVA-managed public lands and facilities may be reported to the TVA Public Lands Information Center at plic@tva.gov or 800-882-5263 (800-TVA-LAND).

Commenter	Comment Summary	TVA Response
Tennessee Wildlife Resources Agency - Dry Creek Wildlife Management Area	TVA needs to enforce their regulations regarding off-road vehicle traffic.	Comment noted. See response to Comment Response 4 above.
Tennessee Wildlife Resources Agency	I believe TVA should choose the Action Alternative to restore Short Leaf Pines on these WMA's and TVA lands.	Comment noted. Thank you for your input.
Tennessee Wildlife Resources Agency	Managing off road vehicle traffic will be an important part of successfully restoring native habitats. Barriers to exclude ORV's and enforcement of ORV trespass, should be included in the list of restoration activities listed in the proposal.	Comment noted. Many roads used to access restoration sites are currently gated and those gates will be closed once restoration is complete. Damaged gates may be repaired or replaced. Specific issues with TVA-managed public lands and facilities may be reported to the TVA Public Lands Information Center at plic@tva.gov or 800-882-5263 (800-TVA-LAND).
United States Environmental Protection Agency	Upon review of the DEA for the Shortleaf Pine Initiative, the EPA concludes that appropriate alternatives were considered and analyzed. The Action Alternative is supportive of TVA's requirement to enhance shortleaf pine habitat. The Action Alternative is technically and economically feasible, and is reasonably consistent with TVA's current land use management for these areas. It also appears that this project will not have a significant impact on human health and the environment. The EPA has no additional concerns at this time.	Comment noted. Thank you for your input.
Tennessee Department of Environment and Conservation	TDEC believes the Draft EA adequately addresses potential impacts to cultural resources within the proposed project area.	Comment noted. Thank you for your input.

Commenter	Comment Summary	TVA Response
Tennessee Department of Environment and Conservation	With respect to open burning, TDEC recommends avoiding burning on days with poor smoke dispersion, not burning on air quality alert days, use of good smoke management practices when planning the open burning and insuring coordination with forestry agencies and local fire agencies prior to conducting any planned burning. TDEC oversees open burning regulations within Hardin County and would need to be contacted about open burning of any vegetative or construction/ demolition related debris generated from the project before the burning begins.	Section 2.4 of the EA has been updated to clarify that TVA will coordinate burn plans with the government agencies responsible for burning regulations in Hardin and Lauderdale counties.
Tennessee Department of Environment and Conservation	TDEC also recommends that the actual acreage of the portion of the 285-acre parcel to be burned is described in the Final EA and associated planning documents, along with the acreage of areas to be treated by spraying and area to be manually treated using mechanized equipment or hand tools.	Section 1.3 of the EA has been updated to disclose that the potential burn area for the 285-acre parcel is approximately 210 acres, and that there are approximately 55 acres of shortleaf pine stand type (thinning would be conducted along the ridgetops and side slopes where shortleaf pine currently grow). Herbicide would be used on an as-needed basis to control non-native species.
Tennessee Department of Environment and Conservation	TDEC encourages TVA to include details in the Final EA regarding the measures designed to mitigate fugitive dust emissions that could be generated during proposed activities. TDEC recommends that TVA discuss anticipated emissions generated by the gasoline and diesel fueled trucks and construction equipment used. TDEC further recommends discussion of how these emissions are expected to be minimized through the use of proper maintenance, new emissions control technologies, and fuels along with the minimization of unnecessary heavy duty vehicle idling, and where possible through using newer trucks for long haul off-site transport to help mitigate emissions during activities.	Section 4.1.1.2 of the EA has been updated to state that emissions would be minimized through these measures where possible. The EA (Section 4.1.12.2) discloses that there would be an average of 10 vehicle trips per day associated with restoration activities on the 285-acre parcel. While these vehicles would produce emissions, the small number of vehicles is unlikely to trend either county toward non-attainment status under the Clean Air Act.

Commenter	Comment Summary	TVA Response
Tennessee Department of Environment and Conservation	TDEC recommends that the Final EA consider and explicitly reflect that any wastes associated with such activities in Tennessee be managed in accordance with the Solid and Hazardous Waste Rules and Regulation of the State of Tennessee (TDEC DSWM Rule 0400 Chapters 11 and 12, respectively).	Section 2.4 of the EA has been updated to incorporate the request in this comment.
Tennessee Department of Environment and Conservation	TDEC encourages TVA to engage in appropriate forestry Best Management Practices for working near stream-sides and at any stream road crossings. Additionally, buffer zones and erosion control BMPs should be established near streams. It is critical to maintain herbicide application and erosion control buffers and BMPs around streams and Pickwick Lake as the First Utility District of Hardin County has an intake less than 10 miles downstream.	Section 2.4 of the EA states that herbicide application would not be applied near streams; any herbicides applied near stream features would have to be approved for aquatic use and would be used according to label instructions. Section 4.1.10 describes the use of BMPs that would minimize contamination of surface water in the project area.
Alabama Department of Environmental Management	The Alabama Department of Environmental Management has reviewed the Shortleaf Pine Initiative Draft Programmatic Environmental Assessment and 285-Acre Site Specific Review. Based on this review, the Department has no comments at this time.	Comment noted. Thank you for your review.