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ENVIRONMENTAL ASSESSMENT

OCOEE 2-OCOEE 3 TRANSMISSION LINE REPLACEMENT

Polk County, Tennessee

Prepared by
TENNESSEE VALLEY AUTHORITY

Cooperating Agency
CHEROKEE NATIONAL FOREST

NOVEMBER 2006

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CHAPTER 1

1. PURPOSE OF AND NEED FOR ACTION

1.1. Proposed Action

Tennessee Valley Authority (TVA) is proposing to replace the existing 69-kilovolt (kV) transmission line (TL) between its Ocoee Number 2 (Ocoee 2) Hydroelectric Power Plant (Hydro Plant) and Ocoee Number 3 (Ocoee 3) Hydro Plant with a new TL. (The line is referred to in this document as the Ocoee 2-Ocoee 3 TL.) The existing TL is located in Polk County, Tennessee, about 20 miles east of Cleveland. It runs for about 4 miles through the Ocoee River Gorge along U.S. Highway (US) 64 in the Cherokee National Forest (CNF). The proposed TL would run for about 4.7 miles through the CNF south of the Ocoee River Gorge. The existing TL, the proposed TL, and additional alternative TL routes are shown in Figure 1. TVA has prepared this environmental assessment (EA) to evaluate the environmental impacts of the proposed TL. The CNF is a cooperating agency in the preparation of the EA because TVA's proposal would require a U.S. Forest Service (USFS) Special Use Permit if National Forest System (NFS) land would be needed for additional right-of-way (ROW) outside the present TL corridor.

1.2. Objectives of the Proposed Replacement of the Ocoee 2-Ocoee 3 Transmission Line

TVA needs a reliable TL that would effectively transmit the power from Ocoee 2 to Ocoee 3. The existing line has deteriorated and reliability has degraded and will continue to degrade unless action is taken.

TVA's Ocoee 2 Hydro Plant is connected to the TVA electric power transmission system only by the Ocoee 2-Ocoee 3 TL. This TL is thus the only transmission connection for the 28 megawatts (MW) of generation from the hydro plant. The TL, purchased by TVA in 1939, uses mostly steel A-frame square towers and a few wood poles. It is in very poor condition. The latest inspection showed that over 90 percent of the insulators have either paint or rust contamination, chipping, or blistering, which cause poor insulation performance. The hooks and hanger plates are more than 50 percent deteriorated for all of the structures. Of the 24 total structures, seven towers and two poles require immediate replacement. An additional seven towers will require replacement in one or two years. The conductor for this line has broken multiple times due to ice, and it needs replacement as well. The TL averages over five hours of outage per year, and this situation is expected to increase with time. The five hours of outage exceeds TVA's planning criteria of no more than two hours per year for delivery points. The generation is a valuable asset TVA relies upon to support the power system and meet peak power demands. In order to be able to continue to transmit this generation, TVA must improve the reliability of the TL serving it.

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Figure 1. Existing and Proposed Ocoee 2-Ocoee 3 Replacement Transmission Line Routes

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The Ocoee Scenic Byway was designated as the nation's first National Forest Scenic Byway in 1988. The area adjacent to the Byway is designated Management Prescription 7.A (Scenic Byway Corridors) in the USFS (2004a) publication entitled *Revised Land and Resource Management Plan for the Cherokee National Forest* (RLRMP, or the Forest Plan). Within this management prescription, the desired condition is described as natural appearing views and primarily a continuous forest overstory. Human-made alterations should fit well within the character of the surrounding landscape. Any management activity should not be evident to the average visitor. Standard RX7A-13 discourages new utility corridors within scenic byways (RLRMP, pages 114-116).

The lack of accessibility to the existing TL due to steep terrain and limited equipment space creates safety issues to workers during construction and/or maintenance activities and unplanned outages. Due to lack of accessibility and terrain, helicopters would be needed to fly materials and equipment to construction sites and to hover at the sites during work, which poses a higher safety risk to workers than traditional methods of ground construction. Also, risks to the general public using US 64 and the Ocoee River would be increased by the use of helicopters. The deteriorated state of the existing energized TL poses a risk to the safety of the public.

1.3. Other Pertinent Environmental Reviews or Documentation

This EA has considered the following previous environmental reviews and documents prepared by the USFS and the U.S. Department of Transportation:

Final Environmental Impact Statement for 1996 Olympic Whitewater Slalom Venue, Ocoee River, Polk County, Tennessee, Ocoee Ranger District, Cherokee National Forest (USFS 1994). This document evaluates construction and operation of a whitewater competition course for the 1996 Summer Olympics and a permanent visitor center and recreational trail system for use by forest visitors. The Center is located between Ocoee 3 Dam and Powerhouse, along the Ocoee River about 1.5 miles upstream of the eastern end of the Ocoee2-Ocoee 3 TL. TVA was a cooperating agency in this EIS.

Revised Land and Resource Management Plan for the Cherokee National Forest (RLRMP) (USFS 2004a)*:* This document establishes the goals, objectives and standards under which the CNF is managed. A new TL needs to be consistent with these goals, objectives and standards. The plan was accompanied by the *Final Environmental Impact Statement for the Revised Land and Resource Management Plan* (USFS 2004b).

Environmental Assessment—Utility Corridor Native Grass Establishment, Tellico Ranger District, Cherokee National Forest (USFS 2006d) *:* This EA addresses maintenance of a TL across another section of the CNF in similar types of vegetation as the proposed Ocoee 2-Ocoee 3 TL with the use of the same kinds of herbicides that TVA would use to maintain its proposedTL.

Final Environmental Impact Statement for Vegetation Management in the Appalachian Mountains (VMEIS) (USFS 1989)*:* This document analyzes the effects of herbicide use in management of the CNF and other National Forests in the region. It addresses the same herbicides and management methods that TVA would use.

Draft Environmental Impact Statement and Draft Section 4(f) Evaluation, Appalachian Development Highway System Corridor K (Relocated US 64) from West of the Ocoee River

to State Route 68 near Ducktown, Polk County, Tennessee (Federal Highway Administration 2003) This document, prepared by the U.S. Department of Transportation, Federal Highway Administration, evaluates the environmental impacts associated with proposed new location alternatives for US 64 between US 411 and the Ocoee 3 area. The proposed new location alternatives would involve construction of US 64 outside of the Ocoee Gorge corridor to the north of existing US 64. The length of the proposed new highway is 20 miles, and both new location alternatives include two Ocoee River crossings between Ocoee 3 Dam and Ocoee 3 Powerhouse. The new location highway could require relocation of the TLs in the vicinity of Ocoee 3 Powerhouse.

1.4. Decisions

The primary decision before TVA is how to improve the reliability of the TL serving Ocoee 2 and reduce the risk of the loss of the Ocoee 2 generation.

Secondary decisions are involved. These include the following considerations:

- The timing of improvements
- The best location for the proposed TL
- Determining any necessary mitigation and/or monitoring measures to meet TVA and CNF standards and minimize potential damages to resources

If additional ROWs on NFS land are required, the decision before CNF would be whether to grant TVA approval to construct, operate, and maintain a new TL.

1.5. Scoping and Public Review

Scoping is the process of determining the issues and alternatives to be addressed in the EA. Because of the need to obtain the Special Use Permit and the cooperation of CNF in preparation of the EA, the scoping process and method of public involvement followed the USFS procedures set forth at 36 CFR 215.6(a)(3). This project was listed in the USFS Schedule of Proposed Actions for the CNF beginning in July 2004. On March 23, 2006, a legal notice was published in the *Knoxville News-Sentinel* to notify the public and solicit comments for 30 days. Letters explaining the proposed project and soliciting comments were mailed to 23 individuals and organizations who have expressed interest in being notified of CNF actions, as well as local, state, and federal governmental representatives; tribal leaders; and state and federal agencies. Information about the project and the 30-day public comment period was also posted on the TVA and CNF Web sites. In response to the notices and mailings, three comments were received. The Eastern Band of the Cherokee Indians requested a Phase I Archaeological Survey of the project's area of potential effect (APE) for potential effects on aboriginal Cherokee resources along with a request that copies be sent of related archaeological and cultural resource investigatory materials. The Tennessee Conservation League requested analysis of the alternative of rebuilding the TL in place. Mr. Ken Jones noted the need to address potential impacts of the proposed TL on the Benton MacKaye and Thunder Rock Express Trails. See Chapter 6 for a listing of those to whom letters were sent and Appendix A for copies of the comments received.

Issues Addressed in the EA

An issue may be a concern or a point of discussion, debate, or dispute about potential environmental effects that could lead to identification of an alternative. An issue could also arise if analysis is needed of whether an environmental resource is present and could be affected and whether mitigation of an effect would be required. The following issues were identified by agencies and the public during scoping, and TVA has addressed these issues in this EA.

- Consistency with the RLRMP
- Impacts on common terrestrial plants and animals and CNF management indicator species
- Impacts on common aquatic plants and animals
- Impacts on terrestrial and aquatic threatened, endangered, and other special status species
- Impacts on groundwater and surface water
- Impacts on wetlands and consistency with Executive Order (EO) 11990
- Impacts on floodplains and consistency with EO 11988
- Impacts on recreation
- Impacts on scenery (visual resources)
- Impacts on cultural resources

1.6. Necessary Permits

In addition to the Special Use Permit potentially needed from CNF under 36 CFR 251.50, a permit would be required from the State of Tennessee for construction site storm water discharge for the TL construction. A permit would also be required from the state for any burning of trees and other combustible materials removed during TL construction. TVA's Transmission Construction organization would prepare the required erosion and sedimentation control and other plans and coordinate these plans with the appropriate authorities in order to secure all necessary permits.

1.7. Other Agency Review

TVA informally consulted with the United States Fish and Wildlife Service (USFWS) regarding possible effects of the proposed TL on the bald eagle, Indiana bat, and small-whorled pogonia. TVA provided a biological evaluation (BE) to the USFWS with a determination that the project would not be likely to adversely affect the species, and the USFWS concurred. The letter of concurrence is attached in Appendix A. The BE is discussed further in Chapters 3 and 4 and is attached as Appendix G.

TVA consulted with the Tennessee State Historic Preservation Officer regarding effects on historic properties. The two agencies prepared a Memorandum of Agreement (MOA) specifying measures to be taken by TVA to resolve adverse effects. A copy of the MOA is attached as Appendix H.

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CHAPTER 2

2. ALTERNATIVES INCLUDING THE PROPOSED ACTION

This chapter describes the various alternatives considered. Information about construction, operation, and maintenance of the proposed TL and removal of the existing TL is also provided. The following five major sections are contained in this chapter:

- Description of Alternatives
- Description of Construction, Operation, and Maintenance of the Proposed Transmission Line
- Description of Removal of the Existing Transmission Line
- Comparison of Alternatives
- Summary of TVA Commitments and Proposed Mitigation Measures

2.1. Description of Alternatives

The study area for the TL was determined by considering applicable constraining factors, including proximity to power sources, land use and land type, known natural and cultural features, and engineering suitability. The study area for this project was identified as the area between the switchyards of the two power sources, Ocoee 2 on the west and Ocoee 3 on the east. Generally, the northern boundary of the study area was the existing TL corridor. The southern boundary was defined by the crests of the nearest ridges, Indian Flat Ridge and Chestnut Ridge, to the switchyards.

The principal criteria used in TL identification were technical feasibility; unobtrusive road crossings; avoidance of occupied structures and other incompatible land uses; and avoidance, wherever possible of any natural or human-made features the TL might significantly impact.

2.1.1. Alternative 1 - Rebuild Ocoee 2-Ocoee 3 Transmission Line in Place

Under this alternative, TVA would rebuild the TL in phases. TVA would initially replace seven towers and two poles and all the hardware and insulators. In the second phase, TVA would replace eight towers and replace the conductor for the entire TL. In the final phase, TVA would replace the remaining towers. This alternative would take about 36 months to complete. During the construction, the TL would be deenergized. However, in peak demand periods, work would cease and the TL would be put back in operation to support the transmission system. During these peak periods, the parts of the existing line not already replaced would continue to risk outage, with associated monetary and manpower maintenance costs.

The availability of the 28 MW of generation for supporting peak loads would be reduced during construction of this alternative because this is the only transmission connection for the 28 MW of generation from Ocoee 2. The majority of the TL would be constructed using helicopters due to lack of access for heavy equipment. Helicopters would be used to carry in/out materials such as structures, conductors, and necessary construction equipment (i.e., generators, augers, chain saws). A pole yard (laydown yard) would be required for worker assembly, vehicle parking, and material storage. An area south of the TL off NFS Road 45 would be used for the pole yard, as shown on Figure 1. Due to locations of the TL and pole

yard, the helicopter would cross the Ocoee River and US 64 multiple times per day during the project. The proposed site was selected in conjunction with USFS staff because it is flat, adjacent to access road NFS Road 45, and is an existing wildlife opening. As a wildlife opening it contains only one tree, so site clearing would be minimal, and after restoration would provide a more desirable wildlife opening.

2.1.2. Alternative 2 - Build Ocoee 2-Ocoee 3 Transmission Line Using New Right-of-Way and Portions of Existing Right-of-Way

Under this alternative, TVA would build a new TL using new ROW, which would overlap portions of the existing TL ROW. The route would be about 4 miles long and require about 36 acres of additional ROW. The proposed TL would have 22 structures. As with Alternative 1, the pole yard for worker assembly, vehicle parking, and material storage would be located in the area south of the TL off NFS Road 45, as shown on Figure 1. Construction would take about 11 months. The proposed ROW would be mostly forested. Investigation determined the route has very steep rocky terrain and limited access resulting in constructability and safety concerns. The majority of the TL would be constructed using helicopters and manual labor due to lack of access for heavy equipment. The route is located in a high use area. It crosses the river six times, crosses three streams, and crosses US 64 eight times. Flying project materials over these high-traffic areas and the existing TL would be a safety concern. Another safety concern would be construction crews working near the existing TL, particularly with helicopters.

Use of new ROW would enable TVA to keep the existing TL in service during more of the construction period. Once the proposed TL was built and connected to the TVA transmission system, the existing deteriorated Ocoee 2-Ocoee 3 TL would be removed.

2.1.3. Alternative 3 - No Action

Under the No Action Alternative, TVA would continue to serve the load by maintaining the existing TL. Because of the TL deterioration, TVA would essentially have to rebuild it, so the main difference between this No Action Alternative and Alternative 1, Rebuild in Place, would be the duration of the rebuilding effort. Under the No Action Alternative, funds and workforce would be allocated in accordance with TVA's emergency response and/or maintenance program. Since the TL is in a deteriorated state, the probability of unexpected TL failure is high. Notwithstanding the likelihood that some amount of rebuilding would be necessary in response to sudden failures, the rebuilding of the TL would probably occur over about a 10-year period as TVA financial resources permit. This would result in an extended time of unreliability of the TL until the rebuilding would be completed. In addition, because only a small amount of work would be done at a time, TVA would not use a pole yard but would bring in material for individual activity from a remote location. Some of the maintenance activity would require the TL to be deenergized. Maintenance activities would most likely not be scheduled during peak generation periods when the generation would most be needed. Due to the extended duration of this alternative, the existing TL would continue having outages. Until late in the project, when most of the deteriorated materials would have been replaced, the outage duration would probably increase from the current yearly average of five hours due to further deterioration of the structures and hardware for this line.

2.1.4. Alternative 4 - Build Ocoee 2-Ocoee 3 Transmission Line Using New Right-of-Way South of the Ocoee River (Proposed Action)

Under Alternative 4, TVA would build a TL from the Ocoee 2 Switchyard to the Ocoee 3 Switchyard south of the Ocoee River on land located in the CNF. The proposed TL would be approximately 4.7 miles in length on ROW 100 feet wide, so the total amount of land used would be approximately 56 acres. The line would be constructed using H-frame steel-pole structures. The TL would have 27 structures. As with Alternatives 1 and 2, the pole yard for worker assembly, vehicle parking, and material storage would be located in the area south of the TL off NFS Road 45, as shown on Figure 1. Construction would take about eight months. Once the proposed TL was built and connected to the TVA transmission system, the existing deteriorated Ocoee 2-Ocoee 3 TL would be removed.

By allowing the existing line to continue in service while the proposed line was being built, this alternative would limit the outage duration. This would allow the 28 MW of generation to be available when needed for peak loads during construction and provide reliable station service to Ocoee 2 during construction.

2.2. Description of Construction, Operation, and Maintenance of the Proposed New Transmission Line Under the Action Alternatives

This section describes the methods of construction, operation, and maintenance of the proposed TL. The methods would generally be the same for all four alternatives as standard methods for every TVA TL. Where there are differences in methods among the four alternatives, these differences are noted.

2.2.1. Transmission Line Construction

2.2.1.1. Structures and Conductors

The proposed TL would use mostly double-pole (H-frame) structures. Such a structure is shown in the foreground of Figure 2. Structure heights would vary according to the terrain and would range between 55 and 125 feet, averaging 80 feet.

Figure 2. H-Frame Transmission Structure

Three conductors (the cables that carry the electrical current) would be used to make up a circuit, as this would be an alternating current TL. Each conductor would be made up of a single cable. The conductors would be attached to fiberglass or ceramic insulators suspended from the structure cross arms. A smaller overhead ground wire would be attached to the top of the structures. This ground wire may contain fiber optic communication cables.

Poles at angles in the line may require supporting guys. Some structures for larger angles could require three poles. Most poles would be imbedded directly into holes augered into the ground to a depth equal to 10 percent of the pole's length plus an additional 2 feet. The holes would range from 2 feet in diameter for the smallest poles to 4 feet for the largest poles. The holes would normally be backfilled with some of the excavated material, and the remainder would be tamped down around the base of the pole. In some cases, gravel or a cement-gravel mixture might be used for replacement fill. A crane would be used to place the structure in the hole. If ground near the structure location is not level, a crane pad, approximately 40 feet by 40 feet, would be prepared by laying gravel brought in for that purpose. Pads would be left in place after construction for future maintenance. Equipment used during the construction phase would include trucks, truck-mounted augers and drills, and tracked cranes and bulldozers. Low ground-pressure-type equipment would be used in specified locations (e.g., areas with soft ground) to reduce the potential for environmental impacts. In addition, a helicopter would be used for installing structures in several locations for each alternative because of the terrain and lack of access into locations.

2.2.1.2. Right-of-Way Clearing

Because of the need to maintain adequate clearance between tall vegetation and TL conductors, as well as to provide access for construction equipment, vegetation would be removed from the ROW. In many cases, trees and shrubs are removed from the entire length and width of a TL ROW. However, in this case, where much of the TL would be high above the spanned valleys, vegetation would not interfere with the TL conductors. In these areas, vegetation would remain. However, it is not possible to identify at this time the extent of the areas that would not be cleared, so the analysis in this EA is done from the expectation that the entire length of the line would be cleared, at least to the extent of removing tall and danger trees. Typical equipment used during ROW clearing includes chain saws, skidders, bulldozers, tractors, and/or low ground-pressure feller-bunchers. Marketable timber would be sold to TVA by the USFS and resold by TVA; otherwise, woody debris and other vegetation would be piled and burned or chipped. Tree stumps would be left undisturbed. In some instances, vegetation may be windrowed along the edge of the ROW to serve as sediment barriers.

Danger trees outside the ROW would also be removed. Danger trees are those trees that are located away from the cleared ROW, but are tall enough to pass within 5 feet of a conductor or strike a structure should they fall toward the TL.

Vegetation removal in streamside management zones (SMZs) and wetlands would be restricted to trees tall enough, or with the potential soon to grow tall enough, to interfere with conductors. Clearing in SMZs would be accomplished using hand-held equipment or remote-handling equipment, such as a feller-buncher, in order to limit ground disturbance. After clearing and construction, the ROW would be planted with native warm season grasses where suitable. Nonsuitable areas would be restored following TVA and/or CNF standard guidelines. These actions would be carried out according to *TVA Right-of-Way Clearing Specifications, Environmental Quality Protection Specifications for Transmission*

Line Construction, Transmission Construction Guidelines Near Streams, *Right-of-Way Vegetation Management,* and/or the RLRMP. For more details, see Appendices B through E. Erosion controls would remain in place until the plant communities were fully established.

2.2.1.3. Access Roads

As Figure 1 shows, existing NFS roads and abandoned roads would be used to allow access to the ROW. The ROW would be used for access to locations for erecting structures wherever possible, avoiding severe slope conditions and minimizing stream crossings. Access roads are typically about 20 feet wide and are surfaced with dirt or gravel. Four roads may need upgrading by placement of gravel on areas of bare soil and removal of overgrown vegetation but no new grading. Bulldozer blades would not be used to remove soil or scraped across soil. This work would be done in accordance with the requirements of the RLRMP.

There would be no fording of perennial streams or heavy equipment in SMZs. Culverts and other drainage devices, fences, and gates would be installed as necessary. Depending on which were more stringent, installation would follow Forest Plan Standards FW-2 through FW-8; RX11-16 through RX11-20; and RX11-29 through RX11-32 or *TVA Right-of-Way Clearing Specifications, Environmental Quality Protection Specifications for Transmission Line Construction, Transmission Construction Guidelines Near Streams, Right-of-Way Vegetation Management,*. Culverts installed in any perennial streams would be removed following construction. However, in wet-weather conveyances, they would be left or removed, depending on the RLRMP standards that might apply.

2.2.1.4. Pole Yard

An area south of the TL off NFS Road 45 would be used for the pole yard under all of the Action Alternatives (see Figure 1). This site would be used for the duration of the construction period, plus approximately one additional month at the start for initial storage and at the end for final removal of material. The site would be cleared before storage begins. High traffic areas would be graveled. Following the completion of construction activities, all trailers, unused materials, and construction debris would be removed from the site. The pole yard would be restored using native warm season grasses according to RLRMP standards.

2.2.1.5. Conductor and Ground Wire Installation

Reels of conductor and ground wire would be delivered to various staging areas along the ROW, and temporary clearance poles would be installed at road crossings to reduce interference with traffic. (When a conductor is installed, it is laid over a crosspiece at the top of the clearance pole so that it does not lie in the road.) Installation of conductors would begin with a small rope being pulled from structure to structure. This rope would then be connected to the conductor and ground wire and used to pull them down the line through pulleys suspended from the insulators mounted on the structures. A bulldozer and specialized tensioning equipment would be used to pull conductors and ground wires to the proper tension. Finally, the wires would be clamped to the insulators and the pulleys removed.

2.2.2. Operation and Maintenance

2.2.2.1. Inspection

Periodic inspections of the TL would be performed from the ground and by aerial surveillance using a helicopter. These inspections, which would occur on approximately five-year cycles after operation begins, would be performed to locate damaged conductors, insulators, or structures, and to identify any abnormal conditions that might hamper the normal operation of the line or adversely impact the surrounding area. During these inspections, the condition of vegetation within the ROW, as well as immediately adjoining the ROW, would be noted. These observations would then be used to plan corrective maintenance or routine vegetation management in coordination with the CNF.

2.2.2.2. Vegetation Management

Management of vegetation along the ROW would be necessary to ensure access to structures and to maintain an adequate distance between TL conductors and vegetation. The TL would be designed to meet a 24-foot-minimum clearance as required by the National Electric Safety Code. Management would consist of the felling of danger trees adjacent to the cleared ROW and the control of vegetation within the cleared ROW.

Management of vegetation within the cleared ROW would use an integrated vegetation management approach designed to encourage the low-growing plant species and discourage tall-growing plant species. A vegetation-reclearing plan would be developed in consultation with CNF for each TL segment based on the results of the periodic inspections described above. These plans would be consistent with the RLRMP and the VMEIS, as supplemented (2002). The two principal management techniques would be mechanical mowing, using tractor-mounted rotary mowers, and herbicide application. Herbicides would normally be applied in areas where heavy growth of woody vegetation is occurring on the ROW and mechanical mowing is not practical. Herbicides would be selectively applied from the ground with backpack sprayers or vehicle-mounted sprayers. Any herbicides used would be applied in accordance with applicable state and federal laws and regulations. Only herbicides registered with the U.S. Environmental Protection Agency and in compliance with the RLRMP and VMEIS would be used. Application rates are expected to be in the ranges used by CNF for vegetation management as reviewed in the VMEIS and determined in that study to have no significant adverse impacts if used according to approved procedures. Herbicides to be used would be:

Glyphosate: This chemical is commonly found in brand name products such as Roundup, Accord, and Rodeo. Glyphosate is a broad-spectrum herbicide used to kill grasses and broadleaf weeds. Rodeo is a formulation labeled for aquatic use. The range of application rates is 0.5 to 7 lb acid equivalent (a.e.)/acre with 2 lb a.e./acre being typical.

Imazapic - This chemical is found in brand name products such as Plateau. Imazapic has been found to be very effective against fescue, while having little effect on native grasses. It is often used for restoration of native plants in pastures and fields. Imazapic is persistent

Imazapyr: This chemical is commonly found in brand name products such as Arsenal and Habitat. Imazapyr is commonly tank-mixed with other products to ensure control of undesirable vegetation. The range of application rates is from 0.06 to 1.5 lb a.e./acre.

Fosamine Ammonium: This product is commonly found in brand name products such as Krenite S and is a brush-control agent.

Metsulfuron Methyl: This chemical is found in the product Escort, which controls broadleaf weeds and brush.

Triclopyr: This chemical is found in brand name products such as Garlon 3A and Garlon 4. Triclopyr is most effective on broad-leaved plants and is used for noxious weed control such as kudzu, planting site preparation, and release of tree seedlings from competition. The range of application rates is 0.05 to 10 lb a.e./acre.

Clopyralid: This chemical is found in brand name products such as Transline. Clopyralid is very effective against kudzu, but most trees and grasses are tolerant of it. It may be used for wildlife opening maintenance, planting site preparation, and release of tree seedlings. The range of application rates is about 0.1 to 0.5 lb a.e./acre

Numerous safeguards as specified in pages A-10 to A-15 of the VMEIS Record of Decision would be taken to minimize risks of herbicide use to human and environmental health. These safeguards are listed in the mitigation section of Chapter 2.

Other than vegetation management, only minor maintenance work would normally be required. TL structures and other components typically last several decades. In the event that a structure must be replaced, it would normally be lifted out of the ground by crane-like equipment, and the replacement structure would be inserted into the same hole or in an immediately adjacent hole. Access to the structures would be on existing roads where possible. Replacement of structures could require leveling the area surrounding the replaced structures, but there would be little, if any, additional area disturbance when compared to the initial installation of the structure. Maintenance work would follow RLRMP standards.

2.3. Removal of the Existing Transmission Line

Under Alternative 2 or 4, the existing Ocoee 2-Ocoee 3 TL would be removed once the proposed TL is complete, and the ROW would be allowed to revert to its natural state. The conductor would be removed from the insulators and reeled onto a reel. The hardware would be removed from each structure and be removed from the site using a vehicle (if accessible) or helicopter (if not accessible by vehicle). Each structure would be cut below grade and removed from site using a vehicle or helicopter. The scrap material would be recycled. All removal activities would be conducted according to RLRMP standards.

2.4. Comparison of Alternatives

Implementation of Alternative 4 would require the least amount of time, thus enabling TVA to have a secure way to transmit the power from Ocoee 3 soonest. Also, Alternative 4 would only require one outage to connect the new TL to the system, whereas, the other alternatives would require various outages during construction to build the TL.

Implementation of Alternative 1, 2, or 3 would result in the continued presence of the entire length of the TL in the Ocoee Scenic Byway corridor, while implementation of Alternative 4 would result in removing the visual and aesthetic presence from the corridor, except for short segments at the beginning and end of the TL. However, implementation of Alternative 4 would result in a new corridor through the black bear habitat MA, increasing approximately 56 acres to early successional habitat.

Implementation of Alternative 1 or 3 would not alter the forest or riparian habitat. Implementation of Alternative 2 or 4 would convert approximately 36 acres or 56 acres of forest to grass/forbs and shrubs. Some of this change would be offset as early successional habitat along the existing TL reverts to forest after TL removal.

Implementation of Alternatives 1 or 3 would likely remove many of the invasive plants during construction; whereas, implementation of Alternatives 2 or 4 would likely introduce exotic or invasive plant species to the present native plant communities.

TL construction under all alternatives would cause soil disturbance, with the greatest disturbance under Alternatives 2 and 4.

The existing TL is potentially eligible for the National Register of Historic Places (NRHP), and its removal under Alternatives 1, 2, and 4 would be considered adverse. In addition, Alternative 4 would affect a potentially eligible archaeological site.

Construction and maintenance of the proposed TL under Alternatives 1 through 3 would require extra care and safety measures for workers due to the steep terrain and extensive use of helicopters to reach structure locations inaccessible to vehicles. Construction of the proposed TL under Alternative 2 would have increased risks due to the closeness to the existing line being kept in service. Removal of the existing TL under Alternative 2 or 4 would require extra care and safety measures for workers due to the steep terrain and extensive use of helicopters to remove the conductor and structures. Helicopter flights over the Ocoee River and US 64 during construction of Alternatives 1 through 3 and removal of the existing TL in Alternative 2 or 4 would require special care and scheduling to protect rafters and travelers.

Alternative 4 would have a beneficial visual impact on recreational users of the Ocoee River and travelers along US 64 because it would not be in the gorge except at the powerhouses, but it would have the most impact on trail users because it would cross more trails, possibly including locating several new structures near trails.

2.5. Summary of TVA Commitments and Proposed Mitigation Measures

The following measures would be taken to reduce the potential for adverse environmental effects.

General

Because the existing TL and all proposed alternatives are within a national forest, coordination with USFS personnel will be maintained throughout the project. USFS contacts are Monte Williams, Ocoee/Hiwassee District Ranger, CNF, and Dan Herron, CNF Southern District Special Use Coordinator. Their telephone number is 423-338-3300.

Herbicide Application

The following mitigation measures from the 1989 USFS VMEIS (supplemented in 2002) would be used by TVA or USFS when applying herbicides.

(62) Herbicides are applied according to labeling information and the site-specific analysis done for projects. This labeling and analysis are used to choose the herbicide, rate, and application method for the site. They are also used to

select measures to protect human and wildlife health, non-target vegetation, water, soil, and threatened, endangered, proposed, and sensitive species. Site conditions may require stricter constraints than those on the label, but labeling standards are never relaxed.

Choice of Herbicide

(63) Only herbicide formulations (active and inert ingredients> and additives registered by EPA and approved by the Forest Service for use on national forests are applied.

(64) Herbicides and application methods are chosen to minimize risk to human and wildlife health and the environment. No class B, C, or D chemical (table 11-I) may be used on any project, except with Regional Forester approval. Approval will be granted only if a site-specific analysis shows that no other treatment would be effective and that all adverse health and environmental effects will be fully mitigated. Whenever possible and effective, class 4 or 5 mineral oil is used in place of diesel oil in mixtures for application.

Application Rate

(65) Herbicides are applied at the lowest rate effective in meeting project objectives and according to guidelines for protecting human and wildlife health. Application rate and work time must not exceed the following typical levels unless a supplementary risk assessment shows that proposed rates do not increase risk to human or wildlife health or the environment beyond standards discussed in Chapter IV.

Typical application rates (lb/at) of active ingredient are:

	2.4-D/a	2.4-D/e	2.4-DP	DICAMBA	FOSAMINE	GLYPHOS	HEXAZ	IMAZAPYR
AG							1.7	
ML	2.5	4.0	4.0	2.0	7.8	1.5	1.7	0.75
MG							1.7	
HG							1.7	
HF	2.0	2.0	1.0	2.0		1.0	0.5	0.75
HB		1.7	1.2					
HS							1.7	
HC	2.0			1.5		1.3		0.75

	FUEL OIL	LIMONENE	PICLORAM	SULFOMFT	TEBUT	TRICLOPYR/a	TRICLOPYR/e
AG					1.0		
ML	2.0	0.9	0.7	0.17	1.0	4.0	4.0
MG					1.0		
HG							
HF	1.5	0.9	0.4	0.06	4.0	1.4	1.0
HB	1.0	0.9					1.9
HS					4.0		
HC			0.3				

KEY:
AG = aerial granular treatment

MG = mechanical granular treatment
treatment
HF = manual foliar broadcast treatment
HB = manual basal treatment
HS = manual soil-spot treatment
HC = manual cut-surface treatment

GLYPHOS = glyphosate
ML = mechanical liquid treatment
SULFOMET = sulfometuron methyl
HG = manual (hand) granular
/a = amine formulation
/e = ester formulation

Application Method

(66) Public safety during such uses as viewing, hiking, berry picking, and fuelwood gathering is a priority concern. Method and timing of application are chosen to achieve project objectives while minimizing effects on non-target vegetation and other environmental elements. Selective treatment is preferred over broadcast treatment. Application methods from most to least selective are:
1) Cut surface treatments
2) Basal stem treatments
3) Directed foliar treatments
4) Soil spot (spot around) treatments
5) Soil spot (spot grid) treatments
6) Manual granular treatments
7) Manual/mechanical broadcast treatments

Prescribed Burning of Treated Areas

(67) not applicable.

Drift Control

(68) Weather is monitored and the project is suspended. If temperature, humidity, or wind become unfavorable as follows:
Wind
Temperatures Humidity (at Target)
Higher Than Less Than Greater Than
Ground:
Hand (cut surface) N.A. N.A. N.A.
Hand (other> 98F 20% 15 mph
Mechanical (liquid) 95F 30% 10 mph
Mechanical (granular) N.A. N.A. 10 mph
Granular N.A.
50%
N.A.
5 mph
8 mph

(69) Nozzles that produce large droplets or streams of herbicide are used. Nozzles that produce fine droplets are used only for hand treatment where distance from nozzle to target does not exceed 8 feet.

Supervision and Training

(70) A certified pesticide applicator supervises each application crew and trains crew members in personal safety, proper handling and application of herbicides, and proper disposal of empty containers.

(71) If work is contracted out, each contract manager, who must ensure compliance on contracted herbicide projects, is a certified pesticide applicator. Contract inspectors are trained in herbicide use, handling, and application.

Protection of Workers

(72) Workers who handle herbicides must wear a long-sleeved shirt and long pants made of tightly woven cloth that must be cleaned daily. They must wear a hard hat with plastic liner, waterproofed boots and gloves, and other safety clothing

and equipment required by labeling. They must bring a change of clothes to the field in case their clothes become contaminated.

(73) Each work crew must take soap, wash water separate from drinking water, eyewash bottles, and first aid equipment to the field.

(74) Contractors ensure that their workers use proper protective clothing and safety equipment required by labeling for the herbicide and application method.

(75) Workers must not walk through areas treated by broadcast foliar methods on the day of application.

(76) Supervisors must ensure that monitoring is adequate to prevent adverse health effects. Workers displaying unusual sensitivity to the herbicide in use are medically evaluated and, if tested as sensitive to the herbicide in use, are reassigned to other activities.

Protection of the General Public and Private Land

(77) Notice signs (FSH 7109.11) are clearly posted, with special care taken in areas of anticipated visitor use.

(78) Buffers are clearly marked before treatment so applicators can easily see and avoid them.

(79) No herbicide is aerially applied within 200 horizontal feet of an open road or a designated trail. Buffers are clearly marked before treatment so applicators can easily see and avoid them.

Protection of Non-Target Vegetation

(80) No soil-active herbicide is applied within 30 feet of the drip line of non-target vegetation (e.g., den trees, hardwood inclusions, adjacent stands) within or next to the treated area. Side pruning is allowed, but movement of herbicide to the root systems of non-target plants must be avoided. Buffers are clearly marked before treatment so applicators can easily see and avoid them.

Protection of Threatened, Endangered, Proposed, and Sensitive Species

(81) Triclopyr is not ground-applied within 60 feet, of known occupied gray, Virginia big-eared, or Indiana bat habitat. The same buffers are used with any formulation containing kerosene or diesel oil around habitat of any threatened, endangered, proposed, or sensitive bird during its nesting season. Buffers are clearly marked before treatment so applicators can easily see and avoid them.

(82) No herbicide is ground-applied within 60 feet, of any known threatened, endangered, proposed, or sensitive plant. Buffers are clearly marked before treatment so applicators can easily see and avoid them.

Protection of Water and Soil

(83) Application equipment, empty herbicide containers, clothes worn during treatment, and skin are not cleaned in open water or wells. Mixing and cleaning water must come from a public water supply and be transported in separate labeled containers.

(84) Not applicable.

(85) No herbicide is broadcast on rock outcrops. No soil-active herbicide with a half-life longer than 3 months is broadcast on slopes over 45 percent, erodible soils, or aquifer recharge zones. Such areas are clearly marked before treatment so applicators can easily see and avoid them.

(86) No herbicide is ground-applied within 30 horizontal feet of wetlands or perennial or intermittent springs and streams. No herbicide is applied within 100

horizontal feet of any public water source. Selective treatments (which require added site-specific analysis and use of aquatic-labeled herbicides) may occur within these buffers only to prevent significant environmental damage such as noxious weed infestations. Buffers are clearly marked before treatment so applicators can easily see and avoid them.

Aerial Application Operations Plan
(87) Not applicable

Control of Spills
(88) During transport, herbicides, additives, and application equipment are secured to prevent tipping or excess jarring and are carried in a part of the vehicle totally isolated from people, food, clothing, and livestock feed.
(89) Only the amount of herbicide needed for the day's use is brought to the site. At day's end, all leftover herbicide is returned to storage.
(90) Herbicide mixing, loading, or cleaning areas in the field are not located within 200 feet of private land, open water or wells, or other sensitive areas.
(91) During use, equipment to store, transport, mix, or apply herbicides is inspected daily for leaks.
(92) Containers are reused only for their designated purpose. Empty herbicide containers are disposed of according to 40 CFR 165.9 Group I & II Containers.
(93) Accident preplanning is done in each site-specific analysis. Emergency spill plans (FSM 2109.12, chapter 30) are prepared. In the unlikely event of a spill, the spill is quickly contained and cleaned up, and appropriate agencies and persons are promptly notified.

Sensitive and other Species
Helicopters or other low-level aircraft would continue to be restricted from an area 0.5 mile around the known bald eagle nest approximately 2.2 miles from the existing TL from January 1-June 31.

To minimize impacts on black bear within the black bear MA, access roads along the ROW after construction would be closed to vehicle use according to RLRMP requirements.

Erosion, Sedimentation, and Polluted Runoff
Prior to the start of ground disturbance, a qualified geologist would inspect the route of the line and mark the areas of most concern for the presence of pyrite. If needed, areas with potential would be tested to confirm the presence or absence of pyrite. Any spoil from augering or grading for crane pads where pyrite is found would be spread over limestone gravel and covered with lime to neutralize any acid created from pyrite.

In upgrading access roads and the pole yard, bulldozer blades would not be used to scrape the ground to expose bare soil.

Visual Resources and Recreation
Clearing of the ROW would be limited in valleys. Only the trees tall enough to interfere with the conductor would be removed. Mowing or bush hogging would be done prior to herbicide treatment to minimize the amount of herbicide used and the visual effect of browned dead vegetation.

The recreating public would be notified of upcoming herbicide applications, and signs would be located along trails that would cross areas of herbicide application.

Trail and road users would be provided with advance notice of any construction affecting the trail or road as far ahead of time as possible and would be directed with signs to substitute trails, if available.

Temporary road and/or skid trail crossings across designated forest trails would be kept to a minimum.

Any crossings would be as perpendicular as possible to designated forest trails.

Designated forest trails would not be used as haul roads/access routes if possible.

If trails must be crossed or used as skid trails/haul roads, trail cleanup/rehabilitation would be done after TL construction to meet applicable USFS trail standards.

Where possible, character trees and trees that define the trail corridor would be retained.

Changes to trail alignment and surfacing would be minimized; the trail would not be straightened or its surface changed unless alternate material would enhance the trail and protect resources. Place warning signs on all trail access points and along the trail where activities are occurring.

New structures would be brown and thus would be less visible (unless seen with sky in background) than most structures on the existing line.

To minimize safety hazards, noise, and visual intrusions to recreational users on the river, overflights to store material at the pole yard before the start of construction would be conducted before the rafting season. Overflights during construction would be scheduled for days when the river is not flowing if possible. If overflights are required on days when the river is flowing, they would be routed upstream of Ocoee 2 Dam, where water use would be much less than below Ocoee 2 Dam. Overflights to install the new conductor and remove the existing conductor would be done only when the river is not flowing.

To protect recreators and minimize noise impacts, all helicopter flights would be routed to avoid the Thunder Rock Campground and the trails near Ocoee 3.

To minimize noise impacts, construction traffic on access roads would be limited to daylight hours.

Slash would be treated to within an average of 4 feet of the ground when visible within 100 feet on either side of Concern Level 2 travel routes (NFSR 45, NRSR 33641-Chestnut Mountain Bike Trail, Indian Flat Ridge Trail #71, Benton MacKaye Trail #2, Thunder Rock trail #305, Thunder Rock Express Trail #340, West Fork Trail #303, and Dry Pond Lead Trail #76). When activities are occurring along open trails, slash would be treated within 100 feet of the corridor daily.

Root wads and other unnecessary debris would be removed or placed out of sight within 150 feet of key viewing points.

Slash would not be placed in trail tread during construction and future maintenance.

Cultural Resources Protection

1. To minimize rutting of archaeological site 40PK132 only low-pressure tired equipment would be used for work in that vicinity.

2. All work in the vicinity of site 40PK132 would be conducted when ground conditions are dry and firm.

3. If the above two measures are not possible, rubber matting would be used underneath all equipment in the vicinity of site 40PK132.

4. All access activity would stay within existing NFS Road 45 in the vicinity of archaeological site 40PK132.

5. TVA will comply with all stipulations in the Historic Structures Treatment Plan for the Ocoee 2-3 TL which are included in the Memorandum of Agreement dated September 12, 2006.

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CHAPTER 3

3. AFFECTED ENVIRONMENT

The present condition of the environmental resources that could be affected by the proposed action and alternatives is described in this chapter. The analysis area is the nine compartments traversed by the four alternative corridors and used by the USFS in collecting natural resource information. These nine compartments contain 9,089 acres. All TL route alternatives are within CNF and within the Ocoee Unit of the South Cherokee Wildlife Management Area (WMA) and the Ocoee Bear Reserve.

- Cherokee National Forest (CNF), approximately 639,450 acres, is managed by the USFS and contains areas of ecological, geological, and scenic importance. The forest is managed for multiple uses, including the protection and improvement of environmental resources and the provision of fish and wildlife habitat, wilderness areas, outdoor recreation, and timber and mineral resources.
- The Ocoee Unit of the South Cherokee WMA within CNF is managed in cooperation with the Tennessee Wildlife Resources Agency (TWRA) for hunting small and big game within the WMA.
- The Ocoee Bear Reserve, a 53,825-acre portion of the WMA within CNF, also is cooperatively managed by TWRA, which prohibits bear and wild boar hunting with dogs in the reserve.

An area of CNF land just west of the eastern end of the existing TL and the Alternative 2 route is designated a concentrated recreation zone. This zone is managed to provide the public with a variety of recreational opportunities in visually appealing and environmentally healthy settings (USFS 2004a).

If Alternative 1, 2, or 3 were implemented, activities would take place mostly within the RLRMP-designated scenic byway corridor. Except for a short segment at its western end on TVA property and a short segment at its eastern end on NFS land designated scenic byway corridor, the proposed Alternative 4 TL route is on NFS land designated for black bear habitat management. This prescription overlaps the Ocoee Bear Reserve. The management emphasis for black bear habitat is to (1) provide secluded and diverse habitat, (2) ensure adequate den sites, and (3) maintain hard and soft mast production (USFS 2004a).

Two designated wilderness areas and two recommended wilderness study areas within CNF and managed by NFS are within a 3-mile radius of the proposed work. These areas are managed to allow ecological and biological processes to progress naturally with little to no human influence or intervention (USFS 2004a).

- Big Frog Wilderness Area within CNF is a 7,993-acre area that offers scenic vistas and hiking opportunities. This area is approximately 1.7 miles south of the TL routes proposed in Alternatives 1 through 3 and 1.0 mile south of the Alternative 4 TL route. The recommended wilderness study area, the 365-acre Big Frog Addition (USFS 2004a), is managed as part of this area.
- Little Frog Mountain Wilderness Area is a 4,666-acre, north to south trending ridge consisting of rolling hills forested with dense second-growth hardwoods. The

wilderness encompasses a horseshoe-shaped valley and is formed by Little Frog Mountain on the southeast and Dry Pond Lead on the northwest. This area is approximately 0.4 mile east of all TL route alternatives. Two recommended wilderness study areas, a 642-acre Little Frog Addition NW and a 335-acre Little Frog Addition NE (USFS 2004a), are managed as part of this area.

Additionally, the proposed work is in the vicinity of an Nationwide Rivers Inventory (NRI) stream.

- The Ocoee River, from RM 19 at Parksville Reservoir to RM 29 at Ocoee 3 Dam, is listed on the NRI. The NPS recognizes this stream for its recreational and scenic values and is noted as "a high quality whitewater recreational river with spectacular mountain scenery." According to NRI information provided by the NPS, "under a 1979 Presidential directive, and related Council on Environmental Quality procedures, all federal agencies must seek to avoid or mitigate actions that would adversely affect one or more NRI segments." The existing TL (and Alternative Routes 2 and 3) crosses the NRI-listed segment of the river five times, and the Alternative 4 TL route would begin and end adjacent to the NRI-listed segment. The rest of the Alternative 4 route is at least 0.3 mile from the river.

Table 1. Distribution of Approximate Affected Acres on National Forest System Land by Forest Plan Prescription Area

Prescription Area	Project Acreage-Row*	Project Acreage-Access Roads And Pole Yard*	Total Acres By Alternative*
7.A. Scenic Byway Corridor	Alt 1 - 48 Acres Alt 2 - 48 Acres Alt 3 - 48 Acres Alt 4 - 6 Acres	Alt 1 - 0 Acres Alt 2 - 0 Acres Alt 3 - 0 Acres Alt 4 - 0 Acres	Alt 1 - 48 Acres Alt 2 - 48 Acres Alt 3 - 48 Acres Alt 4 - 6 Acres
8.C. Black Bear Habitat Management	Alt 1 - 0 Acres Alt 2 - 0 Acres Alt 3 - 0 Acres Alt 4 - 50 Acres	Alt 1 - 3 Acres Alt 2 - 3 Acres Alt 3 - 0 Acres Alt 4 - 19 Acres	Alt 1 - 3 Acres Alt 2 - 3 Acres Alt 3 - 0 Acres Alt 4 - 69 Acres

Alt = Alternative
*These are estimated acreages.

3.1. Terrestrial Ecology

The description of potentially affected terrestrial ecological resources is divided into two major sections—plant life and animal life. These sections also contain listings of threatened and endangered species known from within the proposed project area. In general, the ecology affected by all four alternatives is similar, so the discussion of affected environment does not distinguish between them except for a few specific items. Impacts are discussed for each alternative except where the impacts would be the same for more than one alternative.

For purposes of analysis, the USFS divides the ecology of the CNF into specific biological elements. These elements are shown in Table 2. In the following sections, each terrestrial element present in the area and that could be affected by the proposed TL is discussed. Aquatic elements are discussed in Aquatic Ecology, Section 3.2.

Table 2. Elements of the Biological Environment Derived From Forest Plan Analysis, Relevance to Proposed Alternatives, and Whether the Elements Will be Further Analyzed

Biological Element	Analyzed Further?	Relevance to this Project
Mesic Deciduous Forest	Yes	Mesic deciduous forests occur in the vicinity of the proposed project area. See discussion in Section 3.1.
Spruce-fir Forest	No	There are no spruce-fir forests in the vicinity of the proposed project area.
Eastern Hemlock and White Pine Forest	Yes	Hemlock or white pine forests occur in the vicinity of the proposed project area. See discussion in Section 3.1.
Oak and Oak-pine Forest	Yes	Oak and oak-pine forests occur in the vicinity of the proposed project area. See discussion in Section 3.1.
Pine and Pine-oak Forest	Yes	Pine and pine-oak forests occur in the vicinity of the proposed project area. See discussion in Section 3.1.
Woodlands, Savannas, and Grasslands	Yes	The activities propose to create this type of habitat. See discussion in Section 3.1.
Rare Communities		
Wetland Communities	Yes	This type of habitat occurs in the vicinity of the proposed project area. See discussion in Section 3.4.
Barrens, Glades, and Associated Woodlands	No	None of this type of habitat occurs in the vicinity of the proposed project area.
Carolina Hemlock Forests	No	None of this type of habitat occurs in the vicinity of the proposed project area.
Table Mountain Pine Forests	No	None of this type of habitat occurs in the vicinity of the proposed project area.
Basic Mesic Forests	No	None of this type of habitat occurs in the vicinity of the proposed project area.
Beech Gap Forests	No	None of this type of habitat occurs in the vicinity of the proposed project area.
Rock Outcrops and Cliffs (includes forested boulder fields)	No	None of this type of habitat occurs in the vicinity of the proposed project area.
High Elevation Balds and Meadows	No	None of this type of habitat occurs in the vicinity of the proposed project area.
Caves and Mines	No	No caves are known to occur in the proposed project area.

Biological Element	Analyzed Further?	Relevance to this Project
Successional Habitats	Yes	The proposed removal of the existing TL will allow this type of habitat to develop. See discussion in Section 3.1.
High Elevation Early Successional Habitats	No	None of this type of habitat occurs in the vicinity of the proposed project area.
Permanent openings and old fields, Rights-of way, Improved pastures	Yes	The proposed project intends to create and maintain this type of habitat. See discussion in Section 3.1.
Forest Interior Birds	No	The proposed project area is not identified in the RLRMP as an area where edge effect is an issue.
Old Growth	No	None of this type of habitat occurs in the vicinity of the proposed project area.
Riparian Habitats	Yes	Riparian habitats occur near the proposed project area. See discussion in Section 3.1.
Snags, Dens, and Downed Wood	Yes	Snags occur in or near proposed project area. See discussion in Section 3.1.
Aquatic Habitats	Yes	Several aquatic habitats occur in the proposed project area. See discussion in Section 3.2.
Threatened and Endangered Species	Yes	Potential effects to threatened and endangered species are analyzed. See discussion in Section 3.1.
Demand Species	Yes	Demand species could be impacted by the proposed project. See discussion in Section 3.1.
Migratory Birds	No	Migratory bird issues are included in Section 3.1.
Invasive Nonnative Plants and Animals	Yes	Invasive Nonnative Plants and Animals could be impacted by the proposed project.
Species Viability (State-listed and Sensitive Species)	Yes	Species with viability concerns occur in the proposed project area.
Forest Health	Yes	Forest health is an issue in the proposed project area. See discussion in Section 3.1.

The RLRMP analyzed selected management indicator species (MIS) as a tool to help indicate effects of management on some of the elements in Table 2. The subset of these MIS shown in Table 3 was selected for consideration in this analysis because their populations or habitats may be affected by the project. The discussion of each biological element also includes a discussion of the MIS for that element.

Table 3. Forest-Level Management Indicator Species

Species Name	Purpose	Selected for Project Analysis?	Reasons for Selection/Nonselection
Hooded warbler	To help indicate effects of management on providing dense understory and midstory structure within mature mesic deciduous forest communities	Yes	Mesic deciduous forests occur in the vicinity of the proposed project area.
Scarlet tanager	To help indicate effects of management in xeric oak and oak-pine communities	Yes	Xeric oak and oak-pine communities occur in the vicinity of the proposed project area.
Pine warbler	To help indicate effects of management in pine and pine-oak communities	Yes	Pine and pine-oak communities occur in the vicinity of the proposed project area.
Prairie warbler	To help indicate management effects of creating and maintaining early successional forest communities	Yes	Construction or maintenance of a TL would create early successional communities.
Ruth's golden aster	To help indicate management effects on the recovery of this threatened and endangered plant species	Yes	Populations occur along the Ocoee River.
Chestnut-sided warbler	To help indicate management effects of creating and maintaining high elevation early successional forest communities and habitat	No	There are no high elevation communities associated with the proposed project area.
Pileated woodpecker	To help indicate management effects on snag dependent wildlife species	Yes	Forests with snags occur in the vicinity of the proposed project.
Acadian flycatcher	To help indicate management effects within mature riparian forest community	Yes	Riparian habitats occur within the proposed project area.
Ovenbird	To help indicate management effects on wildlife species dependent upon mature forest interior conditions	Yes	Edge would be created or maintained by the proposed project.
Black bear	To help indicate management effects on meeting hunting demand for this species	Yes	Project is located in prescription area 8.C, Black Bear Habitat Management.

The proposed TL would be built within the Blue Ridge Mountains Physiographic Province (Bailey 1995), which is characterized by forested slopes, cool, clear streams, and rugged terrain. The southern Blue Ridge is the most floristically diverse area in Tennessee. Most

plant communities encountered along the proposed alternatives are common and representative of the Blue Ridge Mountains. Both forested and nonforested communities are within the proposed project area. An uncommon community, Phyllite river-scoured herb community, occurs on exposed rock outcrops within the Ocoee River and on boulders within the riparian zone of the river. This community consists of a unique assemblage of species, sometimes including the federally endangered Ruth's golden aster (*Pityopsis ruthii)*. The proposed TL activities would occur on the steep ridgetops high above or south of the Ocoee River. No project related disturbances would occur in the vicinity of this uncommon community. Ruth's golden aster is an MIS and is discussed below as a federally listed endangered species.

Much of the proposed project area is forested, and most of this forest is a dry mesic oak-pine community. White-tailed deer, black bear, gray squirrel, eastern chipmunk, striped skunk, bobcat, and other mammals are commonly found within this community type. Birds include wild turkey, yellow-billed cuckoo, red-bellied woodpecker, eastern wood-pewee, blue jay, American crow, Carolina chickadee, white-breasted nuthatch, wood thrush, and many breeding neotropical migrant warblers. Reptiles include eastern box turtle, northern black racer, black rat snake, copperhead, five-lined skink, and others. Amphibians are not abundant within the dry mesic oak-pine community. Amphibians that inhabit this community include American toad, Fowler's toad, northern slimy salamander, and the southern zigzag salamander.

Ravines and less exposed northern and eastern slopes grade into mixed mesophytic hardwood forest including some hemlock. These forest types are considerably wetter than the dry mesic oak-pine forests. As a result, more amphibians occur here especially within or near springs and streams. Tolliver Shanty Branch ravine has numerous springs containing dusky salamanders and southern two-lined salamanders. Other amphibians living in this forest type include seepage salamanders, red salamanders, marbled salamanders, and others. Shrews and other small mammals may be common in mixed mesophytic hardwood forests. Wild boar disturbances were observed in springs. Birds observed in this area include many of those listed above for oak-pine forest as well as Acadian flycatcher, blue-headed vireo, and hooded warbler.

Nonforested sites include roads, wildlife openings, and TL ROWs. Scrub shrub and herbaceous plant communities exist under powerlines and in wildlife openings. The existing Ocoee 2-Ocoee 3 TL contains early to mid-successional habitat within the ROW. This provides habitat for many common bird species including gray catbird, indigo bunting, song sparrow, and eastern towhee. The habitat also provides browse and fruiting shrubs for large mammals such as black bear and eastern white-tailed deer.

3.1.1. Forest Communities and Management Indicator Species (MIS)

There are four major types of forest communities in CNF where the four alternatives are proposed; mesic deciduous forests, eastern hemlock and white pine forests, oak and oak-pine forests, and pine and pine-oak forests. Communities of mesic deciduous forests and eastern hemlock and white pine forests occur on the lower slopes, in narrow valleys and along streams. Because of thin soils and the numerous steep slopes and ridge tops, the upper slope forest communities are oak and oak-pine forest and pine and pine-oak forests. The composition and existing conditions of the four forest types are each described below. Where appropriate, the MIS for the condition of that forest type is also described.

Mesic Deciduous Forest and Hooded Warbler (MIS): Mesic deciduous forests as defined in the RLRMP (USFS 2004a) include northern hardwood, mixed mesophytic, and bottomland hardwood community types, as well as the dry-mesic oak forest communities. These forest types are characterized by relatively low levels of disturbance, and from a habitat perspective, their primary value is providing habitat for a variety of species dependent on mid- and late-successional forest stages. These forests are abundant and well distributed on the CNF, comprising 44 percent of the CNF (USFS 2004a). The best, most clustered distributions are found at the higher elevations of the Tellico Ranger District and Big Frog Mountain, followed by Big Bald, Unaka, Roan, Pond and Holston Mountains and Rogers Ridge. Poorest distributions are found on the pine-dominated Starr and Chilhowee Mountains. Mesic deciduous forests represent approximately 53 percent of the forested acres within the analysis area. These consist of four forest types: cove hardwood-white pine-hemlock, white oak-red oak-hickory, white oak and yellow poplar-white oak-red oak.

The hooded warbler (*Wilsonia citrina*) is a Neotropical migrant that is fairly common to common throughout the southeastern U.S. during the breeding season (Hamel 1992). It is found in moist deciduous forests with fairly dense understories, where it breeds and feeds (Hamel 1992, DeGraaf et al. 1991). It has been identified as a MIS for mid-late mesic deciduous forests with canopy gaps and structurally diverse understories. The hooded warbler is common in appropriate habitat on the CNF.

Eastern Hemlock and White Pine Forest: Eastern hemlock and white pine forests are broadly defined to include those forested communities that are either dominated or co-dominated by eastern hemlock (*Tsuga canadensis*) or eastern white pine (*Pinus strobus*) in the canopy.

Eastern hemlock forests typically occur on acidic soils and often have a dense heath shrub layer. These communities are typically low in herbaceous diversity, but may support rich bryophyte communities. White pine forests occupy similar sites but also may occur on dryer locations. White pine forests have also been created as plantations.

The combination of a largely evergreen canopy and a dense midstory in naturally occurring hemlock and white pine forests provide for a variety of benefits, including shading and cooling of riparian systems, thermal cover for wildlife, and nesting and foraging habitat for several species of neotropical migrant birds dependent upon the layered canopy structure and understory thickets (USFS 2004b). There is some evidence that hemlock-white pine forests provide necessary habitat components for the long-term conservation of red crossbills (USFS 2004b).

Eastern hemlock forests may also be important refuges for species typically adapted to higher elevations. Red-breasted nuthatches, winter wrens, and golden-crowned kinglets are found nesting in late successional hemlock forests down to elevations of 2,000 feet (USFS 2004b).

The current amount and distribution of mature eastern hemlock forests is threatened by the recent emergence of the hemlock woolly adelgid in the southern Appalachians. First identified in the eastern U.S. near Richmond, Virginia in the early 1950s, this exotic pest has recently spread into the southern Appalachians and threatens to spread throughout the range potentially causing mortality within five years after initial infestation (Southern Appalachian Man and Biosphere Southern Appalachian Assessment [SAMAB] 1996).

On the CNF, eastern hemlock forests are found primarily in association with north facing coves and slopes and riparian systems. There are currently approximately 45,125 acres of white pine forest types on the CNF; 6,664 acres of which originated as plantations. Eastern hemlock and white pine forests represent approximately 6 percent of the forested acres within the analysis area of the nine compartments surrounding the proposed alternatives. These consist of four forest types: white pine, hemlock, hemlock-hardwood, and white pine-cove hardwood. No MIS is being used to track the condition of hemlock and white pine forest.

Oak and Oak-Pine Forest and Scarlet Tanager: Oak dominated forests covered under this section include dry to mesic oak and oak-pine forests. Dry-mesic oak forests vary greatly in their species composition due to their wide distribution. The major species include chestnut oak (*Quercus montana*), northern red oak (*Q. rubra*), black oak (*Q. velutina*), white oak (*Q. alba*), and scarlet oak (*Q. coccinea*) (USFS 2004a). The dry to mesic oak-pine forests considered here are oak-dominated forests containing a significant pine component. Predominant pine species include white pine, shortleaf pine (*P. echinata*), Virginia pine (*P. virginiana*), and loblolly pine (*P. taeda*).

Oak forests are abundant on the CNF, comprising 43 percent of the CNF acreage. These forests are very well distributed within the northern portion of the CNF. Oak forests are less evenly distributed on the southern CNF, especially along the pine-dominated lower elevations including Starr Mountain and the lower Citico Creek drainage; and in the highest elevations, where mesic deciduous forest types predominate. Oak and oak-pine forests represent approximately 43 percent of the forested acres within the analysis area. These consist of seven forest types: chestnut oak-scarlet oak-yellow pine, white oak-black oak-hickory-yellow pine, chestnut oak, white oak-red oak-hickory, white oak, scarlet oak, and chestnut oak-scarlet oak.

Several management indicators have been identified for assessing effects to oak and oak-pine forest communities. These indicators include both MIS and key habitat variables. Because of their wide distribution across moisture gradients, mid- and late-successional oak and oak-pine forests support a wide variety of species. Drier oak forests support a slightly different mix of species due to their more open condition.

To represent this upland oak community, the scarlet tanager (*Piranga olivacea)* was selected as an MIS in the Forest Plan. This species is most abundant in upland mature deciduous forest (Hamel 1992). The breeding range of scarlet tanager includes eastern North Dakota and southeastern Manitoba across southern Canada and northern U.S. to New Brunswick and central Maine, south to central Nebraska, Kansas, Oklahoma, Arkansas, northern Alabama, northern Georgia, northwestern South Carolina, western North Carolina, central Virginia, and Maryland (NatureServe 2004). North American Breeding Bird Survey data indicate a stable population in North America from 1966-2005. Habitat on breeding grounds is deciduous forest and mature deciduous woodland, including deciduous and mixed swamp and floodplain forests and rich moist upland forests. Scarlet tanagers prefer oak trees for nesting. They nest less frequently in mixed forest and are most common in areas with a relatively closed canopy, a dense understory with a high diversity of shrubs, and scanty ground cover. They are able to breed successfully in relatively small patches of forest. Tanagers also sometimes nests in wooded parks, orchards, and large shade trees of suburbs. They are known to breed in various forest stages but are most abundant in mature woods (according to some sources, prefer pole stands).

Pine and Pine-oak Forest and Pine Warbler (MIS): Pine dominated forests covered in this section include all "Southern Yellow Pine" (USFS 2004a) forest types with various mixtures of hardwood species occurring as minor components. These forests occur on a variety of landforms at a wide range of elevations. Historically, in the Blue Ridge Physiographic Province, these communities occupied areas that were subject to natural fire regimes and typically occurred on ridges and slopes with southern exposures (NatureServe 2002). However, due to a combination of previous land use, fire exclusion, and intensive forestry (plantations), many pine species have expanded beyond their natural range and today, pine-dominated communities can be found on virtually all landforms and aspects. Pine and pine-oak forests represent approximately 28 percent of the forested acres within the analysis area. These consist of three forest types: shortleaf pine, Virginia pine, and Virginia pine-oak.

The pine warbler (*Dendroica pinus*) is a short-distance migrant and summer resident that occurs primarily at elevations below 3,500 feet. It is more abundant on the southern ranger districts. Based on 1992-1993 point count data collected on the Tellico Ranger District, this species is not a predominant component of any community type, but was detected in yellow pine forest types across all successional stages. Point count data collected for this species from 1996-2002 on the Tellico and Ocoee/Hiwassee Ranger Districts, indicates 88 percent of pine warbler observations were in conifer forests, 17 percent were in early successional vegetation, 54 percent were in mid successional, and 29 percent were in late successional.

The overall regional population trend (Blue Ridge Mountains) for 1966-2005 is a slow and slight decrease (Sauer et al. 2005).

3.1.2. Nonforest Communities

Nonforest Communities selected for further analysis are woodlands, savannas and grasslands, successional habitats, permanent openings, old fields, ROWs, and improved pastures.

Woodlands, Savannas, and Grasslands: Complexes of woodlands, savannas, and grasslands were once a frequent occurrence across portions of the southeastern landscape, primarily in the Piedmont and Coastal Plain provinces. Smaller occurrences likely occurred in the southern Appalachians on xeric ridge-tops and south-facing slopes where they were maintained by frequent fire (USFS 2004a). Woodlands are open stands of trees, generally forming 25 to 60 percent canopy closure and may be of pine, hardwood (typically oak), or mixed composition. Savannas are usually defined as having lower tree densities than woodlands; grasslands are mostly devoid of trees. All of these conditions typically occurred in mixed mosaics within a fire-maintained landscape. In all cases, a well-developed grassy or herbaceous understory is present.

Existing remnants of this habitat in both the southern Appalachians and Piedmont are limited primarily to roadsides and power line ROWs due to reductions in fire frequency across most landscapes. One hundred thirty-seven species of viability concern are associated with this community in the southern Appalachian region. Of these, 35 species are of concern in the CNF. Because existing woodland, savanna, and grassland complexes are rare and not consistently tracked, the current acreage in such conditions is not well documented. These communities would likely occur on landforms currently occupied by xeric pine and oak communities. The distribution and condition of xeric pine and oak forests are discussed in other sections of this document.

Successional Habitats and Prairie Warbler (MIS): Forest age and related structure are key determining factors for presence, distribution, and abundance of a wide variety of wildlife. Some species depend on early successional habitats, some depend on late successional habitats, and others depend on a mix of both occurring within the landscape (USFS 2004a). These habitat conditions are also important as wintering and stopover habitats for migrating species. In order to support viability of diverse plant and animal populations and to support demand for game species, a variety of habitat types are needed within national forest landscapes.

Early successional forests are important because they are highly productive in terms of forage, diversity of food sources, insect production, nesting and escape cover, and soft mast. Early successional forests have the shortest lifespan (10 years) of any of the forest successional stages, and are typically in short supply and declining on national forests in the southern Appalachians, and in the eastern U.S. (USFS 2004a). Early successional forests are also not distributed regularly or randomly across the landscape. These habitats are essential or beneficial for some birds (ruffed grouse, chestnut-sided warbler, golden-winged warbler, prairie warbler, yellow-breasted chat, blue-winged warbler); beneficial to deer, turkey, and bear in the South; and sought by hunters, berry pickers, crafters, and herb gatherers for the opportunities they provide. Many species commonly associated with late successional forest conditions also use early successional forests periodically, or depend upon it during some portion of their life cycle (USFS 2004a).

Prairie warblers (*Dendroica discolor*) are shrubland-nesting birds found in suitable habitats throughout the southern Appalachians (Hamel 1992). Prairie warblers require dense forest regeneration or open shrubby conditions in a forested setting. Near optimal habitat conditions are characterized by regeneration, thinned areas or patchy openings 10 acres or more in size where woody plants average 2 to 3 meters in height, 3 to 4 centimeters (cm) in diameter, and occur in stem densities around 3,000 stems/acre (USFS 2004a). Populations respond favorably to conditions created 3 to 10 years following forest regeneration in larger forest patches. Providing a sustained flow of regenerating forests is necessary to support populations of prairie warbler. Populations of prairie warbler have been steadily declining in the eastern U.S. (Sauer et al. 2005).

Permanent Openings and Old Fields: Permanent grass/forb and seedling/sapling/shrub habitats are important elements of early successional habitat. Permanent openings typically are maintained for wildlife habitat on an annual or semi-annual basis with the use of cultivation, mowing, or other vegetation management treatments. These openings may contain native grasses and forbs, but many are planted to nonnative agricultural species such as clover, orchard grass, winter wheat, annual rye, or other small grains. Old fields are sites that are no longer maintained and are succeeding to forest or are maintained on a less frequent basis (5-10 year intervals, usually with burning and mowing). They are largely influenced by past cultural activities and may be dense sod or a rapidly changing field of annual and perennial herbs, grasses, woody shrubs, and tree seedlings.

Permanent openings are used by a variety of wildlife, both game and nongame species. The benefits of permanent openings to white-tailed deer are well documented. Permanent openings, especially those containing grass-clover mixtures, are used most intensively in early spring, but also are an important source of nutritious forage in winter, especially when acorns are in short supply. Forest openings also are a key habitat component for wild turkeys throughout the year. Maintained openings provide nutritious green forage in the winter and early spring and seeds during late summer and fall. Because of the abundance

of insects and herbaceous plants produced in these openings they are especially important as brood-rearing habitat for young turkeys. Linear openings, especially those associated with young regenerating forests provide optimal brood habitat conditions for ruffed grouse.

There also are numerous wildlife benefits from openings maintained in native species. Native warm season grasses provide nesting, brood-rearing, and roosting habitat for northern bobwhite and other grassland species of wildlife. Native species are well adapted to local environments and generally require less intensive maintenance following establishment.

Old fields provide food and cover for a variety of wildlife species. A number of disturbance-dependent birds, such as northern bobwhite, grasshopper sparrow, golden-winged warbler, and blue-winged warbler are associated with old field habitat. Recently abandoned fields are important for rabbits and many small mammals. Woodcock use old fields as courtship, feeding, and roosting sites. Although managed less intensively than other types of permanent openings, some degree of periodic management is necessary to maintain these habitats.

There are approximately 1,517 acres of permanent maintained openings on the CNF. This represents 0.2 percent of the total national forest acres. Many were created by the expansion of log landings following timber harvest or by closing and seeding old roads to create linear openings. They are maintained with funding provided by TWRA, the USFS, and partners including the National Wild Turkey Federation (NWTF). Many are planted in nonnative grass-clover mixtures, which include combinations of white or red clovers along with wheat, rye, oats, orchard grass, and ryegrass. Some of the older openings are dominated by fescue and/or annual weed species, and some of the recently renovated openings are planted to grain sorghum.

ROWs and Improved Pastures: Although pastureland acreage has declined over the last 50 years, pastures still comprise approximately 7 percent of the southeastern U.S. For the Southern Appalachian Assessment area (SAMAB 1996), pastures comprise approximately 17 percent of the area, 99 percent of which is on private land. There are no comparable estimates for ROWs.

Utility ROWs and improved pastures typically are managed for purposes other than to provide wildlife habitat. However, they can provide wildlife benefits if managed appropriately. ROWs can be established and maintained in plantings that enhance their benefits to wildlife. Once established, maintenance costs generally are reduced. There are approximately 1,300 acres of power line ROW in the CNF. ROW acreage was estimated by multiplying the existing 85 miles of power line ROW known to the CNF by an average width of 125 feet. The majority of these ROWs support a mixture of herbaceous plants and shrubs and are maintained by a variety of methods.

Native warm season grass plantings have been established at Doc Rogers fields, several tracts along the French Broad River, and along a power line ROW between the Ocoee and Hiwassee Rivers. Emphasized species include bluestems, Indian grass, switchgrass, and native legumes. An experimental native cool season grass planting (Virginia wild rye) has been established along the Nolichucky River. These plantings total approximately 215 acres and were established with funds provided by the USFS, TWRA, TVA, and several sportsmen's organizations including Quail Unlimited.

3.1.3. Other Biological Elements Found in the Project Area

Riparian Habitats and Acadian Flycatcher (MIS): Terrestrial riparian habitats encompass the transition area between aquatic systems and upland terrestrial systems. All wetlands (including beaver ponds), as well as margins of varying widths along streams, rivers, lakes, ponds, and reservoirs, are contained within terrestrial riparian habitats. These areas provide a number of critical functions for associated species. Most importantly, they provide rich, moist environments, not often found in upland areas. Riparian terrestrial habitats may serve as corridors for wildlife movement, allowing for daily travel and seasonal migration. The riparian area may serve as a connector of habitats and populations allowing gene flow to occur, thus keeping populations genetically vigorous (USFS 2004a). Riparian habitats ideally include a mosaic of native plant and animal communities and successional stages, with a predominance of late successional forests. Late successional riparian forests contain multiple canopy layers that provide a variety of ecological niches, thermal and protective cover, and maintenance of moist conditions. Decline of older forests provides an abundance of snags and downed wood, which also help retain moisture and provide important habitat substrate for reptiles, amphibians, small mammals, invertebrates, mosses, and liverworts. The majority of riparian dependent species need or prefer late successional forest conditions for the diverse structure and the moist, temperature-moderated microclimates they provide.

Breeding range of the Acadian flycatcher (*Empidonax virescens)* includes southeastern South Dakota east across southern Great Lakes region to southern New England, south to southern Texas, Gulf Coast, and central Florida, west to central Kansas; in Canada, restricted to southwestern Ontario (NatureServe 2004). The highest nesting densities were in the Cumberland Plateau and in Virginia and West Virginia. Key habitat requirements are moist deciduous forests with a moderate understory, generally near a stream (Hamel 1992). Humid deciduous forest (primarily mature), woodlands, shaded ravines, floodplain forest, river swamps, hammocks, cypress bays thickets, second growth, and plantations are used for nesting and breeding. Acadian flycatchers require a high dense canopy and an open understory. These birds tend to be scarce or absent in small forest tracts, unless the tract is near a larger forested area.

Snags, Dens, and Downed Wood and Pileated Woodpecker (MIS): Large woody debris (including branches, large logs, stumps, and root wads) is an important habitat component both to streams and terrestrial areas. It is important both structurally and as a source of energy. Large snags provide birds with nesting and feeding sites, singing perches, and as lookout posts for predators and prey (USFS 2004a). Bats roost and produce maternity colonies under exfoliating bark. Amphibians, reptiles, small mammals, and invertebrates utilize woody debris as cover. Animals use snags, logs, and stumps as denning sites. Downed wood and logs are used for drumming by grouse to attract mates. Turtles and snakes use logs in streams and overhanging branches for basking and sunning. Large woody debris in riparian areas is used as cover by amphibians, insects, and other invertebrates, and small mammals. Small mammals utilize logs as travel ways. Fungi and other decomposers of woody debris are key components of food webs. Rotting wood tends to absorb moisture during wet periods and release it in dry periods, thus helping to maintain a cooler microclimate (USFS 2004a).

Snag availability is currently not considered a limiting factor in the CNF. Snag availability is influenced by a variety of factors including tree species, age, slope, aspect, and health, allowing for lots of variability within the landscape. It is estimated that there are about seven to eight snags per acre across the forest. The recent southern pine beetle (SPB)

outbreak has resulted in a sharp increase in snag availability over the past several years. Unless another disease outbreak occurs, a gradual decline toward pre-SPB outbreak levels should be expected over the next several years as these trees decay and fall to the ground. Snag availability is expected to exhibit a gradually increasing long-term trend as the average age of the forest continues to increase. With the provisions included under all alternatives in the RLRMP, existing snags, downed wood, and den trees would be well maintained on National Forest land.

The pileated woodpecker (*Dryocopus pileatus)* utilizes many forest communities, but generally is limited to mature coniferous, deciduous, and mixed forests with large, dead trees (DeGraaf et al. 1991). Highest densities occur in mixed pine-hardwood sawtimber. This species is a locally common permanent resident of Tennessee found in woodlands with trees large enough for nesting and foraging (Nicholson 1997). It can be found throughout the elevational range of the Unaka Mountains but is less common at higher elevations and in spruce-fir forests. It is typically considered a forest interior species but will readily fly across openings and is somewhat tolerant of forest fragmentation. Its occurrence in an area is more dependent on a regional forested area rather than individual forested tracts. Tennessee Christmas counts show an increase in pileated numbers (Nicholson 1997). See the *CNF Fiscal Year 2003 Monitoring and Evaluation Report (USFS 2004c)* for details of habitat requirements, Cherokee point count data information, and RLRMP Standards and Objectives forestwide. The overall regional population trend (Blue Ridge Mountains) for 1966-2005 is a steady increase (Sauer et al. 2005).

3.1.4. Threatened and Endangered Species

Site-specific inventories of state-listed, federally listed and sensitive species for this project were completed for each proposed alternative. Aquatic, botanical and terrestrial animal surveys were completed in May 2004 and August and September 2005. Field investigations revealed no occurrences federally listed species within any of the proposed alternatives.

Federally Listed Plant Species

The TVA Regional Natural Heritage database and the 2001 CNF Threatened, Endangered or Sensitive (TES) list were reviewed to determine potential impacts to federally listed plants and their habitats by the proposed alternatives. Only those federally listed species that have potential to occur within the proposed project area, based on habitat requirements, are included here for further analysis. For a complete list of species considered by the USFS refer to Attachment A of the Biological Evaluation in Appendix G.

Ruth's golden aster (*Pityopsis ruthii*) -This is a member of the aster family, up to 1 foot in height, with bright yellow flowers and narrow leaves covered with silver-gray hairs. Globally this species is a narrow endemic, known from two short sections of the Ocoee and Hiwassee Rivers in Tennessee. It is restricted to cracks on boulders in and adjacent to the water within the flood zones of the Hiwassee and Ocoee Rivers in Polk County, Tennessee (Weakley 2006). Ruth's golden aster is known to occur within 5 miles of all four alternatives. Building a proposed new TL and the proposed removal activities associated with the existing TL, which has six Ocoee River crossing points, are not anticipated to impact Ruth's golden aster populations. The TL activities would occur on the steep

ridgetops high above the Ocoee River. Rare plant surveys revealed no occurrences of either species within or adjacent to the proposed alternatives.

Small whorled pogonia *(Isotria medeoloide*s) -This federally threatened orchid occurs sporadically with a primary range extending from southern Maine and New Hampshire through the Atlantic Seaboard states to northern Georgia and southeastern Tennessee. Outlying colonies have been found in the western half of Pennsylvania, Ohio, Michigan, Illinois, and Ontario, Canada (U.S. Fish and Wildlife Service [USFWS] 1992). Known populations are sometimes separated by long distances, occasionally hundreds of miles. Small whorled pogonia occurs in acidic soils, in dry to mesic second-growth, deciduous or deciduous-coniferous forests. Typically the forest has moderate to light leaf litter, with sparse to moderate ground cover (except when among ferns), a moderate to light shrub layer, and relatively open canopy (USFWS 1992). It has been observed that this species occurs in proximity to logging roads, streams, or other features that create long persisting breaks in the forest canopy (USFWS 1992). Typical canopy species associated with small whorled pogonia in its southern range include chestnut oak, red maple, tulip poplar, white oak, and white pine (USFWS 1992). Understory trees and shrubs in the southern part of the range include flowering dogwood, mountain laurel, sourwood, witch-hazel and, in the mountains, flame azalea (USFWS 1992). Typical ground layer species found throughout its range include Indian cucumber root, lowbush blueberry, New York fern, partridge berry, and rattlesnake plantain with cat-brier, Christmas fern and Virginia creeper primarily being found in its southern range (USFWS 1992). It is believed that part of the reason for this orchid's rarity is the tendency of individual plants to remain dormant for very long periods of time (Weakley 2006). There are two populations known in Tennessee from Hamilton and Washington Counties. There are no known populations recorded on the CNF.

White fringeless orchid (*Platanthera integrilabia*) - This federal candidate species is endemic to Kentucky, east Tennessee, southwest Virginia, western North Carolina, northwest South Carolina, north Georgia, northern Alabama, and northern Mississippi, primarily in the Cumberland Plateau (Weakley 2006). It is a slender, erect, white-flowered perennial with a lack of fringe on the lip of the flower. Habitats for this species include partial shade or open seepage areas both wooded and herbaceous including swamps, floodplain forests, stream banks and seepage slopes (Weakley 2006). None were observed during surveys of the project area.

Federally Listed Terrestrial Animal Species

Based on information in the TVA Natural Heritage database and the 2001 CNF TES list, the federally listed species Indiana bat, bald eagle, and red-cockaded woodpecker have historically occurred or have potential habitat within the proposed project area and require further analysis.

Bald eagle *(Haliaeetus leucocephalus)* - Bald eagles nest from Alaska to the eastern coast of Canada and south along the coast to Florida. They are also known to nest along lakes and rivers in noncoastal states in the Southeast. An eagle nest was discovered on Parksville Lake, Polk County, Tennessee approximately 2.2 miles from the proposed project area in 2006. Bald eagles typically nest near large bodies of water including lakes, rivers, and riparian wetlands. They form small to large roosts in the same habitats during the winter. Bald eagles normally produce their first young at four or five years of age, shortly after molting into adult plumage. Egg-laying dates extend from early February through late April and peak on about February 20 in Tennessee (Floyd 1990) although egg-

laying in November and December is also known for the region (Ganier 1931; Spofford 1948). Bald eagle numbers were greatly reduced in the Southeast in the mid-1900s due to the use of the insecticide Dichlorodiphenyltrichloroethane (also known as DDT) and direct persecution. In recent years, bald eagle numbers have greatly increased throughout the area.

Indiana bat *(Myotis sodalis)* - The distribution of Indiana bats is generally associated with limestone caves in the eastern U.S. (Menzel et al. 2001). Within this range, the bats occupy two distinct types of habitat. During summer months, maternity colonies roost under sloughing bark of dead and partially dead trees of many species, often in forested settings (Callahan et al. 1997). Reproductive females require multiple alternate roost trees to fulfill summer habitat needs. Adults forage on winged insects within 3 miles of the occupied maternity roost. Swarming of both males and females and subsequent mating activity occurs at cave entrances prior to hibernation (MacGregor et al. 1999). During this autumn period, bats roost under sloughing bark and in cracks of dead, partially dead, and live trees.

Red-cockaded woodpeckers *(Picoides borealis)* - This species nests in pines infected with the fungus, *Phellinus pini* in old-growth pine forests with an open, parklike understory. Historically, a colony of red-cockaded woodpeckers existed near Parksville Reservoir. However, the species is considered to be extirpated from the region and Tennessee. No red-cockaded woodpecker habitat is known from the proposed project area.

State-Listed and Sensitive Plant Species

A review of the TVA Natural Heritage database indicates there are 47 state-listed plant species known from Polk County, Tennessee. These plants are listed in Table 4 and described following the table. Twenty-one of these species (indicated by asterisks in Table 4) are known to occur within 5 miles of the proposed TL alternatives and therefore were selected for more detailed analysis. In addition to the TVA Natural Heritage database, the 2001 Cherokee National Forest TES list was reviewed to determine potential impacts to these species and their habitats by the proposed removal of the Ocoee 2-Ocoee 3 TL and the proposed construction of a new TL. The USFS Project Review Form was used to evaluate each species and assign a Project Review Code (PRC). Only those species that have potential to occur within the proposed project area, based on habitat requirements, are included for further analysis.

Table 4. State-Listed Plant Species Known From Polk County, Tennessee

Common Name	Scientific Name	Federal Status	State Status
American ginseng*	*Panax quinquefolius*	-	S-CE (S3S4)
Ash-leaved bush-pea*	*Thermopsis fraxinifolia*	-	THR (S3)
Bitter cress	*Cardamine flagellifera*	-	THR (S2)
Branching whitlow-wort	*Draba ramosissima*	-	SPCO (S2)
Broadleaf bunchflower*	*Melanthium latifolium*	-	END (S1S2)
Broad-leaved tickseed*	*Coreopsis latifolia*	-	END (S1S2)
Butternut	*Juglans cinera*	-	THR (S3)
Catfoot	*Gnaphalium helleri*	-	SPCO (S2)
Chalk maple*	*Acer saccharum* ssp. *leucoderme*	-	SPCO (S3)
Chokecherry*	*Prunus virginiana*	-	SPCO (S1)
Cow parsnip*	*Heracleum maximum*	-	SPCO (S2)
Decumbent trillium	*Trillium decumbens*	-	END (S1)
Dwarfy filmy-fern	*Trichomanes petersii*	-	THR (S2)
Eastern turkeybeard	*Xerophyllum asphodeloides*	-	THR (S3)
Fraser loosestrife*	*Lysimachia fraseri*	-	END (S2)
Giant hyssop*	*Agastache scrophulariifolia*	-	P-THR (S1S2)
Gibbous panic-grass	*Sacciolepsis striata*	-	SPCO (S1)
Green-and-gold*	*Chrysogonum virginianum*	-	THR (S2)
Hairy umbrella-sedge	*Fuirena squarrosa*	-	SPCO (S1)
Horsesugar*	*Symplocos tinctoria*	-	SPCO (S2)
Large cranberry	*Vaccinium macrocarpon*	-	THR (S2)
Larkspur-leaved coreopsis	*Coreopsis X Delphiniifolia*	-	THR (S1)
Mountain bitter cress	*Cardamine clematitis*	-	THR (S2)
Mountain bush-honeysuckle*	*Diervilla rivularis*	-	THR (S2)
Mountain honeysuckle*	*Lonicera dioica*	-	SPCO (S2)
Mountain rattlesnake root*	*Prenanthes roanensis*	-	THR (S3)
Naked-fruited rush*	*Juncus gymnocarpus*	-	SPCO (S3)
Nestronia	*Nestronia umbellula*	-	END (S1)
Nevius' stonecrop*	*Sedum nevii*	-	END (S1)
Northern bush-honeysuckle	*Diervilla lonicera*	-	THR (S2)
Obovate marshallia	*Marshallia obovata*	-	THR (S1)
Ovate catchfly*	*Silene ovata*	-	END (S2)
Panic-grass	*Panicum acuminatum* var. *leucothrix*	-	SPCO (S1)
Pink lady-slipper*	*Cypripedium acaule*	-	E-CE (S4)
Ribbonleaf pondweed	*Potamogeton epihydrus*	-	SPCO (S1S2)
Rock skullcap	*Scutellaria saxatilis*	-	THR (S3)
Roundleaf serviceberry	*Amelanchier sanguinea*	-	THR (S2)
Small purple fringe orchid	*Platanthera psycodes*	-	SPCO (S2)
Southern lobelia*	*Lobelia amoena*	-	THR (S1S2)
Southern nodding trillium*	*Trillium rugelii*	-	END (S2)
Sweet pinesap*	*Monotropsis odorata*	-	THR (S2)
Sweetbay magnolia	*Magnolia virginiana*	-	THR (S2)
Tawny cotton-grass	*Eriophorum virginicum*	-	THR (S1S2)
Tennessee pondweed	*Potamogeton tennesseensis*	-	THR (S2)
Yellow jasmine	*Gelsemium sempervirens*	-	SPCO (S1S2)

END-Endangered; THR-Threatened; SPCO-Special Concern; CE–Commercially Exploited; P-Proposed; S1-Extremely rare and critically imperiled in state with five or fewer occurrences; S2-Very rare and imperiled within state with 6-20 occurrences and less than 3,000 individuals; S3-Rare and uncommon in state with 21-100 occurrences; S4-Widespread, abundant and apparently secure in state, though it may be rare in some parts of its range; S#S#-Denotes a range of ranks because the exact rarity is uncertain (e.g., S1S2).

American ginseng (*Panax quinquefolius*) – Perennial with palmately compound leaves, usually with five stalked, elliptic, toothed leaflets. Small greenish-white flowers occur in a single umbel usually below the leaves and appear in May to July. This species occurs in moist woods throughout most of the eastern U.S. and eastern Canada (Weakley 2006). Populations are disappearing due to over collection of the roots for commercial uses. It is scattered across Tennessee.

Ash-leaved bush-pea (*Thermopsis fraxinifolia*) – A yellow flowered, early summer flowering member of the bean family. This herb is mostly restricted to the Southern Appalachians in Tennessee, North Carolina and Georgia, and grows in dry, open oak or oak-pine woods that are prone to fire (Weakley 2006).

Broadleaf bunchflower (*Melanthium latifolium*) – Erect, stout, poisonous perennial from 2 to 5 feet tall occurring in rich woods in Coffee, Polk , Sevier and Unicoi counties in Tennessee. The extended range is from Connecticut south to Georgia (Weakley 2006). The inflorescence is a panicle of loose racemes. The flowers have greenish-white petals with wavy margins and appear July to August.

Broad-leaved tickseed (*Coreopsis latifolia*) – A sunflower-like plant up to 4 feet in height with toothed leaves and yellow flowers. It is found only in the mountains of Tennessee, North Carolina, South Carolina and Georgia, and grows in rich, moist cove hardwood forests (Weakley 2006).

Chalk maple *(Acer saccharum ssp leucoderme)* – A small tree, closely related to sugar maple, with chalky white bark. Primarily occurring in the Piedmont, it ranges from North Carolina west to east Oklahoma and east Texas (Weakley 2006). In Tennessee it is almost entirely restricted to Polk County. It grows on moderately-moist slopes and streamsides, and occasionally can be a significant understory species.

Chokecherry (*Prunus virginiana*) – This is a colonial shrub with black, smooth bark. The flowers are white and appear in late April to early July. This species is found in thickets and woodland borders in Oak-Hickory forests in North Carolina, Tennessee, Virginia, Kentucky and West Virginia (Weakley 2006).

Cow parsnip *(Heracleum maximum*) –This plant is 4 to 10 feet in height and has large leaves and numerous tiny white flowers. This species occurs along stream banks, meadows and roadside in the mountains of North Carolina, Tennessee, Kentucky and West Virginia (Weakley 2006).

Fraser loosestrife *(Lysimachia fraseri*) – An erect herb up to 5 feet tall with whorled leaves and a long cluster of showy yellow flowers at the end of the stem. It is primarily a species of the Southern Appalachians, ranging from North Carolina and South Carolina west to Alabama (Weakley 2006). It grows in open, moist fields and roadsides, and occurs at several sites in the Ocoee River gorge.

Giant hyssop (*Agastache scrophulariifolia)* – Erect perennial to 60 inches tall with densely-flowered spikes with a purplish corolla. This species is found in at high elevations in upland woods in Polk and Carter counties in Tennessee (Weakley 2006).

Green-and-gold (*Chrysogonum virginianum*) – A colonial plant with flowers that appear from late March to early June. This species grows in moist to fairly dry woodlands and forests

and is found in northeast South Carolina, northwest North Carolina, northeast Tennessee, and southeast Kentucky south to eastern Georgia, central Georgia, and eastern central Alabama (Weakley 2006).

Horsesugar (*Symplocos tinctoria*) – A small tree with relatively large, thick leaves which superficially resemble those of evergreen rhododendrons. The leaves have a very sweet sap and sometimes are heavily browsed by wildlife and livestock. It is primarily a Coastal Plain and Piedmont species which also occurs in extreme southeastern Tennessee (Weakley 2006).

Mountain bush-honeysuckle (*Diervilla rivularis*) – A medium sized, summer flowering shrub with opposite leaves and pale yellow flowers at the end of twigs. This species is found primarily in the Southern Appalachians, and grows in open, rocky woods, especially along bluffs or large streams. It is known from Polk, Marion, Hamilton, Washington, Unicoi, and Roane counties in Tennessee (UT Herbarium 2006).

Mountain honeysuckle *(Lonicera dioica*) – A semi-erect shrub or twining woody vine with light-colored shreddy bark and opposite simple leaves. It has yellow to orange, tubular to funnel-shaped flowers in clusters at branch tips and blooms in May or June. It occurs in mountain woods and thickets and is found in Putnam, Jackson, Hamilton, Polk, Roane, Loudon, Claiborne, Hancock, Washington and Johnson counties in Tennessee (UT Herbarium 2006).

Mountain rattlesnake root (*Prenanthes roanensis*) – Biennial herb with an erect stem to 2 feet tall. The flowers are yellow and appear in August to frost. This species occurs on wooded slopes and road banks in mountainous areas of Tennessee and North Carolina (Weakley 2006).

Naked-fruited rush (*Juncus gymnocarpus*) – Naked-fruited rush is a slender, tufted perennial growing to 2 feet tall. The flowers appears lateral and are seen July to September. The fruits are small and brown. This species is found in swampy and springy areas in the mountainous areas of east Tennessee and in Florida (Weakley 2006).

Nevius' stonecrop (*Sedum nevii*) – A late spring flowering succulent with small white flowers. This species is restricted to a small number of river gorge sites in the mountains of Tennessee and Alabama (Weakley 2006). It usually grows on open, rocky seepages within these gorges but occasionally will spread for a short distance into surrounding forests. In Tennessee it is known only from the Ocoee River gorge, which supports one of the largest known populations.

Ovate catchfly (*Silene ovata*) – Perennial to 6 feet tall. The inflorescence is a loose panicle, and the white flowers are an inch wide with five fringed petals. It is found in rich woods and is thinly scattered across Tennessee, and found from Virginia to Kentucky south to Georgia, Alabama and Arkansas (Weakley 2006).

Pink lady-slipper (*Cypripedium acaule*) – Perennial with two basal leaves and a pink flower help distinguish this flower from the rest of the lady-slippers. This species ranges from Newfoundland west to north Alberta, south to North Carolina, South Carolina, Tennessee, and northern Indiana, and Minnesota and is found in dry to mesic, acid forests or woodlands, often under pine or other conifers (Weakley 2006).

Southern lobelia *(Lobelia amoena*) – A small, blue flowered plant with milky sap. This species ranges from Virginia south to Florida and west to Mississippi. It is at the northern edge of its range in Tennessee, and is only found in the far southeastern part of the state. It grows on streambanks and open, dry roadsides (Weakley 2006).

Southern nodding trillium (*Trillium rugelli*) – Erect perennial to 2 feet tall. The three large green leaves are whorled and taper to the base to a short stalk. The white flower has a green-apple fragrance (Weakley 2006). It is found in Tennessee and North Carolina south in the Blue Ridge and Piedmont, and in the Coastal Plain of Alabama, Georgia and South Carolina.

Sweet pinesap (*Monotropsis odorata*) – Saprophytic erect perennial from 2 to 5 inches. The flowers are pink to rose to purple, 0.4 inches long and have a sweet smell. Sweet pinesap inhabits pine dominated forests and pine-oak heaths. It is found in Grundy, Polk, Monroe, Blount and Sevier counties in Tennessee. The species is found more frequently in North Carolina and Virginia and becomes more rare as it reaches the limits of its range, which is from Maryland and West Virginia south to Alabama, Georgia and possibly Florida (Weakley 2006).

In addition to the TVA Natural Heritage database, the entire 2001 CNF TES Species List was reviewed to determine potential impacts to sensitive species and their habitats by the proposed alternatives. Only those sensitive species that have potential to occur within the proposed project area, based on habitat requirements, are included for further analysis. These species are listed in Table 5 and their habitats are described following the table.

Table 5. USFS Sensitive Plant Species Requiring Further Analysis

Common Name	Scientific Name
Vascular Plants	
American barberry	*Berberis canadensis*
Ashleaf goldenbanner	*Thermopsis mollis var. fraxinifolia*
Beadle's mountain mint	*Pycnanthemum beadlei*
Carolina hemlock	*Tsuga caroliniana*
Cutleaved meadow parsnip	*Thaspium pinnatifidum*
Dixie grapefern	*Botrychium jenmanii*
Fraser's yellow loosestrife	*Lysimachia fraseri*
Georgia aster	*Aster georgianus*
Large witchalder	*Fothergilla major*
Nevius' stonecrop	*Sedum nevii*
Piratebush	*Buckleya distichophylla*
Riverbank bush-honeysuckle	*Diervilla rivularis*
Small's beardtongue	*Penstemon smallii*
Sweet pinesap	*Monotropsis odorata*
Tall larkspur	*Delphinium exaltatum*

American barberry (*Berberis canadensis)* - American barberry ranges from Pennsylvania south to Alabama and Georgia and west as far as Missouri. Considered rare south of Virginia, this species is a broad southern Appalachian Ozarkian endemic. American barberry is generally known from open rocky woods, openings, and streambanks, usually over mafic or calcareous rock (Weakley 2006). Formerly an inhabitant of savannas and open woodlands, fire suppression has significantly restricted its habitat to sites with shallow soil (such as glades and cliffs) or areas with mowing or other canopy-clearing activities (such as powerline corridors, railroad/road ROWs and riverbanks). No locations for this plant are currently recorded for the Cherokee National Forest.

Ashleaf goldenbanner *(Thermopsis mollis var. fraxinifolia)* - *Thermopsis mollis var. fraxinifolia* is a southern Appalachian endemic that ranges from North Carolina and Tennessee, south to northern portions of Georgia and South Carolina. Habitat includes openings in dry woodlands and ridges (Weakley 2006). There are currently 28 known sites for this species on the Cherokee National Forest, many of which occur along roadsides.

Beadle's mountain mint (*Pycnanthemum beadlei*) - Beadle's mountain mint is a southern Appalachian endemic that is known to occur in forests and woodland borders from southwest Virginia and northeast Tennessee to southwest North Carolina and northwest South Carolina and north Georgia (Weakley 2006). There are currently no documented sites for this species on the Cherokee National Forest.

Cutleaved meadow parsnip (*Thaspium pinnatifidum*) - This species is known from Kentucky and Ohio, south to western North Carolina, eastern Tennessee and northern Alabama where it occurs in forests and woodlands over calcareous rock (Weakley 2006). There is currently one documented site for this species on the Cherokee National Forest.

Dixie grapefern (*Botrychium jenmanii*) - This plant ranges from Virginia south to Florida through Tennessee, Alabama, and Louisiana. Like most other grapeferns, specific habitat is difficult to categorize, and may include dry to moist forests and disturbed areas. It occurs in a variety of habitats including hardwoods, pine woods, open grassy places, and disturbed areas and is rare across most of its range. No locations for this plant are currently recorded for the Cherokee National Forest.

Fraser's loosestrife (*Lysimachia fraseri)* - Fraser's loosestrife is a regional endemic, occurring in eastern Tennessee, the Carolinas, Alabama, and Georgia with disjunct populations in southern Illinois and northwestern Tennessee. This species is known from hardwood forests, forest edges, roadbanks, and thin soils near rock outcrops. *Lysimachia fraseri* is generally found in wet areas such as alluvial meadows, moist stream and riverbanks, flats along streams, moist pastures, and roadside ditches, yet it is also known from rocky upland and hardwood forests. Flowering seems dependent upon treefall gaps or other openings in the canopy (Weakley 2006). There are currently 10 known populations recorded on the Cherokee National Forest.

Georgia aster *(Aster georgianus)* - This species is known to occur from central North Carolina, south to central Georgia and Alabama. Disjunct populations occur in Florida. This species is not currently known to occur on the Cherokee National Forest, but is possible in southeastern Tennessee. Habitats are described as dry, rocky, open woods and roadsides in areas that probably had a previous history of periodic fire. This species is considered to be associated with historic post oak and blackjack oak woodlands (Weakley 2006).

Large witchalder *(Fothergilla major)* - This species ranges from Arkansas east to Tennessee, Alabama, Georgia, and the Carolinas. It is typically found in dry, ridgetop forests of moderate elevations especially along the Blue Ridge escarpment (Weakley 2006). There are currently three known occurrences of this species on the Cherokee National Forest.

Nevius' stonecrop (*Sedum nevii)* - This species is endemic to southeast Tennessee (Polk County), north central and east central Alabama and west central Georgia. It occurs on gneiss rock outcrops on river bluffs (Weakley 2006). There are currently nine records known on the Cherokee national Forest, all restricted to the Ocoee River gorge.

Piratebush *(Buckleya distichophylla)* and Carolina hemlock (*Tsuga caroliniana)* - These are both southern Appalachian endemics that often occur together on open, dry, rocky bluffs. Piratebush is only known to occur at a few, widely scattered locations in the mountains of southern Virginia, western North Carolina, and northeastern Tennessee (Weakley 2006). There are currently 14 known sites for this species on the Cherokee National Forest. Carolina hemlock is known from over 50 locations on the Forest and ranges from Virginia, south through Tennessee and North Carolina, to northern portions of Georgia and South Carolina (Weakley 2006).

Riverbank bush-honeysuckle (*Diervilla rivularis)* - This species is found in western North Carolina, east Tennessee south to northwest Georgia and northeast Alabama. It grows on rock outcrops, ridges and streambanks at moderate to high elevations. It flowers from June to August (Weakley 2006). There are currently 12 known occurrences on the Cherokee National Forest.

Sweet pinesap *(Monotropsis odorata)* - This plant ranges from Maryland and West Virginia south to Georgia and Alabama, though it seems to be centered in the Appalachians (Weakley 2006). On the Cherokee National Forest, this species typically inhabits dry to mesic pine and mixed pine-hardwood woodlands. This species is mycotrophic (deriving its nutrition from another vascular plant via fungal hyphae) thus, the distribution of this species may be tied, in part, to the distribution of certain fungi and other vascular plants (Olson 1994). Where found, populations often occupy only a few square meters, thus only a tiny fraction of available habitat is utilized. Although it has a wide distribution and nonspecific habitat, it remains an extremely rare plant throughout its range. There are currently eight known sites for this species on the Cherokee National Forest.

Small's beardtongue (*Penstemon smallii)* - This species is a southern Appalachian endemic that occurs in woodlands, cliffs, glades, and roadsides from northwest North Carolina and northeast Tennessee, south to northwest South Carolina and northern Georgia (Weakley 2006). There are currently no records of this species on the Cherokee National Forest.

Tall larkspur (*Delphinium exaltatum)* - This larkspur is known to occur primarily west of the Blue Ridge Mountains from southwest Pennsylvania and Ohio, to Missouri, then east to eastern Tennessee, the mountains of southern Virginia, and the mountains and Piedmont of North Carolina. The species occurs in dry to moist habitats over calcareous or mafic rock, usually in full or partial sun, often on forest edges or within grassy balds (Weakley 2006). The flowers are a pale to medium blue and occur July (low elevations) to September (high elevations). No locations for this species are recorded on the Cherokee National Forest.

State-Listed and Sensitive Terrestrial Animal Species

A review of the TVA Natural Heritage database indicates that 10 state-listed species are reported from Polk County. Six additional species, all invertebrates, known to occur in this county are considered uncommon by the Tennessee Natural Heritage Program, but they do not have official status in Tennessee. All of these species are listed in Table 6 below. The species descriptions follow Table 6.

Table 6. State-Listed Terrestrial Animal Species Reported From Polk County, Tennessee

Common Name	Scientific Name	Federal Status	State Status
Amphibians			
Eastern hellbender	*Cryptobranchus alleghaniensis alleghaniensis*	--	NMGT (S3)
Seepage salamander	*Desmognathus aeneus*	--	NMGT (S1)
Reptiles			
Northern coal skink	*Eumeces anthracinus anthracinus*	--	NMGT (S1)
Northern pine snake	*Pituophis melanoleucus melanoleucus*	--	THR (S3)
Bird			
Swainson's warbler	*Limnothlypis swainsonii*	--	NMGT (S3)
Mammals			
Common shrew	*Sorex cinereus*	--	NMGT (S4)
Smoky shrew	*Sorex fumeus*	--	NMGT (S4)
Southeastern shrew	*Sorex longirostris*	--	NMGT (S4)
Southern Appalachian woodrat	*Neotoma floridana haematoreia*	--	NMGT (S2)
Woodland jumping mouse	*Napaeozapus insignis*	--	NMGT (S4)
Invertebrates			
Allegheny snaketail	*Ophiogomphus alleghaniensis*	--	NOST (S1)
Blue-gray glyph	*Glyphyalinia ocoae*	--	NOST (S2)
Cherokee clubtail	*Gomphus consanguis*	--	NOST (S1)
Cohutta slitmouth	*Stenotrema cohuttense*	--	NOST (S2)
Edmund's snaketail	*Ophiogomphus edmundo*	--	NOST (S1)
Ocoee covert	*Fumonelix archeri*	--	NOST (S1)

Status abbreviations: NMGT = In Need of Management; THR = Threatened; NOST = No official status but tracked due to rarity of occurrence; S1- extremely rare and critically imperiled in the state with five or fewer occurrences, or very few remaining individuals, or because of some special condition where the species is particularly vulnerable to extinction; S2 - very rare and imperiled within the state, 6-20 occurrences, or few remaining individuals, or because of some factor(s) making it vulnerable to extinction; S3 - rare and uncommon in the state, from 21-100 occurrences; S4 - widespread, abundant, and apparently secure within the state, but with cause for long-term concern.

Eastern hellbenders *(Cryptobranchus alleghaniensis alleghaniensis)* are found in large and mid-size, fast-flowing, rocky rivers at elevations below 762 meters (Petranka 1998). Numerous records are known from the Hiwassee River, but they are absent from the Ocoee River due to environmental conditions of the river.

Seepage salamanders *(Desmognanthus aeneus)* occur in and around seepages or in terrestrial habitats adjoining small streams (Hairston 1986). They frequent moist leaf litter but are occasionally found beneath logs, moss mats, and other surface objects (Petranka

1998). Seepage salamanders were observed during field surveys within seepages in the proposed Alternative 4 powerline corridor at Tolliver Shanty Branch.

Northern coal skinks *(Eumeces anthracinus anthracinus)* inhabit rocky areas near springs, streams or wetlands in moist woodlands. Habitat exists for this species within stream coves and ravines.

Northern pine snakes *(Pituophis melanoleucus melanoleucus)* inhabit well-drained sandy or loamy soils with dense vegetation. They have been found in pine barrens, mixed scrub pine and oak woods, dry rocky mountain ridges, sand hills, and old fields (Ernst and Ernst 2003). Habitat exists for this species along the proposed TL route.

Swainson's warblers *(Limnothlypis swainsonii)* nest in wooded bottomlands and ravines with a thick, shrubby understory. Habitat exists within the Tolliver Shanty Branch drainage.

Common shrews *(Sorex cinereus)* are found in a variety of habitats but are most commonly found living amongst rocks and logs in moist woods as well as in marshy meadows and sphagnum bogs, but have on occasion been taken in dry upland fields (Linzey 1998). Habitat for this species exists along the proposed TL route especially within stream coves and ravines.

Smoky shrews *(Sorex fumus)* inhabit cool, damp hemlock and spruce forests as well as deciduous forests (Linzey 1998). They have been collected in swamps and bogs. Numerous records occur for this species in the project area. Habitat for this species exists within the Tolliver Shanty Branch drainage.

Southeastern shrews *(Sorex longirostris)* are found in a variety of habitats. They prefer moist situations in woods or fields (Linzey 1998) including disturbed habitat such as abandoned fields with dense ground cover of honeysuckle, grasses, sedges, and herbs (Linzey and Brecht 2002). Numerous records for this species occur within the project area.

Southern Appalachian woodrats *(Neotoma floridana)* occupy woodland and brushy habitats south of the Tennessee River. They are usually associated with rocky outcrops, but also in areas with dense vegetation (Mirarchi 2004).

Woodland jumping mice *(Mapaeozapus insignis)* inhabit mesic spruce-fir and hemlock-hardwood forests especially with dense herbaceous growth (Linzey 1998). Habitat suitable for this species exists within the Tolliver Shanty Branch drainage.

Uncommon invertebrates occur within a variety of habitat types. Cherokee clubtails inhabit spring-fed moderately flowing forest streams, especially where they drain small ponds, Edmund's snaketails are found in clear, moderately flowing mountain streams and rivers, and Alleghany snaketails are found within clear streams at low elevations in the open, with sandy or gravelly riffles (Dunkle 2000). The other three invertebrates listed are snails. They are all found within forests.

In addition to the TVA Natural Heritage database, the entire 2001 Cherokee National Forest TES list was reviewed to determine potential impacts to sensitive species and their habitats by the proposed alternatives. Only those sensitive species that have potential to occur within the proposed project area, based on habitat requirements, are included for further analysis. These species are listed in Table 7 and their habitats are described following the table.

Table 7. USFS Sensitive Species Requiring Further Analysis

Common Name	Scientific Name
Insect	
Diana fritillary	*Speyeria diana*
Mammals	
Eastern small-footed bat	*Myotis leibii*
Rafinesque's big-eared bat	*Corynorhinus rafinesquii*
Snail	
Ocoee covert	*Fumonelix archeri*

Diana fritillary *(Speyaria diana)* - The original range of this species was possibly as far north as western Pennsylvania; presently it ranges to the Virginias. To the west, its range was formerly mostly through the Ohio Valley to Illinois, and south to northern Louisiana and north Georgia, though distribution has been somewhat spotty. Diana fritillary is currently very rare outside of Appalachia. This species has been found recently primarily in the mountains from central Virginia and West Virginia through the western Carolinas and eastern Tennessee into extreme northern Georgia and adjacent Alabama (NatureServe 2006). Habitat for this species includes glades and other open areas within rich, moist mountain forests (Glassberg 1999). The Diana fritillary routinely lays eggs near violets, the larvae's host food. The caterpillars hatch, hibernate over the winter as pupae, and then crawl to nearby violets in the springtime (P. Lambdin personal communication). Adults are present from late June to September with males emerging before females. One brood is produced per year.

Eastern small-footed bat *(Myotis leibii)* - This species is found in rocky mountainous areas from Quebec southwest along the Southern Appalachians to northern Georgia, and west to Oklahoma. Abundance is extremely difficult to assess, and populations and occurrences are relatively scattered and small throughout its range (Erdle and Hobson 2001). In 350 nights of mist netting across the CNF since 1991, only 12 individuals have been recorded and banded in Polk, Monroe, Cocke, Unicoi, and Greene Counties. Several bachelor colonies and two maternity colonies have been observed in bridges, mines and rock crevices during the period 2000-2003 (G. Libby, Pers. comm.). Summer roosts include rock outcrops and cliffs, rock faults and crevices, bridge expansion joints, and abandoned mines and buildings. Rocky areas or bridges with sun exposure in a forested landscape may be important maternity site features. These bats hibernate singly or in small groups in caves, mines and buildings and are often found under talus and rocks on cave floors or wedged into cracks and crevices. Known threats include direct human disturbance of roosts, and landscape changes that alter habitat parameters of roosts or hibernacula. Snag retention is important.

Corynorhinus rafinesquii Rafinesque's big-eared bat - This species ranges widely over the southern states from Virginia, West Virginia, Ohio, Indiana, and Illinois south to the Gulf of Mexico; west to Louisiana, Oklahoma, and eastern Texas. It inhabits forested regions. Hibernation in the north and in mountainous regions most often occur in caves or similar sites; small caves are selected, and the bats stay near the entrance (often within 30 meters) and are thought to move about in winter. Winter habitat in the south is not well known. Summer roosts often are in hollow trees, occasionally under loose bark, or in abandoned buildings in or near wooded areas, instead of being restricted to caves (NatureServe 2006).

Ocoee covert *(Fumonelix archeri)* - Ocoee coverts are known from the Ocoee watershed in Polk County, Tennessee. The TVA Natural Heritage database lists two populations in or near the Ocoee River, but seven new sites for this species are currently known (D. Doursen, Pers. comm.). This species is found under the leaf litter in hardwood forests, especially in areas with dog hobble (*Leucothoe fontanesiana).*

State-Listed and Sensitive Aquatic Species

The Tennessee dace (*Phoxinus tennesseensis)* is known to occur in smaller streams in the Ocoee River drainage within 10 miles of the proposed TL. No other listed aquatic animal species are known from the Ocoee or its tributaries within the project area. The Tennessee dace is listed as "In Need of Management" in Tennessee (Tennessee Department of Environment and Conservation [TDEC] 2005). This fish is found sporadically in small tributaries of the upper Tennessee River drainage from the Clinch River in Virginia to the Hiwassee River, west of Chattanooga. The Tennessee dace typically inhabits shallow pools with undercut banks in small, low-gradient woodland streams (Etnier and Starnes 1993), but has been encountered in higher gradient (>10 percent gradient streams by USFS biologists) .

The forested headwater streams crossed by the proposed alternatives are all located at higher elevations (>1,200 feet) and are high-gradient streams that drain the surrounding ridges and do not provide optimal habitat for the Tennessee dace. TVA considers that the possibility that the Tennessee dace occurs within or immediately adjacent to the ROW crossings is minimal.

3.1.5. Demand Species-Black Bear

The black bear (*Ursus americanus*) uses a wide variety of habitats in the southern Appalachians, occurring primarily on national forests and national parks of the southern Blue Ridge, northern Cumberland, and Allegheny Mountains and the Northern Ridge and Valley. These public lands in Virginia, West Virginia, North Carolina, Tennessee, and Georgia connect to form a forested landscape of over 6 million acres where bears are generally distributed at low to medium densities. The increase of older oak forests in this large block of habitat, along with increased protection and conservative hunter harvest, has allowed bear populations throughout the southeastern mountain region to increase moderately over the past 30 years.

Bears generally are absent from the Cumberland Plateau, southern Cumberland Mountains, Southern Ridge and Valley and Piedmont (SAMAB 1996). Tennessee's black bear population is estimated at 1,000 to 1,500 animals, half of which may occupy the CNF. Bait station survey data and legal harvest data indicate a significant population increase since 1980 (USFS 2004c).

In the southern Appalachians, including the CNF, important habitat elements are habitat remoteness, habitat diversity, den site availability, and availability of hard mast.

Black bears are opportunistic omnivores and consume a variety of seasonal plant and animal foods including flowering plants, grasses, various roots and tubers, and especially soft mast (grapes, berries, apples, etc.). However, availability of hard mast (acorns and hickory nuts) is critical throughout the winter, and reproductive success is closely related to this habitat factor (USFS 2004a). Total production of hard mast and production by

individual trees can fluctuate from year to year due to climatic and other factors (USFS 2004a).

Bears den in a wide variety of sites including road culverts, abandoned buildings, and in vegetation (USFS 2004a). Traditional dens are found on the ground in caves, rockfalls, or under the root mass of uprooted trees, and in hollow trees. Some researchers have found that hollow trees are preferred dens (USFS 2004a). Others have found that ground dens are preferred in the North Carolina mountains (USFS 2004a). Preference may be related to availability and may be a learned behavior (USFS 2004a). During field investigations conducted in May 2004 and August 2005, no den sites or potential den sites were found.

Availability of potential den trees on the CNF is augmented by a forestwide standard requiring their retention during all vegetation management treatments. For this reason, the black bear was selected as an MIS to help indicate management effects on meeting hunting demand for this species.

3.1.6. Invasive Nonnative Plants and Animals

On the CNF, the following nonnative invasive plant species are tracked through project level inventories: Tree of heaven (*Ailanthus altissima*), small carpetgrass (*Arthraxon hispidus*), autumn olive (*Eleagnus umbellata*), English ivy (*Hedera helix*), sericea lespedeza (*Lespedeza cuneata*), privet (*Ligustrum sinense*), Japanese honeysuckle (*Lonicera japonica*), Nepal grass (*Microstegium vimineum*), princess tree (*Paulownia tomentosa*), kudzu (*Pueraria lobata*), and multiflora rose (*Rosa multiflora*). While other invasive plant species may occur with scattered distributions on the forest, these species are recognized as having significant occurrences with a high potential for impacts to native communities on the forest. The RLRMP (USFS 2004a) includes numerous goals, objectives, and standards to address the potential impacts of nonnative invasive species. These include control efforts and maintenance and restoration of native species.

Invasive exotic plant species encountered along the proposed routes include Johnson grass (*Sorghum halepense)*, Japanese honeysuckle, multiflora rose, Nepal grass, princess tree, sericea lespedeza and tree of heaven. Invasive terrestrial plant species have the potential to adversely impact the native plant communities because of their potential to spread rapidly and displace native vegetation.

The wild boar (*Sus scrofa*) is another example of nonnative species that is negatively affecting certain habitats in the southern Appalachians (USFS 2004a). Wild boars were introduced into the southern Appalachian Mountains in the early 1900s. Originally imported for hunting, they eventually escaped from their enclosed hunting reserves in North Carolina and over time have become a naturalized component of the area's fauna (USFS 2004a). Management of this species is somewhat controversial in that some hunters desire it as a major game species, yet its impacts to the natural environment must be mitigated.

3.1.7. Forest Health

The health of the CNF is vulnerable to insects, diseases, and potential storm damage. Damage to forest communities occurs in varying degrees depending on community types and species composition, location on the landscape, age of the forested community, past disturbance, and weather conditions.

Gypsy Moth

The gypsy moth (*Lymantria dispar*) was brought to the U.S. in 1869 in a failed attempt to start a silkworm industry. Escaping soon after, the gypsy moth has become, over the past century, a major pest in the northeastern U.S. and southeastern Canada. The gypsy moth continues to expand its range to the west and south each year (USFS 2006a). The infested areas have spread as far south as Virginia, just north of the CNF. The gypsy moth is projected to occur on CNF between the years 2010 and 2025 (SAMAB 1996).

Gypsy moth larvae feed on more than 300 species of trees, shrubs, and vines. It has a preference for the leaves of deciduous hardwood trees such as maple, elm, and particularly oak. Gypsy moths can also feed on apple, alder, birch, poplar, and willow trees. As it grows, it will also attack evergreens like pines and spruces. Gypsy moths appear to dislike ashes, sycamores, butternuts, black walnuts, dogwoods and balsams. However, during heavy infestations, competition for food will drive the caterpillar to attack almost any tree or shrub (USFS 2006a).

Tree defoliation is caused by the insect larvae, or caterpillars, which emerge from their eggs beginning in early spring and continuing through mid-May. The larvae move to the leaves of trees and begin to eat, mostly at night. During daylight hours, larvae generally seek shade from the sun, but feeding can occur in daytime in heavy infestations.

Hemlock Woolly Adelgid (HWA)

The first report of HWA (*Adelges tsugae)* in eastern North America was in the early 1950s. It was first observed in western North America on western hemlock in the 1920s and is believed to have originally arrived from Asia. Hemlocks in Asia and western North America appear resistant to HWA; however, eastern and Carolina hemlocks are highly susceptible. Significant problems from this insect did not appear until the mid-1980s when the distribution of the insect started to spread rapidly up and down the east coast. The insect is currently found from Massachusetts to the Shenandoah Valley into the Blue Ridge Mountains of Virginia, North Carolina, South Carolina, Tennessee, and Georgia. The entire range of eastern hemlock is vulnerable and could be infested within 30 years.

The CNF has reported infested stands in the north end of the forest. North Carolina and the Great Smoky Mountains National Park have reported well-established populations in the forests adjacent to CNF.

The HWA has caused extensive and widespread mortality to hemlocks of various ages. Infestations have killed trees in as little as two years, yet trees have maintained infestations for greater than 10 years. Hemlocks normally occupy habitats characterized as humid and cool, with year-round moisture. Their stands produce a dense canopy, resulting in a cooler understory microhabitat than found under adjacent hardwood stands. This combination of habitat location and microhabitat quality makes eastern hemlock a critical component of the riparian ecosystems. A variety of aquatic species, including brook trout, are found more commonly in streams bordered by hemlocks because of the cooling effect of the canopy. Hemlock stands provide important field cover for ruffed grouse, turkey, and rabbit. Numerous bird and plant species are associated with natural hemlock stands (USFS 2006b).

Southern Pine Beetle (SPB)
The SPB (*Dendroctonus frontalis)* is the most serious pest of coniferous forests in the southern U.S. They most commonly mass-attack the trunks of mature or overmature pine trees, but may attack and kill pines as young as five years of age. The SPB is native to the south. Beetle populations will remain at endemic levels for years until populations build up to epidemic levels for a two- or three-year period. These cycles occur about every 7-10 years. Often infestations that show up in the spring do not continue and will die out. Trees may be killed singly or in groups. However, when populations are high, infestations can expand almost like wildfire within pure pine and mixed pine-hardwood stands, killing thousands of trees and covering hundreds of acres (USFS 2006c). The adults bore directly through the outer bark into the inner living bark. At each point of contact, the tree typically exudes resin, which forms a small pitch tube about the size of a small piece of popped popcorn. Adult beetles create winding, S-shaped galleries, which cut across one another and eventually girdle the tree. Blue-stain fungi in the sapwood, introduced by the beetles, hasten the death of the tree. The first indication of tree mortality is discoloration of the foliage. Natural enemies, such as diseases, parasites, predators, and weather, help maintain beetle populations at low levels and help bring cyclic outbreaks under control.

The beetle attacks southern yellow pines, i.e., loblolly, shortleaf, Virginia, pitch, and table mountain pines. Eastern white pine is occasionally attacked during an especially large buildup of the insect population (USFS 2006c). All of these pines are native to the CNF. Pine is a significant facet of the forested communities within the CNF and represents a large portion of the forest.

Storm Damage
Storm damage to trees from tornadoes, hurricanes, snow, or ice loading with or without wind, is similar. These stresses cause hardwoods and pines to break off, split, be root sprung, bend, and suffer branch and foliage losses. Stresses appear to be mostly the same, regardless of storm type. Tree crown configuration; age (old, large trees suffer greater damage); size and limberness of stems; branching habit; lean of bole; anchorage based on rooting characteristics and soil; and the presence of root and stem diseases have as much or more to do with tree damage as the intensity of the storm itself.

Elevation can be important in the case of ice and snow damage. Frequently, a variation of one or 2 degrees in air temperature can result in bands of varying damage on the same hillside at different elevations, depending on the temperatures there at the time of precipitation. Pre-storm management to minimize damage is not possible because of the natural randomness of weather patterns.

3.2. Aquatic Ecology

Alternatives 1, 2, and 3
These alternatives have eight perennial stream crossings: six crossings of the Ocoee River, one crossing of Tolliver Shanty Branch, and one crossing of Gassaway Creek. TL ROWs for Alternatives 1, 2, and 3 would all cross these streams and effects of construction, operation, and maintenance of these alternatives would be similar.

The reach of the Ocoee River between the Ocoee 3 Dam and the Ocoee 2 Powerhouse has been impacted by construction and operation of the Ocoee River dams and powerhouses. Historically, much of the riverflow downstream of Ocoee 3 Dam has been

diverted through a tunnel to the Ocoee 3 Powerhouse. Water reenters the river briefly, and then the majority of flow is again diverted though a flume at the Ocoee 2 Dam to the Ocoee 2 Powerhouse. As a result, slightly over 5 miles of the river has been essentially dewatered except for recreational releases from the Ocoee projects. No fish were collected during TVA Index of Biotic Integrity (IBI) monitoring in this reach in 1995 (TVA unpublished data). The Ocoee River has been stocked with rainbow trout, and some individuals may persist in this reach of the river.

Gassaway Creek was monitored in 1994 and scored "poor"in the IBI ratings. Catch rates were extremely low, 12.6 fish/effort (TVA unpublished data). No listed species were collected during this survey. Fish populations in the tributary streams in this area are isolated from one another by the poor river conditions in this reach of the Ocoee River. Tolliver Shanty Branch has not been sampled, but the fish community composition is expected to be typical of streams in the area.

No wet-weather conveyances were shown in the existing plan and profile drawings, but due to the steep topography, a number are expected to be present.

Alternative 4

Tolliver Shanty Branch, Short Creek, an unnamed tributary to Short Creek, and Little Gassaway Creek would be crossed by the proposed ROW of Alternative 4. All of these streams are indicated as perennial streams on the Caney Creek, Tennessee, and Ducktown, Tennessee, 1:24,000 U.S. Geological Survey topographic quad maps. Tolliver Shanty Branch, Short Creek, and Little Gassaway Creek are likely perennial streams. All of these streams drain to the Ocoee River.

Tolliver Shanty Branch flows through a mature hemlock stand under the proposed ROW. The channel was 10 feet wide and 2.5 feet deep; with water 8-12 inches deep. Aquatic macroinvertebrates indicative of good stream quality and two common salamander species were found. The spring seep that flows into Tolliver Shanty Branch had a weakly defined channel under the proposed ROW. One species of salamander was found. The unnamed tributary to Short Creek likely has only intermittent flow. Due to high stream gradient in this area and the fact that all of these streams are only first- or second-order, these perennial streams likely support only a few fish species. No fish were observed during the field visit in any of these streams.

Twenty-one wet-weather conveyances draining into these creeks, Pace Creek, and Horsebone Branch were identified during a topographic survey of this proposed TL route.

3.3. Groundwater and Surface Water

The project area lies within the Blue Ridge Physiographic Province. The rock formations found in this area of the Blue Ridge are listed, from youngest to oldest, in Table 8.

Table 8. Stratigraphy of the Ocoee 2-Ocoee 3 Project Area

Age	Group	Formation
Precambrian Ocoee Super Group	Walden Creek Group	Wilhite Formation
		Shields Formation
		Licklog Formation
	Great Smoky Group	Anakeesta Formation
		Thunderhead Sandstone
		Elkmont Sandstone

Source: Geologic Map of Tennessee. (Swingle et al.1966)

The rock formations were originally sediments that have been exposed to various degrees of metamorphism. As a result of the metamorphism, these formations include highly mineralized zones that may contain pyrite, a potentially acid-forming mineral. The rocks of the area are extensively folded and have been transported northwestward on thrust faults. In many places, the folding is very tight, and in some places, the beds are overturned. The complexity of folding combined with lateral changes in lithology and varying degrees of metamorphism makes geologic mapping and interpretation difficult in this area.

The majority of all alternativeTL routes are underlain by the Walden Creek Group, which includes the Wilhite Formation, the Shields Formation, and the Licklog Formation. The Wilhite Formation consists of gray to green siltstone and slate with interbedded conglomerate, sandstone, and quartzite. The thickness of the Wilhite Formation is estimated to be about 4,000 feet. The Shields Formation is approximately 1,500 feet and consists of massive conglomerate, sandstone, and argillaceous slate. The Licklog Formation consists of feldspathic sandstone, greenish phylite, and bluish-gray slate with a thickness of about 1,500 feet.

Smaller parts of all alternative TL routes are underlain by the Great Smoky Group, which includes the Anakeesta Formation, the Thunderhead Sandstone, and the Elkmont Sandstone. The Anakeesta Formation is made up of dark gray, bluish-gray, and black slate interbedded with fine grained, dark gray sandstone. The thickness of the Anakeesta is 3,000 to 4,500 feet thick. The Thunderhead Sandstone consists of course grey feldspathic sandstone, graywacke, and conglomerate, with blue quartz, which occurs in massive ledges with graded bedding. The thickness of the Thunderhead Sandstone ranges from 5,500 to 6,300 feet. The Elkmont Sandstone is described as course to fine, gray feldspathic sandstone, graywacke, and fine conglomerate, with graded bedding and a thickness ranging from 1,000 to 8,000 feet.

Within the Great Smoky Group, the Anakeesta Formation is well known for bearing pyrite. None of the formations in the Walden Creek Group has been described as being particularly pyrite bearing; however, all of the Walden Creek Group formations are partially made up of slate, which could contain pyrite. Hurst and Schlee (1962) described sections of dark pyritic slate, within what is now considered the Walden Creek Group, occurring in several locations in the Ocoee Gorge between Ocoee 2 and Ocoee 3.

On-site soils are of the Junaluska-Citico-Tusquitee general soil map unit (U.S. Department of Agriculture Natural Resources Conservation Service 2003). These soils are deep and well drained, with a slope range of 5 to 65 percent. They have a moderate erodibility. However, the current forest land cover over most of the project area protects the soil from

erosion by a combination of tree canopy, dense root network, and organic surface layer of accumulated leaves and debris.

3.3.1. Groundwater

Groundwater in the Blue Ridge Physiographic Province is present in fractured bedrock aquifers and the surficial aquifer. Regolith forms the unconfined surficial aquifer, while the underlying fractured bedrock is the unconfined to semiconfined fractured bedrock aquifer. Regolith consists of soils, saprolite (weathered bedrock), and alluvium (transported weathered bedrock). The location and amount of groundwater in the Blue Ridge aquifers is determined by the number, size, and degree of interconnection of fractures and the thickness of the regolith. Rocks in the Blue Ridge Province generally are massive and have little or no primary porosity. The saturated regolith that overlies the bedrock and the alluvium (in major stream valleys) store groundwater and release it slowly into the bedrock fractures. The regolith and alluvium supply sufficient water for domestic wells. However, wells completed in regolith might go dry during late summer and early autumn when water levels usually decline because of a decrease in precipitation or increased withdrawals or both. Groundwater circulation in the Blue Ridge aquifers is localized. Most of the groundwater moves along short, shallow flow paths. Precipitation recharges the regolith and alluvium and then percolates downward into the bedrock aquifers. Discharge is to seeps and springs, as base flow to streams and rivers, and as withdrawals from wells (Lloyd and Lyke 1995).

Sources for public water supply in the region are from both groundwater and surface water. In Polk County, groundwater sources for public water supply are far outside the vicinity of the project area. However, there are transient, noncommunity groundwater wells supplying campgrounds and the Olympic Whitewater Center (U.S. Environmental Protection Agency [USEPA] 2005). No state-designated source water protection areas occur within the project area.

3.3.2. Surface Water

Precipitation in the project area averages about 60 inches per year with the wettest month in March at 6.4 inches and the driest month in October at 3.3 inches. The average annual air temperature is 57 degrees Fahrenheit (°F), ranging from a monthly average of 38°F in January and February to 76°F in July. Streamflow varies with rainfall and averages about 31 inches of runoff per year or approximately 2.3 cubic feet per second per square mile of drainage area.

The major streams in the area are the Hiwassee and the Ocoee Rivers. The Hiwassee has a drainage area of 1,131 square miles above the Apalachia Powerhouse, and the Ocoee drains 523 square miles above the Ocoee 2 Powerhouse. The project area drains to Pace Creek, Tolliver Shanty Branch, Short Creek, Little Gassaway Creek, Horse Bone Branch, and Gassaway Creek (tributaries to the Ocoee River) as well as to the river directly. The Ocoee in turn joins the Hiwassee about 30 river miles downstream of the project area. The reach of the Ocoee River in the vicinity of the project is classified by the Tennessee Department of Environment and Conservation (TDEC) for industrial water supply, fish and aquatic life, recreation, irrigation, and livestock watering and wildlife. It is identified by the state as Tier II high quality waters due to recreational resource of national significance, commercial rafting, Ruth's golden aster, scenic gorge, and CNF. The tributary streams in the project area are classified for domestic and industrial water supply, fish and aquatic life, recreation, irrigation, and livestock watering and wildlife.

Ocoee 2 Reservoir (this reach of the river) is on the state 303 (d) list (TDEC 2006) as not supporting its designated uses due to copper, iron, zinc, siltation, and flow alteration from mill tailings, mine tailings, contaminated sediments, impacts from abandoned mining, and upstream impoundment. The Ocoee River from Parksville Reservoir to Ocoee 2 Dam is listed as impaired due to copper, iron, zinc, and flow alteration from mill tailings, mine tailings, contaminated sediments, impacts from abandoned mining, and upstream impoundment.

The small streams flowing into the Ocoee River are generally representative of Blue Ridge Province mountain streams, with drainage areas of several square miles, steep gradients, gravel/cobble/boulder substrates, and soft, poorly buffered waters. These streams are underlain mostly by crystalline and meta-sedimentary rocks of the Blue Ridge Province. Because these siliceous rocks are relatively insoluble and surface-water drainage is rapid, streams draining this area generally contain relatively low concentrations of dissolved minerals. The watersheds are entirely within the CNF and are largely undisturbed forests. Roads, trails, and dispersed recreation areas are the primary sources of the limited erosion within the area. Anakeesta (or anakeesta-like) rock outcrops affect the pH of some streams and are known to affect the occurrence and diversity of aquatic life within the streams.

The alternatives and portions of the associated subwatersheds in which they are contained are provided in Table 9. The ROW of Alternative 4 makes up 3.08 percent of the Horse Bone Branch watershed. All other alternatives make up no more than 1.50 percent of any subwatershed.

Table 9. Subwatersheds Associated With Each Alternative

Subwatershed	Watershed (acres)	Alternatives 1 and 3		Alternative 2		Alternative 4	
		(acres)	(Portion of watershed)	(acres)	(Portion of watershed)	(acres)	(Portion of watershed)
Ocoee River	334,720	32	0.01%	32	0.01%	26	0.008%
Horse Bone Branch	120	0	0.0%	0	0.0%	3.7	3.08%
Little Gassaway Creek	523	0	0.0%	0	0.0%	6.1	1.17%
Short Creek*	1,140	3.1	0.27%	3.1	0.27%	17.1	1.50%
Tolliver Shanty Branch	290	2	0.69%	2	0.69%	4.1	1.41%
Gassaway Creek	1,810	2	0.11%	2	0.11%	0	0

* Acreage includes no ROW, only pole yard for Alternatives 1 and 2; ROW plus pole yard for Alternative 4. Alternative 3 has no pole yard, therefore there is no acreage in the Short Creek watershed.

3.4. Wetlands

Alternatives 1 Through 3

A field survey of the project area was conducted on May 5-6, 2004. Two wetlands meeting U.S. Army Corps of Engineers (USACE) parameters (Environmental Laboratory 1987) for

federal jurisdictional wetlands were identified in the ROW. A small (<1.0 acre), palustrine scrub-shrub (PSS1) wetland was identified within the right descending bank of the Ocoee River in the existing ROW and the east half of the proposed ROW near RM 21.3. The location of his wetland, labeled W1, is shown in Figure 3. A small (<0.1 acre), palustrine emergent wetland was identified on a low bench along Gassaway Creek in the existing and proposed ROW. The location of his wetland, labeled W1, is shown in Figure 4.. Neither of these wetlands is one of the rare types discussed in the RLRMP (USFS 2004a).

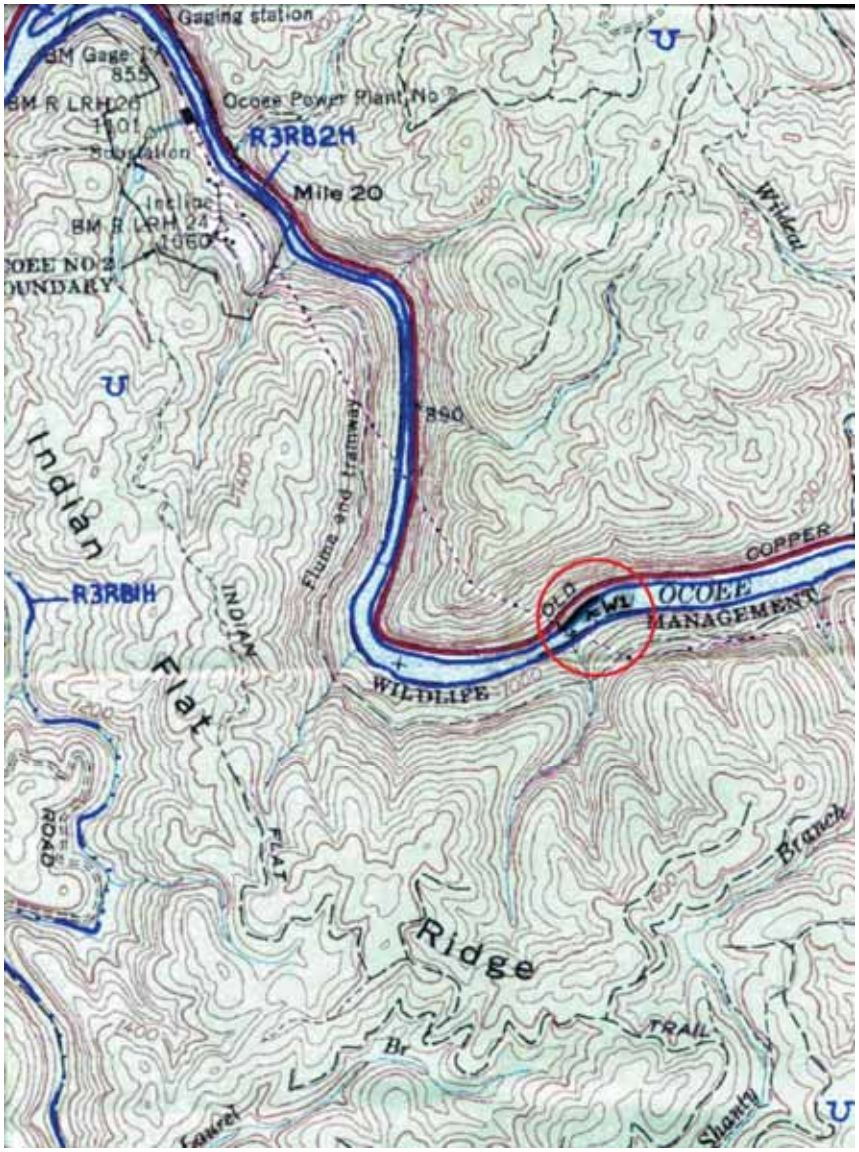

Figure 3. Wetland W1 Location

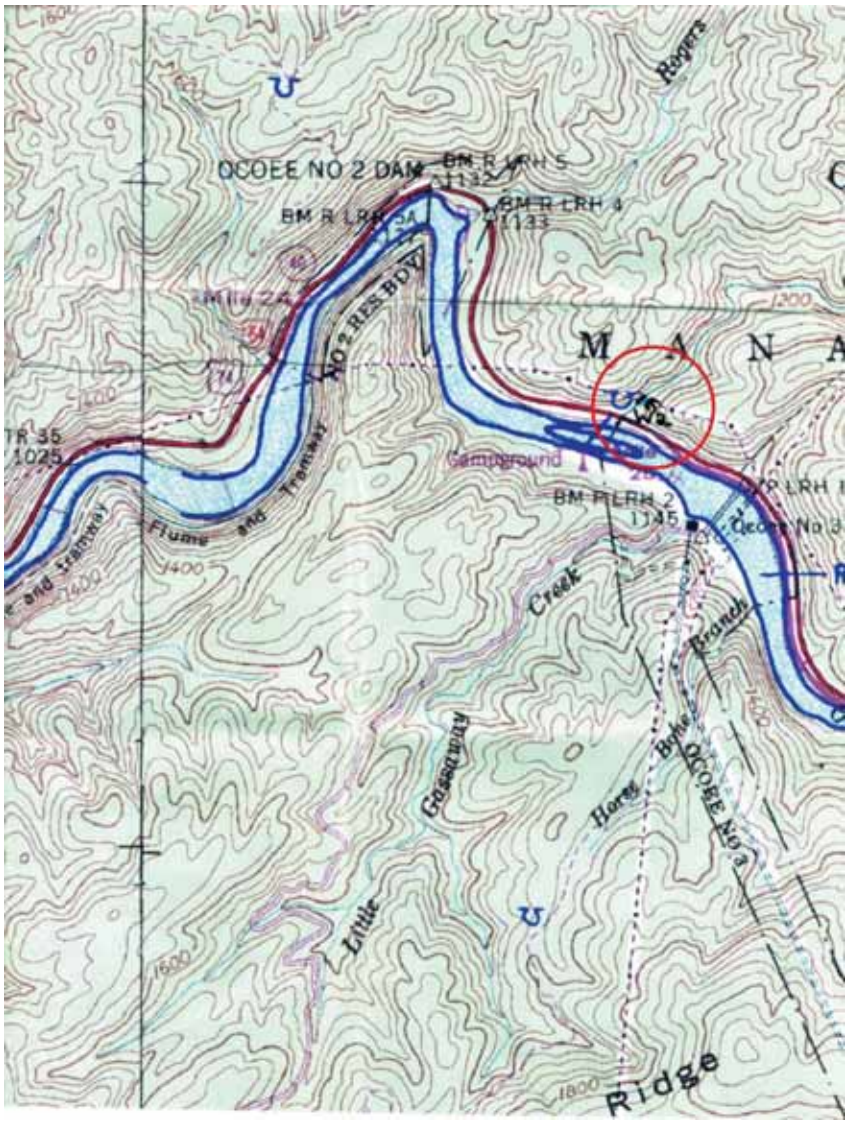

Figure 4. Wetland W2 Location

Wetland determinations were performed according to USACE standards (Environmental Laboratory 1987), which require documentation of hydrophytic vegetation (USFWS 1996), hydric soil, and wetland hydrology. Broader definitions of wetlands, such as the definition provided in EO 11990 (Protection of Wetlands), the Tennessee state regulatory definitions (Tennessee Rule: 1200-04-07 and TCA Section 69-3-103(33)), the USFWS definition (Cowardin et al. 1979), and the TVA Environmental Review Procedures definition, were also considered in this review. Routine Wetland Determination Data Forms and photographs of the wetlands are in Appendix F.

Alternative 4

A field survey of the project area was conducted in September 2005. No wetlands were found in the proposed project area. Wetlands in the Blue Ridge ecoregion typically develop in poorly drained, low-lying areas; given the steep topography in the proposed ROW, no wetlands were found in the project area.

3.5. Visual Resources (Scenery) and Recreation

The physical, biological, and cultural features of an area combine to establish its visual landscape character. Scenic integrity indicates the degree of unity or wholeness of the visual character. Scenic attractiveness is the evaluation of outstanding or unique natural features, scenic variety, seasonal change, and strategic location. Where and how the landscape is viewed would affect the more subjective perceptions of its aesthetic quality and sense of place. Views of a landscape are described in terms of what is seen in foreground, middleground, and background distances. In the foreground, an area within 0.5 mile of the observer, details of objects are easily distinguished in the landscape. In the middleground, normally between 1 and 4 miles from the observer, objects may be distinguishable, but their details are weak and they tend to merge into larger patterns. Details and colors of objects in the background, the distant part of the landscape, are not normally discernible unless they are especially large and standing alone. The impressions of an area's visual character can have a significant influence on how it is appreciated, protected, and used (USFS 1995).

The general landscape character of the study area is described in this section from the point of connection at the Ocoee 3 Powerhouse, moving along the route to the Ocoee 2 Powerhouse, generally east to west. US 64, the Ocoee River, and USFS trails provide the majority of viewing positions. This method of description relates the landscape character to the primary user groups and from which positions these groups would view the proposed alternatives. The locations from which the views are described are shown in Figure 1. Primary user groups within the area of potential effect include: motorists traveling US 64, recreational river users, hikers/bikers on the USFS Tanasi Trail System, campers in the Thunder Rock Campground, and other visitors dispersed in the vicinity. These user groups are further described below.

Alternatives 1, 2, and 3

The TL routes in Alternatives 1, 2, and 3 follow a very similar path and their scenic values are similar. Therefore, the descriptions of the existing resources for Alternatives 1, 2, and 3 have been combined.

As discussed in Chapter 1, the existing line and proposed routes for Alternatives 1 through 3 lie within the view of the USFS Ocoee Scenic Byway located along US 64, which is also a State Scenic Highway. This area is designated Management Prescription 7A (Scenic Byway Corridors) in the RLRMP. Within this management prescription, the desired condition is described as natural appearing views and primarily a continuous forest overstory. Human-made alterations should fit well within the character of the surrounding landscape. Any management activity should not be evident to the average visitor. Standard RX7A-13 discourages new utility corridors within scenic byways (USFS 2004a). According to the RLRMP (USFS 2004a), the desired Inventoried Scenic Class designations for this corridor are 1 and 2 with High Scenic Integrity Objective. The NPS NRI, authorized under a Presidential directive signed in 1979, notes that this area has outstandingly remarkable values in the categories of scenery, recreation, geology, fish, and wildlife (Duncan 2004). The scenic attractiveness is distinctive, and the scenic integrity ranges from moderate to high. Most of this area is forested.

The eastern end of the project is at the Ocoee 3 Powerhouse, on the southwest bank of the river approximately at RM 25.2. The Ocoee Whitewater Center is approximately 1.5 miles downstream. The topography rises sharply about the Ocoee 3 Powerhouse to the north and south, as Brock Mountain and Chestnut Ridge extend upward and to the horizon. The

river lying along the valley floor, with numerous boulders, shoals, and rapids and predominantly vegetated banks, stretches westward and out of view at this location. The existing TL and the routes of Alternatives 1 through 3 cross the river just east of NFS Road 45 along the exiting TVA TL ROW from Ocoee 3 Powerhouse and cross over US 64.

Numerous existing recreation facilities and activities occur near the eastern end of the TL and proposed routes. The facilities include the USFS Thunder Rock Campground with 42 campsites, the USFS Tanasai Trail System, and the Benton MacKaye Trail. The Tanasai Trail System is popular for mountain bikers as well as day hikers. The Benton MacKaye Trail is popular for long-distance hikers as well as day hikers. The Benton MacKaye Trail is almost 300 miles long. It extends from the Georgia-Tennessee state line through the Great Smoky Mountains National Park. It was officially designated as a specific named trail in 2005 but is largely a combination of numerous preexisting trails-in this location the USFS trails included as part of the Benton MacKaye Trail are West Fork Trail No. 303, Thunder Rock Trail No. 305, and Dry Pond Lead Trail No. 76.

All of the recreational facilities are on the southwest side of the river, but the Benton MacKaye Trail crosses the river along NFS Road 45 to access Dry Pond Lead Trail. After crossing US 64 the trail then passes under the existing Ocoee 2-Ocoee 3 TL about 200 feet beyond US 64 and runs alongside the existing TL for about 0.2 miles. At that point the trail turns to the east and crosses under the TL to leave the area. There is also an access road directly behind Thunder Rock Campground from NFS Road 45 to the existing TL. In addition to hiking and mountain biking, informal recreation activities include hunting, hiking, mountain biking, birding, and whitewater activities on the Ocoee River.

While the existing TL and the Alternative 1 and 3 routes parallel the Ocoee River for the majority of their lengths, they do cross the river six times and are visible from the recreation sites. Foreground views of TLs and structures associated with power production/transmission, including the Ocoee 3 Powerhouse itself, are available at many locations to motorists, recreational river users, campers at the Thunder Rock Campground, and hikers/bikers using the USFS Tanasai Trail System (see Figure 5). The Tanasai Trail System winds through the forest upward and away from the Ocoee 3 Powerhouse. At occasional crossings of NFS roads and openings in the overgrowth, there are superior views (views from above) of the valley beneath and dramatic views that terminate into mountainous vistas in the background.

Farther westward along the proposed route of the TL, near the confluence of Gassaway Creek and the Ocoee River at RM 25, motorists traveling US 64 have immediate foreground views of the riverbed below. Views remain focused along the roadway as the topography abruptly rises from the river gorge, confining views to primarily the foreground-viewing distance. To the west and above the roadway, an existing transmission structure is visible within the plane created by the tree canopy at the horizon line.

Figure 5. View From NFS Road 45 Showing a TVA TL in Background

Ocoee 2 Dam lies at approximately RM 24.3, just downstream from the confluence of the Ocoee River and Gassaway Creek. Four of the six times the TL crosses the Ocoee River are below Ocoee Dam 2. In 1984, TVA entered into a 35-year agreement with the State of Tennessee to provide 116 days of controlled water releases for recreation purposes between Ocoee 2 Dam and an area at Caney Creek below Ocoee 2 Powerhouse. In addition, TVA granted an easement to the state over certain lands owned by TVA for access and takeout areas for the operation, management, and maintenance of a whitewater recreation area. The agreement also provided for $1 million to be placed in an interest-bearing trust fund for the state's operation and management of the area. The dam functions doubly as a put-in location for Ocoee River whitewater rafting. The heavily used public recreation area includes parking and drop-off areas for local outfitters, restroom facilities, pedestrian access ramp to the river, and a picnic area. This point is a staging area for over 200,000 rafters and kayakers that visit the river each year. The put-in location

and the river course below remain packed with vacationers during a season that begins in late March of each year and concludes in early November. Views of the river below from this location vary distinctively, from those of shallow trickling pools to an explosive river that rages into Class IV rapids, which diversify the viewing constituency associated with this remaining segment of the proposed TL into two main groups: those viewing the proposed route from US 64 and those viewing from the river below during recreational use. From atop the dam, views are kept mostly to the foreground, due again to the steep and well-vegetated slopes. Views are available, looking upstream, of a transmission tower as the existing Ocoee line crosses the river just above the put-in picnic area at approximately RM 24.3 (see Figure 6).

Slightly downstream and to the west as recreational river users pass through the Gonzo Shoals rapid at RM 24 and motorists travel US 64 above the river, views of existing transmission structures are available only to the east and upstream, as the severe topography prevents views of existing structures to the west. This sense of enclosure is typical along the length of roadway that parallels the whitewater course. Dense, mature vegetation, which is typical of the CNF, causes motorists' views to focus within the foreground-viewing distance. The views afforded motorists along the route differ from those of the seasonal recreational river users as many have views of the existing line route intermittently through seasonal changes in vegetation and from slightly elevated positions.

Farther downstream, near the Second Helping rapid near RM 23.5, river users and motorists again have brief views of transmission structures as the existing Ocoee line parallels US 64 for a short stretch. These views remain somewhat consistent to the west and downstream, with views occasionally available of the flume and tramway above the river on the left bank. The historic structure parallels the watercourse and appears cleft into the hillside amidst heavy vegetation.

Existing transmission structures may again be seen at points near the David and Tammy rapid crossing (at approximately RM 22.5) and again downstream through the Doldrums near the Surprise rapid crossing (approximately RM 21.8) where existing lines appear to fade into the tree canopy with no structures to support them. Motorists would have views similar to those available to recreational river users but from slightly higher elevations and slightly shorter durations.

Approaching the Hells Hole rapid, and TVA's Ocoee 2 Powerhouse (approximately RM 20), views of existing transmission structures increase. The take-out facilities are located at Caney Creek just below Ocoee No. 2 Powerhouse. As river users approach these facilities, foreground views narrow into the overpass leading to the powerhouse and the adjacent spillway. It is at this point that the proposed TL route terminates near the Ocoee 2 Powerhouse.

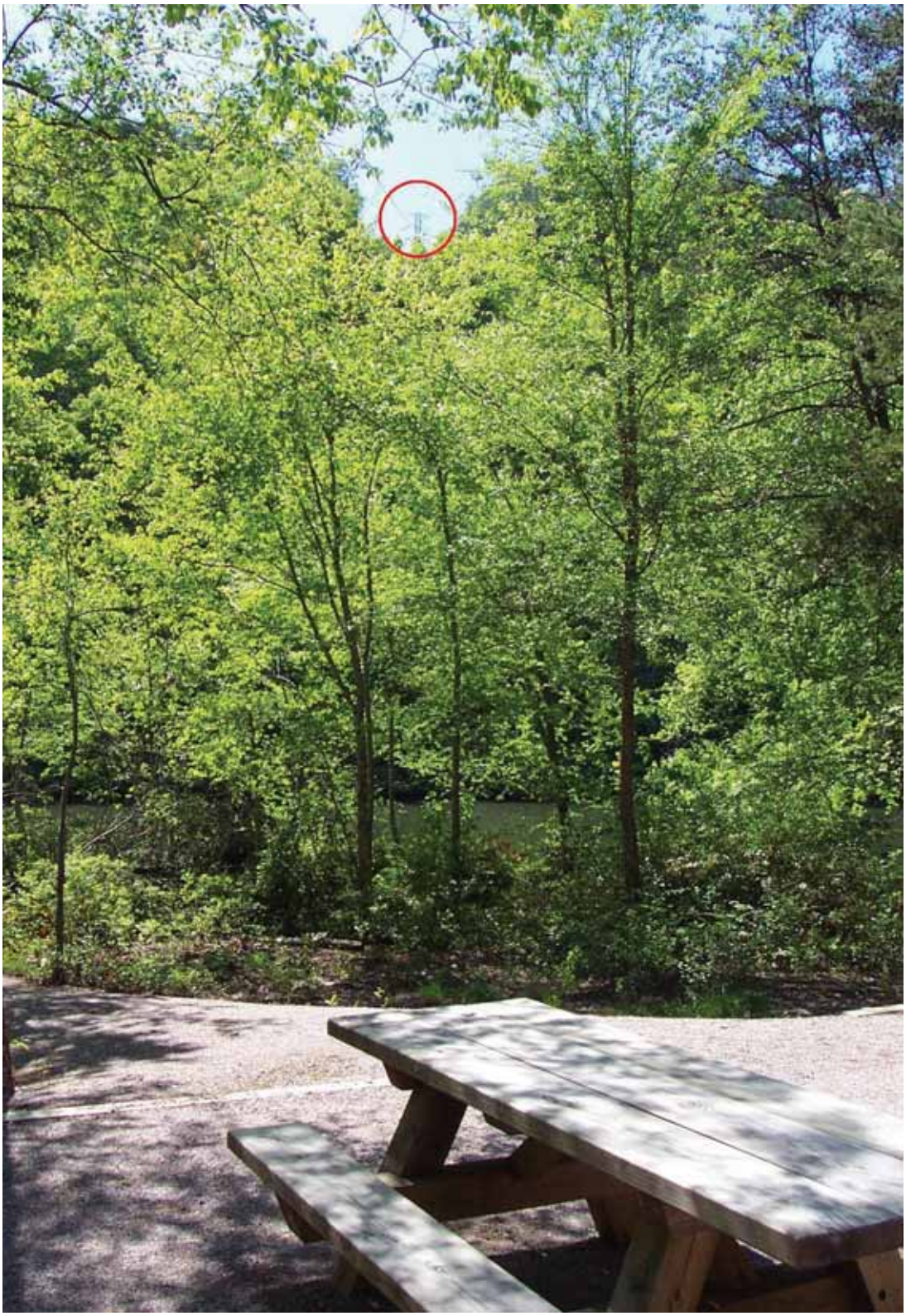

Figure 6. Transmission Structure Visible at the Put-In Picnic Area

Alternative 4

As shown in Figure 1, the proposed route of Alternative 4 heads from the Ocoee 3 Powerhouse for approximately 0.1 mile and then runs south along the western bank of Horse Bone Branch for about 0.2 mile. This section of the proposed TL route is close to several trails of the Tanasai Trail System as well as two existing TVA TLs from Ocoee 3 Powerhouse. Continuing to the west, the proposed route would cross the Thunder Rock Express Trail, Little Gassaway Creek, NFS Road 45, and the Benton MacKaye/West Fork/Thunder Rock Trail within about 0.5 mile. The Benton MacKaye/West Fork/Thunder Rock Trail at this point runs along NFS Road 45. The proposed route continues to the west for about 0.8 mile, where it crosses Short Creek, and then about 0.2 mile to the end of NSF Road 33292. At that point, the route turns northwest toward Indian Flat Ridge and crosses NFS Road 5054 and Tolliver Shanty Branch within about 0.5 mile. NFS Road 5054 is gated near NFS Road 221 south of the proposed TL route, but NFS Road 5054 and NFS Road 33292 are used by mountain bikers and other day users. Within about the next 0.5 mile, the proposed TL would climb onto Indian Flat Ridge and cross NFS Road 1376 (Indian Flat Trail) twice. NFS Road 1376 is also gated near NFS Road 221 south of the route, but NFS Road 1376 and the roads intersecting with it are also used by mountain bikers and other day users. Gradually turning in a more northerly direction over about a mile, the route would stay on Indian Flat Ridge and cross NSF Road 1376 again as well as a short unnumbered NSF road intersecting with NSF Road 1376. The proposed route would then turn back northeast and travel for about 0.5 mile until reaching the existing TL, at which point it would turn back northwest to the Ocoee 2 Powerhouse.

Most of the proposed route would be within a corridor of mid- to late successional forest with a continuous forested canopy over at least 65 percent of the project area. The proposed route would be outside the USFS scenic byway corridor except at the eastern and western ends of the route. Except at the ends, scenic attractiveness is distinctive due to the number of prominent mountain peaks in the area. Also except at the ends, scenic integrity is generally high due to the intactness of the landscape. At the eastern and western ends of the proposed route, scenic integrity is lower due to the presence of the Ocoee facilities and, at the eastern end, other TLs in addition to the existing Ocoee 2-Ocoee 3 TL.

Views of the proposed route are generally not available for those using the NFS roads and trails because of elevation changes and vegetation. Figure 7 shows a typical view from Indian Flat Trail. The route is also generally not visible from nearby mountain peaks during the summer due to dense vegetation closest to the peaks, though views might be present during winter when leaves are not present.

Figure 7. Typical View From Indian Flat Trail

3.6. Floodplains

The existing TL ROW and the proposed ROW for Alternative 2 cross the identified approximate 100-year floodplain of the Ocoee River and several minor unmapped floodplain areas along tributary streams. The floodplain of the Ocoee River is very narrow, approximately within the existing riverbank due to the steep topography. The existing switchyards at the Ocoee 2 and Ocoee 3 Powerhouses and the existing support structures are not located within the 100-year floodplain. Some access roads would cross small streams without mapped floodplains.

The proposed route of Alternative 4 also crosses minor unmapped floodplain areas along tributary streams.

3.7. Cultural Resources

East Tennessee has been an area of human occupation for the last 12,000 years. Human occupation of the area is generally described in five broad cultural periods: Paleo-Indian (11,000-8000 BC), Archaic (8000-1600 BC), Woodland (1600 BC-AD 1000), Mississippian (AD 1000-1700), and Historic (AD 1700- to present).

Prehistoric land use and settlement patterns vary during each period, but short- and long-term habitation sites are generally located on floodplains and alluvial terraces along rivers and tributaries. Specialized campsites tend to be located on older alluvial terraces and in the uplands.

European interactions with Native Americans in this area were associated with the fur trading industry and began in the 17th and 18th centuries. The territory north of the Hiwassee River was opened to white settlement after the Treaty of 1819, and the Cherokees were forced to give up their final land claims in Tennessee in the 1835 Treaty of Removal. In 1839, Polk County was created from parts of Bradley and McMinn Counties. Copper mining became an important part of economic development after copper was discovered in Ducktown, Tennessee, in 1843. However, the mining proved disastrous by 1900, killing all vegetation in a 7,600-acre zone, with severe effects in an area of hundreds of thousands of acres. The resulting erosion prevented reforestation until the 1970s, after four decades of efforts to reestablish vegetation in the denuded landscape.

The Area of Potential Effect (APE) for cultural resources was determined by TVA, in consultation with the Tennessee SHPO, as the existing TL corridor and a 0.5-mile-wide zone centered on the various proposed TL routes. It also included the proposed access roads and pole yard. For architectural resources, the APE also includes those areas from which the proposed TL would be visible.

Alternatives 1 Through 3

An archaeological and historical survey of the Alternative 2 TL route was conducted in May 2004. One previously identified NRHP-listed archaeological site, 40PK373 (a portion of Old Copper Road), runs through the project area. The Old Copper Road, originally a wagon road, was built in 1853 to transport ore to the nearby city of Cleveland from Ducktown, Tennessee. Although these alternatives span site 40PK373, none of the structures are or would be within the road ROW and therefore would not alter the integrity of this resource. Two NRHP-listed properties within the APE, the Ocoee 2 Power Plant and Ocoee 2 Dam, were revisited during the historic survey, along with 150 adjoining acres. The Ocoee 3 Powerhouse and the existing Ocoee 2-Ocoee 3 TL also occur within the APE and are potentially eligible for listing in the NRHP.

Alternative 4

A records search identified 49 previously recorded archaeological sites within 0.5 mile of the Alternative 4 TL route, of which 26 were located south of the Ocoee River. Of these 26 sites, 15 were recorded as being within or adjacent to the proposed APE, and 9 of these 15 are actually located within the APE. The archaeological survey revisited one previously recorded site (40PK132) within the APE and identified one new prehistoric site (40PK628). Site 40PK132 is a middle archaic site located on the eastern edge of an open field situated on a ridgetop between Short Creek and Little Gassaway Creek, and is recommended potentially eligible for listing in the NRHP because of the potential for intact buried deposits. Site 40PK628 is a prehistoric site located on a narrow, north-south trending ridgetop that overlooks the Ocoee River and Ocoee 3 Powerhouse to the north. The site is considered ineligible for listing in the NRHP because it has no depth and little potential for intact features. The historical/architectural survey of the proposed TL corridor involved examination of two previously recorded historic structures (Ocoee 2 Hydro Plant and Ocoee 3 Powerhouse) within the project's APE. Ocoee 2 Hydro Plant is listed in the NRHP, and Ocoee 3 Powerhouse is potentially eligible for listing in the NRHP.

3.8. Other Cumulative Actions

Other past, present, and reasonably foreseeable future actions in the vicinity of the proposed TL include the following:

- **Development of the Ocoee Whitewater Center and Ocoee recreational corridor**. This development took place between Ocoee 3 Dam and Powerhouse, along the Ocoee River, and involved construction of a whitewater competition course for the 1996 Summer Olympics and a permanent visitor center and recreational trail system for use by forest visitors.

- **Potential construction of US 64**. A draft environmental impact statement (FHWA 2003) has been published on alternatives for four-lane construction of US 64 between US 411 and Tennessee State Route 68 at Ducktown. The proposed corridor would cross the Ocoee River in the vicinity of Ocoee 3 Powerhouse and lie north of the Ocoee Gorge between approximately 0.25 and 2 miles in the vicinity of the proposed TL.

- **Exotic and invasive plant species management for CNF**. This project seeks to provide effective methods for the control of exotic and invasive plants. An EA is in preparation.

- **Hogback Forest Management**. This upcoming project would involve wildlife habitat improvements, forest health management, and other actions in an area south of the Ocoee Scenic Byway corridor between Parksville Lake and the Big Frog Wilderness Area. An EA is in preparation.

- **Ruth's golden aster habitat improvement**. This project would focus on removal of competing vegetation around the endangered plants along the Hiwassee River. The status is listed as "on hold" in the CNF Schedule of Proposed Actions.

- Other activities within this analysis area include various forms of recreation (camping, hunting, fishing, boating, and hiking), road maintenance, vegetation management, and wildlife habitat improvements.

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CHAPTER 4

4. ENVIRONMENTAL CONSEQUENCES

Potential environmental effects of adopting Alternatives 1 through 4 are presented in this chapter. This discussion is organized in the same order as in the previous chapter.

4.1. Terrestrial Ecology

The following sections describe the effects by alternative for most biological element listed above in Table 2, and the related MIS listed above in Table 3. The exceptions are impacts to aquatic habitats, which are discussed in Section 4.2 (Aquatic Ecology) and wetlands, which are discussed in Section 4.4.

Direct and Indirect Effects - Mesic Deciduous Forests

Alternatives 1 and 3

Under these alternatives, there would be no new clearing in mesic deciduous forests and therefore no change to the existing age class distribution of mesic deciduous forests surrounding the TL. Forests would continue to age, only affected by natural forces of disturbance. There would be potential indirect effects during cyclical vegetation management activities and from danger tree removal. These indirect effects would only affect a few square feet of mesic deciduous forest on an occasional basis when maintenance is needed.

The final environmental impact statement for the RLRMP (USFS 2004b) states that expected population trends for hooded warblers under plan implementation is relatively stable for the next 50 years. Alternatives 1 and 3 would have no effect on populations of this management indicator.

Alternatives 2 and 4

Under Alternative 2, approximately 36 acres of forest would be converted to grass/forbs and shrubs with some small, young trees. Under Alternative 4, approximately 56 acres of forest would be converted to grass/forbs and shrubs. The proposed ROW for each of these alternatives would be maintained by hand clearing, mechanical clearing, or approved RLRMP herbicide application during vegetation management activities every five years. Mesic deciduous forests comprise 53 percent of the nine-compartment area. These alternatives would negatively affect hooded warblers on less than 1 percent of the nine-compartment area by removing the forest and converting it to early successional habitat. There would be ample habitat remaining in the surrounding forest for the hooded warblers. Moreover, following the proposed removal of the existing TL, the ROW would be allowed to revert to its natural state and would eventually provide hooded warbler habitat. Therefore, neither Alternative 2 nor Alternative 4 would have a measurable effect on populations of this management indicator. New edge habitat would be created, which could potentially provide corridors for cowbirds to parasitize nests of woodland birds. However, the transmission line corridors are not near agricultural lands or extensive lawns that are frequented by cowbirds. Therefore, the potential for cowbird nest parasitism is minimal.

Cumulative Effects - Mesic Deciduous Forests

In addition to TL construction, other future projects potentially affecting mesic deciduous forest are potential construction of US 64 and forest management activities, such as are envisioned in the Hogback analysis area. Overall, under the Forest Plan, the area of mesic deciduous forest is expected to increase in the future as forests mature.

Alternatives 1 and 3

Proposed activities would take place within existing access roads, power line ROWs, and road and forest edges. These areas experience periodic disturbance as a result of maintenance and forest use. Although planned activities represent a greater level of disturbance than average, general habitat conditions within the proposed alternative are not expected to change following completion and recovery of the project. Impacts to mesic deciduous forest plant communities or the hooded warbler would be negligible, resulting in no cumulative effects.

Alternatives 2 and 4

Construction, operation, and maintenance of the proposed TL would not affect long-term stability or increases in mature mesic forest expected under the current RLRMP (USFS 2004a). Construction of a TL, combined with construction of a new highway corridor, would minimally decrease the acreage of mesic deciduous forests. These impacts would be a small portion of the mesic forest community on CNF. On a cumulative basis, the minimal acreages of the two new corridors would not affect the long-term stability or change acreages of this forest type. Consequently, cumulative impacts to mesic deciduous forests plant communities or the hooded warbler would be negligible.

Direct and Indirect Effects - Eastern Hemlock and White Pine Forests

Alternatives 1 and 3

Under these alternatives, there would be no change to the existing age class distribution of eastern hemlock and white pine forests surrounding the TL. Forests would continue to age, only affected by natural forces of disturbance. ROW vegetation management would be necessary to maintain an adequate distance between TL conductors and vegetation. Trees must have a minimum 24-foot clearance as required by the National Electric Safety Code. The TL spans many of the deep coves and ravines where this forested community typically occurs. As stated in Section 2.2.2.2, a vegetation-reclearing plan would be developed in consultation with CNF based on periodic inspections.

Alternatives 2 and 4

Under Alternative 2, approximately 36 acres of forest would be converted to grass/forbs and early successional habitat. Under Alternative 4, approximately 56 acres of forest would be converted to grass/forbs and early successional habitat. The deep gorges and ravines would be spanned during construction activities allowing these areas to remain forested. Because much of the hemlock forests are in the deep gorges and ravines, the actual acreages impacted would be much less. ROW vegetation management would be necessary in the future to maintain an adequate distance between TL conductors and vegetation. Trees must have a minimum 24-foot clearance as required by the National Electric Safety Code. As stated in Section 2.2.2.2, a vegetation-reclearing plan would be developed in consultation with CNF based on periodic inspections. Moreover, the existing TL would eventually be removed and allowed to revert back to its natural state, allowing the

vegetation in the deep gorges and ravines to grow freely in areas that were once controlled by vegetation management activities.

Cumulative Effects - Eastern Hemlock and White Pine Forests

In addition to TL construction, other future projects potentially affecting eastern hemlock and white pine forests are potential construction of US 64 and forest management activities, such as are envisioned in the Hogback analysis area. As well, hemlock forests are expected to be under stress from hemlock woolly adelgid (HWA) infestation.

Alternatives 1 and 3

Proposed activities would take place within existing access roads, power line ROWs, and road and forest edges. These areas experience periodic disturbance as a result of maintenance and forest use. Although planned activities represent a greater level of disturbance than average, general habitat conditions within the proposed alternative are not expected to change following completion and recovery of the project. Potential impacts to eastern hemlock-white pine forest plant communities would be negligible, resulting in no cumulative effects.

Alternatives 2 and 4

Construction of a TL, combined with construction of a new highway corridor, would minimally decrease the total acreage of these forests. However, these alternatives do not disproportionately impact this forest type and these corridors. Moreover, the proposed TL ROWs and the highway corridor actually traverse uplands for much of their length, where eastern hemlocks do not typically occur. Therefore, this alternative would not contribute to ongoing stresses affecting these forest types or add significantly to forest losses that may occur.

Direct and Indirect Effects - Oak and Oak-Pine Forests

Alternatives 1 and 3

Under these alternatives, there would be no change to the existing age class distribution of oak and oak-pine forest surrounding the TL. Forests would continue to age, only affected by natural forces of disturbance. Since there would be no change to the surrounding forest that provides nesting habitat for scarlet tanagers, there would be no direct or indirect effects to the scarlet tanager. ROW vegetation management would be necessary to maintain an adequate distance between TL conductors and vegetation. Trees must have a minimum 24-foot clearance as required by the National Electric Safety Code. As stated in Section 2.2.2.2, a vegetation-reclearing plan would be developed in consultation with CNF based on periodic inspections.

Alternatives 2 and 4

Under Alternative 2, approximately 36 acres of forest would be converted to grass/forbs and shrubs with some small, young trees. Under Alternative 4, approximately 56 acres of forest would be converted to grass/forbs and shrubs with some small, young trees. The proposed ROW would be maintained by hand clearing, mechanical clearing, or approved RLRMP herbicides during vegetation management activities. Oak and oak-pine forests comprise 43 percent of the nine-compartment area. These alternatives would negatively affect scarlet tanagers on less then 1 percent of the nine-compartment area by removing the forest and

converting it to early successional habitat. There would be ample habitat remaining in the surrounding forest for the scarlet tanager. Moreover, following the proposed removal of the existing TL, the ROW would be allowed to revert to its natural state and would eventually become forested. Therefore, neither Alternative 2 nor Alternative 4 would have a measurable effect on populations of this management indicator.

Cumulative Effects - Oak and Oak-Pine Forests

Actions that could potentially cumulatively affect these forests include potential construction of US 64 and forest management activities, such as are envisioned in the Hogback analysis area.

Alternatives 1 and 3

Proposed activities would take place within existing access roads, power line ROWs, and road and forest edges. These areas experience periodic disturbance as a result of maintenance and forest use. Although planned activities represent a greater level of disturbance than average, general habitat conditions within the proposed alternative are not expected to change following completion and recovery of the project. Potential impacts to oak and oak-pine forest plant communities and the scarlet tanager would be negligible, resulting in no cumulative effects.

Alternatives 2 and 4

Construction of a TL, combined with construction of a new highway corridor, would minimally decrease the total acreage of these forests. These impacts would be a small portion of the forest community on CNF. Construction, operation, and maintenance of the proposed TL would not affect long-term stability or increases in oak and oak-pine forest expected under the current RLRMP (USFS 2004a). Therefore, cumulative impacts to oak and oak-pine forest plant communities and the scarlet tanager would be negligible.

Direct and Indirect Effects - Pine and Pine-Oak Forests

Alternatives 1 and 3

Under these alternatives, there would be no change to the existing age class distribution of pine and pine-oak forest surrounding the TL. Forests would continue to age, only affected by natural forces of disturbance. Since there are no known scheduled changes to the surrounding forest that provides nesting habitat for pine warblers, there would be no direct or indirect effects to the pine warbler. ROW vegetation management would be necessary to maintain an adequate distance between TL conductors and vegetation. Trees must have a minimum 24-foot clearance as required by the National Electric Safety Code. As stated in Section 2.2.2.2, a vegetation-reclearing plan would be developed in consultation with CNF based on periodic inspections.

Alternatives 2 and 4

Under Alternative 2, approximately 36 acres of forest would be converted to grass/forbs and shrubs with some small, young trees. Under Alternative 4, approximately 56 acres of forest would be converted to grass/forbs and shrubs with some small, young trees. The proposed ROW would be maintained by hand clearing, mechanical clearing, or approved RLRMP herbicides during vegetation management activities. Pine and pine-oak forests comprise 28 percent of the nine-compartment area. These alternatives would negatively affect pine warblers on less than 1 percent of the nine-compartment area by removing the forest and

converting it to early successional habitat. There would be ample habitat remaining in the surrounding forest for the pine warbler. Moreover, following the proposed removal of the existing TL, the ROW would be allowed to revert to its natural state and would eventually become forested. Therefore, neither Alternative 2 nor Alternative 4 would have a measurable effect on populations of pine warbler.

Cumulative Effects - Pine and Pine-Oak Forests

Actions that could potentially cumulatively affect these forests include potential construction of US 64 and forest management activities, such as are envisioned in the Hogback analysis area.

Alternatives 1 and 3

Proposed activities would take place within existing access roads, power line ROWs, and road and forest edges. These areas experience periodic disturbance as a result of maintenance and forest use. Although planned activities represent a greater level of disturbance than average, general habitat conditions within the proposed alternatives are not expected to change following completion and recovery of the project. Impacts to pine and pine-oak forest plant communities and the pine warbler would be negligible, resulting in no cumulative effects.

Alternatives 2 and 4

Construction of a TL, combined with construction of a new highway corridor, would result in cumulative impacts to this forest type. These impacts would be a small portion of the forest community on CNF. Construction, operation, and maintenance of the proposed TL would not affect long-term stability or increases in pine and pine-oak forest expected under the current RLRMP (USFS 2004a). Therefore, cumulative impacts to pine and pine-oak forest plant communities and the pine warbler would be negligible.

Direct and Indirect Effects - Woodlands, Savannas, and Grasslands

Selection of Alternative 2 or 4 would result in opening the forest canopy along the proposed routes except for particular ravines where trees can be left. Selection of Alternative 1 or 3 would result in maintaining the current ROW in an early successional state dominated by grasses, forbs, and shrubs through hand clearing, mechanical mowing, or use of RLRMP-approved herbicides discussed in Section 2.2.2.2.

Following the completion of proposed construction activities, the pole yard and suitable portions of the ROW would be revegetated with approved native or nonpersistent seed mixes or allowed to revert back to its natural state according to the RLRMP and TVA standards. CNF would manage the pole yard area as a native warm season grass wildlilfe opening. Following the proposed removal of the existing TL as described in Alternative 2 or 4, the structures would be flown out by helicopter, and the ROW would be allowed to revert back to its natural condition.

Alternatives 1 and 3

Under these alternatives, the current ROW would be maintained by hand clearing, mechanical clearing or approved RLRMP herbicides during vegetation management activities every five years allowing grassland areas to remain open. There would be no increase or decrease of grassland areas.

Alternatives 2 and 4

Under Alternative 2, approximately 36 acres of forest would be converted to grass/forbs and shrubs with some small, young trees. Under Alternative 4, approximately 56 acres of forest would be converted to grass/forbs and shrubs with some small, young trees. The proposed ROW would be maintained by hand clearing, mechanical clearing or approved RLRMP herbicides during vegetation management activities every five years. This gain of woodland, savanna, and grassland habitats would be offset to a slight degree by reversion to forest by the present habitats of this type upon removal of the existing TL.

Cumulative Effects - Woodlands, Savannas, and Grasslands

This fire-created mosaic of plant communities would most likely be created by controlled burns or other activities and would not be created by any of the past, present, and reasonably foreseeable actions. However, those activities that create new cleared areas could create elements of this habitat mosaic which could then be complemented by management activities. Other activities that could cumulatively contribute to increases in this habitat type are potential construction of US 64, existing road maintenance, and wildlife habitat improvements such as are envisioned in the Hogback analysis area.

Alternatives 1 and 3

Under these alternatives, the current ROW would be maintained by hand clearing, mechanical clearing or approved RLRMP herbicides during vegetation management activities every five years allowing grassland areas to remain open. There would be no increase or decrease of grassland areas and thus no cumulative impacts.

Alternatives 2 and 4

The proposed ROWs would provide a small increase of grasslands over the existing ROW, though the reversion of part of the existing ROW to forest would slightly offset the increase. Because natural woodland, savanna, and grassland habitats are currently rare, occurring on private ownerships primarily along mowed roadside and power line ROWs, there would be a small net beneficial cumulative impact.

Direct and Indirect Effects - Successional Habitats

Alternatives 1 and 3

No additional early successional habitat would be created with these alternatives. Forests outside of the ROW would continue to age, affected by an increase in shade tolerant species that do not provide habitat for species that use these communities. The TL ROW would continue to be maintained as open grass/forbs and shrubby areas through hand-clearing, mechanical mowing, or approved RLRMP herbicide application.

These alternatives would have no direct or indirect effect on prairie warblers. Habitat conditions would remain relatively stable as the stands age with the possible exception of natural storm events or wildfire.

Alternatives 2 and 4

Under Alternative 2, 36 forested acres would be converted to open grass/forbs and shrubby areas. Under Alternative 4, 56 forested acres would be converted to open grass/forbs and shrubby areas. The proposed ROW would be maintained by hand clearing, mechanical clearing or approved RLRMP herbicides during vegetation management activities. Immediately after reclearing, suitable habitat for species requiring shrubby habitats would

be limited, but would increase during the later years of the vegetation management cycle. This early successional habitat would provide habitat conditions for species such as the prairie warbler and yellow-breasted chat. Alternatives 2 and 4 would benefit prairie warbler by creating more nesting habitat.

Cumulative Effects - Successional Habitats

Activities that could cumulatively contribute to increases in this habitat type are potential construction of US 64 and wildlife habitat improvements such as are envisioned in the Hogback analysis area.

Alternatives 1 and 3

Maintaining the current open areas in the existing ROW and allowing some vegetation to regrow between maintenance cycles would continue to provide some of the benefits of successional habitats, but these areas would remain about the same acreage over time, so there would be no net change and thus no cumulative impacts, with no likely effects on prairie warbler.

Alternatives 2 and 4

The proposed ROWs would provide a small increase of habitat with some of the benefits of true successional habitat, though the reversion of part of the existing ROW to forest would slightly offset the increase. Therefore, there would be a small net beneficial cumulative impact to prairie warbler.

Direct and Indirect Effects - Permanent Openings and Old Fields, ROWs, Improved Pastures

Alternatives 1 and 3

No additional permanent openings, old fields, ROWs, or pastures would be created with this alternative. Forests outside of the ROW would continue to age, affected by an increase in shade-tolerant species that do not provide habitat for species that use these communities. The TL ROW would continue to be maintained as open grass/forbs and shrubby areas through hand clearing, mechanical mowing, or approved RLRMP herbicide application.

Alternatives 2 and 4

Under Alternative 2, 36 forested acres and under Alternative 4, 56 forested acres would be converted to open grass/forbs and shrubby areas. This would benefit many species of wildlife, both game and nongame species. The openings would provide an important source of nutritious forage in winter, especially when acorns are in short supply. Forest openings also are a key habitat component for wild turkeys throughout the year. Maintained openings provide nutritious green forage in the winter and early spring and seeds during late summer and fall. Because of the abundance of insects and herbaceous plants produced in these openings, they are especially important as brood-rearing habitat for young turkeys.

Following the completion of construction activities, the pole yard and suitable portions of the ROW would be revegetated with approved seed mixes or allowed to revert back to its natural state according to RLRMP and TVA standards. The TL ROW would continue to be maintained by TVA in an early successional state, dominated by grasses, forbs, and shrubs by hand clearing, mechanical mowing, or RLRMP-approved herbicides discussed in

Section 2.2.2.2. The pole yard currently exists as a wildlife opening and would continue to be maintained for that purpose by the USFS. Following the proposed removal of the existing TL, the ROW would be allowed to revert to its natural state and would eventually become forested, slightly offsetting the increase in open area along the ROW of the proposed TL.

Cumulative Effects - Permanent Openings and Old Fields, ROWs, Improved Pastures

Permanent open lands have been created by past management activities and existing ROWs and recreation areas such as the Ocoee Whitewater Center. Under all alternatives ROW maintenance activities for the TL and new highway corridor would sustain and add minimally to the total acreage of this open habitat, and this would provide year-round forage, soft mast, and an abundance of insects for many species.

Direct and Indirect Effects - Riparian Habitats

Alternatives 1 and 3

Under Alternatives 1 and 3, forested, riparian habitat would neither be destroyed nor altered. All work along riparian areas would comply with the provisions of the RLRMP and TVA BMPs. These alternatives would have no direct or indirect effect to Acadian flycatchers.

Alternatives 2 and 4

Under Alternative 2, approximately 36 acres of new ROW would be created, and under Alternative 4, approximately 56 acres of new ROW would be created. Riparian habitat within ravines or gorges would likely not be impacted, since these areas would be spanned. All work occurring within riparian areas would comply with the provisions of the RLRMP and TVA BMPs. Impacts to riparian habitat would be minimal due to these provisions, and the likelihood that this habitat would be spanned. These alternatives would have no direct or indirect effect to Acadian flycatchers.

Cumulative Effects - Riparian Habitats

Alternatives 1 Through 4

Riparian habitats have been affected by intensive recreational activities such as past construction of the Ocoee Whitewater Center and other facilities in the river corridor, and the proposed construction of US 64 would cross a number of riparian habitats. All of the proposed TL alternatives would have the potential to contribute to additional riparian habitat impacts. However, the height of the TL would avoid at least some riparian habitats in deep ravines, thus retaining the canopy and avoiding cumulative effects to Acadian flycatchers.

Direct and Indirect Effects - Snags, Dens, and Downed Wood

Alternatives 1 and 3

This alternative would have no effect on snags, dens, and downed wood. All proposed activities would take place within existing ROW. There would be no effect on pileated woodpeckers.

Alternatives 2 and 4

The proposed actions would remove potential snags, dens, and downed wood. This would negatively affect species in the area that use those elements. The effects would be limited to the areas affected by the proposed ROW. Due to the recent SPB outbreak, snags are not a limiting factor at this time.

The proposed habitat improvements would negatively impact pileated woodpeckers by removing mature trees the birds might use for nesting and feeding. There is an abundance of this type of habitat found in the surrounding area. This alternative would negatively affect pileated woodpeckers on less than 1 percent of the nine-compartment area by removing the forest and converting it to early successional habitat. There would be ample habitat remaining in the surrounding forest for the pileated woodpecker. Neither Alternative 2 nor Alternative 4 would have a measurable effect on populations of this management indicator.

Cumulative Effects - Snags, Dens, and Downed Wood

Snags and downed wood are abundant across the landscape in the aftermath of the SPB outbreak, so any reduction by forest clearing for construction of US 64 and forest management such as envisioned in the Hogback analysis area is not likely to have them become a limiting factor for species such as pileated woodpecker.

Alternatives 1 and 3

The past ROW clearing for these alternatives has already removed any trees which would be dangerous as snags. Therefore these alternatives would likely not affect snags, dens, downed wood, or pileated woodpeckers and thus, there would be no cumulative effects to these elements or to pileated woodpeckers.

Alternatives 2 and 4

TL construction under alternatives 2 and 4 would create new corridors without large woody debris, but the acreage to be affected would be small enough, especially in light of the abundance of snags and downed wood, that it would not contribute to a cumulative loss of these wildlife habitat features or to habitat for pileated woodpeckers.

Direct and Indirect Effects - Threatened and Endangered Species

Threatened and Endangered Plants

Alternatives 1 and 3

Gradual structure removal and replacement activities to the existing TL, which has six Ocoee River crossing points, are not anticipated to impact Ruth's golden aster populations. The TL activities would occur on the steep ridgetops high above the Ocoee River. The nearest occurrence of the federally listed Ruth's golden aster to a TL river crossing is approximately 570 feet from the first (northernmost) crossing of the Ocoee River. The second crossing is approximately 1,760 feet from an occurrence of this species. The third crossing is more than 2,000 feet from the nearest occurrence of the species. The fourth and fifth crossings are more than 4,300 feet and 10,000 feet, respectively, from the nearest occurrence. Although the nearest river crossing is 570 feet, the actual TL spans the gorge high above the river. As mentioned in Chapter 2, removal of the existing TL, especially near the water, would be conducted following the requirements and guidelines presented in TVA's environmental protection and BMP guidelines (Muncy 1999) and the RLRMP (USFS

2004a). The measures planned to minimize disturbances during removal and the distances from the plants would prevent impacts to Ruth's golden aster.

No direct or indirect impacts to small whorled pogonia, and white fringeless orchid are expected, because no occurrences of these or any other rare species were found within the existing TL ROW, pole yard, or access roads of Alternatives 1 and 3.

Continued ROW vegetation management would be necessary to maintain adequate clearance between vegetation and the conductors and accessibility to structures under Alternatives 1 or 3. The rare plant populations in the river would not be affected by vegetation management activities. As stated in Section 2.2.2.2, a vegetation-reclearing plan would be developed in consultation with CNF based on periodic inspections.

Alternatives 2 and 4

The proposed removal of the existing TL, which has six Ocoee River crossing points, is not anticipated to impact Ruth's golden aster populations. Although the nearest river crossing is 570 feet from a population of the aster, the actual TL spans the gorge high above the river. As mentioned in Chapter 2, all removal work, especially near the water, would be conducted following the requirements and guidelines presented in TVA's environmental protection and BMP guidelines (Muncy 1999) and the RLRMP (USFS 2004a). No occurrences of federally listed plant species were encountered during rare plant surveys of Alternatives 2 and 4, and none are known to occur within the proposed ROW, pole yard, or proposed access roads. Therefore, no direct or indirect effects to Ruth's golden aster, small whorled pogonia, or white fringeless orchid are expected.

There are no rare plants known within the ROW, pole yard, or the proposed access roads. No project-related impacts to rare plant species are anticipated to result from adoption of either Alternative 2 or 4.

Threatened and Endangered Terrestrial Animals

Alternative 1

Since Alternative 1 would stay within the boundaries of the existing ROW, potential Indiana bat roosting sites would not be impacted. The Alternative 2 discussion below contains additional information regarding Indiana bats.

An active bald eagle nest is known to exist approximately 2.2 miles from the existing Ocoee 2-Ocoee 3 TL. The distance is beyond the protective zones designated by the USFWS to protect bald eagles. Impacts to the nest are not expected from ground work within the ROW. Aerial flyovers may be necessary to support construction activities along the corridor. Helicopters or other low-level aircraft are restricted from an area 0.5 mile around the nest from January 1-June 31. With this commitment, there would be no impacts to the bald eagles or their habitat.

Red-cockaded woodpeckers are considered to be extirpated from Tennessee; therefore, the proposed actions would not impact this species. The Alternative 2 discussion below contains additional information regarding red-cockaded woodpeckers.

The proposed activities would not result in direct or indirect effects on threatened and endangered terrestrial animals.

Alternative 2

Excellent habitat for Indiana bats occurs nearby, just south of Deep Gap. TVA biologists conducted field studies to determine if Indiana bats were present in the area during the maternity season. No Indiana bats were captured during mist net surveys. Although this study could not exclude the presence of Indiana bats from the site, it was determined that this area does not support significant populations of Indiana bats. Much of the habitat along the existing TL ROW largely consists of yellow pines on dry, ridge-tops. This habitat ranks as low quality using Indiana bat suitability habitat indexes.

Potentially good Indiana bat habitat occurs in hardwood communities that exist within ravines along the existing ROW. The proposed TL ROW would span these ravines thus avoiding the clearing of potential Indiana bat habitat in these locations. Therefore, there would be no direct or indirect effects on this species.

As discussed under Alternative 1, the nearby bald eagle nest would not be affected. Red-cockaded woodpeckers are considered to be extirpated from Tennessee. The last known colony in CNF was located on the south side of Parksville Reservoir. Several stands of pine trees do exist along the line; however, these stands are considered to be of marginal quality (USFS 1997). Because of a lack of suitable habitat along the TL and because no birds have been found in the vicinity, the project would not result in direct or indirect impacts to this species.

Alternative 3

Since a new ROW would not be created under Alternative 3, impacts to threatened and endangered species would be negligible to nonexistent.

Since Alternative 3 would stay within the boundaries of the existing ROW, potential Indiana bat roosting sites would not be impacted. The Alternative 2 discussion above contains additional information regarding Indiana bats.

As discussed under Alternative 1, the nearby bald eagle nest would not be affected. Since red-cockaded woodpeckers are considered to be extirpated from Tennessee, the proposed actions would not impact this species. The Alternative 2 discussion above contains additional information regarding red-cockaded woodpeckers. The proposed activities would not result in direct or indirect effects on threatened and endangered terrestrial animals.

Alternative 4

Although Indiana bats are not recorded from Polk County, they have been observed in adjacent counties. Indiana bat habitat was assessed using a protocol based on information in Romme et al. (1995). Forested sections along the proposed TL route were ranked as having low quality. Given the abundance of forested habitat in the vicinity and the overall low-quality ranking of the habitat, the proposed project is not likely to result in direct or indirect effects to Indiana bats. For additional information regarding impacts on Indiana bats, please refer to the discussion in Alternative 2.

Refer to discussion and commitment related to bald eagles in Alternative 1. Habitats required for red-cockaded woodpeckers do not exist along the proposed route and the existing TL route. Red-cockaded woodpeckers are considered to be extirpated from Polk County. The proposed activities would not result in direct or indirect effects on threatened and endangered terrestrial animals.

Cumulative Impacts - Threatened and Endangered Species

Alternatives 1 and 3

Proposed activities would take place within existing access roads, TL ROWs, and road and forest edges. These areas experience periodic disturbance as a result of maintenance and forest use. Although planned activities represent a greater level of disturbance than average, general habitat conditions within the proposed alternative are not expected to change following completion and recovery of the project. Impacts to small whorled pogonia, white fringeless orchid, and Ruth's golden aster are not expected to occur, resulting in no cumulative effects.

Since Alternative 1 would stay within the boundaries of the existing ROW, potential Indiana bat roosting sites would not be impacted. The Alternative 2 discussion below contains additional information regarding Indiana bats.

An active bald eagle nest is known to exist approximately 2.2 miles from the existing Ocoee 2–Ocoee 3 TL. The distance is beyond the protective zones designated by the USFWS to protect bald eagles. Impacts to the nest are not expected from ground-work within the ROW. Aerial flyovers may be necessary to support construction activities along the corridor. Helicopters or other low-level aircraft are restricted from an area 0.5 mile around the nest from January 1-June 31. With the commitment to continue this restriction, there would be no impacts to the bald eagles or their habitat.

Red-cockaded woodpeckers are considered to be extirpated from Tennessee; therefore, the proposed actions would not impact this species. The Alternative 2 discussion below contains additional information regarding red-cockaded woodpeckers.

Impacts to several state-listed species are considered minimal and insignificant. Habitat for these species occurs in forested ravines along the existing ROW. By spanning forested ravines and using BMPs, the proposed project would not result in adverse impacts to state-listed species or their habitats.

Since no substantial amounts of habitat would be converted, Alternative 1 would not add to cumulative affects to TES species in the area.

Alternative 2

Construction, operation, and maintenance of the proposed TL would not affect long-term stability of known threatened and endangered species expected under the current RLRMP. Potential impacts to small whorled pogonia, white fringeless orchid, and Ruth's golden aster populations are not expected to occur, resulting in no cumulative effects.

Marginal habitat for some federally listed and state-listed animals exists along the proposed route. Excellent habitat for Indiana bats occurs nearby, just south of Deep Gap. TVA biologists conducted field studies during May 26-June 2, 1998, to determine if Indiana bats were present in the area during the maternity season. No Indiana bats were captured during mist net surveys. Although this study could not exclude the presence of Indiana bats from the site, it was determined that this area does not support significant populations of Indiana bats. Much of the habitat along the existing TL ROW largely consists of yellow pines on dry, ridge-tops. This habitat ranks as low quality using Indiana bat suitability habitat indexes.

Potentially good Indiana bat habitat occurs in hardwood communities that exist within ravines along the existing ROW. The proposed TL ROW would span these ravines thus avoiding the clearing of potential Indiana bat habitat in these locations. Therefore, there would be no negative effects on this species.

As discussed under Alternative 1, the nearby bald eagle nest would continue to be protected.

Red-cockaded woodpeckers are considered to be extirpated from Tennessee. The last known colony in CNF was located on the south side of the Ocoee River. Several stands of pine trees do exist along the line; however, these stands are considered to be of marginal quality (USFS 1997). Because of a lack of suitable habitat along the line and because no birds have been found in the vicinity, the project would not result in impacts to this species.

Potential impacts to several state-listed species are considered minimal. Habitat for these species occurs in forested ravines along the existing ROW. By spanning forested ravines and using BMPs, the proposed project would not result in adverse impacts to state-listed species or their habitats. Cumulative effects would be minimal, since both regenerated forest and early successional habitat would be created.

Alternative 4

Construction, operation, and maintenance of the proposed TL would not affect long-term stability of known threatened and endangered species expected under the current RLRMP. Potential impacts to small whorled pogonia, white fringeless orchid, and Ruth's golden aster populations are not expected to occur, resulting in no cumulative effects.

Although Indiana bats are not recorded for Polk County, they have been observed in adjacent counties. Indiana bat habitat was assessed using a protocol based on information in Romme et al. (1995). Forested sections along the proposed TL route were ranked as having low quality. Given the abundance of forested habitat in the vicinity and the overall low-quality ranking of the habitat, the proposed project is not likely to result in adverse impacts to Indiana bats. For additional information regarding impacts on Indiana bats, please refer to the Alternative 2 narrative under the subsection entitled "Threatened and Endangered Terrestrial Animals" in the "Direct and Indirect Effects - Threatened and Endangered Species" Section.

As discussed under Alternatives 1 and 3, the nearby bald eagle nest would continue to be protected. Habitats required for eastern hellbenders and red-cockaded woodpeckers do not exist along the proposed and existing TL routes. The routes do not cross large streams or rivers containing hellbenders. Red-cockaded woodpeckers are considered to be extirpated from Polk County.

Seepage salamanders, northern coal skinks, Swainson's warblers, woodland jumping mice, common shrews, and smoky shrews all inhabit moist woodland sites found in stream coves and ravines. Although habitat for these species occurs within the Tolliver Shanty Branch cove, only seepage salamanders were observed here. The area contains large trees including an area dominated by eastern hemlocks. Under the current location of the proposed TL, several and possibly all trees would be removed in the ROW. Removal of these trees would cause changes in the microclimate and moisture level of the forest floor, which would cause a local impact on the above species in the area. Swainson's warblers and woodland jumping mice may benefit from the removal of trees as the new ROW

becomes vegetated with dense shrubs. The other listed species including seepage salamanders would likely disperse to similar habitats from the new ROW into surrounding rich cove forest. Since no federally listed threatened and endangered species are known to occur here, and since state-listed species occurring or possibly occurring here would either benefit or adapt to the proposed new ROW, this Action Alternative is not expected to result in adverse impacts to these species.

Northern pine snake, eastern woodrat, and southeastern shrew habitat is common in the project area. All three species inhabit areas with dense vegetation, which would be created within the new ROW. Thus, the proposed TL may benefit these species. No adverse impacts are anticipated.

The new ROW would initially add to the cumulative effects created by the conversion of forested land to early successional habitat. This would be offset by the conversion of the existing ROW to forest over time.

Endangered, Threatened, and USFS Sensitive Aquatic Animals

The potential for impacts to state-listed or federally listed aquatic animals is similar in all alternatives. Since no federally listed aquatic species are present in areas affected under any of the alternatives, no federally listed species or habitat would be affected directly or indirectly by the construction, operation, and maintenance of the proposed TL, and there would be no cumulative impacts.

All alternative actions have the potential to affect local populations of one state-listed fish species (Tennessee dace), if it resulted in an increased sediment load or other changes in physical habitat of affected streams. However, all TL removal activities, and subsequent construction and maintenance activities would be conducted following the requirements and guidelines presented in TVA's environmental protection and BMP guidelines (Muncy 1999) and the RLRMP (USFS 2004a). These measures would minimize erosion and sedimentation during construction and maintenance activities, and reduce the potential for adverse impacts on listed aquatic species to negligible levels.

Alternatives 1 and 3

The potential for impacts to aquatic resources is similar under Alternatives 1 and 3. Pole replacements would occur as needed, eventually resulting in a complete or near complete rebuild of the entire line. Only the time frame of these activities would differ from Alternative 1. By continuing to follow the appropriate stream protection requirements at SMZs already established along this TL route, removal of the existing line and construction, operation, and maintenance of the proposed TL would not result in significant impacts to aquatic life. Because the Ocoee River contains trout, SMZs at Ocoee River crossings are designated as Category B (Muncy 1999), and would include additional measures to protect water quality and aquatic communities. Potential effects of this alternative would be similar to the No Action Alternative, but removal and construction effects would occur in a significantly shorter time span.

Alternative 2

By continuing to follow the appropriate stream protection requirements already established along this TL route, construction, operation, and maintenance of the proposed TL would not result in significant impacts to aquatic life. Potential for surface water effects of this alternative would be slightly higher than for Alternatives 1 and 3. However, the proposed

changes in alignment from the existing ROW would be minor, and no significant changes to existing SMZs are anticipated. Ocoee River crossings would continue to be designated for Category B protection.

Alternative 4

The three perennial streams, one intermittent stream, and 21 wet-weather conveyances to be crossed by the proposed TL would be protected by standard BMPs (including SMZs) as identified in Muncy 1999. These BMPs are designed to minimize erosion and subsequent sedimentation in ponds and watercourses.

By following the appropriate protection requirements for the identified SMZs as discussed above, the construction and maintenance of the proposed project would not result in significant impacts to aquatic life in Tolliver Shanty Branch, Short Creek, Little Gassaway Creek, or any of their tributaries. All construction and maintenance work would be conducted following the requirements and recommendations presented in TVA's guidelines for environmental protection during TL construction and maintenance (Muncy 1999).

Road access to TL and substation construction sites would be planned and constructed to minimize erosion and sedimentation effects. Use of existing access points on the existing ROW would reduce impacts related to access. Where herbicides are used, these chemicals would be applied following USEPA label restrictions, TVA BMPs, and RLRMP standards.

USFS Sensitive Species – Plants and Terrestrial Animals

The 2001 CNF TES Species List was reviewed to determine potential impacts to these species and their habitats by the proposed removal of the existing TL and the proposed construction of a new TL.

These species are those for which there is concern for viability of their populations across their range. Based on this analysis, 19 sensitive species potentially occur in the vicinity of the project. The construction of the TL may impact individuals but is not likely to cause a trend toward federal listing or loss of viability for any of the species as indicated in Table 10.

Table 10. Species Evaluated in the Biological Evaluation and Determinations of Effect for Alternatives 1 Through 4

Scientific Name	**Determination of Effect for Alternatives 1 Through 4**
American barberry (Berberis canadensis)	May impact individuals but not likely to cause a trend toward federal listing or loss of viability.
Ashleaf goldbanner (Thermopsis mollis var. fraxinifolia)	May impact individuals but not likely to cause a trend toward federal listing or loss of viability.
Beadle's mountain mint (Pycnanthemum beadlei)	May impact individuals but not likely to cause a trend toward federal listing or loss of viability.
Carolina hemlock (Tsuga caroliniana)	May impact individuals but not likely to cause a trend toward federal listing or loss of viability.
Cutleaved meadow parsnip (Thaspium pinnatifidum)	May impact individuals but not likely to cause a trend toward federal listing or loss of viability.
Diana fritillary (Speyeria Diana)	May impact individuals but not likely to cause a trend toward federal listing or loss of viability.
Dixie grapefern	May impact individuals but not likely to cause a trend

Scientific Name	Determination of Effect for Alternatives 1 Through 4
(Botrychium jenmanii)	toward federal listing or loss of viability.
Eastern small-footed bat (Myotis leibii)	May impact individuals but not likely to cause a trend toward federal listing or loss of viability.
Fraser's loosestrife (Lysimachia fraseri)	May impact individuals but not likely to cause a trend toward federal listing or loss of viability.
Georgia aster (Aster georgianus)	May impact individuals but not likely to cause a trend toward federal listing or loss of viability.
Large witchalder (Fothergilla major)	May impact individuals but not likely to cause a trend toward federal listing or loss of viability.
Mountain bush-honeysuckle (Diervilla rivularis)	May impact individuals but not likely to cause a trend toward federal listing or loss of viability.
Nevius' stonecrop (Sedum nevii)	May impact individuals but not likely to cause a trend toward federal listing or loss of viability
Ocoee covert (Fumonelix archeri)	May impact individuals but not likely to cause a trend toward federal listing or loss of viability.
Piratebush (Buckleya distichophylla)	May impact individuals but not likely to cause a trend toward federal listing or loss of viability.
Rafinesque's big-eared bat (Corynorhinus rafinesquii)	May impact individuals but not likely to cause a trend toward federal listing or loss of viability.
Small's beardtongue (Penstemon smallii)	May impact individuals but not likely to cause a trend toward federal listing or loss of viability.
Sweet pinesap (Monotropsis odorata)	May impact individuals but not likely to cause a trend toward federal listing or loss of viability.
Tall larkspur (Delphinium exaltatum)	May impact individuals but not likely to cause a trend toward federal listing or loss of viability.

Direct and Indirect Effects - Demand Species

Alternatives 1 and 3

Alternatives 1 and 3 would create no change in vegetation composition in the area. Temporary direct and indirect effects on bear activity in the vicinity could occur during construction of the proposed TL. Direct and indirect effects to bears from the proposed construction activities would cease after completion.

Alternative 2

Alternative 2 would create a slight change in vegetation composition in the vicinity. Overall some early successional habitat would be created and some would be lost. Temporary direct and indirect effects on bear activity in the vicinity could occur during construction of the proposed TL. Direct and indirect effects to bears from the proposed activities would cease after completion. See Alternative 4 below for further discussion.

Alternative 4

Alternative 4 would increase the acreage in the 0-10 year age class by approximately 56 acres. Some of this would be offset by the loss of approximately 47 acres of early successional habitat as the existing Ocoee 2-Ocoee 3 TL would revert back to forest. The addition of structural and biological diversity in the form of shrub/sapling vegetation would provide soft mast, insects, forage, and escape cover. Additional cover would be provided by tops and root wads left behind. Known black bear den sites would be protected for as long as they remain suitable by prohibiting vegetation management and ground-disturbing

activities within a minimum 100 feet around the den. Potential black bear den trees would be retained during all vegetation management treatments. Potential den trees are those that are greater than 20-inch diameter breast height and are hollow with broken tops. As stated above, no known black bear den sites were found during field surveys. Potential future den sites located would be protected by these provisions.

Openings created by the proposed ROW would benefit black bear by providing soft mast and cover. Female bears use middle elevations with higher stand richness during summer months, and the addition of structural and biological diversity in the form of shrub/sapling vegetation would provide soft mast, insects, forage, and escape cover.

Soft mast and other forage is a valuable diet supplement to black bears, especially during the months when hard mast is absent and in years when there is a hard mast failure. Those that would grow naturally after harvest, such as blackberries, would provide this.

Temporary direct and indirect impacts on bear activity in the vicinity could occur during construction of the proposed TL and during the removal of the existing Ocoee 2-Ocoee 3 TL. Direct impacts to bears from the proposed activities would cease after construction and after the complete removal of the existing line.

Cumulative Effects - Demand Species

Alternative 1 Through 4

The MIS for demand species is black bear. Other activities in the CNF with potential to inadvertently impact black bear include recreational activities (inadvertent harassment). Alternatives 1 through 3 would take place outside of the black bear habitat management area and would take place in areas where there is already human use. Thus, their potential to cumulatively affect the black bear is minimal. Alternative 4 would take place in the bear habitat area and would have a greater potential to affect the black bear. TL construction might temporarily improve access to the black bear habitat management area for recreational users, thus conflicting with the goal of providing secluded habitats. To minimize these impacts, access roads along the ROW after construction would be closed to vehicle use according to Forest Service requirements.

Direct and Indirect Effects - Invasive Nonnative Plants

Alternatives 1 and 3

The existing ROW and proposed pole yard areas within Alternatives 1 and 3 have been disturbed and currently contain exotic invasive terrestrial plants. The proposed activities would likely remove many of these invasive plants during construction. Due to the likely removal of exotic invasive terrestrial plant species during construction, revegetation activities, and maintenance by hand clearing, mechanical clearing, or RLRMP-approved herbicides (as discussed in Section 2.2.2.2), the revegetation of native and/or nonpersistent nonnative species would potentially benefit plant ecology. Exotic and invasive plants are a threat to plant ecology and the removal or reduction of exotic invasive plants would be a benefit. This would reduce the impacts of these plants and reduce the likelihood of them spreading, which would benefit the impacted area by allowing native and desired nonnative vegetation to reoccupy the site.

Alternatives 2 and 4

Impacts to native plant communities from the introduction and spread of exotic or invasive plant species are anticipated as a result of the proposed action. To minimize impacts to native plant communities, the ROW would be revegetated with native warm season grasses and other native or nonpersistent nonnative species according to RLRMP standard FW-67. The ROW would be maintained by hand clearing, mechanical clearing, or RLRMP-approved herbicide application only. This would reduce the impacts of these plants and reduce the likelihood of them spreading, which would benefit the impacted area by allowing native and desired nonnative vegetation to reoccupy the site. The planting of native and nonnative nonpersistent species and reclearing activities would help minimize adverse direct and indirect effects to existing native plant communities. Native and nonpersistent nonnative plants would no longer have to compete for water, light, and space with the introduced nonnative invasive terrestrial plants.

Cumulative Effects - Invasive Nonnative Plants

Alternatives 1 Through 4

The presence of existing US 64 in addition to the existing TL ROW provides opportunities for cumulative impacts of invasive nonnative plants. If US 64 is widened or relocated there would be additional disturbance providing opportunities for establishment of invasive nonnative plants. It is expected that if additional ROW is required for the US 64 project, the applicant would be required to comply with Forest Wide Standard FW-67, which provides that when seeding temporary openings, only native or nonpersistent nonnative species would be used. Intentional establishment of invasive nonnative plant species would not occur under any of the reasonably foreseeable future actions. Should an invasion occur, treatment would occur according to RLRMP standards and any future standards to be developed under the EA being developed for exotic and invasive plant species management. These actions would prevent these disturbance actions from contributing cumulatively to the spread of exotic plants.

Direct and Indirect Effects - Forest Health

Alternatives 1 Through 4

Under these alternatives, there would be only a negligible change to the existing forest. Forests surrounding the existing TL would continue to age, only affected by natural forces of disturbance; these include insects, diseases, and storm events.

Cumulative Effects - Forest Health

Alternatives 1 Through 4

Oak decline, gypsy moth, HWA and SPB would affect the forest structure and composition. Oak decline and the gypsy moth could affect the analysis area to a large degree due to the large amounts of mature oak. Approximately 48 percent of the analysis area classified as primarily oak forest types is over the age of 70. The effect would be a decline in the number of oaks and the associated hard mast of this forest type.

SPB outbreaks (most recently 1999 through 2002) have impacted the analysis area and the surrounding landscape. Approximately 21 percent of the analysis area is pine or pine

hardwood forest types over the age of 60 and highly vulnerable to SPB. The probability of another SPB outbreak is high and would result in a further reduction of pine forests.

Hemlock is a major forest component on approximately 6 percent of the analysis area. Nearly all of these stands are older than 60 years. HWA is likely to kill most of these hemlocks within 10-20 years. Their position in the forest canopy is likely to be replaced by white pine and yellow poplar.

Alternatives 1, 2, 3, and 4 do not provide measures to improve forest health and reduce forest susceptibility to these ongoing disease and pest outbreaks. However, the presence or absence of the proposed TL would also not cumulatively increase the susceptibility of CNF forests to these forest pests and diseases.

4.2. Aquatic Ecology

Many aspects of the potential impacts to aquatic resources would be similar under all of the alternatives because all alternatives involve TL construction, operation, and maintenance activities. These are discussed below.

Because of area topography, structures would be located primarily on higher elevation points, well away from streams. For example, the two structures nearest to Little Gassaway Creek are far outside of the established 200-foot SMZ (approximately 1,300 and approximately 700 feet away, respectively). These structures are also situated at “high points” (at approximately 1,500 feet elevation above mean sea level (msl) and approximately 1,590 feet elevation msl). The channel of Little Gassaway Creek is located at approximately 1,300 feet msl at the ROW crossing. The result is that the stream channel is “spanned” by the TL, and clearing within the SMZ is either not necessary or is limited to the removal of “danger trees” (those trees tall enough to either potentially directly contact the TL or fall into the TL).

Nonetheless, BMPs as described in Muncy 1999 and as required in the RLRMP would be used in areas of disturbance and construction to prevent erosion and sedimentation, which could affect streams in the project area. Any ground disturbance and clearing for removal of the old TL and construction and maintenance of the proposed new TL at lower elevations in wet-weather conveyances and in defined SMZs along perennial and intermittent streams would also follow BMPs. SMZs are determined by level of protection needed and slope of land adjacent to the stream (Muncy 1999). In this area of steep topography, TVA has determined that all of the SMZs in this area would be 100 feet wide on each side of the stream.

Reclearing activities along transmission ROWs would be conducted primarily by hand clearing. Some herbicide use may occur during vegetation management along the ROW; however, aerial application of herbicides would not occur within SMZs. Herbicide application would mainly occur in the near vicinity of structures. Where herbicides are used, these chemicals would be spot applied to control vegetation. All herbicide application would follow USEPA label restrictions, TVA BMPs, and RLRMP standards.

Aquatic ecology in the Ocoee River gorge watershed is potentially cumulatively affected by two new corridors, one for the TL along and south of the river and one for the US 64 project along and north of the river. Potential cumulative impacts would primarily be from erosion and sedimentation. If either or both projects were approved, rigorous implementation of

BMPs as described in the RLRMP would be required in order to prevent cumulative impacts. The scale of the proposed TL is much smaller than the proposed US 64 project, so the contribution of the TL to any cumulative impacts would be very slight in comparison to US 64.

4.3. Groundwater and Surface Water

4.3.1. Groundwater

Many aspects of the potential impacts to groundwater would be similar under all of the alternatives because all alternatives involve TL construction, operation, and maintenance activities. These are discussed (in general) below.

The transfer of surface contaminants to the fractured bedrock aquifers is unlikely due to the depth and confined or semiconfined nature of these aquifers. The transfer to the surficial aquifers would be minimal due to the nature of the proposed action and the use of BMPs. Augering to implant transmission structures has the potential to encounter underlying Anakeesta or similar formations containing pyrite. When exposed to oxygen and water seeping down the auger holes, the pyrite breaks down to form acidic groundwater. However, impact to groundwater from the transfer of these near-surface contaminants would be very unlikely due to the depth to the fractured bedrock aquifers and confined or semiconfined nature of these aquifers. Also, the amount of augering would be very slight and widely dispersed, and the holes would be refilled with the compacted augered material after installation of the new poles. During revegetation and maintenance activities, application of fertilizers and herbicides would be used in accordance with manufacturers' labels to avoid impacts to groundwater sources. Herbicides with groundwater contamination warnings would not be used in this area. With the use of BMPs/RLRMP standards, impacts from the proposed action on groundwater would be negligible.

Because most of the disturbance on new corridors for the TL or for US 64 construction would be at the surface, there would be little potential for these actions to cumulatively affect groundwater.

4.3.2. Surface Water

Erosion, Sedimentation, and Polluted Runoff

Due to the topography of the proposed project area, there is potential for indirect impacts to water quality within the Ocoee system downstream of the project and for cumulative impacts to sensitive aquatic resources. The proposed ROW runs across a series of ridges and valleys characterized by steep slopes. Construction of the proposed new line would involve clearing of some woody vegetation in the ROW. Because of the steep slopes, the potential for erosion would be severe and revegetation difficult. Soil disturbances and storm water runoff associated with access roads or other construction activities could potentially affect surface water quality. Soil erosion and sedimentation can clog small streams and threaten aquatic life. Removal of the tree canopy along stream crossings can increase water temperatures and enhance algal growth. Such situations can subsequently cause dissolved oxygen depletion and adversely affect aquatic biota. In addition to soil erosion and sedimentation, acidic runoff could result from pyrite weathering in newly exposed Anakeesta or similar formations. Fuel and other fluid spills can pollute streams.

Precautions as described in Muncy 1999 would be included in project design, construction, and maintenance to minimize these potential impacts, particularly within SMZs. Permanent stream crossings would be made so as not to impede runoff patterns and the natural movement of aquatic fauna. Extreme care would be taken to prevent erosion throughout construction including but not limited to silt fence installation, use of erosion control netting, and immediate revegetation of all disturbed areas. Temporary stream crossings and other construction and maintenance activities would comply with appropriate state permit requirements and TVA requirements as described in Muncy (1999). Canopies in all SMZs would be left undisturbed unless there is no practicable alternative. These initial clearing activities (including removal of danger trees) within SMZ areas along streams would be accomplished by using either hand-held equipment or other appropriate clearing equipment (e.g., feller-buncher), which would result in minimal soil disturbance and damage to low-lying vegetation. Prior to the start of ground disturbance, a qualified geologist would inspect the route of the line and mark the areas of most concern for the presence of pyrite. If needed, areas with potential would be tested to confirm the presence or absence of pyrite. Any spoil from augering or grading for crane pads would be spread over limestone gravel and covered with lime to neutralize any acid created from pyrite. In clearing roads and the pole yard, bulldozer blades would not be used to scrape the ground to expose bare soil.

During construction, watercourses along the entire ROW and along access roads would be protected from direct impacts, sedimentation, or spills by the application of Category A (standard) stream protection guidelines, as defined in Muncy (1999). The BMPs and recommended practices specified in the guidelines are intended to minimize soil erosion, subsequent sedimentation of streams, and adverse impacts on the vegetation in riparian buffer areas. In addition, SMZs 100 feet wide on each side as noted in the aquatic ecology section would be established and maintained at the intermittent and perennial stream crossings on the proposed new portion of the line.

Transmission structures are normally located away from surface waters due to topography and to minimize potential impacts on water quality and aquatic habitat. All construction work, especially near streams, would be conducted consistent with TVA guidelines (Muncy 1999). Road access to new ROW would be planned and constructed to minimize erosion and sedimentation effects. Existing access points would be used whenever feasible. If no practicable alternative exists, trees along streams within the corridor and danger trees adjacent to the corridor would be cut; however, their stumps would not be removed and understory vegetation would be disturbed as little as possible.

Herbicides

There would be approximately 36 acres of ROW in the 4 miles of TL in Alternatives 1, 2, and 3, and 56 acres in the 4.7 miles of line in Alternative 4. This is total mileage of line; the actual area treated with herbicide would generally be much less than the total acreage in the ROW. Funding and logistical constraints would limit the actual quantity of areas treated in a given year. Buffers of untreated vegetation would remain near streams and other areas not appropriate for herbicide application. This would reduce the actual area to be treated with herbicide to approximately 28 acres for Alternatives 1 and 3, approximately 32 acres for Alternative 2, and approximately 28 acres for Alternative 4. The use of herbicides in these areas would reduce the number of acres disturbed by mechanical treatment activity, reducing ground disturbance which would lower the potential for erosion. Individual plant treatment would minimize contact with soil and minimize the potential for direct application to soil or drift to surface water. Because of their targeted use, herbicides would

not be likely to leave the TL right of way. The most likely scenario for leaving the ROW would be during a spill or if herbicides were applied immediately before a heavy rain. In these unlikely events, herbicides would reach the aquatic environment in a very dilute form. Herbicides to be used were selected based on their low toxicity in the aquatic environment or their rapid degradation in water.

Herbicides to be used are:

Glyphosate - This chemical is commonly found in brand name products such as Roundup, Accord, and Rodeo. Glyphosate is a broad-spectrum herbicide used to kill grasses and broadleaf weeds. Rodeo is a formulation labeled for aquatic use. Glyphosphate is inactivated when it comes into contact with soil since it is strongly adsorbed onto soil particles. It is readily metabolized by soil bacteria. Accordingly it is not easily leached into either groundwater or surface water. In the unlikely event it does enter the water, it is non-toxic to fish. Effects to birds, mammals, fish and invertebrates are minimal (USFS, 2006d; SERA, 1996; Tu et al, 2001).

Imazapic - This chemical is found in brand name products such as Plateau. Imazapic has been found to be very effective against fescue, while having little effect on native grasses. It is often used for restoration of native plants in pastures and fields. Imazapic is persistent in soils. It is degraded by soil microbes. Accordingly, it is not easily leached into either groundwater or surface water. In the event it does enter the water, it is degraded by sunlight and is relatively safe to aquatic animals. Effects to birds and mammals are minimal (USFS, 2006d; Durkin and Follansbee, 2004a; Tu et al, 2001).

Triclopyr - This chemical is found in brand name products such as Garlon 3A and Garlon 4. Triclopyr is most effective on broad-leaved plants and is used for noxious weed control such as kudzu, planting site preparation, and release of tree seedlings from competition. Triclopyr is not mobile in soil and binds to clay and organic matter. It is broken down by microbes and ultraviolet light. The different forms of triclopyr vary in toxicity to fish, with the ester form (Garlon 4) being of most concern. The ester form breaks down in water to a less toxic form, and this is aided when the water column is exposed to light. Both forms have been shown to be non-toxic to birds and to have no adverse effects to amphibians at likely exposure levels. If applied properly, triclopyr in either form would not be found in concentrations adequate to kill aquatic organisms (USFS, 2006d; Durkin, 2003; Tu et al, 2001).

Clopyralid - This chemical is found in brand name products such as Transline. Clopyralid is very effective against kudzu, but most trees and grasses are tolerant of it. It may be used for wildlife opening maintenance, planting site preparation, and release of tree seedlings. It is highly soluble in water and does not adsorb to soil. Once in soil or water, it is relatively persistent. It is degraded by soil microbes, and warm and moist conditions enhance this process. It will leach to ground water if applied to permeable, sandy, or limestone-fractured areas. The geology of the Ocoee Gorge does not contain sandy soils or limestone. In the event it does enter the water, it is of low toxicity to fish and aquatic invertebrates. It is non-toxic to terrestrial animals (USFS, 2006d; SERA, 1999; Tu et al, 2001).

Imazapyr: This chemical is commonly found in brand name products such as Arsenal and Habitat. It is relatively persistent in soils, and does not bind strongly with soil particles. The project is non-toxic to soil microbes and does not bioaccumulate in the food chain. In the event it does enter the water, it photodegrades and exhibits very low toxicity to fish and

aquatic invertebrates. It is of low toxicity to birds and mammals (Durkin and Follansbee, 2004b; Tu et al, 2001).

Fosamine Ammonium: This product is commonly found in brand name products such as Krenite S and is a brush-control agent. Fosamine binds readily with soils high in clay and organic matter. It is rapidly degraded by soil microbes. Therefore, the potential for off-site movement in runoff water is low. In the event it reaches surface water, it has low toxicity to fish and aquatic invertebrates and does not bioaccumulate in fish (Tu et al., 2001).

Metsulfuron Methyl: This chemical is found in the product Escort, which controls broadleaf weeds and brush. In clay soils, off-site transport is possible during rain events. However, it has very low potential to cause adverse effects in aquatic animals at the concentrations likely to reach streams. Fish are not highly sensitive, and there is low toxicity in birds and mammals (Klotzbach and Durkin, 2004).

Methods of application for the above herbicides would be:

- Foliar, where the foliage of the individual plant to be controlled is sprayed
- Basal (streamline), where the herbicide is sprayed onto the individual stem of the plant to be controlled
- Cut surface, where the herbicide is applied to an axe-chop in the stem (hack and squirt) or to the freshly sawn stump

Herbicide would be applied by broadcasting or backpack sprayer. Broadcast treatment utilizes a multiple nozzle boom attached to a vehicle. The spray is applied to all the vegetation in the boom swath. Broadcast spraying efficiently treats areas with a high density of undesirable plant species. Broadcast treatment is typically used to gain control of a site, and then more selective treatment is used as follow-up maintenance. Treatment by broadcast would not occur on steep slopes or other areas not accessible by vehicles.

Backpack sprayers have a single nozzle applicator. They would be utilized by manually treating target plant species with herbicides.

The corridor would be treated once and then spot treated thereafter about every five years as needed. Persistent vegetation such as kudzu may require retreatment. Some manual maintenance such as mowing and chain sawing would continue. Herbicide use would complement manual methods to increase the effectiveness of control. Herbicide use may eventually reduce or eliminate the need for mechanical manipulation of the ROW.

Based on the above considerations and information on toxicity, the herbicides to be used would not likely be transported off-site because they are targeted in application to plants, are applied at low rates, and generally bind to soil. In the event they are washed off-site during heavy rainfall, they would be diluted and are low in toxicity to aquatic and terrestrial organisms.

Alternative 1

Under Alternative 1, there would no change in the route of the ROW; therefore, no additional ROW clearing would take place. Potential for additional erosion would be

minimal. Potential for soil compaction would be minimal because helicopters would be used for construction.

A pole yard would be constructed in the Short Creek watershed (see Table 11). Construction and operation of the pole yard and additional traffic on existing roads would generate some sediment. Impacts would be minimized by use of BMPs. After construction, the pole yard would be restored using native warm season grasses according to RLRMP standards.

Table 11. Subwatersheds Affected by Alternative 1

Subwatersheds	Watershed Area (acres)	New ROW (acres)	Pole Yard (acres)	Portion of Watershed Affected by Construction (New ROW and Pole Yard)
Ocoee River	334,720	0	0	0%
Horse Bone Branch	120	0	0	0%
Little Gassaway Creek	523	0	0	0%
Short Creek	1,140	0	3.1	0.27%
Tolliver Shanty Branch	290	0	0	0%
Gassaway Creek	1,810	0	0	0%

Alternative 2

The route would change for Alternative 2. New cleared areas would create some potential for erosion; this potential would be minimized by BMPs. Potential for soil compaction would be minimal because helicopters would be used for construction. All of the changes occur within areas of local drainage to the Ocoee River (Table 12). Because such a small portion of the watershed would be affected, water quality impacts likely would be too small to be measured.

Table 12. Subwatersheds Affected by Alternative 2

Subwatersheds	Watershed Area (acres)	New ROW (acres)	Pole Yard (acres)	Portion of Watershed Affected by Construction (New ROW and Pole Yard)
Ocoee River	334,720	22	0	0.007%
Horse Bone Branch	120	0	0	0.0%
Little Gassaway Creek	523	0	0	0.0%
Short Creek	1,140	0	3.1	0.27%
Tolliver Shanty Branch	290	0	0	0%
Gassaway Creek	1,810	0	0	0.0%

A pole yard would be constructed in the Short Creek watershed. Construction and operation of the pole yard and additional traffic on existing roads would generate some sediment. Impacts would be minimized by use of BMPs. After construction, the pole yard would be restored using native warm season grasses according to RLRMP standards.

Alternative 3

Alternative 3 would require no new ROW or pole yard, so there would be no new areas cleared.

Alternative 4

Alternative 4 would be a new route. The western portion of this route would mostly follow the ridge above the Ocoee River. Continuing east, it would cross Tolliver Shanty Branch, Short Creek, and Little Gassaway Creek, roughly perpendicular to their channels. The east end of the route would parallel Horse Bone Branch.

Because of the steep slopes where the ROW would cross the creek valleys and the use of heavy equipment for construction, this alternative would have the greatest potential for increased erosion. If the ROW were cleared to the creek, this alternative would have the potential for significant impacts to water quality in the small creeks it would cross or parallel. Use of construction BMPs and SMZs would minimize the potential for impacts.

A pole yard would be constructed in the Short Creek watershed. Construction and operation of the pole yard and additional traffic on existing roads would generate some sediment. Impacts would be minimized by use of BMPs. After construction, the pole yard would be restored using native warm season grasses according to RLRMP standards. See Table 13 for information on subwatersheds that would be affected by Alternative 4.

Table 13. Subwatersheds Affected by Alternative 4

Subwatershed	Watershed Area (acres)	New ROW (acres)	Pole Yard (acres)	Portion of Watershed Affected by Construction (New ROW and Pole Yard)	Access Roads (miles)
Ocoee River	334,720	26	0	0.008%	1.40
Horse Bone Branch	120	3.7	0	3.08%	0.43
Little Gassaway Creek	523	6.1	0	1.17%	2.60
Short Creek	1,140	14	3.1	1.50%	1.47
Tolliver Shanty Branch	290	4.1	0	1.41%	2.06
Gassaway Creek	1,810	0	0	0.0%	0

Other actions that may affect surface water quality include those with land disturbance, as described in the aquatic ecology section above, and those that involve herbicide use, such as exotic and invasive plant species management and forest health management as is

envisioned in the Hogback analysis area. Because of the small area involved, even on a cumulative basis, and the safeguards incorporated in the required BMPs for soil erosion and herbicide use, the potential for adverse cumulative effects is low.

4.4. Wetlands

Alternative 1

The two wetlands identified in the existing ROW would not be impacted by the phased rehabilitation of the TL because the height of the conductors allows the TL to span the river and stream valleys where the wetlands are located. The current TL conductors span the valleys at a minimum height of over 300 feet above wetland W1 and over 200 feet above wetland W2. Routine clearing of vegetation in the vicinities of the wetlands is confined to the tops of the steep slopes where the new structures would be located. There would be no vegetation clearing or other ROW construction or maintenance-related work within a minimum of 200 feet of either of the wetlands. No impacts to wetlands are anticipated, since no clearing would occur in or adjacent to the wetlands and no structures are proposed in the wetlands.

Alternative 2

The wetlands identified in the existing TL ROW, as well as the adjacent areas to be incorporated in the ROW, would not be impacted because the height of the conductors allows the TL to span the river and stream valleys where the wetlands are located. The current and proposed TL conductors span the valleys at a minimum height of over 300 feet above wetland W1 and over 200 feet above wetland W2. The placement of proposed new TL would be done by helicopter, thus eliminating the need for equipment to cross wetlands. Clearing of vegetation for the proposed ROW in the vicinities of the wetlands would be confined to the tops of the steep slopes where the new structures would be located. There would be no vegetation clearing or other ROW construction or maintenance-related work within a minimum of 200 feet of either of the wetlands. No impacts to wetlands are anticipated, since no clearing would occur in or adjacent to the wetlands and no structures are proposed in the wetlands.

Alternative 3

Under the No Action Alternative, the wetlands identified in the existing ROW would not be affected, since the height of the present or future conductors permit the TL to span both wetlands. Routine clearing of vegetation in the vicinities of the wetlands would continue to be confined to the tops of the steep slopes where the present structures are located. There would be no vegetation clearing or other ROW construction or maintenance-related work within a minimum of 200 feet of either of the wetlands. No impacts to wetlands are anticipated since no clearing would occur in or adjacent to the wetlands, and no structures are currently located or proposed in the wetlands.

Alternative 4

No impacts to wetlands are expected either for the removal of the existing TL or the construction of the proposed TL.

Because no impacts to wetlands are anticipated, there is no potential for this project to cumulatively contribute to wetlands impacts from other past, present, and reasonably foreseeable future actions.

4.5. Visual Resources (Scenery) and Recreation

Potential effects to visual resources were examined based on changes between the existing landscape and the landscape character after alteration, identifying changes in the landscape character based on commonly held perceptions of landscape beauty and the aesthetic sense of place. The potential effects to recreation were examined based on the existing recreation opportunities, impacts to recreation opportunities during construction, and effects on recreation opportunities after construction is complete.

Where the potential effects vary by location, the impacts are described in the same manner as the existing environment, i.e., from Ocoee 3 to Ocoee 2 in generally an east to west direction along the proposed alternative TL routes.

Construction of a TL under all alternatives in a public recreational area potentially affects public safety through the presence of construction traffic. In addition, transmission construction on rugged terrain such as in the Ocoee Gorge would involve low-flying helicopters, creating worker safety issues. Implementation of transmission construction in the Ocoee Gorge under Alternatives 1 and 2 would result in intensive activities along and close to US 64 and close to recreational users. Some potential impacts would be avoided by limiting active construction activities to periods when water is not being released for recreational floating. Implementation of incremental upgrades under Alternative 3 or construction of a new corridor under Alternative 4 would remove some, but not all, of the construction presence from the US 64 Scenic Byway corridor. Because of the low-flying helicopters, additional construction traffic on US 64, and the presence of many recreational users in the Ocoee Gorge, implementation of Alternatives 1 or 2 probably has the most potential to affect public safety, followed by Alternatives 3 and 4.

Alternatives 1 and 3

Under these alternatives, impacts would essentially be the same, though the shorter period of rebuilding under Alternative 1 would mean the impacts would be experienced for a shorter period of time than for Alternative 3. For both alternatives, the existing landscape character would not change. Temporary visual discord would be evident during the construction phases of the project, which would include equipment operated throughout the proposed route and the use of material and construction staging areas. This alteration to the visual character would be minor and would not be noticeable after restoration, as no new access roads would be created as a result of the proposed project. The changes that would be visible after construction would not be discernibly different, as the replacement H-frame transmission structures would be similar in character to existing transmission structures located at the Ocoee 3 Powerhouse and along the existing route. There would also be no new clearing of ROW, so there would be no immediate change in the appearance of the ROW and little cutting of vegetation or browning from application of herbicide during maintenance.

It is possible that rebuilding of the structures at the eastern end of the line on the north side of US 64 could delay hikers along the Benton MacKaye/Rock Creek/Dry Pond Lead Trail during a few days at most to prevent safety hazards to hikers. The heavy equipment used for construction would adversely impact the trails. Under Alternative 3, motorists and bikers along NFS Road 45 might experience brief delays while helicopters were landing and taking off from the pole yard. The heavy equipment used for construction would adversely impact the trails.

Impacts to rafters all along the proposed route of the TL would include noise and visual discord from numerous helicopter flights over the river to carry material and equipment because there would be no access roads, resulting in noise and a visual effect. It is possible that traffic along US 64 would need to be stopped briefly during installation of the conductor to minimize safety hazards to travelers from the helicopter overflight with the cable.

On the whole, the changes that would be visible after construction would not be discernable as new intrusive elements in the landscape and would not contribute to the loss of established landscape character, a degradation of the visual resources, or a loss of recreational opportunities. Therefore, impacts to visual resources and recreation associated with these alternatives would be insignificant.

Under Alternative 3, continued reliance on the existing TL poses a safety risk to the public as the energized TL continues to deteriorate. Emergency repairs would likely occur under less desirable or extreme weather conditions, increasing risks to workers and the public.

Alternative 2

In the vicinity of the Ocoee 3 Powerhouse, numerous views of the proposed TL would be available from varying positions, viewing distances, and durations. Motorists traveling US 64 would have brief views of transmission structures and new ROW where the proposed TL would cross the scenic byway. These views from the immediate foreground distance would remain in context with the established landscape character, and new structures would be seen against the existing powerhouse and other existing TLs and maintained ROW. The incremental addition of structures and additional ROW would not affect the scenic qualities of existing views available from this crossing point. The recreational river users at this location would have normal/inferior views of the proposed route, in which case landscape elements such as topography and vegetation would obscure views of the transmission structures and ROW. In areas near the riverbank at the Thunder Rock Campground, visitors would have intermittent views of transmission structures, again from within the foreground distance, as the position of the viewer in combination with slope and vegetation reaching from the river gorge precludes views from within the normal vertical cone of vision. Hikers/bikers using the Tanasai Trail System above the powerhouse would have views of the proposed route from greater distances and for longer durations; however, from their superior viewing positions, views of the proposed transmission structures and ROW would recede from view and appear ancillary to existing TL routes.

Building the proposed new structures and removing the existing structures at the eastern end of the line on the north side of US 64 could delay hikers along the Benton MacKaye/Dry Pond Lead Trail for a few days at most to prevent safety hazards to hikers. The heavy equipment used for construction would adversely impact the trails. Motorists and bikers along NFS Road 45 might experience brief delays while helicopters were landing and taking off from the pole yard.

Impacts to rafters all along the proposed route of the TL would include noise, visual discord, and possible safety hazard from numerous helicopter flights over the river to carry material and equipment because there would be no access roads, resulting in noise and a visual effect. Traffic along US 64 may need to be stopped briefly during installation of the conductor to minimize safety hazards to travelers from the helicopter overflight with the cable.

Between Ocoee 3 Powerhouse and Ocoee 2 Dam along the proposed route, motorists would have brief foreground views of transmission structures in context with existing structures and maintained ROW, as duration of view would be confined to a matter of seconds.

In the vicinity of Ocoee 2 Dam, the number and duration of available views increase substantially from locations farther east. The proposed TL would be visible from within the foreground distance, but immediately adjacent to existing structures and from normal/inferior positions as shown in Figure 5, where views are generally directed to the water body, which is visible from normal/superior positions. After rafters and kayakers depart from the put-in area, views of the proposed TL would be available only briefly, when not obscured completely by slope and vegetation and in context with existing transmission structures.

Rafters/kayakers and motorists would have views of new structures and a widened TL ROW as the route parallels the river and crosses the roadway at the next crossing to the west (approximately RM 23.9). These views of new structures against existing ROW and structures would be available only briefly.

Farther west, views of proposed TL structures would not be readily discernable at the crossing near the Surprise rapid (approximately RM 21.8) as slope and vegetation preclude extensive views of existing structures. Motorists and river users would have very brief views of the additional ROW and TL, but this view would be very brief and between structures, as the proposed line crossing would be perpendicular to the highway and river at this location.

Near Hell's Hole rapid and the Ocoee 2 Powerhouse at RM 20, the recreational river user has focused foreground views of the whitewater course. From these vantage points along the river, views would be available of proposed structures and ROW above the left bank and would be in context with existing structures contributory to the landscape character of the powerhouse area.

Temporary visual discord would be evident during the construction phases of the project due to the presence of equipment operated throughout the proposed route and the use of material and construction staging areas. This temporary alteration to the visual character would be minor and would not be noticeable after completion, as no new access roads would be created as a result of the proposed project. During construction of the proposed new TL, the existing TL would remain in place, so both sets of structures and ROW would be visible. After construction of the proposed TL and removal of the existing TL, there would only be one set of structures, and the existing ROW not occupied by the proposed TL would revert back to natural conditions. The existing landscape character and visual resources would be altered by the presence of the proposed TL and associated ROW, increasing the number of discordant elements in the landscape. There would be some cutting of vegetation and browning of vegetation from application of herbicides during maintenance. On the whole, the changes that would be visible after construction would not be discernable as new intrusive elements in the landscape and would not contribute to the loss of established landscape character, a degradation of the visual resources, or a loss of recreational opportunities. Therefore, impacts to visual resources and recreation associated with this alternative would be insignificant.

Alternative 4

Removal of the existing TL would be visually beneficial and would contribute to the USFS desired scenic integrity objective for the scenic byway. Structures and lines seen along the Ocoee River and US 64 would be removed, restoring altered landscapes to a more naturally appearing setting. This would create a greater sense of place by providing more homogenous, contiguous tracts of land undisturbed by human development. The removal of the existing TL would require helicopter overflights, which would generate noise and visual discord and could pose a safety hazard to those using the river. Removal of the existing structures and conductor at the eastern end of the line on the north side of US 64 could delay hikers along the Benton MacKaye/Dry Pond Lead Trail for a few days at most to prevent safety hazards to hikers. Traffic along US 64 may need to be stopped briefly during removal of the conductor to minimize safety hazards to travelers from the helicopter overflight with the cable. Motorists and bikers along NFS Road 45 might experience brief delays while helicopters were landing and taking off from the pole yard.

Views of the proposed TL would be similar to the impacts of Alternative 1 through 3 for motorists along US 64 and recreation users in the Ocoee River near Ocoee 2 Hydro Plant. Trail users and visitors along the Tanasai Trail System, Thunder Rock Trail, Thunder Rock Express Trail, West Fork Trail, NFS Road 45, and Indian Flat Ridge would notice an increase in elements contributing to discordant contrast in the landscape. New ROW would be cleared adjacent to trails. Clearing the ROW, building new structures, and installing conductor could delay hikers and bikers using the trails during a few days at most to prevent safety hazards. The heavy equipment used for construction would adversely impact the trails. No structures are expected to be built on any existing trails, so no trail closures or relocations would be needed. The proposed new line would cross trails along Indian Flat Ridge six times. Trail users would have open views of TL ROW and associated structures and lines. However, most views of these new elements would remain in the foreground due to steep terrain and heavily vegetated slopes. Vegetation along Indian Flat Trail (NFS Road 1376), NFS Roads 5054 and 33292, the unnamed road off NFS Road 45, and NFS Road 33641 may need to be trimmed for equipment because these roads would be used for access by large construction vehicles. This would open the canopy and allow for better views from the trail but would also make the corridor for the trail more visible from other vantage points. After construction the vegetation would be allowed to regrow, reducing the canopy opening and views from the trail and of the trail corridor. There would be some cutting of vegetation and browning of vegetation from application of herbicides during maintenance.

On the whole, the changes that would be visible after construction would not be discernable as new intrusive elements in the landscape and would not contribute to the loss of established landscape character, a degradation of the visual resources, or a loss of recreational opportunities. Therefore, impacts to visual resources and recreation associated with this alternative would be insignificant.

Cumulative Impacts

Under Alternative 4, the TL would have cumulative effects on visual resources and recreation in conjunction with past actions near the eastern end, where there are already several TLs which are visible from trails and US 64. In addition, the TL would not change the overall visual character of the scenery in that area and would not permanently interfere with any ongoing recreational activities. Vegetation management activities within the Hogback analysis area would take place in some of the same viewsheds as the Alternative

4 corridor. These potential cumulative effects would be taken into account when the vegetation management activities are planned, and appropriate mitigation measures would be applied.

There would be some cumulative effect associated with Alternatives 1-4 with the construction of the proposed relocation of US 64 in the draft EIS. As an impact on recreation, the relocated US 64 would cross the Benton MacKaye/Dry Pond Lead Trail near the crossing by the TL in Alternatives 1-3. Cumulative visual impacts from both projects (Alternatives 1-3) could occur near the whitewater center building and parking lot. This is where the relocated US 64 and the eastern end of the TL under all alternatives are in the same viewshed.

Measures to Mitigate Impacts to Scenery and Recreation

Clearing of the ROW would be limited in valleys. Only the trees tall enough to interfere with the conductor would be removed. Mowing or bush hogging would be done prior to herbicide treatment to minimize the amount of herbicide used and the visual effect of browned dead vegetation.

The recreating public would be notified of upcoming herbicide applications, and signs would be located along trails that would cross areas of herbicide application.

Trail and road users would be provided with advance notice of any construction affecting the trail or road as far ahead of time as possible and would be directed with signs to substitute trails, if available.

Temporary road and/or skid trail crossings across designated forest trails would be kept to a minimum.

Any crossings would be as perpendicular as possible to designated forest trails.

Designated forest trails would not be used as haul roads/access routes if possible.

If trails must be crossed or used as skid trails/haul roads, trail cleanup/rehabilitation would be done after TL construction to meet applicable USFS trail standards.

Where possible, character trees and trees that define the trail corridor would be retained.

Changes to trail alignment and surfacing would be minimized; the trail would not be straightened or its surface changed unless alternate material would enhance the trail and protect resources. Place warning signs on all trail access points and along the trail where activities are occurring.

New structures would be brown and thus would be less visible (unless seen with sky in background) than most structures on the existing line.

To minimize safety hazards, noise, and visual intrusions to recreational users on the river, overflights to store material at the pole yard before the start of construction would be conducted before the rafting season. Overflights during construction would be scheduled for days when the river is not flowing if possible. If overflights are required on days when the river is flowing, they would be routed upstream of Ocoee 2 Dam, where water use

would be much less than below Ocoee 2 Dam. Overflights to install the new conductor and remove the existing conductor would be done only when the river is not flowing.

To protect recreators and minimize noise impacts, all helicopter flights would be routed to avoid the Thunder Rock Campground and the trails near Ocoee 3.

To minimize noise impacts, construction traffic on access roads would be limited to daylight hours.

Slash would be treated to within an average of 4 feet of the ground when visible within 100 feet on either side of Concern Level 2 travel routes (NFSR 45, NRSR 33641-Chestnut Mountain Bike Trail, Indian Flat Ridge Trail #71, Benton MacKaye Trail #2, Thunder Rock trail #305, Thunder Rock Express Trail #340, West Fork Trail #303, and Dry Pond Lead Trail #76). When activities are occurring along open trails, slash would be treated within 100 feet of the corridor daily.

Root wads and other unnecessary debris would be removed or placed out of sight within 150 feet of key viewing points.

Slash would not be placed in trail tread during construction and future maintenance.

4.6. Floodplains

For any of the four alternatives, neither substation, none of the structures, nor the proposed pole yard would be located in a floodplain. Also, any necessary stream crossings for the access roads would be done in such a manner that upstream flood elevations would not be adversely impacted. Therefore there would be no adverse impacts to any floodplains from any of the alternatives and the removal of the existing TL, and the proposed project would be consistent with EO 11988 (Floodplain Management).

Because no adverse impacts to floodplains would occur from any of the TL alternatives, there would not be a potential to cumulatively contribute to floodplain impacts from other reasonably foreseeable future actions.

4.7. Cultural Resources

Alternatives 1 Through 3

All of these alternatives would pass high over the Old Copper Road seven times. Although the Old Copper Road is listed in the NRHP, the project corridor traverses segments of the road that have been altered by modern construction of US 64. In addition, there would be no ground-disturbing activity occurring on the Old Copper Road. Therefore, TVA has determined that there would be no adverse effect on this property.

Under these alternatives, the proposed TL would extend within the property of the Ocoee 2 Hydro Plant, a NRHP-listed property, and the Ocoee 3 Powerhouse, which is potentially eligible for listing in the NRHP, and the TL would have a visual effect on both facilities. However, the TL would not compromise either building's architectural significance, nor would the proposed improvements physically alter or disturb the resources. Also, the plants' historic viewsheds already contain the existing TL as an integral part of the plants' function, though the new structures would have a different design. Therefore, TVA has

determined that this effect would not be adverse. The proposed TL would share the same ROW as the existing line, which spans the flume. The proposed line spans the flume in five places, which would have a visual effect, but the effect would also not be adverse.

The existing Ocoee 2-Ocoee 3 TL, which is potentially eligible for listing in the NRHP, would be adversely affected by the construction of the proposed TL, because the historic structures would be replaced in either Alternative 1 or 3, and the line would be removed in Alternative 2.

Alternative 4

Under this alternative, the proposed TL would extend within the property of the Ocoee 2 Hydro Plant, a NRHP-listed property, and the Ocoee 3 Powerhouse, which is potentially eligible for listing in the NRHP, and the TL would have a visual effect on both facilities. However, the TL would not compromise either building's architectural significance, nor would the proposed improvements physically alter or disturb the resources. Also, the plants' historic viewsheds already contain the existing TL as an integral part of the plants' function, though the new structures would have a different design. Therefore, TVA has determined that this effect would not be adverse.

The removal of the existing TL would be an adverse effect on the TL itself.

Archaeological site 40PK132 would be affected by the use of NFS Road 45 as an access road for TL construction.

Measures to Mitigate Impacts to Cultural Resources

TVA has consulted with the SHPO regarding this undertaking. The SHPO has concurred with TVA's determinations regarding the adverse impact on the existing TL and the visual effect on Ocoee 2 Hydro Plant and the Ocoee 3 Powerhouse. The two agencies have signed an MOA (see Appendix H), under which TVA will document the historical significance of the existing TL prior to its removal and preserve representative selected components, such as insulators.

Because archaeological site 40PK132 is potentially eligible for listing in the NRHP, TVA would include the following measures to minimize effects on the site:

1. To prevent rutting, only low-pressure tired equipment would be used in the vicinity of site 40PK132.

2. All work in the vicinity of site 40PK132 would be conducted when ground conditions are dry and firm.

3. If the above measures are not possible, rubber matting would be used underneath all equipment in the vicinity of site 40PK132.

4. All access activity would stay within existing NFS Road 45 in the vicinity of archaeological site 40PK132.

TVA has determined that with the above conditions, archaeological site 40PK132 would not be adversely affected.

The proposed TL and proposed US 64 corridor would have a cumulative impact on cultural resources. US 64 would create an additional crossing of the Old Copper Road in a section that is used as a hiking trail. Alternatives 1 through 3 would also pass high over the Old Copper Road, but on segments that have been altered by modern construction of US 64. Both potential actions would be designed to avoid ground disturbing activity on the historic property. In the case of relocated US 64, a bridge structure would be designed to blend with the natural environment and no abutments or piers would be placed on or adjacent to the trail. Considering the height at which the proposed TL would cross the Old Copper Road, the cumulative impact would be minor and insignificant.

4.8. Other Potential Environmental Effects

Heavy equipment, such as utility trucks, would be used during construction. Exhaust emissions from engines would cause minor and temporary effects to air quality. Cleared vegetation would likely be piled and burned. Overall effects to air quality would be minor and insignificant. Helicopters and heavy equipment would create noise during construction, but the impact would be insignificant because the duration would be temporary and only during daylight hours. Solid waste would be produced. Metallic wastes would be recycled. Any other solid waste production is not expected to affect the capacity of local landfills. The proposed action would not disproportionately affect any minority or economically disadvantaged groups and would be consistent with EO 12898 (Environmental Justice).

4.9. Summary of Impacts and Consistency With RLRMP

Potential impacts to the CNF from proposed activities are determined based on several factors, including distance from the proposed action, the context of the action (local to global), the frequency/duration, the uniqueness of the area, the percentage of area affected, and the intensity of the action, including the level of conflict with management objectives of the area.

Under Alternative 1, because the existing TL lies within a scenic byway corridor of the CNF in which management prescriptions emphasize visual landscape character and because this alternative has the longest continuous duration of construction, it would have a slightly greater impact on the visual landscape than other alternatives under consideration within this scenic byway corridor. Because no additional clearing for ROW near the Ocoee River would be necessary for this alternative, because BMPs for stream crossings would be used, and because all activity will follow guidelines of the RLRMP no additional adverse impacts to the Ocoee River are anticipated. The Big Frog and Little Frog Mountain Wilderness Areas are not anticipated to be affected adversely because of their distance from the proposed activity.

Under Alternative 2, potential impacts on CNF from proposed activities would be similar to those provided above in Alternative 1. Differences include a shorter duration, which would result in less impact to the scenic byway corridor of CNF. However, clearing required for additional ROW would increase the impact on the area's visual landscape. New utility corridors are discouraged in Prescription 7.A., Scenic Byway Corridors. When corridors are determined to be necessary, visual screening, feathering, and other vegetation management techniques are to be considered.

Under Alternative 3, potential impacts on CNF from proposed activities would be similar to those provided above in Alternatives 1 and 2. The major difference is the duration and frequency of the project. Because the proposed work would be conducted on a maintenance schedule over about a 10-year period, the scenic byway area of the CNF and the Ocoee River would become a sporadically disturbed area, which could negatively affect visitation and use of the scenic resources of the area.

Under Alternative 4, the existing TL, which is within the scenic Ocoee River Gorge, would be removed and a new TL would be constructed south of and outside the river gorge. Except for a short segment at its western end on TVA property and a short segment at its eastern end on NFS land designated scenic byway corridor, the proposed Alternative 4 TL would be constructed on NFS land which is designated black bear habitat management and overlaps the Ocoee Bear Reserve. Although new utility corridors are discouraged or prohibited for some areas within a national forest, and goals for special use lands include a preference for using existing utility corridors to their greatest potential, no specific restrictions for TLs are given for the area proposed for the Alternative 4 route. CNF management prescriptions do, however, emphasize timber management for this area, including methods to provide adequate sunlight for shade-intolerant oaks and hickories to ensure sufficient hard mast production for bear. Clearing for a TL ROW through the bear reserve would not conflict with these management prescriptions and would change the cleared forested areas to early successional habitat.

Because of the distance from the proposed work in Alternative 4, no impacts are anticipated to the Big Frog and Little Frog Mountain Wilderness Areas.

The proposed work in Alternative 4 would cross the NRI-listed Ocoee River during removal and would be at least 0.3 mile from the river during construction of the TL. With the implementation of BMPs for stream crossings, no adverse impacts to this stream are anticipated.

The removal of the existing TL would benefit the visual quality of the Ocoee River and would be consistent with the management prescriptions of a scenic byway corridor designation within CNF.

CHAPTER 5

5. LIST OF PREPARERS

5.1. NEPA Project Management

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CHAPTER 6

6. LIST OF AGENCIES AND PERSONS CONSULTED

Federal Agencies

U.S. Department of Energy
U.S. Forest Service
U.S. Fish and Wildlife Service

State Agencies

Tennessee Division of Natural Heritage
Tennessee Department of Environment and Conservation Office of General Counsel
Tennessee Division of Water Pollution Control
Tennessee Historical Commission

Elected Officials

U.S. Senator Bill Frist
U.S. Senator Lamar Alexander
U.S. Representative Zach Wamp
Tennessee State Senator Jeff Miller
Tennessee State Representative Eric Watson
Benton Mayor Jerry Stephens
Copperhill Mayor Herbert Hood
Ducktown Mayor James Talley
Polk County Mayor Hoyt Firestone

Members of the Public and Local Organizations

Bell and Associates, Charles Corn, Debbie Tuten, Wildlaw, Southern Appalachian Forest Coalition, Southern Appalachian Biodiversity Project, Tennessee Forestry Association, Sierra Club, Weyerhauser, Tennessee Conservation League, Patty Daniel, Cherokee Forest Voices, East Tennessee Quail Unlimited, Julie Guthrie, Kirk Johnson, Ken Jones, Gretchen Kirkland, Georgia Forest Watch, Smokey Mountain Hiking Club, Harry Switzer, Ocoee River Outfitters Association, Chattanooga Bike Club

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CHAPTER 7

7. SUPPORTING INFORMATION

7.1. Literature Cited

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7.2. Acronyms, Abbreviations, and Glossary of Terms

<	Less Than
>	Greater Than
%	Percent
ºF	Degrees Fahrenheit
a.e.	Acid Equivalent
APE	Area of Potential Effect

BMP	Best Management Practice
CFR	Code of Federal Regulations
cm	Centimeters
CNF	Cherokee National Forest
Compartment	A group of contiguous forest stands defined and mapped by the USFS for management purposes
Conductor	A cable or “wire” that carries electric current
Cone of Vision Vertical	Approximately fifteen degrees above and below the horizontal position of the fixed eye where objects within the field of vision are distinguishable
Confining Unit	An underground layer of rock or other relatively impervious material that restricts the movement of groundwater
Danger Tree	A tree located outside the ROW, which if it fell, would come within 5 feet of the transmission line or a structure
dm	Decimeter
EA	Environmental Assessment
EO	Executive Order
Cone of Vision Horizontal	Approximately thirty degrees to the left and right of the vertical position of the fixed eye where objects within the field of vision are distinguishable
HWA	Hemlock Woolly Adelgid
Inferior views	Viewing position in which the observer is lower than the normal horizontal plane and views landscape elements from below; this position often evokes a sense of enclosure
kV	kilovolt
lb	Pound
MA	Management Area
Mesic	A habitat having a moderate amount of water
MIS	Management Indicator Species
mm	Millimeters
MOA	Memorandum of Agreement
msl	Mean Sea Level
MW	Megawatt
NEPA	National Environmental Policy Act
NFS	National Forest System
Normal Views	Viewing position in which the observer has eye-level views of landscape elements
NPS	National Park Service
NRHP	National Register of Historic Places
NRI	Nationwide Rivers Inventory
Outage	A period during which a transmission line or facility is out of service
Palustrine	Marshy or swamplike; not part of a main water body
Proclamation Boundary	The boundary of the area within which the U.S. Forest Service may purchase land from willing sellers to add to a national forest without additional Congressional approval
Perennial Plant	Having a life cycle lasting more than two years
Perennial Stream	A stream which flows throughout the entire year
RLRMP	Revised Land and Resource Management Plan
RM	River Mile
ROW	Right-of-Way
SAMAB	Southern Appalachian Man and the Biosphere
SHPO	State Historic Preservation Officer

SMZ	Streamside Management Zone
SPB	Southern Pine Beetle
Superior Views	Viewing position in which the observer is elevated and views landscape elements from above; landscape elements are generally seen in a broader context.
TCA	Tennessee Code Annotated
TDEC	Tennessee Department of Environment and Conservation
TES	Threatened, Endangered, and Sensitive
TL (Transmission Line)	A line, usually high-voltage, that carries (transmits) electric power from one location to another
TVA	Tennessee Valley Authority
TWRA	Tennessee Wildlife Resources Agency
U.S.	United States
US	U.S. Highway
USACE	U.S. Army Corps of Engineers
USEPA	U.S. Environmental Protection Agency
USFS	U.S. Forest Service
USFWS	U.S. Fish and Wildlife Service
Wet-Weather Conveyance	A stream that flows only following a rainfall
WMA	Wildlife Management Area
VMEIS	Final Environmental Impact Statement for Vegetation Management in the Appalachian Mountains

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