CHAPTER 3

3.0 AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

3.1 Terrestrial Environment (including Wetlands)

In the final Cherokee Plan, the TVA property (a portion of Tract XCK-337R) surrounding Shields Creek embayment is included in Parcel 118. This parcel of planned land, approximately 151 acres in size, includes shoreline around Shields and Ray Creeks, four small islands, and a small stretch of shoreline along Highway 11W and the east side of Gap Branch. It is allocated to Natural Resources Conservation (Zone 4) in the plan and surrounds Shields Creek embayment. This project would be consistent with the intent of this land use allocation (TVA, 2001).

The largest part of the Parcel 118 is a riparian strip on the eastern end of Ray Creek, which includes Shields Creek and the small islands. Around Shields Creek, a relatively narrow strip of fee land (approximately 17 acres in the proposed license area above elevation 1075 msl) lies adjacent to the reservoir embayment. The Shields Creek impoundment area would lie completely north of Highway 11W and discharge into the main reservoir (at its confluence with Ray Creek).

The ecological communities on Parcel 118 (TVA, 2001) are heavily influenced by various types and intensities of agricultural use. Much of the parcel and the 17 acres of land around Shields Creek embayment are open land (e.g., grazed, farmed, orchards, etc) in pasture and small areas in various stages of early succession. Common vegetation includes fescue grass, briars, honeysuckle, and various shrubs. Scattered pockets of red cedar, Virginia pine, upland and bottomland hardwoods, and mixtures of these vegetation types occur on the shoreland and islands. Outstanding (private third-party) agricultural use rights occur over all the property surrounding Shields Creek embayment and the adjoining farmer pastures and waters cattle on this public land. The southern portion of the embayment shoreland slopes more gently to the water while the northern portion is surrounded by moderate to steep wooded hills. The TVA property within the Shields Creek embayment above summer pool is predominantly open fescue pasture with scattered clumps and single hardwood trees. The northern one-third of this property, along the banks of Shields Creek, is mature hardwoods. Common trees include red and white oaks, sweet gum, yellow poplar, and sycamore. During the fall and winter, the reservoir drawn-down area is a sparsely vegetated, homogeneous reservoir bottom.

A small amount of emergent and scrub-shrub wetland occurs around the reservoir shoreline between elevations 1067 and 1072 msl and along the streambanks of Shields Creek. The hydrology for these wetlands would potentially be enhanced due to water being impounded at the location for a longer period of the year. Such would not result in the destruction of the wetlands but likely result in minor positive changes to the moist site vegetation growing in the immediate vicinity.

Various species of wildlife would be expected to utilize the TVA property and surrounding Shields Creek area. Mammals would include white-tailed deer, raccoon, opossum, coyote, gray and red fox, and gray and fox squirrel, and mink. Common resident and migratory birds would include various songbirds, wading birds, hawks, owls, and wild turkey. Red and brown bats may utilize the forested portions of this tract for roosting. Reptiles and amphibians expected to use this area would likely include fence lizard, five-lined skink, eastern box turtle, American toad, and eastern garter snake. As water levels recede in the late summer and early fall, various species of migrant waterfowl and shorebirds, would likely use the exposed reservoir bottom for resting and foraging.

Because the short and long-term disturbance associated with the proposed access road, boat ramp, and dam construction would largely affect the existing draw-down zone, affects on terrestrial and wetland wildlife species would be insignificant. The Shields Creek impoundment water level would mimic the main reservoir approximately 4 to 5 months of the year (mid-September to March). Under the proposed operational water level regime, a stable impoundment pool would be present from the end of March through September 15 at approximately 1067 msl. Some exposed reservoir bottom habitat used by shorebirds would be under water during the spring (late April to mid June) and fall (August and September) migration periods. However, given the small amount of area affected (maximum of 45 acres) compared to the large amount of other seasonally exposed habitat available on Cherokee Reservoir, the affects on migratory shorebirds would be insignificant. The annually stable water levels throughout the entire growing season would likely enhance existing wetlands and provide suitable conditions for the formation of additional wetland wildlife habitat.

Incidental predation of fingerling crappie by fish-eating bird such as herons, cormorants, and osprey would also likely occur, benefiting these bird populations. However, predation is expected to result in only a small loss of fish that would otherwise be released into the main reservoir. If predation becomes unexpectedly substantial, TVA would require TWRA to manage and control fish-eating birds by use of non-lethal methods.

Exotic, invasive plants, including privet, honeysuckle, multiflora rose and autumn olive are scattered across several portions of Parcel 118. However because most of the disturbance associated with facilities construction, operation, and maintenance would occur within the sparsely vegetated draw-down zone, this project is not expected to contribute to the spread of exotic plant or animal species or negatively affect the native flora or fauna. This is consistent with the intent of Presidential Executive Order 13112 (Invasive Species).

3.2 Aquatic Environment

Based on fall, 2000, sampling by TVA, the fish community at the forebay (area nearest the dam) and a mid-reservoir station rated “fair” compared to the fish communities sampled at similar locations in other Ridge and Valley ecoregion reservoirs (TVA, 2001a). Fish species expected to use Shields and Ray Creek embayments would include gizzard shad, common carp, freshwater drum, green sunfish, bluegill, largemouth and smallmouth bass, striped bass, white and black crappie, blue and channel catfish, *striped x white bass* (Cherokee bass) and *walleye x sauger* hybrids, and white bass.

Based on TVA field inspection, there are no unique aquatic features along the TVA property or within the draw-down zone or reservoir bottom of Shields Creek embayment within the proposed impoundment area. There are no sizable areas of stumps, bedrock outcrops, or other unique aquatic habitats in the immediate area of the dam site. Since cattle regularly graze the area, riparian vegetation is very limited with few woody plants. Visible substrate in the draw-down zone is essentially featureless soil with some scattered areas of gravel.

The proposed impoundment is expected to provide reliable nursery habitat for crappie and other aquatic life, resulting in long-term beneficial effects on aquatic life in Cherokee Reservoir. Temporary construction impacts such as sediments in runoff and localized turbidity resulting from the proposed activities would be insignificant with the implementation of the following General and Standard Conditions for Section 26a and land use actions. These are the TVA land use and Section 26a, General Condition 9 and Standard Conditions 3c, 6a, 6d, 6e, 6g, and 6i which are as follows:

- General Condition 9: You agree to stabilize all disturbed areas within 30 days of completion of work authorized. All land-disturbing activities shall be conducted in accordance with Best Management Practices (BMPs) as defined by Section 208 of the Clean Water Act to control erosion and sedimentation to prevent adverse water quality and related aquatic impacts. Such practices shall be consistent with sound engineering and construction principles; applicable federal, state and local statutes, regulations, or ordinances; and proven techniques for controlling erosion and sedimentation, including any required conditions.

- Standard Condition 3c: Bank, shoreline, and floodplain stabilization will be permanently maintained in order to prevent erosion, protect water quality, and preserve aquatic habitat.

- Standard Condition 6a: You agree that removal of vegetation will be minimized, particularly any woody vegetation providing shoreline/streambank stabilization.

- Standard Condition 6d: You agree to keep equipment out of the reservoir or stream and off reservoir or stream banks, to the extent practicable (i.e., perform work “in the dry”).

- Standard Condition 6e: You agree to avoid contact of wet concrete with the stream or reservoir, and avoid disposing of concrete washings, or other substances or material, in those waters.

- Standard Condition 6g: You agree to apply clean/shaken riprap or shot rock (where needed at water/bank interface) over a water permeable/soil impermeable fabric or geotextile and in such a manner as to avoid stream sedimentation or disturbance, or that any rock used for cover and stabilization shall be large enough to prevent washout and provide good aquatic habitat.

- Standard Condition 6i: You agree to use vegetation (verse riprap) whenever practicable and sustainable to stabilize streambanks, shorelines, and adjacent areas. These areas will be stabilized as soon as practicable, using either an appropriate seed mixture that includes an annual (quick cover) as well as one or two perennial legumes and one or two perennial grasses, or sod. In winter or

summer, this will require initial planting of a quick cover annual only, to be followed by subsequent establishment of the perennials. Seed and soil will be protected as appropriate with erosion control netting and/or mulch and provided adequate moisture. Streambank and shoreline areas will also be permanently stabilized with native woody plants, to include trees wherever practicable and sustainable (this vegetation prescription may be altered if dictated by geologic conditions or landowner requirements). You also agree to install or perform additional erosion control structures/techniques deemed necessary by TVA.

3.3 Water Quality

Like other deep storage reservoirs with long retention times, Cherokee Reservoir exhibits strong vertical stratification during summer months. The hypolimnetic oxygen deficit (i.e., low oxygen concentration at various locations in the water column) in this reservoir is one of the worst of all reservoirs in the TVA system.

Two Cherokee Reservoir sites are included in TVA's Vital Signs Monitoring Program (VSMP). In 2000, the VSMP rating of the overall ecological condition of Cherokee Reservoir was "poor," quite similar to results seen in previous years, because of low DO and high chlorophyll (at the mid-reservoir site). This rating method qualitatively portrays the ecological health of the reservoir and does not suggest any use impairments or violation of state water quality standards. Cherokee Reservoir sampling had indicated acceptable nutrient levels at the forebay in most previous years, but rated "poor" there for the first time in 2000 (TVA, 2001a). Nutrient levels have been consistently elevated at mid-reservoir in recent years (the level seen there was among the highest observed in the Valley in 1998). These high nutrient levels, combined with the reservoir's depth and long retention time, are contributing factors to consistently low DO levels (TVA, 1999). Sampling of Cherokee Reservoir sediments indicates good conditions at the forebay through 1995, but chlordane has been detected in subsequent samples. Chlordane has been consistently detected in mid-reservoir sediment samples in recent years, but has not caused elevated levels in fish (TVA, 1999).

There are no swimming or fish consumption advisories for Cherokee Reservoir. Only one of the ten samples collected in 1998 at the swimming beach at Cherokee Dam contained high levels of fecal coliform bacteria; bacteria levels in samples collected there in previous years have been consistently low. However, the state of Tennessee advises against water contact in the lower 5 miles of Turkey Creek, between Morristown and the reservoir (TVA, 2001).

Temporary construction impacts on water quality resulting from the proposed activities would be insignificant with the implementation of the General and Standard Conditions for Section 26a and land use actions indicated in Section 3.2, (i.e., General Condition 9 and Standard Conditions 3c, 6a, 6d, 6e, 6g, and 6i). These measures, including BMPs, are designed to protect water quality and, therefore, reduce aquatic effects.

Because of expected inflow and impoundment operations allowing regular water exchange with the main reservoir, this project would not significantly impact water quality in the reservoir (including water chemistry, e.g., further reduce dissolved oxygen, increase excess nutrients, etc.). Future activities associated with facilities operations and maintenance on Tract XCK-337R should have insignificant water quality impacts, with the imposition of the aforementioned BMPs in the Section 26a permit.

Further, the state of Tennessee certified that the project will not violate the provisions of *The Tennessee Water Quality Control Act of 1977* (T.C.A. § 69-3-101 et seq.) or of §§ 301, 302, 303, 306 or 307 of *The Clean Water Act*. The certification requires that the proposed work must be accomplished in accordance with special conditions included in the TDEC WQC to ensure that the impacts are within acceptable limits and meets the state's water quality standards.

3.4 Floodplains

The 100-year flood elevation on Cherokee Reservoir is 1,075.0 feet msl at the dam (Holston River Mile 52.3). This elevation is used throughout the reservoir. The 500-year or "critical action" floodplain on Cherokee Reservoir is also the area below elevation 1,075.0 feet msl.

The Shields Creek impoundment project involves construction within the limits of the 100-year floodplain, elevation 1075.0, and is, therefore, subject to compliance with EO 11988. TWRA and CLUA have evaluated alternative sites and documented that there is no practicable alternative to constructing the impoundment at this location. The proposed dam and impoundment would result in the loss of about 7.64 acre-feet of flood control and power storage. TVA does not believe the impoundment would result in unacceptable increases in upstream flood elevations resulting from headwater flooding. In addition, the amount of displaced flood control storage has been minimized while achieving the project objective. Therefore, the project would comply with EO 11988 and the TVA Flood Control Storage Loss Guideline. The loss of power storage (7.64 acre-feet) would also be minimized because of the operating schedule for the dam. Therefore, there would be no charge for displaced power storage.

From the standpoint of flood control, TVA has no objection to the proposed project and license agreement over the subject tract provided language is included in the final permit approval and any transfer or conveyance document(s) to ensure that:

1. Any future facilities or equipment subject to flood damage are located above or flood-proofed to the 500-year flood elevation 1075.0.

2. Any future development proposed within the limits of the 100-year floodplain, elevation 1075.0, must receive additional approval from TVA.

3. All future development is consistent with the requirements of TVA's Flood Control Storage Loss Guideline.

4. TVA reserves the right to flood this tract as needed during flood control operations.

3.5 Cultural Resources

Archaeological research within the Cherokee Reservoir area has included small scale surveys along Poor Valley Creek (Faulkner, 1972), Fall Creek Campground (Ahlman et al., 1997), and Fall Creek Dock and Campground (Ahlman, 2000). A reservoir-wide survey was conducted by the University of Tennessee from 1996 to 1999 (TVA, 1998). Most information concerning settlement and land use patterns in the area is derived from more extensive research to the south in the Tennessee River and Little Tennessee River Valleys (Chapman, 1985 and Davis, 1990) and in nearby North Carolina (Keel, 1976) and Virginia.

Investigations in support of the Cherokee Plan (TVA, 2001) occurred over nearly 1,660 acres of land and 420 archaeological resources were identified within and along Cherokee Reservoir (Frankenberg, et al., 2000). Existing data, including survey results from SMI (TVA, 1998), along with these recent survey results were reviewed by TVA staff.

Because the dam would not change the maximum pool elevation within the new impoundment (elevation 1075 msl), TVA has determined that the Area of Potential Effect (APE) for this project will include only the area within which the access road, boat ramp, and impoundment structure would be constructed and a sufficient radius for equipment and construction material lay-down. Based on the original project locations, by letter of June 8, 2001, the TN State Historic Preservation Officer indicated that in its opinion no National Register of Historic Places (NRHP) listed or eligible properties would be affected by the undertaking (see Appendix A). However, based on TVA field reviews conducted along Tract XCK-337R shoreline during 2001, two prehistoric archeological sites (40Gr203 and 40Gr204) were identified in the vicinity of this project that are potentially eligible for listing in the NRHP. One site occurs on each side of Shields Creek. Both sites are upstream of the proposed access road, boat ramp, and impoundment structure locations.

Because of the known sites, by letter dated December 4, 2002, TVA forwarded a copy of the draft EA and initiated further consultation with the THC. Furthermore, TVA requested concurrence that, with commitments included in the draft EA; no historic properties will be affected by the proposed undertaking. By letter dated December 9, 2002, THC concurred with TVA's finding that, with commitments included in the EA, no historic properties would be affected by the project. THC further concurred that TVA should regularly monitor the construction so as to be assured that the archaeological sites do not incur any damage.

TVA has determined that both archaeological sites will be avoided and no ground disturbance will occur at either of these locations; and, therefore, neither of these two sites will be affected. A map will be prepared by TVA showing the archaeological site locations. These boundary locations will then be verified and marked (i.e., fenced, flagged or staked) on the ground. A pre-construction site meeting will then be scheduled among TWRA, CLUA, and TVA staff to examine areas to be avoided. No construction, equipment, vehicles, or material storage, construction lay-down or other such ground disturbing activities will occur on these sites. TWRA will erect temporary fences around these sites for the duration of construction. TVA will regularly monitor work activities throughout the duration of the project.

3.6 Recreation

Cherokee Reservoir's central location to the people of Jefferson, Hamblen, Hawkins, and Grainger Counties makes it an attractive day trip and weekend destination for residents of these and surrounding counties. Cherokee Reservoir is a clear water reservoir with about 75 percent of its shoreline undeveloped (TVA, 1998). Developed access for the general public is provided by commercial and public facilities on approximately 1,057 acres of the 8,187 acres of TVA public land. There are ten commercial marinas and/or campgrounds. In addition, there are also two county parks, one state park, and the Cherokee Dam Reservation which provide land-based facilities and access. There are a total of 25 boat ramps around the reservoir; 10 are commercially operated and 15 are provided by public agencies. Undeveloped access is readily available around most of Cherokee Reservoir's shoreline. Informal and

dispersed recreation activities such as primitive camping, bank fishing, hunting, nature study, wildlife observation, and other forms of outdoor recreational activities occur on TVA land around the reservoir. It is reasonable to assume that the minimum increase in recreational demand would likely be around 8 percent, the same as the U.S. Census Bureau's projected increase in population growth from 1999-2010 (TVA, 2001).

A popular game fish, crappie fishing provides economically valuable recreation opportunities for many thousands of sportspersons from the area and across the region. Because the purpose of this project is to provide optimum spawning conditions and ultimately improve the population of this species, it is expected to have a beneficial impact on recreational fishing. However, because of potential boating hazards associated with the new dam being located just upstream of the Highway 11W Bridge over Shields Creek, a warning of the existence of the dam is needed. Therefore, to reduce this potential safety hazard, TWRA will be required to post warning signs that will be visible to boaters, such as "Caution – Obstruction in Reservoir." TVA and USACE will work with TWRA on appropriate signage.

TWRA will also close the area upstream of the dam to the public for fishing once the crappie impoundment is completed. Violators would be prosecuted as specified by TWRA. With some 396 miles of mainland and island shoreline, Cherokee Reservoir would continue to offer ample fishing opportunity. This small loss (i.e., 45 surface-acres) would be enhanced by the creation of better crappie fishing in the long-term.

3.7 Endangered Species

Field work and data base review in support of the Cherokee Plan (TVA, 2001) revealed that no federally-listed plants and 11 state-listed plants (30 occurrences) were known to occur or reported from Grainger, Hamblen, Hawkins, and Jefferson Counties. No federally-listed plant species and six species (11 new occurrences) of Tennessee state-listed plant species were found during field inventories of TVA property. Review of the TVA Natural Heritage database identified neither protected or sensitive terrestrial plant or animal species nor aquatic species or sensitive aquatic habitat on Tract XCK-337R. No state-listed plants or animals would be adversely impacted. By letters dated August 4, 2000 and July 5, 2001, FWS indicated that based on available wetlands information and endangered species collection records, no wetlands or federally listed or proposed endangered or threatened species occur within the impact area of the project. According to FWS, no significant adverse impact to federally-listed species is expected to result from this proposal and the requirements of Section 7 of the Endangered Species Act of 1973, as amended, are fulfilled. Therefore, FWS has no objection to the issuance of the permit to conduct the work described in the subject notice.

On December 4, 2002, FWS was forwarded a copy of the draft EA for its review. In a conversation with Wally Brines, Cookeville Field Office, FWS, on December 12, he indicated that since neither the project nor its location had changed substantially, no additional comments would be forthcoming. Furthermore, because sensitive resource information in the vicinity of the project had not changed since its July 2001 review, FWS indicated that it continued to have no objections and that the project, as now proposed, would not likely adversely affect federally listed species.

3.8 Cumulative and Secondary Impacts

Cumulative impacts are those on the environment that results from the incremental effects of the action when added to other past, present, and reasonably foreseeable future actions. Cumulative impacts are those that result in individually minor but collectively significant action taking place over a period of time (40 CFR 1508.7). Secondary or indirect impacts are defined as effects that are caused by and result from the activity although they are later in time or further removed in distance, but still reasonably foreseeable (40 CFR 1508.8).

Each application is considered on its own merits and its environmental impacts assessed in light of historical permitting activity along with anticipated future activity in the area. Cumulative and secondary impacts are considered in the analysis conducted during the environmental review. When analyzing secondary impacts, the strength of the relationship between those impacts and the regulated portion of the activity is considered, i.e., whether or not the impacts are likely to occur even if the permit is not issued, in deciding the level of analysis and what weight to give these impacts in the decision. This analysis should consider whether another project, not requiring a permit, could likely occur at the site or in the vicinity, and whether its impacts would be similar to impacts of the project requiring a permit.

Resources potentially affected by this proposal include the terrestrial and aquatic ecology, wetlands, endangered species, water quality, floodplains, recreation, and cultural resources. Other proposed actions on Cherokee Reservoir that could affect these resources are US 11W, US 25E, and State Route 31 improvements; municipal and community utility (water and electric transmission) and wastewater treatment upgrades, natural and recreation resources development; new or expansions of existing marinas, and ongoing pier, ramp, and boat dock permitting. These actions could potentially have negative impacts on these same resources in the area. However, because of mitigation requirements that are normally placed on TVA and USACE permit actions, cumulative effects to these actions would be substantially reduced and are anticipated to be minor.

As growth occurs in the area, additional requests to discharge fill into streams and wetlands and utilize public (government) property are anticipated in the future. It is anticipated that future projects in the area, as with past actions, will involve some impacts to both the aquatic resources and surrounding resources. Mitigation measures, including construction best management practices (BMP), associated with this proposal would be designed and implemented to protect water quality and reduce aquatic effects. The aquatic environment, including wetlands and the fishery in Cherokee Reservoir would ultimately be improved. No threatened or endangered species occur on the site and archaeological resources known to occur on the site will be avoided. Secondary impacts of the proposal and anticipated future development, such as those that could occur on recreational boating, floodplain values and the possible need to control of fish-eating bird predation, would be minor. Therefore, with the use of standard practices and the additional mitigation measures proposed, the Shields Creek project, in combination with past, present, and reasonably foreseeable future actions, would not lead to adverse trends or degradation of these resources on Cherokee Reservoir or the surrounding area. Because of conditions and mitigation requirements that are normally placed on TVA and USACE permit actions, cumulative effects to resources in the watershed are substantially reduced and are anticipated to be minor.

3.9 Environmental Justice

Executive Order 12898, Environmental Justice, provides that federal agencies identify and address disproportionately high and adverse impacts of its activities on low-income or minority populations. This project will not result in changes in neighborhood or community cohesion or split neighborhoods. It will not impact special groups such as handicapped, minorities, or elderly.

3.10 Conclusion

The proposed Shields Creek impoundment would likely result in long-term benefits to the crappie fishery and resultant recreational and socioeconomic value of Cherokee Reservoir to the area and region. Implementation of this proposal can be accomplished while complying with EO 13112. This proposal is consistent with the planned natural resources conservation on Parcel 118 in the Cherokee Plan. No impacts on endangered species or wetlands are expected. In fact, wetland areas would likely be enhanced. Provided commitments are implemented, including BMPs, insignificant impacts on aquatic ecology, water quality and floodplains are anticipated. There would also be positive affects on the reservoir's aquatic environment. Two archaeological sites in the vicinity of the project would be avoided and, therefore, unaffected by the project construction, operation, and maintenance.