Document Type:
 EIS-Administrative Record

 Index Field:
 Environmental Document Transmitted Public/Agencies

 Project Name:
 Bear Creek Leakage Resolution

 Project Number:
 2006-58

FINAL ENVIRONMENTAL IMPACT STATEMENT

BEAR CREEK DAM LEAKAGE RESOLUTION PROJECT Franklin County, Alabama

LEAD AGENCY TENNESSEE VALLEY AUTHORITY

COOPERATING AGENCIES U.S. ARMY CORPS OF ENGINEERS U.S. FISH AND WILDLIFE SERVICE

AUGUST 2007

Page intentionally blank

Final Environmental Impact Statement

Proposed project: Bear Creek Dam Leakage Resolution Franklin County, Alabama Lead agency: Tennessee Valley Authority **Cooperating agencies:** U.S. Army Corps of Engineers U.S. Fish and Wildlife Service James F. Williamson, Jr. For further information, contact: **Tennessee Valley Authority** 400 West Summit Hill Drive Knoxville, Tennessee 37902 Phone: (865) 632-6418 (865) 632-3451 Fax: e-mail: jfwilliamson@tva.gov

The Tennessee Valley Authority (TVA) is evaluating alternatives to resolve a Abstract: leakage problem at Bear Creek Dam in Franklin County, Alabama, which if left unresolved, poses a risk of dam failure during heavy rains. Potential alternatives to resolve the problem evaluated in this environmental impact statement include modification of the dam to maintain a summer pool elevation level of 576 feet (the original dam design), lowering of the dam to maintain a summer pool elevation level of 565 feet, and removal of the dam and restoration of the former creek channel. The alternatives that would keep the dam would retain the primary purposes for which the project was constructed, namely, flood control, recreation, and economic development, including water supply. In addition, TVA has committed to minimum-flow releases to conserve and enhance habitat for endangered mussels downstream in Bear Creek between the dam and Pickwick Reservoir. At this time, TVA prefers to modify the dam and restore the 576-foot operating pool. This would continue to provide benefits for the region, including water supply, and would better allow TVA to meet the seasonal minimum flows to conserve aquatic resources downstream of the dam.

August 2007

Page intentionally blank

SUMMARY

PURPOSE OF AND NEED FOR ACTION

Bear Creek Dam, located in Franklin County, Alabama, was completed in 1969. Although most of the dam has a rock foundation, a portion of the dam was constructed on residual soil. Since completion, there has been continuous leakage of water through the foundation of the dam. Tennessee Valley Authority (TVA) has attempted several repairs, generally involving drilling and grouting to plug leakage pathways through the underlying rock and soil. After the most recent repairs in 2004-2005, TVA returned the reservoir to normal summer pool of 576 feet, but leakage continued. This continued leakage increases the risk of dam failure, and as a precautionary measure, TVA subsequently lowered the summer pool 8 feet. However, when heavy rains occur, the reservoir rises to 576 feet and above, and the risk of dam failure increases. Although TVA maintains equipment for emergency repairs and increases its monitoring and notifies local officials when the water rises, these measures are not a viable long-term solution to the leakage problem. TVA has prepared this environmental impact statement (EIS) to evaluate alternatives for a long-term solution to the problem of excessive leakage of water through Bear Creek Dam.

ALTERNATIVES INCLUDING THE PROPOSED ACTION

TVA received many suggestions and comments on potential alternatives following announcement of an EIS preparation. TVA used this information as well as the results of its continuing engineering and feasibility studies to develop four alternatives for detailed analysis. All alternatives, except those involving no action and dam removal, include compliance with federal dam safety guidelines, which require the dam to withstand and safely pass the probable maximum flood (PMF).

Under Alternative 1, No Action, TVA would not implement a long-term solution to the leakage problem and would attempt to operate the dam at the originally intended summer pool level of 576 feet. Normal winter pool would be 565 feet. Adoption of Alternative 1 would not remedy the leakage problem, and the dam would be at risk of dam failure, which would cause downstream flood damage.

Under Alternative 2, Modify Dam and Maintain Summer Pool Level of 576 Feet, TVA would rebuild the dam in place or immediately downstream of the existing dam and restore the normal summer pool to 576 feet. The normal winter pool would raised one foot to 566 feet. The specific repair method would be determined based on engineering and design studies. The options being considered are a roller-compacted concrete reinforcing structure, grouting, and trenching as a water cut-off method. County Road 37 would be returned to normal service upon completion of construction and repairs.

Under Alternative 3, Lower Dam and Maintain Summer Pool Level of 565 Feet, the existing dam would be partially removed and stabilized. A grout curtain would be added to reduce leakage, PMF modifications would be made, and the roadway across the dam would be rebuilt. Pool level would be maintained at approximately 565 feet throughout the year.

Under Alternative 4, Remove Dam and Restore Former Creek Channel, the dam would be removed, the reservoir would be eliminated, and Bear Creek would no longer be regulated by Bear Creek Dam. A bridge would be built to replace the roadway that now crosses the dam.

AFFECTED ENVIRONMENT

Bear Creek Reservoir is one of four reservoirs located in northwest Alabama that comprise the Bear Creek Project. The project was authorized by Congress in 1964 for the primary purposes of flood control, recreation, and economic development, including water supply. Bear Creek Dam, which is 68 feet high and 1,385 feet long, impounds a reservoir 12 miles long with a summer pool of 690 acres. The reservoir is operated to provide a minimum flow of 21 cubic feet per second (cfs) downstream of the dam, and this has been met over 99 percent of the time. The minimum one-day flow since dam closure is 0 cfs; the mean daily flow is 470 cfs; and the maximum one-day flow is 19,554 cfs. Reservoir water at the drinking water intake for Franklin County Water Service Authority (FCWSA) has low alkalinity with moderate to high levels of carbon and high levels of iron and manganese. Due to low dissolved oxygen (DO) levels, high chlorophyll concentrations, and low benthic species diversity, the reservoir is consistently rated fair to poor in ecological health. Fish communities are rated fair to good, and sediment quality is rated good. The recreational floatway upstream of Bear Creek Reservoir has had past problems with bacterial contamination from animal waste, but waste management systems now in place have eliminated this issue.

Most of the reservoir shoreline is forested, and about half has erosion or potential erosion problems. In the three growing seasons since the dam has been operated with a lower summer pool, natural revegetation has occurred on much of the formerly submerged area, and there is currently little erosion at the water line. Erosion at the former summer pool level has been greatly reduced. Since the dam has closed, several feet of sediment have accumulated with the most sediment in the original Bear Creek channel. Downstream of Bear Creek Dam, the stream banks are stable until the Bear Creek Floodway begins. Below the floodway, occasional eroding sections of stream bank are present. Below the downstream end of the floodway, banks are stable and forested.

Groundwater resources are generally good and provide some of the water supply of the area, including water for Red Bay and Hodges. Most residents receive water from public water suppliers rather than from individual wells. Water for Russellville is supplied by Elliott Lake with an emergency backup on Cedar Creek Reservoir. Other water in Franklin County is supplied by Upper Bear Creek Water and Sewer from Upper Bear Creek Reservoir and FCWSA on Bear Creek Reservoir. FCWSA water is available to Vina, Hackleburg, Hodges, Red Bay, and areas of the county not presently served by a municipal water system.

The Bear Creek watershed is noted for its aquatic biodiversity, with 106 species of freshwater fish and 32 species of mussels documented in the system. The majority of the surviving mussels are found between the confluence of Rock Creek (downstream of Bear Creek Dam at the Natchez Trace Parkway) and Pickwick Reservoir. The sport fishery in Bear Creek Reservoir is considered good, even with the lower water levels of the last few years. Two mussel species that are federally listed as endangered and one federal candidate mussel species are found in Bear Creek from the Alabama/Mississippi state line to the backwaters of Pickwick Reservoir is designated as critical habitat for the endangered mussels, the Cumberlandian combshell and the oyster mussel. An additional 11 fish, eight mussel, and one snail species that are state-listed in Alabama and/or Mississippi are found in streams of the Bear Creek watershed.

With respect to terrestrial resources, the analysis area included the reservoir area that lies below the 576-foot elevation upstream of Bear Creek Dam, those areas in the vicinity of Bear Creek Reservoir, and the area contained within the 500-year flood zone downstream and extending to Pickwick Reservoir. The most common plant communities in the project area are upland deciduous forest, mixed forest, bottomland forest, and early successional habitats. Loblolly pine plantations and cropland are also present. These plant communities are common and representative of the region. There are no globally rare plant communities known from the reservoir shoreline or the 500-year flood zone downstream of the dam. Most of the wildlife in the area are common species. Uncommon resources near Bear Creek Reservoir include caves and heronries. Approximately 20 caves occur in the analysis area: however, no caves were inundated when the reservoir was filled. A small heronry is located a short distance upstream of the dam. Wetland habitat exists downstream of the dam as riparian zones and above the dam along sloughs and reservoir margins. There are an estimated 323 acres of wetlands in the reservoir area and in those nearby areas that are directly affected by the reservoir groundwater. About 5.200 wetland acres occur in the tailwater area. The wetland habitat complexes on the reservoir shoreline between Bear Creek Miles (BCMs) 78 and 84 are of very high quality.

Three federally listed plant species, leafy prairie-clover, lyrate bladderpod, and Tennessee yellow-eyed grass, are recorded from Colbert and Franklin counties in Alabama. A population of white fringeless orchid, a candidate for federal listing, formerly occurred in Tishomingo County, Mississippi. Federally listed terrestrial animals recorded from Colbert, Franklin and Tishomingo counties include the bald eagle, gray bat, Indiana bat, and red-cockaded woodpecker. An additional 40 state-listed plant species are recorded from within 1 mile of the analysis area. Nineteen of the 40 state-listed plant species are recorded in the downstream floodplain. Twenty state-listed terrestrial animal species are recorded from within 3 miles of the analysis area.

Bear Creek Reservoir provides boating, swimming, and camping opportunities. Bear Creek Development Authority (BCDA) manages two campgrounds and the Bear Creek Lakes Recreation and Education Center (BCLREC). Rock Bridge Canyon, a privately operated scenic area with unique rock formations and vegetation, is located 0.25 mile south of the reservoir. The floodplain downstream of the dam includes Mingo Swamp and Tishomingo State Park. The Natchez Trace Parkway crosses Bear Creek near BCM 38, and several scenic overlooks are located along Bear Creek. Upstream of the reservoir is the Bear Creek Floatway, a 25-mile recreational float trail. Bear Creek downstream of the reservoir is also utilized for floating and is designated as the lower Bear Creek Canoe Trail.

From the headwaters to the dam, the landscape surrounding Bear Creek Reservoir is naturally appearing with only minor evidences of development. These are the dam itself, two recreation areas, a water intake, and the outdoor education center. Much of the reservoir is framed by rock formations and steep topography. The existing scenic attractiveness is common to distinctive, and the scenic integrity is high.

The floodplain below Bear Creek Dam contains large acreages of prime farmland, with more than half of the soils so classified. Much of this is flooded only during the largest floods. There are no sites listed on the National Register of Historic Places (NRHP) within the project area, and no listed sites or sites eligible for listing have been identified in the potential dam construction area. Archaeological surveys have identified 130 sites within the Bear Creek Reservoir properties and five sites downstream in the flood zone. More detailed surveys would likely reveal more sites downstream. There are 25 structures more

than 50 years old in the floodplain that would be subject to flood damage. Some of these could be determined to be eligible for the NRHP pending more detailed evaluation.

The population in the area is expected to remain stable or increase slightly within the next 10 years. Unemployment rates are at or below the national average, except for the adjacent Mississippi areas, which have rates above the national average. Employment in Franklin County is more dependent on agriculture than most of the other counties in the area and nationally. Income in the region is below the national average. The minority share of the population is lower than the national average, and the poverty level is higher than the national average.

ENVIRONMENTAL CONSEQUENCES

As a result of a 2006 Biological Opinion issued by the U.S. Fish and Wildlife Service (USFWS) regarding operation and maintenance activities at TVA water control facilities, TVA has recently agreed to change release scheduling from Bear Creek Dam and two other dams in the Bear Creek system (Little Bear Creek and Cedar Creek) to achieve targeted flows in Bear Creek. For Bear Creek Dam, these required minimum flows range from a high of 347 cfs in January through April to a low of 52 cfs during July through October. This requirement would be in effect under Alternative 1 or 2. If Bear Creek Dam were operated according to its original operation guide with a summer pool of 576 feet and a winter pool of 565 (or 566) feet, hydrologic impacts would be influenced by this new requirement for minimum-flow releases. Adaptive management of dam releases would provide appropriate seasonal minimum flows to support aquatic resources (including listed species) in Bear Creek downstream of the dam. It would also essentially eliminate the potential for the occurrence of "no flow" conditions at Bear Creek Dam. Also, releases would be managed to minimize the effects of high flow velocities in downstream portions of Bear Creek that contribute to erosion and bed load movement, especially during the fall drawdown of the reservoir. If the dam were lowered under Alternative 3 or removed under Alternative 4, the minimum-flow commitments would not apply. However, TVA would work with USFWS to determine other necessary means of conserving the endangered species in Bear Creek.

DO levels in the reservoir would remain the same if the dam were operated as designed but not repaired under Alternative 1 or repaired under Alternative 2. Low DO conditions would persist if the dam were lowered under Alternative 3, but the time period in which there were low DO levels would likely be shorter. If the dam were removed, DO levels would improve (i.e., increase), and planktonic algae production would be suppressed by increased water velocity and limited light due to shade from the forest canopy.

If the dam were repaired or removed under Alternative 2, 3, or 4, exposed areas of bare soil would exist during construction. Stabilization and dredging of sediment from the former stream channel would be necessary to prevent excessive erosion and sediment transport under Alternative 4. If a lower pool were maintained (Alternative 3), the shoreline subject to wave action would be at a different elevation. However, because much of this shoreline has been eroded to rock or gravel, shoreline erosion rates would likely decline. The frequency, duration, and magnitude of flows downstream in Bear Creek and the floodway would increase. More channel erosion, downcutting, bank over-steepening, and bank failure would occur. However, these impacts would not likely affect the channel downstream of the floodway. Dam removal under Alternative 4 would result in the exposure of that portion of the reservoir below the 565 foot elevation. After a few years,

this area would become stabilized with vegetation as root systems are established. Restoration of peak flows downstream would result in increased erosion in unstable stream areas.

No long-term groundwater impacts are expected under any of the alternatives, although declines approaching 20 feet might occur in aquifers near the impoundment if Alternative 4 were chosen. Implementation of alternatives that would lower the summer pool or eliminate the dam would increase pumping costs for FCWSA. In addition, construction of a weir would be needed under Alternative 4 to provide adequate head for the water intake.

Minimal impacts to vegetation and wildlife would occur under any of the alternatives. Elimination of the reservoir under Alternative 4 would change the composition of habitats within the floodplain downstream of the dam. An increase in flood frequency may decrease the proportion of farmland and pine plantations and increase early successional habitat, with consequences for wildlife usage. The increase in flood frequency may benefit Mingo Swamp. BCLREC would need to adapt its program to emphasize land- and stream-related activities. Adoption of Alternative 4 would eliminate the reservoir fishery.

Endangered and threatened fish and mussels would likely benefit from a reservoir operated with a lower pool, such as under Alternative 3. Elimination of the dam under Alternative 4 would result in more natural streamflow regimes and would also be beneficial in the long run if sedimentation were controlled adequately immediately following dam removal. However, elimination of the dam could lead to periods of virtually no flow. This could occur during dry periods or at other times when the outflow of Upper Bear Creek Dam along with the incidental inflow from small tributary sources is exceeded by the FCWSA water intake. During such times, the flow at Bear Creek Dam would be virtually zero. Approximately 77 acres of scrub-shrub, emergent, and aquatic bed/flats wetland habitat that has developed along the reservoir shoreline in the last few years of lower pool levels would be flooded if the reservoir were returned to full summer pool under Alternative 1 or 2. However, former wetlands would become reestablished at the normal summer pool level under these two alternatives. These 77 acres of wetlands would mostly persist under Alternative 3, as the water level would decrease by only 3 feet. However, they would be lost under Alternative 4. This loss under Alternative 4 would be offset over time by long-term increases in floodplain/riverine wetlands as the creek returned to a more natural channel and a more natural flooding regime.

Implementation of alternatives that would change or eliminate the operation of the reservoir, such as Alternatives 3 and 4, would adversely affect outdoor recreation opportunities. Operations of the BCLREC would be forced to change, and the two campgrounds would be less appealing to campers.

Operation of the dam as designed, which would under Alternative 2, would result in flood protection for agricultural lands downstream and would provide economic benefits to the region. Downstream roads and bridges would also be protected from flooding. Under Alternative 3 with the lower dam, some structures would be flooded more frequently, and downstream bridges could be overtopped. Considerably more prime farmland would be subject to flooding under Alternative 3 as compared to Alternative 2. For the 10-year crop season flood, this would be as much as 5,750 acres under Alternative 3 compared to a maximum of 2,150 acres under Alternative 2. These additional growing season impacts could harm local farmers and result in loss of farm income, but the regional economic impacts would likely be small. Without the dam structure (Alternative 4), the acreage

flooded would increase in frequency and duration, and approximately 25 structures would be flooded during the 500-year flood. Some additional prime farmland soils would be exposed if Alternative 4 were selected, but this would be overshadowed by the amount of prime farmland downstream that would be subject to longer and more frequent flooding.

If the dam were lowered under Alternative 3, measures to prevent erosion of archaeological sites and increased patrols to prevent looting would be necessary. Elimination of the reservoir under Alternative 4 would require restoration of the creek channel and could result in potential impacts to archaeological sites along the original creek bank. An increase in monitoring to protect sites from illegal archaeological excavation would be necessary until the area becomes revegetated.

PREFERRED ALTERNATIVE

TVA's preferred alternative is Alternative 2, Modify Dam and Maintain Summer Pool Level of 576 Feet. Implementation of this alternative would continue to provide flood protection, water supply, and public recreation benefits for the region. Adaptive management of dam releases would provide appropriate seasonal minimum flows to support aquatic resources (including listed species) in Bear Creek downstream of the dam. It would also essentially eliminate the potential for the occurrence of "no flow" conditions at Bear Creek Dam. Releases would also be managed to minimize the effects of high flow velocities in downstream portions of Bear Creek that contribute to erosion and bed load movement, especially during the fall drawdown of the reservoir.