TENNESSEE VALLEY AUTHORITY

BEAVER CREEK and CEDAR CREEK RESERVOIRS

FINAL RESERVOIR LAND MANAGEMENT PLAN

Volume II

NORTHEASTERN TRIBUTARY RESERVOIRS
LAND MANAGEMENT PLAN

FINAL ENVIRONMENTAL IMPACT STATEMENT

MARCH 2010

TVA

This page intentionally left blank

Document Type: EIS-Administrative Record
Index Field: Final Environmental Document
Project Name: Northeastern Tributary Reservoirs Land Plan
Project Number: 2008-32

NORTHEASTERN TRIBUTARY RESERVOIRS LAND MANAGEMENT PLAN AND ENVIRONMENTAL IMPACT STATEMENT

VOLUME II

Beaver Creek and Clear Creek Reservoirs

PREPARED BY:
TENNESSEE VALLEY AUTHORITY

MARCH 2010

For information, contact:

Tennessee Valley Authority
Holston-Cherokee-Douglas Land Planning Team
106 Tri-Cities Business Park Drive
Gray, Tennessee 37615
Phone: (423) 467-3801
Fax: (423) 467-3815

Page intentionally blank

TABLE OF CONTENTS

LIST OF TABLES AND FIGURE

ACRONYMS AND ABBREVIATIONS

EA	Environmental Assessment
EO(s)	Executive Order(s)
EIS	Environmental Impact Statement
EPT	Ephemeroptera, Plecoptera, Trichoptera (aquatic ecology index)
ESA	*Endangered Species Act*
MOA	Memorandum of Agreement
MSC	Maximum shoreline contour
LAC	Limits of Acceptable Change
msl	Mean Sea Level
NEPA	*National Environmental Policy Act*
NRHP	National Register of Historic Places
NTRLMP	Northeastern Tributary Reservoirs Land Management Plan
RFAI	Reservoir Fish Assemblage Index
RLMP	Reservoir Land Management Plan
SMP	Shoreline Management Policy
TWRA	Tennessee Wildlife Resources Agency
TVA	Tennessee Valley Authority
USA	United States of America
USDA	U.S. Department of Agriculture
USFS	U.S. Forest Service

Page intentionally blank

1.0 INTRODUCTION

The Beaver Creek and Clear Creek Reservoirs Land Management Plan is a study of the Tennessee Valley Authority (TVA)-managed public land surrounding Beaver Creek and Clear Creek reservoirs. It is one of five reservoir land management plans (RLMPs) associated with an environmental impact statement (EIS) for the northeastern tributary reservoirs (NTRs). The EIS, Volume I, contains information on the scoping process, allocation process, alternatives, comparison of the alternatives, and analysis of impacts. In addition, the EIS contains a summary, an index, and appendices.

This document provides background information about TVA land management throughout its history and specifically TVA management of public land surrounding Beaver Creek and Clear Creek reservoirs. It explains the purpose of this RLMP and describes the process used in its development. The RLMP includes the planning process, which lists the objectives around which the RLMP was developed and a summary of the allocation process. The Beaver Creek and Clear Creek Reservoirs Regional Overview describes the natural and social development of the reservoir and the surrounding area. The Parcel Descriptions include total acreage and parcel descriptions documenting land management allocations. The allocation map is stored in the pocket on the back cover of this RLMP.

1.1. Background

TVA has been charged by Congress with improving navigation, controlling floods, providing for the proper use of marginal lands, providing for industrial development, and providing power at rates as low as is feasible, all for the general purpose of fostering the physical, economic, and social development of the Tennessee Valley region. The lands that TVA holds as steward in the name of the United States of America (USA) are some of the most important resources of the region. These lands have provided the foundation for the dams and reservoirs that protect the region from flooding and secure for its residents the benefits of a navigable waterway and low-cost electricity.

TVA's public lands are the sites for its power generating system and arteries for delivering power to those that need it. Many of the region's parks, recreation areas, and wildlife refuges that are so important for the region's quality of life are on lands TVA made available. TVA public lands often have been the catalyst for public and private economic development that supports all of these activities.

The USA, through TVA, originally acquired approximately 1.3 million acres of land in the Tennessee River Valley. The construction and operation of the reservoir system inundated approximately 470,000 acres. Approximately 508,000 acres have been transferred to other federal and state agencies for public uses or sold for private uses. The USA owns about 293,000 acres that TVA manages pursuant to the *TVA Act of 1933*.

TVA originally acquired a total of 10,952 acres of land above normal summer pool for the seven NTRs and associated hydroelectric generating facilities. Over the years, TVA has transferred the majority of this land to other public agencies, primarily the U.S. Forest Service (USFS), or sold it to various public and private entities. TVA presently manages a total of 4,933 acres of land on these reservoirs that is the subject of the Northeastern Tributary Reservoirs Land Management Plan (NTRLMP).

As stewards of this important resource, TVA's policy is to manage its lands to protect the integrated operation of the TVA reservoir and power systems, to provide for appropriate public use and enjoyment of the reservoir system, and to provide for continuing economic growth in the Tennessee Valley region. TVA recognizes that historical land transfers have contributed substantially to meeting these multipurpose objectives, and it is TVA's policy to preserve reservoir lands remaining in public ownership under its control except in rare instances when the benefits to the public will be so significant that transferring the land is justified.

1.2. Purpose

TVA's Land Policy (Volume I, Appendix A) was approved by the TVA Board of Directors on November 30, 2006. This policy governs how land is planned, including whether it is disposed of or retained. To systematically manage TVA public land around its reservoirs, TVA develops RLMPs, which seek to integrate land and water program goals, provide for the optimum public benefit, and balance competing and sometimes conflicting resource uses.

By providing a clear statement of how TVA intends to manage land and by identifying each parcel for specific purposes, TVA hopes to facilitate decision-making for the use of the public land in its care. Land planning guides TVA in the management of resources and property administration decisions on land under its control. RLMPs are approved by the TVA Board of Directors and adopted as agency policy, providing for long-term land stewardship and accomplishment of TVA responsibilities under the *TVA Act*.

TVA's integrated resource management approach focuses on balancing flood control, navigation, power generation, water quality, recreation, and land use needs to obtain the optimum benefit for the whole system. Land planning supports TVA's vision of generating prosperity in the Valley by addressing the goals of supporting a thriving river system and stimulating economic growth. To that end, the NTRLMP provides a framework for deciding the optimum use of TVA public land and promotes the efficient operation of the TVA reservoir system.

This RLMP will guide resource management and administration decisions on approximately 304 acres around Beaver Creek and Clear Creek reservoirs, which are publicly owned and managed by TVA. It identifies the most suitable uses for four parcels of project land by providing areas for Project Operations, Sensitive Resource Management, Natural Resource

Conservation, Industrial, Developed Recreation, and Shoreline Access. The 304 acres of TVA public land account for approximately 1.3 miles of reservoir shoreline.

Page intentionally blank

2.0 PLANNING PROCESS

Under the *TVA Act of 1933*, TVA is responsible for the control and use of the Tennessee River and its tributaries and the development and use of the resources in the Tennessee Valley. TVA has managed the public reservoir land under its stewardship to meet a wide range of regional and local resource development needs and to improve the quality of life, both within specific reservoir areas and throughout the Tennessee Valley. Reservoir properties, together with adjoining private lands, have been used for public parks, industrial development, commercial recreation, residential development, tourism development, and forest and wildlife management areas. These areas also meet a variety of other needs associated with local communities.

An increasing demand for and use of reservoir land sometimes results in conflicting and uneconomical land use patterns between public and private use. These competing interests and development pressures, coupled with today's environmental awareness, underscore the need for a planned approach to the management of reservoir land and related resources.

The land planning process is subject to the *National Environmental Policy Act* (NEPA) and its implementing regulations, which require environmental review of federal actions having the potential to impact the environment. Land planning supports state and federal goals to be environmentally responsible, stakeholder-driven, and growth-oriented by providing a framework for deciding the best use of TVA-managed public land.

The reservoir land management planning process involves allocation of TVA fee-owned land to seven defined land use zones. The term *land use zone* refers to a descriptive set of criteria given to distinct areas of land based on location, features, and characteristics (see Table 1 for land use zone definitions). The process includes resource data, computer analysis, and input from the public, other agencies, and knowledgeable TVA staff. The definition of a land use zone provides a clear statement of how TVA will manage public land, and allocation of a parcel to a particular land use zone identifies that land for specific uses. Implementation of an RLMP minimizes conflicting land uses and makes it easier to handle requests for use of public land.

This RLMP was developed by a team of land managers and technical experts from TVA, knowledgeable about the reservoir and its resources. The planning team made land use decisions by integrating public needs, environmental conditions, economic benefits, state and federal policies, and the original congressional intent of the Beaver Creek and Clear Creek reservoirs projects.

Table 1. Land Use Zone Definitions

Zone		Definition
1	**Non-TVA Shoreland**	Shoreland that TVA does not own in fee or land never purchased by TVA. Non-TVA Shoreland allocations are based on deeded rights and, therefore, will not change as a result of the land planning process. This category is provided to assist in comprehensive evaluation of potential environmental impacts of TVA's allocation decision. Non-TVA shoreland includes: • ***Flowage easement land***—Privately or publicly owned land where TVA has purchased the right to flood and/or limit structures. Flowage easement rights are generally purchased to a contour elevation. Since construction on flowage easement land is subject to TVA's Section 26a permitting requirements, the SMP guidelines discussed in the definition of Zone 7 would apply to the construction of residential water use facilities fronting flowage easement land. SMP guidelines addressing land-based structures and vegetation management do not apply. • ***Privately owned reservoir land***—This was land never purchased by TVA and may include, but is not limited to, residential, industrial, commercial, or agricultural land. This land, lying below the 500-year flood elevation, is subject to TVA's Section 26a approvals for structures.
2	**Project Operations**	All TVA reservoir land currently used for TVA operations and public works projects, including: • ***Land adjacent to established navigation operations***—*Locks, lock operations and maintenance facilities, and the navigation work boat dock and bases.* • ***Land used for TVA power projects operations***—*Generation facilities, switchyards, and transmission facilities and rights-of-way.* • ***Dam reservation land***—*Areas acquired and managed for the primary purpose of supporting the operation and maintenance of TVA dams and associated infrastructure; secondary uses may also include developed and dispersed recreation, maintenance facilities, watershed team offices, research areas, and visitor centers.* • ***Navigation safety harbors/landings***—*Areas used for tying off commercial barge tows and recreational boats during adverse weather conditions or equipment malfunctions.* • ***Navigation dayboards and beacons***—*Areas with structures placed on the shoreline to facilitate navigation.* • ***Public works projects***—*Includes public utility infrastructure, such as substations and rights-of-way for sewer lines, water lines, transmission lines, and major highway projects.* • ***Land planned for any of the above uses in the future.***
3	**Sensitive Resource Management**	Land managed for protection and enhancement of sensitive resources. Sensitive resources, as defined by TVA, include resources protected by state or federal law or executive order and other land features/natural resources TVA considers important to the area viewscape or natural environment. Recreational natural resource activities, such as hunting, wildlife observation, and camping on undeveloped sites, may occur in this zone, but the overriding focus is protecting and enhancing the sensitive resource the site supports. Areas included are: • TVA-designated sites with potentially ***significant archaeological resources***. • TVA public land with ***sites/structures listed in or eligible for listing in the National Register of Historic Places***.

Zone		Definition
		• ***Wetlands***—Aquatic bed, emergent, forested, and scrub-shrub wetlands as defined by TVA. • ***TVA public land under easement, lease, or license to other agencies/individuals*** for resource protection purposes. • ***TVA public land fronting land owned by other agencies/individuals*** for resource protection purposes. • ***Habitat Protection Areas***—These TVA Natural Areas are managed to protect populations of species identified as threatened or endangered by the U.S. Fish and Wildlife Service, state-listed species, and any unusual or exemplary biological communities/geological features. • ***Ecological Study Areas***—These TVA Natural Areas are designated as suitable for ecological research and environmental education by a recognized authority or agency. They typically contain plant or animal populations of scientific interest or are of interest to an educational institution that would utilize the area. • ***Small Wild Areas***—These TVA Natural Areas are managed by TVA or in cooperation with other public agencies or private conservation organizations to protect exceptional natural, scenic, or aesthetic qualities that can also support dispersed, low-impact types of outdoor recreation. • ***River Corridor with sensitive resources***—A River Corridor is a segment of a river and the adjacent land along the banks. River Corridors often consist of a linear green space of TVA land serving as a buffer to tributary rivers entering a reservoir. These areas will be included in Zone 3 when identified sensitive resources are present. • ***Significant scenic areas***—Areas designated for visual protection because of their unique vistas or particularly scenic qualities. • ***Champion tree site***—Areas designated by TVA as sites that contain the largest known individual tree of its species in that state. The state forestry agency "Champion Tree Program" designates the tree, while TVA designates the area of the sites for those located on TVA public land. • ***Other sensitive ecological areas***—Examples of these areas include heron rookeries, uncommon plant and animal communities, and unique cave or karst formations. • ***Land planned for any of the above uses in the future.***
4	**Natural Resource Conservation**	Land managed for the enhancement of natural resources for human use and appreciation. Management of resources is the primary focus of this zone. Appropriate activities in this zone include hunting, timber management to promote forest health, wildlife observation, and camping on undeveloped sites. Areas included are: • ***TVA public land under easement, lease, or license to other agencies*** for wildlife or forest management purposes. • ***TVA public land fronting land owned by other agencies*** for wildlife or forest management purposes. • ***TVA public land*** managed for wildlife or forest management projects. • ***Dispersed recreation areas*** maintained for passive, dispersed recreation activities, such as hunting, hiking, bird watching, photography, primitive camping, bank fishing, and picnicking. • ***Shoreline Conservation Areas***—Narrow riparian strips of vegetation between the water's edge and TVA's back-lying property that are managed for wildlife, water quality, or visual qualities.

Zone		Definition
		• ***Wildlife Observation Areas***—TVA Natural Areas with unique concentrations of easily observed wildlife that are managed as public wildlife observation areas. • ***River Corridor without sensitive resources present***—A River Corridor is a linear green space along both stream banks of selected tributaries entering a reservoir managed for light boat access at specific sites, riverside trails, and interpretive activities. River Corridors will be included in Zone 4 unless sensitive resources are present (see Zone 3). • ***Islands of 10 acres or less.*** • ***Land planned for any of the above uses in the future.***
5	**Industrial**	Land managed for economic development, including businesses in distribution/ processing/assembly and light manufacturing. Preference will be given for businesses requiring water access. There are two primary types of uses for TVA land allocated for Industrial: **(1) Access for water supply or structures associated with navigation such as barge terminals, mooring cells, etc., or (2) Land-based development potential.** Areas included are: • ***TVA public land under easement, lease, or license to other agencies/ individuals*** for purposes described above. • ***TVA public land fronting land owned by other agencies/individuals*** for industrial purposes described above. • ***Land planned for any of the above uses in the future.*** In some cases, TVA land allocated to industrial use would be declared surplus and sold at public auction. Types of development that can occur on this land are: • **Light Industrial**—TVA waterfront land that would support businesses and light manufacturing activities. Industrial parks should not include retail, service-based businesses like assisted living, retirement centers, or walk-in-type businesses (excluding retail use). • **Industrial Access**—Access to the waterfront by back-lying property owners across TVA property for water intakes, wastewater discharge, or conveyance of commodities (i.e., pipelines, rail, or road). Barge terminals are associated with industrial access corridors. • **Barge Terminal Sites**—Public or private facilities used for the transfer, loading, and unloading of commodities between barges and trucks, trains, storage areas, or industrial plants. • **Fleeting Areas**—Sites used by the towing industry to switch barges between tows or barge terminals that have both offshore and onshore facilities. • **Minor Commercial Landing**—A temporary or intermittent activity that takes place without permanent improvements to the property. These sites can be used for transferring pulpwood, sand, gravel, and other natural resource commodities between barges and trucks.
6	**Developed Recreation**	The designations below are based on levels of development and the facilities available to the public. Parcel descriptions should describe the primary type of use and identify access potential for infrastructure and potential for development: **Water Access**—Small parcels of land, generally less than 10 acres, and typically shoreline areas conveyed to public agencies for public access.

Zone	Definition
	Public—More recreational opportunities, some facilities, more than a parking lot and boat ramp. This includes areas conveyed for public recreation. **Commercial**—Property suitable and capable to support commercial water-based operations. This includes areas conveyed for commercial recreation. Land managed for concentrated, active recreational activities that require capital improvement and maintenance, including: • ***TVA public land under easement, lease, or license to other agencies/individuals*** for recreational purposes. • ***TVA public land fronting land owned by other agencies/individuals*** for recreational purposes. • ***TVA public land*** developed for recreational purposes, such as campgrounds, day use areas, etc. • ***Land planned for any of the above uses in the future.*** Types of development that can occur on this land are: • ***Water access***, e.g., areas that tend to have limited development and can include a launching ramp, courtesy piers, canoe access, parking areas, picnic areas, trails, etc. • ***Public Recreation***—recreation on publicly owned land. These areas typically have facilities or uses developed by a public agency and provide amenities open to the general public. Facilities at "public recreation" areas could include playgrounds/play structures, picnic facilities, tennis courts, horseshoe areas, play courts, recreation centers, athletic fields, trails, natural areas, amphitheaters, food concessions (vending, snack bar), access to water for fishing and boating, swimming areas and swimming pools, marina facilities owned by the public entity, parking, and campgrounds. Public recreation, time-forward, will not include residential use, cabins, or other overnight accommodations (other than campgrounds), except if a recreation area is owned by a state or state agency and operated as a component of a state park system, in which case cabins and other overnight accommodations will be permitted. Public recreation uses typically include areas and facilities owned and operated by the federal, state, county, or local government (municipalities/communities). However, private entities may operate recreation facilities on public property as concessionaires under agreement with the public entity controlling the property. The use of the facilities may be offered free or for a fee. This does not allow for public-private partnership where facilities are owned by private investors. All structures and facilities should be owned by the agreement holder. • ***Commercial Recreation***—is defined as recreation amenities that are provided for a fee to the public intending to produce a profit for the owner/operator. These primarily water-based facilities typically include marinas and affiliated support facilities like restaurants and lodges, campgrounds, cabins, military vessel attractions, and excursion tour vessels (restaurant on the water). These uses and activities can be accommodated through changes in existing conveyance agreements. These areas do not include residential use, long-term accommodations or individually owned units. Where applicable, TVA will request appropriate compensation for the use of the property.

Zone		Definition
		• ***Greenways***—Linear parks or developed trails located along natural features, such as lakes or ridges, or along man-made features, including abandoned railways or utility rights-of-way, which link people and resources together.
7	**Shoreline Access**	TVA-owned land where Section 26a applications and other land use approvals for residential shoreline alterations are considered. Requests for residential shoreline alterations are considered on parcels identified in this zone where such use was previously considered and where the proposed use would not conflict with the interests of the general public. Types of development/management that may be permitted on this land are: • ***Residential water use facilities***, e.g., docks, piers, launching ramps/driveways, marine railways, boathouses, enclosed storage space, and nonpotable water intakes. • ***Shoreline access corridors***, e.g., pathways, wooden steps, walkways, or mulched paths that can include portable picnic tables and utility lines. • ***Shoreline stabilization***, e.g., bioengineering, riprap and gabions, and retaining walls. • ***Shoreline vegetation management.***

2.1. Planning Goals

The goals of the RLMP, listed below, are designed to implement TVA's mission:

Goal 1: Apply a systematic method of evaluating and identifying the most suitable uses of TVA public lands using resource data, stakeholder input, suitability and capability analyses, and TVA staff input.

Goal 2: Identify land use zone allocations to optimize public benefit and balance competing demands for the use of public lands.

Goal 3: Identify land use zone allocations to support TVA's broad regional resource development mission. TVA reservoir properties are managed to provide multiple public benefits, including recreation, conservation, and economic development.

Goal 4: Provide a clear process by which TVA will respond to requests for use of TVA public land.

Goal 5: Comply with federal regulations and executive orders (EOs).

Goal 6: Ensure the protection of significant resources, including threatened and endangered species, cultural resources, wetlands, unique habitats, natural areas, water quality, and the visual character of the reservoir.

Goal 7: Provide a mechanism that allows local, state, and federal infrastructure projects when the use is compatible with the zone allocation.

2.2. Allocation Process

Prior to allocating parcels, the TVA planning team reviewed the characteristics of each parcel (i.e., location and existing conditions). TVA also reviewed deeds of selected tracts

previously sold to private entities to identify existing shoreline access rights. In addition, the planning team honored all existing commitments—that is, existing leases, licenses, and easements. No sensitive resources surveys were conducted on committed land. The need for field reviews for uncommitted parcels was determined based on data from the TVA Heritage database. Land with identified sensitive resources was placed in the Sensitive Resource Management Zone. The remaining parcels were allocated based on reservoir planning objectives and public input. Decisions were made by consensus among the TVA planning team. During the allocation process, the planning team allocated the reservoir land to one of seven planning zones using the standard zone definitions for all TVA reservoirs (Table 1).

2.3. Committed Land

Land currently committed to a specific use was allocated to a zone compatible with that use unless there was an overriding need to change the use. Some committed land uses are determined by the covenants and provisions of easements, leases, licenses, and sale and transfer agreements. Committed lands include the following: properties where TVA has granted landrights (easements, leases, etc.) for specific uses, properties where TVA has previously identified resources in need of protection, TVA Project Operations lands (transmission lines, dam reservations, etc.), and lands fronting national forest properties. Possible reasons to change a committed land use would be to prevent or remedy ongoing adverse impacts resulting from the actions of a license or easement holder.

Approximately 290 acres (100 percent) of TVA land surrounding Beaver Creek Reservoir are committed, and 14 acres (100 percent) of TVA land surrounding Clear Creek Reservoir are committed due to existing TVA or other public infrastructure projects. Agricultural licenses are not considered as committed uses because they are an interim use of TVA land.

In the allocation process, if sensitive resources were identified on a committed parcel, that parcel remained zoned for the committed use unless an ongoing adverse impact was found. However, TVA approval would be required prior to future activities that could impact the identified sensitive resources.

2.4. Uncommitted Land

None of the TVA land surrounding Beaver Creek and Clear Creek reservoirs are uncommitted. Representatives from different TVA organizations including Power Generation, Land and Water Stewardship, Recreation, and Economic Development met to allocate the parcels of TVA public land into the seven planning zones. Maps that identified the location of known and potential sensitive resources (e.g., cultural resources, wetlands, and threatened and endangered species) were used in determining the capability and suitability for potential uses of each parcel.

2.5. Property Administration

In the Beaver Creek and Clear Creek RLMP, TVA identifies the suitable uses for each tract of TVA-managed land around the Beaver Creek and Clear Creek reservoirs, consistent with TVA policy and guidelines and applicable laws and regulations. As administrators of TVA land, the Holston-Cherokee-Douglas Watershed Team will use the Beaver Creek and Clear Creek RLMP (Volume II) and the NTRLMP EIS (Volume I), along with TVA policies and guidelines, to manage resources and to respond to requests for the use of TVA land. All inquiries about, or requests for, the use of TVA land on the NTRs should be made to the TVA Environmental Information Center at 1-800-882-5263.

Pursuant to the TVA Land Policy (Volume I, Appendix A), TVA would consider changing a land use designation outside of the normal planning process only for water-access purposes for industrial or commercial recreation operations on privately owned back-lying land or to implement TVA's Shoreline Management Policy (SMP).

The SMP is based on the Shoreline Management Initiative, by which TVA, with public input, examined its system for granting permits for docks and other shoreline development. The primary goal was to establish a Valleywide policy that would improve the protection of shoreline and aquatic resources while allowing reasonable access to the water.

Public works/utility projects such as easements for pipelines, power or communication wires, roads or other public infrastructure proposed on any TVA public land that do not affect the zoned land use or sensitive resources would not require an allocation change as long as such projects would be compatible with the use of the allocated zone. Proposed public works/utility projects would be subject to a site-specific environmental review. Any other requests involving a departure from the planned uses would require the approval of the TVA Board of Directors.

Proposals consistent with TVA's policies and the allocated use, and otherwise acceptable to TVA, will be reviewed in accordance with NEPA and must conform to the requirements of other applicable environmental regulations and other legal authorities.

3.0 BEAVER CREEK AND CLEAR CREEK RESERVOIRS REGIONAL OVERVIEW

Within the portion of the Tennessee River Valley known as the Upper Holston area are seven reservoirs: Beaver Creek, Boone, Clear Creek, Fort Patrick Henry, South Holston, Watauga, and Wilbur. Beaver Creek, Boone, Clear Creek, Fort Patrick Henry, and South Holston reservoirs, and a small portion of Wilbur Reservoir, are located in the Ridge and Valley Ecoregion of Tennessee and Virginia. This region occurs between the Blue Ridge Mountains on the east and the Cumberland Plateau on the west. The region is a relatively low-lying area made of roughly parallel ridges and valleys that were formed through extreme folding and faulting events in past geologic time (Griffith et al. 1998).

3.1. The Past

According to archaeologists, humans first occupied this land around 12,000 years ago. This early population was initially nomadic, but later developed a seasonal subsistence based on the region's plant and animal resources. These abundant natural resources provided a diverse source of food, which included deer, nuts, fruits, and a variety of small animals, fish, and shellfish. Between 8000 B.C. and about 500 B.C., there were signs of population growth, settlement, and interregional trade. By 500 B.C. stable villages had developed, which are evidenced by cultivated plants, dwelling structures, pottery, and burial mounds. By A.D. 1500, there is evidence of an increasingly sophisticated society, with town centers, fortified villages, an elite class, as well as smaller and scattered hamlets or communities. The Cherokee Nation eventually occupied this area of Southern Appalachia. Cherokee territory extended throughout Southern Appalachia and included parts of Virginia, North Carolina, Kentucky, Tennessee, Georgia, and South Carolina. There is record of at least 43 towns just before the outbreak of the Revolutionary War. Their society was gradually penetrated, constrained, and eventually removed by white Europeans whose livelihood was based on capitalistic trade, manufacturing, and agricultural production.

Many early routes used by these indigenous peoples are still in use today and were originally based on early migration patterns. By instinct, herds of buffalo would find their way through this territory by selecting the lines of least resistance. One of their routes was through the mountain gap between present-day Zionville, North Carolina, and Trade, Tennessee, and into the upper part of the area drained by the Watauga River. They followed the creeks and the river itself, around Buffalo Mountain—near today's Johnson City—and into the valley near where the Watauga flows into the South Fork Holston River—the site of today's Boone Reservoir. These buffalo trails became roads followed by hunters, then pioneers, and later became routes for stagecoaches and railroads.

The first European visitors to the area followed these paths through the mountain gaps and along the waterways and settled near the rivers. During the 1760s, Daniel Boone came through the gap, followed the buffalo trail, and visited the Watauga area as a hunter. In 1768, William Bean settled at the mouth of Boone's Creek, to be followed by friends and

others from Virginia and North Carolina. Still others came down the Holston Valley out of Virginia. In 1772, these first white settlers formed the Watauga Association, believed to be the first independent governmental body constituted west of the mountains and by American-born freeman. The Watauga Association and others from North Carolina acquired land from the Cherokees at the famous treaty site at Sycamore Shoals on the Watauga.

The immigration of European white settlers into this frontier led to new territorial claims, conflicts, and adjustments. Disagreement and disputes over boundaries were inevitable, and the Holston and Watauga valleys were centers of activity. Skirmishes between the Cherokees and the new settlers occurred. Land claims were complicated by land grants from Virginia, claims for settling and clearing virgin acres, and Lord Granville's North Carolina grants. Both Virginia and North Carolina formed counties in an area they each claimed. Settlers formed the State of Franklin, which existed between 1784 and 1788, with its capitol in Jonesborough. Those who followed John Tipton in opposing the Franklinites were known as "Tiptonites" and made their seat of government at Buffalo. North Carolina ceded its western lands in 1790 to the USA, and those lands became the Southwest Territory and later Tennessee. The temporary seat of government was located at Rocky Mount, home of William Cobb near the Watauga River. Even though the Virginia-Tennessee boundary was set in 1803, as it remains today, the legal jurisdiction dispute was not put to rest until a U.S. Supreme Court decision in 1903.

This upper east Tennessee area served as an important point of departure for expeditions for both opening up new lands and protecting settled territory. From Long Island on the Holston, Daniel Boone departed in 1775, marking the trail for pioneers to follow, eventually through the Cumberland Gap and into Kentucky. In the fall of 1780, the men of the region marched from Sycamore Shoals to the upper reaches of the Watauga watershed and through Carver's Gap of Roan Mountain to fight and defeat the British troops under Colonel Patrick Ferguson at Kings Mountain. During the last years of the 18th century, two separate expeditions left Long Island to settle middle Tennessee and Nashville. The James Robertson party went overland, while the Donelson party traveled by rivers.

The early 1800s saw the extension of commerce, growing settlements, and the development of transportation systems. Area farmers grew wheat, rye, corn, barley, oats, and tobacco, and they raised cattle and swine. While the Long Island area served as a crossroads for migratory settlers and for Cherokee trails, it also was the head of navigation for the Tennessee River system. Salt, iron, and tobacco from southwest Virginia, brought by packhorse and wagon to the Holston River, were loaded on flatboats and floated as far as Nashville or New Orleans. Retail, wholesale, and shipping businesses grew around William King's Boatyard, which served as an important distribution and transfer point. In 1822, the City of Kingsport was formed there. In 1825, the first stage line was established connecting Nashville and Salem, North Carolina, via Knoxville, Johnson City, Elizabethton, and Boone Gap. In 1831, a cotton-spinning factory began operation on Boone's Creek, 9 to 10 miles from Jonesborough—the first factory of its kind in this part of east Tennessee.

In 1858, the East Tennessee and Virginia Railroad was completed between Knoxville and Bristol. It traveled through Johnson City but bypassed Kingsport. The railroad connection from Richmond and Lynchburg through southwest Virginia to Bristol also was completed in the mid-1800s.

During the Civil War, while the area was not affected by major battles, mixed loyalties among residents and alienation among families took a heavy toll. After the war, reconstruction was difficult and progress slowed. During the latter part of the 19th century, the growth of railroads helped towns regain momentum and prosper. Signs of progress in upper east Tennessee were occurring throughout the region. Changes in Johnson City exemplified this progress. New churches and schools were built, and a newspaper was established. The first real estate company was founded, as were other industries such as a tannery, foundry, and machine works. Railroad branches such as the Virginia Creeper at Abingdon linked Bristol with areas rich in timber and coal resources.

Industrialization continued into the new century, and by 1915, the Clinchfield Railroad from Spartanburg, South Carolina, to Elkhorn City, Kentucky, was completed. City planner John Nolen was hired by area leadership and drew up plans for a new industrial city of 50,000. In 1917, the new City of Kingsport was incorporated. While some industries were successfully recruited before World War I, it was after the war that Kingsport's new industrial base took shape. Eastman Kodak Company, *Kingsport Press*, Mead Fiber Company, Holliston Mills, Blue Ridge Glass, The Borden Company, and others became established there during the 1920s. Kingsport grew dramatically during the Great Depression—largely due to new product lines at Tennessee Eastman Corporation. Industrial employment quintupled between 1935 and 1945, partly due to national defense work associated with World War II. The U.S. Census of 1950 gives the following population data for the industrial cities of the upper Holston: Johnson City, 27,864; Kingsport, 19,571; Bristol, Tennessee, 16,771; Bristol, Virginia, 15,954; and Elizabethton, 10,754.

The post-World War II economy of the Upper Holston area rapidly changed from one predominantly rural in character to one more equally divided between agriculture and industry. This change provided larger incomes for families of the area and made additional demands for trained personnel in business, industry, and agriculture. The wartime baby boom created need for more schools in the 1950s and 1960s. In the late 1970s, completion of interstate highways through the area linking the east coast with points west not only improved accessibility for travelers, business persons, and local residents, but stimulated more development. Homes "out in the county," neighborhood shopping centers, fast food outlets, shopping plazas, office parks, and scattered residential subdivisions became more accessible and demanded even better roads.

While the Upper Holston reservoirs were envisioned to provide flood control and electricity, they also provided new sources of recreation. The management of water levels by TVA provides seasonal recreation opportunities. Conveniently accessible to area residents, these reservoirs provided an attractive site for second-home development and lake cottages. By the year 2000, tremendous population growth in the area expanded

populations in the following cities: Johnson City, 55,469 people; Kingsport, 44,905 people; Bristol, Tennessee, 24,821 people; Bristol, Virginia, 17,367 people; Blountville, 2,959 people; Bluff City, 1,559 people; and Elizabethton, 13,372 people.

3.2. The Projects

Beaver Creek Dam was completed in 1965 to provide flood protection and recreation for the Bristol, Tennessee-Virginia, area. Beaver Creek is a flood detention dam with no permanent reservoir pool. The dam is 85 feet high and 1,588 feet long. The detention basin has a flood storage capacity of 5,020 acre-feet.

The downtown businesses of Bristol, Tennessee and Bristol, Virginia, as well as residential neighborhoods and businesses, have been affected by periodic, unpredictable flooding along Beaver Creek. In 2004, the U.S. Army Corps of Engineers (USACE), Nashville District, undertook a flood damage reduction study for Beaver Creek pursuant to Section 205 of the 1948 Flood Control Act. As part of the study, the USACE prepared an Environmental Assessment (EA) evaluating various alternatives for alleviating flood damage in the cities of Bristol, Tennessee and Bristol, Virginia (USACE 2004). The USACE's preferred alternative included widening selected channels, removal of a building, bridge improvements, and modification to the Beaver Creek Dam. TVA was a cooperating agency for the EA. In March 2006, TVA adopted the USACE EA and signed a Finding of No Significant Impact (TVA 2006). Subsequently, TVA and USACE developed a draft Memorandum of Agreement (MOA) for construction, operation, and maintenance of the proposed outlet structure on Beaver Creek Dam. However, the MOA was never signed and the construction of the modified outlet has not begun.

Clear Creek Dam and Reservoir, adjacent to Beaver Creek, was also completed in 1965 to provide flood protection and recreation for the Bristol, Tennessee-Virginia, area. Clear Creek Dam is 51 feet high, 670 feet long, and has a flood-storage capacity of 2,511 acre-feet. Clear Creek Reservoir stretches 0.6 mile upstream from the dam.

Beaver Creek and Clear Creek dams together were projected to reduce the average annual flood damage by 80 percent in Bristol, Tennessee-Virginia.

3.3. The Present Shoreland

3.3.1. Physiographic Overview

The Beaver Creek and Clear Creek reservoirs are located within the Ridge and Valley ecoregion of Tennessee. This region occurs between the Blue Ridge Mountains on the east and the Cumberland Plateau on the west and is a relatively low-lying area made up of roughly parallel ridges and valleys that were formed through extreme folding and faulting events in past geologic time (Griffith et al. 1998).

Beaver Creek and Clear Creek reservoirs are located within the Southern Limestone/Dolomite Valleys and Rolling Hills subregion. This is a heterogeneous region

composed predominantly of limestone and cherty dolomite. Landforms are mostly undulating valleys and rounded ridges and hills, with many caves and springs. Soils vary in their productivity, and land cover includes oak-hickory and oak-pine forests, pasture, intensive agriculture, urban and industrial land uses.

3.3.2. Land Use and Prime Farmland

Collectively, Beaver Creek Reservoir and Clear Creek Reservoir are known as the Bristol Project. The existing shoreline, on either reservoir, supports no developed subdivisions having the landrights to request private water use facilities. Historically, no areas on these reservoirs have been permitted shoreline access across public land.

Any structures placed below the 1,901.0 maximum shoreline contour (MSC) on Beaver Creek Reservoir and below the 1,967.0 MSC on Clear Creek Reservoir are subject to Section 26a of the *TVA Act of 1933*, as amended. Section 26a is designed to ensure that construction along the shoreline and in waters of the Tennessee River system and the TVA reservoirs does not adversely impact TVA's responsibility for managing the river system and for achieving "Unified Development and Regulation of the Tennessee River." For more information on TVA's SMP, see Section 2.5 of this RLMP.

Beaver Creek is a flood detention dam with no permanent reservoir pool and has approximately 1.2 miles of shoreline. Today, there are approximately 290 acres of Beaver Creek Detention Reservoir shoreland, on which future land uses can be planned. TVA-managed public land located on Beaver Creek Reservoir, contains approximately 250 acres of the 400-acre Sugar Hollow Park. It is under easement to the City of Bristol to provide developed recreation facilities. Sugar Hollow Park offers a variety of facilities including a softball complex, soccer fields, picnic tables, picnic shelters, the Waldo Miles pavilion, a campground, a swimming pool, playgrounds, biking trails, and hiking trails. The remainder of the 40 acres on Beaver Creek Reservoir makes up the Beaver Creek Dam Reservation.

Figure 1 represents the percent of land acreage on Beaver Creek Reservoir that is allocated to each land use zone. Developed Recreation (Zone 6) comprised the largest portion (86 percent) of all zones allocated for Beaver Creek Reservoir. The only other zone allocation for Beaver Creek Reservoir is Project Operations (Zone 2) comprising 14 percent. There were no allocations to Sensitive Resource Management (Zone 3), Natural Resource Management (Zone 4), Industrial (Zone 5), and TVA Shoreline Access (Zone 7). No additional shoreland was allocated to Non-TVA Shoreland (Zone 1).

TVA-managed land located on Clear Creek Reservoir is made up of the dam reservation only and is approximately 14 acres. This land includes about 0.1 mile of the total 2.2 miles of shoreline. A public golf course surrounds this land. The fishing docks at the reservoir are accessible via the golf course fairway. Project Operations (Zone 2) is the only zone allocation for TVA-managed land on Clear Creek Reservoir.

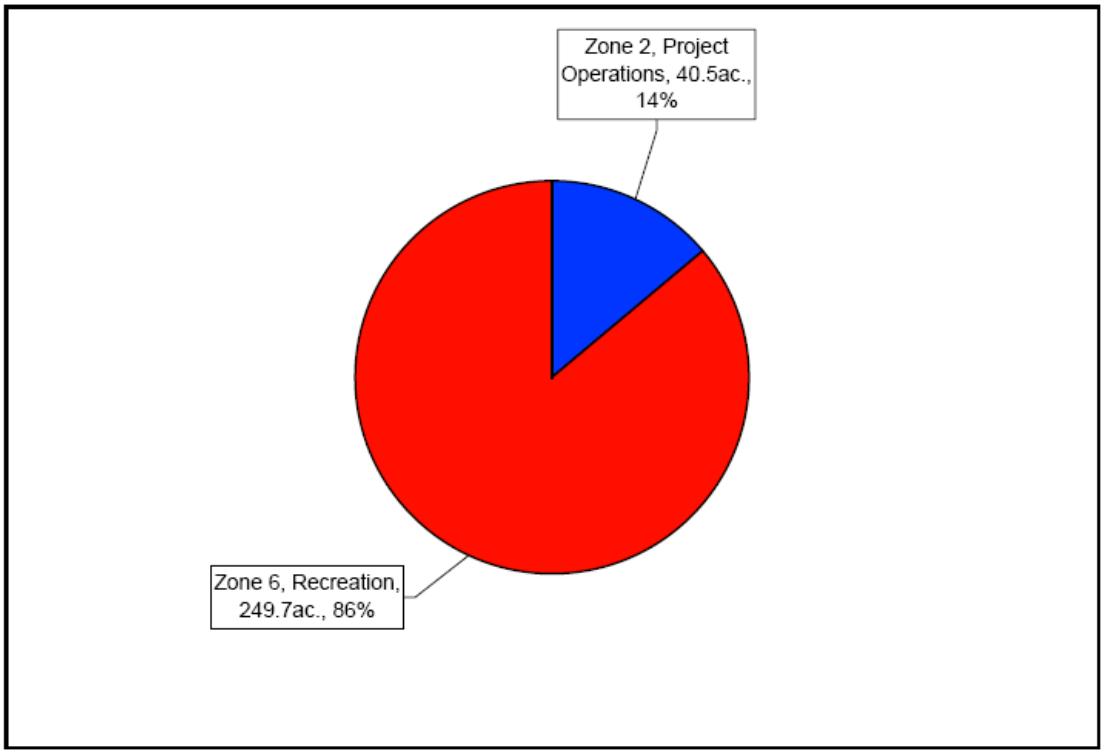

Figure 1. Percent of Beaver Creek Reservoir Acreage Allocated by Zone

Beaver Creek Reservoir contains 18.2 acres of identified prime farmland on Parcel 3. There is no identified prime farmland on Clear Creek Reservoir. In addition to this acreage, the Commonwealth of Virginia recognizes an additional 120 acres of land of statewide importance on Beaver Creek Reservoir and 3 acres on Clear Creek Reservoir (see Volume I, Appendix G and Table 3-6). Prime farmland has the best combination of soil physical and chemical characteristics for producing food and fiber and is protected from conversion to industrial and nonagricultural uses by the U.S. Department of Agriculture (USDA). These 18.2 acres occur in Zone 6 (Developed Recreation), where major soil disturbances could occur on Zone 6 (Developed Recreation), in specific locations, if recreation facilities are constructed. Conversely, large areas could remain unaffected for more dispersed recreation management. For detailed information on land use and prime farmland, see Volume I, Sections 3.2 and 3.4.

3.3.3. Recreation

TVA's recreation vision seeks to enhance recreation opportunities and address unmet recreation needs while managing resources on Beaver Creek and Clear Creek reservoirs. Developed recreation provides modern facilities and amenities on shoreline properties such as campgrounds, lodges, marinas, developed boat launches/ramps, and a myriad of day use facilities (picnic areas, swimming beaches, and fishing piers). These TVA lands are primarily allocated as Zone 6 (Developed Recreation) and as Zone 2 (Project Operations) because developed recreation facilities may occur on Dam Reservations (see Table 1 for land use zone definitions).

Dispersed recreation areas opportunities provide passive, unconfined opportunities that are predominantly nature-based. In general, areas that provide dispersed recreation amenities contain one or more of the following: rustic trails for fishing access/walking/hiking and horseback riding; primitive campsites; unimproved swimming and launching sites; and hunting and fishing areas. The TVA areas that provide dispersed recreation opportunities on TVA lands include many proposed Zone 2 parcels such as substations and dam reservations, Zone 3 and 4 parcels, and undeveloped Zone 6 parcels (see Table 1 for land use zone definitions).

Developed recreation facilities and amenities on Beaver Creek and Clear Creek reservoirs include one campground with day use facilities: one picnic area, one golf course, one swimming pool, two fishing piers, and a variety of ball fields. Beaver Creek and Clear Creek reservoirs parcel descriptions (see Section 4.0) further describe the management entity and management prescription of recreation facilities on these lands managed either by TVA or under contractual agreement to another government entity or commercial operator. Table 2 itemizes developed recreation area lands that are managed by TVA or are under contractual agreement for recreation purposes, their managing agency/entity, and their locations by parcel number. Table 2 does not include privately owned/operated recreation facilities that are adjacent to Beaver Creek and Clear Creek shoreline, because they are private and beyond the scope of this RLMP.

Table 2. Developed Recreation Areas on TVA Lands on Beaver Creek and Clear Creek Reservoirs

Reservoir	Recreation Area	Managing Entity	Location
Beaver Creek	Sugar Hollow Park	City of Bristol, Virginia	Parcels 1, 2 and 3
Clear Creek	Clear Creek Golf Course	City of Bristol, Virginia	Parcel 1

Dispersed recreation areas on Beaver Creek and Clear Creek reservoirs were assessed, and analysis of the data qualified two areas as beyond the biophysical “Limits of Acceptable Change” (LAC). Areas that exceeded the LAC may be prioritized by the watershed team and proposed for improvements. There are no dispersed recreation areas or sites on Beaver Creek and Clear Creek reservoirs. A site is defined as an area of impact where a recreation activity occurs; an area is the sum of the sites near one another on a TVA parcel. For detailed information on recreation, see Volume I, Section 3.3.

3.3.4. Terrestrial Ecology

The Ridge and Valley ecoregion contains long stretches of ridges with adjacent valleys that run in a southwestern-to-northeastern direction. The variety of landforms, soils, climate, and geology across the Ridge and Valley have allowed for an extremely diverse assemblage of animals. Deciduous forests and mixed evergreen-deciduous forests provide wildlife habitat among the intense agriculture and urban sprawl.

Oak-hickory forest is the most abundant forest type in the eastern U.S. (Flather et al. 1999) and is prevalent in the Beaver Creek and Clear Creek reservoirs region. Numerous bird species nest in deciduous forests, for example wild turkey, whip-poor-will, ruby-throated hummingbird, red-eyed vireo, blue-headed vireo, wood thrush, gray catbird, black-throated green warbler, black-and-white warbler, ovenbird, hooded warbler, and the scarlet tanager.

Evergreen and evergreen-deciduous forests account for 35 percent of the land cover for the Beaver Creek and Clear Creek reservoirs area (Tennessee Department of Environment and Conservation 2000; 2006a; 2006b). This type of forests provide nesting habitat for woodland birds including pine and yellow-throated warbler, great crested flycatcher, and chuck-will's-widow. Birds that winter in this forest type include red-breasted nuthatch, red crossbill, and pine siskin. Other animals that inhabit evergreen and evergreen-deciduous forests but are not restricted to them include white-tailed deer, wild turkey, black bear, eastern mole, southern bog lemming, eastern kingsnake, smooth earth snake, eastern fence lizard, and six-lined racerunner.

Additionally, streams, wetlands, and other seasonally wet areas in this forest type provide habitat for a variety of salamanders, frogs, and toads. The riparian zones along streams within deciduous forests provide nesting habitat for Acadian flycatchers, northern parula, and Louisiana waterthrush. Many additional bird species migrate through and winter in the area. Common mammal species of deciduous forests include black bear, white-tailed deer, red bat, eastern chipmunk, eastern gray and southern flying squirrels, white-footed mouse, southern red-backed and woodland vole, short-tailed shrew, gray fox, least weasel, and bobcat. For detailed information on terrestrial ecology, see Volume I, Section 3.5.

3.3.5. Invasive Nonnative Species

Most of the planned TVA parcels around Beaver Creek and Clear Creek reservoirs contain a substantial amount of invasive nonnative species. EO 13112 defines an invasive nonnative species as any species, including its seeds, eggs, spores, or other biological material capable of propagating that species, that is not native to that ecosystem; and whose introduction does or is likely to cause economic or environmental harm or harm to human health (USDA 2007).

According to the Federal Noxious Weed List of 2006 (USDA 2007), there are no known federal noxious weeds reported from the lands around Beaver Creek, Clear Creek, or the other NTRs. In addition, Southeastern Exotic Plant Pest Council (2006) provides a list of nonnative invasive species that could pose potential threats to native ecosystems and human health for each southeastern state. In reviewing the Tennessee exotic plant pest list (Tennessee Exotic Plant Pest Council 2001), there were 15 (Rank 1) species that pose a severe threat to native ecosystems observed in the NTRs region. Plants listed as a severe threat include the following: autumn olive, bush honeysuckle, Chinese lespedeza, Chinese privet, English ivy, garlic mustard, Japanese honeysuckle, Japanese stiltgrass, Johnson grass, kudzu, mimosa, multiflora rose, oriental bittersweet, princess tree, and tree of heaven. Other nonnative species such as crown vetch, tall fescue, shrubby bushclover,

Queen Anne's lace, periwinkle, and small carpet grass were also referenced. All of these species have the potential to adversely impact the native plant communities because of their potential to spread rapidly and displace native vegetation. All of the Rank 1 (severe threat) species are considered to be of high priority to TVA (James 2002).

3.3.6. Endangered and Threatened Species

TVA biologists and natural resource specialists used the TVA Natural Heritage database to assess the endangered and threatened species within and around each of the NTRs. The TVA Natural Heritage database was created to ensure that environmental compliance activities are conducted in a consistent manner across the TVA Region and that these activities meet the requirements of NEPA and the *Endangered Species Act* (ESA). Database searches are based on the following criteria: (1) distance, (2) presence/absence of suitable habitats, (3) element occurrence rank values, and (4) species or type of element present. Accordingly, plants are assessed within a 5-mile radius, aquatic species within 10 miles, and terrestrial species within 3 miles. Federally listed and state-listed species identified during field reviews and/or results from the TVA Natural Heritage database searches are presented in Table 3.

Table 3. Federally Listed and State-listed Species Within and Near Beaver Creek and Clear Creek Reservoirs

Common Name	Scientific Name	Federal Status	State Status*	State Rank
Indiana Bat	*Myotis sodalis*	LE	END**	S1
Cherokee Clubtail	*Gomphus consanguis*	--	NOST**	S2
Tennessee Dace	*Phoxinus tennesseensis*	--	NMGT	S3
Tennessee Pigtoe***	*Fusconaia barnesiana*	--	SC	S2

Federal status abbreviations: LE = Listed endangered
State status abbreviations: END = Endangered; NMGT = In need of management; NOST = No status; SC= Special concern
State rank abbreviations: S1 = Critically imperiled, often with five or fewer occurrences, S2 = Imperiled, often with <20 occurrences; S3 = Rare or uncommon, often with <80 occurrences
* Tennessee record unless otherwise specified
** Virginia record
***Historic record

3.3.6.1. *Plants*

Reviews of the TVA Natural Heritage database did not indicate any federally listed endangered or threatened plant species within 5 miles of Beaver Creek and Clear Creek reservoirs. Likewise, no designated critical habitat for rare plants is present within or near Beaver Creek and Clear Creek reservoirs. For detailed information on plant communities, see Volume I, Section 3.6.

3.3.6.2. Terrestrial Wildlife

Field surveys and reviews of the TVA Natural Heritage database indicated that one federally listed endangered species and one Virginia state-listed species occur within and near Beaver Creek and Clear Creek reservoirs. For detailed information on terrestrial wildlife, see Volume I, Section 3.6.

3.3.6.3. Aquatic Wildlife

Two Tennessee state-listed species, the Tennessee pigtoe and Tennessee dace, have been reported to occur downstream of Clear and Beaver Creek reservoirs. No state- or federally listed aquatic species are known from the reservoir area.

The Tennessee pigtoe typically occurs in small- to medium-sized rivers in middle and east Tennessee. Habitat generally consists of substrates of coarse sand, silt, and gravel in less than 2 feet of water (Parmalee and Bogan 1998). This particular record, located downstream of the Clear and Beaver Creek reservoirs, is historical and may no longer occur at this particular locality. According to records found in the TVA Natural Heritage database, the Tennessee pigtoe has not been seen in Clear and Beaver Creeks since 1975.

Tennessee dace are restricted to small low-gradient streams in the upper Tennessee River drainage. Streams are typically no bigger than 6 feet wide. Several records have been reported from small tributaries to Beaver Creek, downstream of the Clear and Beaver Creek impoundments. A review of the TVA Natural Heritage database found that it was last observed in Clear and Beaver Creeks in 1995. For detailed information on aquatic wildlife, see Volume I, Section 3.6.

3.3.7. Wetlands

Wetlands are transitional ecosystems between terrestrial and aquatic communities, where saturation with water is the dominant factor in determining the types of plants and animals present. Wetlands are ecologically important because of their beneficial effect on water quality, their moderation of flow regimes by retaining and gradually releasing water, their value as wildlife habitat, and as areas of botanical diversity. Wetlands exist within and adjacent to TVA reservoirs, and are influenced by surface water and groundwater connections to the water levels in these reservoirs.

Field surveys were conducted to determine types and locations of wetlands on uncommitted parcels on each reservoir. Wetlands on uncommitted parcels were also categorized by their functions, sensitivity to disturbance, rarity, and irreplaceability. Based on estimates from the U.S. Fish and Wildlife Service National Wetlands Inventory maps combined with data sets developed for TVA's 2004 *Reservoir Operations Study*, Beaver Creek Reservoir has approximately 6 acres of wetland habitat, and Clear Creek Reservoir has approximately 12 acres of wetlands. No field surveys were conducted for either Beaver Creek or Clear Creek reservoirs, because there were no uncommitted parcels associated with these reservoirs. For detailed information on wetland resources, see Volume I, Section 3.7.

3.3.8. Floodplains

For Beaver Creek Dam, the area impacted by the RLMP extends from the lower limit of Sugar Hollow Park at approximately Beaver Creek Mile 22.3 to approximately Mile 23.7. Beaver Creek Dam is located at Beaver Creek Mile 22.5. Beaver Creek Dam is a flood

detention dam and has no permanent reservoir pool. The 100-year floodplain for Beaver Creek is the area that would be inundated by the 100-year flood. We have no flood information for the area downstream of Beaver Creek Dam. The 100-year flood elevation for Beaver Creek, upstream of Beaver Creek Dam, is 1,855.5 feet mean sea level (msl) from the dam to the upper end of the TVA landrights at approximately Mile 23.7. The 500-year flood elevation for Beaver Creek, upstream of Beaver Creek Dam, is 1,865.4 feet msl from the dam to the upper end of the TVA landrights at approximately Mile 23.7.

For Clear Creek Dam the area impacted by the RLMP extends from the lower limit of TVA's property at approximately Clear Creek Mile 2.6 to approximately Mile 4.2. Clear Creek Dam is located at Clear Creek Mile 2.8. The 100-year floodplain for Clear Creek is the area that would be inundated by the 100-year flood. We have no flood information for the area downstream of Clear Creek Dam. The 100-year flood elevation for Clear Creek, upstream of Clear Creek Dam, is 1,939.0 feet msl from the dam to the upper end of the TVA landrights at approximately Mile 4.2. The 500-year flood elevation for Clear Creek, upstream of Clear Creek Dam, has not been determined.

All msl measurements are according to the National Geodetic Vertical Datum model of 1929.

3.3.9. Cultural and Historic Resources

Relatively little archaeological research has been conducted near Beaver Creek. One archaeological resource has been identified in the Beaver Creek Reservoir area, as a result of a requested easement across TVA property. The Resting Tree Cemetery is reportedly one of the cemeteries that served the enslaved communities of the Preston family in 19th century Washington County, Virginia (Klatka 2005).

Prior to transferring Clear Creek Reservoir to the City of Bristol, TVA conducted an archaeological survey of 428 acres surrounding the reservoir (DuVall et al.1994; Shumate and Shumate 1995). Nine archaeological sites dating from the 19th to the 20th centuries were identified during the survey. To determine the National Register of Historic Places (NRHP) eligibility status of the nine sites, additional archaeological investigations were conducted (Shumate and Shumate 1995). The study concluded that only one of the nine sites, the Teeter home site, retained enough integrity to be eligible for the NRHP. For detailed information on the cultural and historic resource review process, see Volume I, Section 3.9.

3.3.10. Managed Areas and Sensitive Ecological Sites

Natural areas include managed areas, ecologically significant sites, and Nationwide Rivers Inventory streams. *Managed areas* include lands held in public ownership that are managed by an entity (e.g., TVA, USFS, State of Tennessee, Sullivan County) to protect and maintain certain ecological and/or recreational features. A management plan or similar document defines what types of activities are compatible with the intended use of the managed area. *Ecologically significant sites* are tracts of privately owned land either that

are recognized by resource biologists as having significant environmental resources or identified tracts on TVA lands that are ecologically significant but not specifically managed by TVA's Natural Areas Program. *Nationwide Rivers Inventory* streams are free-flowing segments of rivers recognized by the National Park Service as possessing outstandingly remarkable natural or cultural values.

A review of the TVA Natural Heritage database indicated no natural areas on or adjacent to Beaver Creek and Clear Creek reservoirs. Within a 3-mile radius of Beaver Creek Reservoir is Hickey Gap Road, an ecologically significant site. There are no sites within a 3-mile radius of Clear Creek Reservoir. For detailed information on managed areas and sensitive ecological sites, see Volume I, Section 3.10.

3.3.11. Water Quality and Aquatic Ecology

Unimpounded rivers of the Ridge and Valley ecoregion typically consist of limestone rubble and bedrock riffles, sandy silty pools, and some extensive sand and gravel shoals (Etnier and Starnes 1993). These conditions exist in upper reaches of reservoirs where free-flowing streams transition into impounded reservoirs as well as in reservoir tailwaters. Water discharged into the tailwaters can be very cold and have low dissolved oxygen content, impairing water quality. Subsequently, the stretch of river directly downstream of dams can have less diverse aquatic communities.

Beaver Creek Reservoir is a detention-only reservoir, meaning Beaver Creek is a free-flowing stream most of the time. The Virginia Department of Game and Inland Fisheries has designated Beaver Creek as a stockable trout water. Unlike Beaver Creek, Clear Creek is an impounded reservoir; however, it is relatively small, approximately 46 acres at full pool.

Beaver Creek and Clear Creek are not included in TVA's Reservoir Ecological Health Monitoring Program because of their small size and operational characteristic. For detailed information on Reservoir Ecological Health Monitoring Program, see Volume I, Section 3.12. TVA measures water quality in Beaver Creek and Clear Creek using two indices: Index of Biotic Integrity (IBI) and EPT (Ephemeroptera, Plecoptera, Trichoptera) Index (see Tables 4 and 5).

Table 4. Aquatic Community Condition Based Upon the Index of Biotic Integrity Scores for Beaver Creek and Clear Creek Reservoirs

Sample Year	Beaver Creek (Creek Mile 17.6)	Clear Creek (Creek Mile 0.4)
1995	Poor	Fair
1996	Very Poor/Poor	Poor/Fair
1997	-	Fair
2002	Poor	-
2007	Poor	-

- = Data not available

IBI Scores	**12-22**	**28-34**	**40-44**	**48-52**	**58-60**
Community Condition	Very Poor	Poor	Fair	Good	Excellent

Table 5. Aquatic Community Condition Based Upon the EPT Scores for Beaver Creek and Clear Creek Reservoirs

Sample Year	Beaver Creek (Creek Mile 17.6)	Clear Creek (Creek Mile 0.4)
1995	Poor/Fair	Fair
1996	Fair	Good
1997	-	Fair
2002	Fair	-
2007	Fair	-

- = Data not available

EPT Index Scores	**0-5**	**7-11**	**>13**
Community Condition	Poor	Fair	Good

The IBI assesses stream environmental quality by applying ecologically based metrics or community characteristics to the resident fish community as originally developed by Karr (1981). Twelve metrics address species richness and composition, trophic structure, fish abundance, and fish condition. Each metric reflects the condition of one aspect of the fish community and is scored in comparison to an unimpacted stream of comparable size and location. Potential ratings for each metric are 1-poor, 3-intermediate, or 5-the best to be expected. Scores for the 12 metrics are summed to produce the IBI for the site with a range from 12 (all metrics poor) to 60 (all metrics good). The IBI is then classified using the system developed by Karr (1981) rating the site from "very poor" to "excellent." Results from benthic evaluations and habitat assessments are used to augment and understand results of the IBI score.

The EPT Index is named for three orders of aquatic insects that are common in the benthic macroinvertebrate community: *Ephemeroptera* (mayflies), *Plecoptera* (stoneflies), and *Trichoptera* (caddisflies). The EPT Index is based on the premise that high-quality streams usually have the greatest species richness. Greater pollution is expected to result in lower species richness. Based upon the total number of EPT families, a classification ranging from 0-5 (poor) to >13 (good) is assigned.

Beaver Creek was sampled at Creek Mile 17.6, 4.9 creek miles downstream from Beaver Creek Dam. Clear Creek data were collected at Creek Mile 0.4, approximately 2.4 creek miles below the dam. Although the data presented may not represent species found in the

reservoir itself, they are a reflection of the condition of Clear Creek as a whole (including the reservoir's influence on the stream), since the sampling station was only 0.4 mile from its confluence with Beaver Creek. These sites were chosen as stream sampling stations because they met TVA's criteria: all habitat types present, suitability for assessment of cumulative effects of pollutants entering the watershed, proximity to existing fixed surface water monitoring stations, and proximity of reservoirs or tributaries that might affect the number of fish species at that station due to immigrations.

Since 1995, IBI scores for Beaver Creek Reservoir have consistently rated poor. Benthic community scores for Beaver Creek have consistently rated fair. The most recent IBI and benthic data for Clear Creek Reservoir is from 1997, and both have consistently rated fair. Water quality data for all NTRs are available in Volume I, Section 3.13.

3.4. The Future

The City of Bristol has a permanent recreation easement on these TVA-managed areas. The cooperation between TVA and the City of Bristol is a successful example of how key natural and cultural resources, on public land, may provide developed recreation opportunities and minimize the effects of urbanization on natural areas.

As the Bristol area grows, development will have minimal impact on the natural resources of Beaver Creek and Clear Creek reservoirs. However, as the population of the area increases, there will be an increased demand on the recreation opportunities these reservoirs provide.

Beaver Creek and Clear Creek reservoirs are unique resources, which can be enjoyed by many future generations. For this to happen, the reservoirs must be able to accommodate increased demands that are placed upon them, or some demands must be curtailed. How these increased demands can be accommodated will depend on the actions of government, business, and civic leaders within the region, as well as those who come to enjoy the reservoirs, and adjacent property owners.

3.5. Parcel Allocations

The parcel allocations for Beaver Creek and Clear Creek reservoirs can be found below in Tables 6 and 7, which is the parcel information matrix that coincides with the Beaver Creek and Clear Creek reservoirs map. The tables identify each parcel number, allocation zone, number of acres, and parcel description. Non-TVA Shoreland (Zone 1) does not occur on Beaver Creek and Clear Creek reservoirs and is not included in Tables 6 and 7 because it is shoreland that TVA does not own in fee or land that TVA never purchased.

Table 6. Beaver Creek Reservoir Parcel Allocations

Parcel Number	Zone Allocations							Beaver Creek Reservoir Description
	Acres	2	3	4	5	6	7	
1	38.3					●		Sugar Hollow Park
2	40.5	●						Dam Reservation
3	211.4					●		Sugar Hollow Park
Total	290.2							
	Committed Land - Under current agreement, used for project operations, with sensitive resources, or fronting public recreation land.							
	Uncommitted Land - Land that is considered "Plannable".							

Table 7. Clear Creek Reservoir Parcel Allocations

Parcel Number	Zone Allocations							Clear Creek Reservoir Description
	Acres	2	3	4	5	6	7	
1	13.8	●						Dam Reservation
Total	**13.8**							
	Committed Land - Under current agreement, used for project operations, with sensitive resources, or fronting public recreation land.							
	Uncommitted Land - Land that is considered "Plannable".							

Page intentionally blank

4.0 PARCEL DESCRIPTIONS

4.1. Beaver Creek Reservoir Parcel Descriptions

(See exhibit map)

Note: Parcel descriptions represent the total acreage listed that lies above the 1,815.0-foot median shoreline contour for Beaver Creek Reservoir. Each parcel description is discussed in four sections: General Description, Recreation, Sensitive Resources, and Transfers/License/Easement/Lease Agreements. In cases where the recreation section is absent, recreation activities are not compatible with the use or allocation of the parcel.

Parcel 1 **38.3 Acres**
Common Name: **Sugar Hollow Park**
Allocation: **Zone 6 (Developed Recreation)**
Hydrologic Unit: **VA-06010102-007**
County: **Washington, Virginia**
Stream: *Beaver Creek Creek Mile 22.0*

General Description:
This parcel is part of the 400-acre Sugar Hollow Park. It is under easement to the City of Bristol to provide developed recreation facilities.

Private water use facilities will not be considered.

Recreation:
Sugar Hollow Park offers a variety of facilities, including a softball complex, soccer fields, picnic tables, picnic shelters, the Waldo Miles pavilion, a campground, a swimming pool, playgrounds, and biking and hiking trails. Much of the parcel is largely manicured by mowing and landscaping. It was placed in Zone 6 to reflect its committed use as a developed public recreation asset.

Sensitive Resources:
No sensitive resources surveys have been conducted on committed land. Existing data did not indicate any sensitive resources at this location.

Transfers/License/Easement/Lease Agreements:

- The City of Bristol has a permanent recreation easement on this entire parcel.
- The City of Bristol has a permanent road easement for Sugar Hollow Road on the southern end of this parcel.
- The Commonwealth of Virginia Highway Department has a permanent road easement on the southern end of this parcel for Highway 11.

Prior Forecast: No Forecast

Parcel 2 **40.5 Acres**
Common Name: **Dam Reservation**
Allocation: **Zone 2 (Project Operations)**
Hydrologic Unit: **VA-06010102-007**
County: **Washington, Virginia**
Stream: *Beaver Creek Creek Mile 22.50*

General Description:
Beaver Creek Dam was completed in 1965. The dam is 85 feet high and 1,588 feet long. The detention basin has a flood-storage capacity of 5,020 acre-feet. Beaver Creek is a flood detention dam with no permanent reservoir pool.

A road easement has been granted to the City of Bristol, VA for access to the industrial park complex, which was built on land that was bought from TVA in the mid-1990s. A portion of the access road is located on TVA's Beaver Creek Dam Reservation. This area is manicured and used for public recreation.

Private water use facilities will not be considered.

Recreation:
The nearby Sugar Hollow Park offers walking trails that ramble back and forth across the creek and dam area. The park also includes soccer and softball fields, as well as picnic areas and a campground.

Sensitive Resources:
No sensitive resources surveys have been conducted on committed land. Existing data did not indicate any sensitive resources at this location.

Transfers/License/Easement/Lease Agreements:

- The City of Bristol has a permanent road easement for Resting Tree Drive.

Prior Forecast: No Forecast

Parcel 3 **211.4 Acres**
Common Name: **Sugar Hollow Park**
Allocation: **Zone 6 (Developed Recreation)**
Hydrologic Unit: **VA-06010102-007**
County: **Washington, Virginia**
Stream: *Beaver Creek Creek Mile 23.0*

General Description:
This parcel is part of the 400-acre Sugar Hollow Park. It is under easement to the City of Bristol to provide developed recreation facilities. Much of the parcel is largely manicured by mowing and landscaping. It was placed in Zone 6 to reflect its committed use as a developed public recreation asset. This parcel contains 18.2 acres of identified prime farmland.

Private water use facilities will not be considered.

Recreation:
Sugar Hollow Park offers a variety of facilities including a softball complex, soccer fields, picnic tables, picnic shelters, the Waldo Miles pavilion, a campground, a swimming pool, playgrounds, and biking and hiking trails.

Sensitive Resources:
No sensitive resources surveys have been conducted on committed land. Existing data did not indicate any sensitive resources at this location.

Transfers/License/Easement/Lease Agreements:

- The City of Bristol has a permanent recreation easement on this entire parcel.
- The City of Bristol has a permanent road easement for Sugar Hollow Road on the southern end of this parcel.
- The City of Bristol Utility has a permanent easement for utilities for sewer.

Prior Forecast: No Forecast

4.2. Clear Creek Reservoir Parcel Descriptions

(See exhibit map)

Note: Parcel descriptions represent the total acreage listed that lies above the 1,963.0-foot median shoreline contour for Clear Creek Reservoir. Each parcel description is discussed in four sections: General Description, Recreation, Sensitive Resources, and Transfers/License/Easement/Lease Agreements. In cases where the recreation section is absent, recreation activities are not compatible with the use or allocation of the parcel.

Parcel 1 **13.8 Acres**
Common Name: **Dam Reservation**
Allocation: **Zone 2 (Project Operations)**
Hydrologic Unit: **VA-06010102-007**
County: **Washington, Virginia**
Stream: *Clear Creek Creek Mile 2.80*

General Description:
Clear Creek Reservoir, in southwest Virginia was built in the 1960s to provide flood protection and recreation for the Bristol, Tennessee-Virginia, area. Clear Creek Dam, which was completed in 1965, stands 51 feet high and is 670 feet long. Clear Creek Reservoir has a flood-storage capacity of 2,511 acre-feet and stretches 0.6 mile upstream from the dam. The area is largely dominated by the golf course and open manicured grasslands.

Private water use facilities will not be considered.

Recreation:
Clear Creek Reservoir, adjacent to Beaver Creek, features a public golf course that surrounds the scenic reservoir. The fishing docks at the reservoir are accessible via the golf course fairway.

Sensitive Resources:
Some forested habitat exists on the parcel providing some habitat to resident wildlife and migratory neotropic birds. Overall, the site provides limited wildlife habitat. No sensitive resources surveys have been conducted on committed land. Existing data did not indicate any sensitive resources at this location.

Transfers/License/Easement/Lease Agreements:

- The City of Bristol has a permanent recreation easement on this parcel.

Prior Forecast: No Forecast

5.0 LITERATURE CITED

DuVall, G. D., P. B. Ezzell, and D. E. Olinger. 1994. *Phase I Archaeological Survey of the TVA Clear Creek Reservoir Tract in Washington County, Virginia*.

Etnier, D. A. and W. C. Starnes. 1993. *The Fishes of Tennessee*. Knoxville: University of Tennessee Press.

Flather, C. H., S. J. Brady, and M. S. Knowles. 1999. *Wildlife Resource Trends in the United States: A Technical Document Supporting the 2000 USDA Forest Service RPA Assessment.* Gen. Tech. Rep. RMRS-GTR-33. Fort Collins, Colo.: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station.

Griffith, G. E., J. M. Omernik, and S. Azevedo. 1998. Ecoregions of Tennessee (color poster with map, descriptive text, summary tables, and photographs; map scale 1:250,000). Reston, Va.: U S. Geological Survey.

Grossman, D. H., D. Faber-Langendoen, A. S. Weakley, M. Anderson, P. Bourgeron, R. Crawford, K. Goodin, S. Landaal, K. Metzler, K. D. Patterson, M. Payne, M. Reid, and L. Sneedon. 1998. *International Classification of Ecological Communities: Terrestrial Vegetation of the United States, Volume 1: The Natural Vegetation Classification System: Development, Status, and Application*. Arlington, Va.: The Nature Conservancy. Available from <http://www.csu.edu/CERC/researchreports/documents/TerrestrialVegetationUnitedStatesVolumeI.pdf>.

James, W. K. 2002. *Nonnative, Noninvasive Species Suitable for Public Use Areas, Erosion Control/Stabilization and Wildlife Habitat Plantings.* Compiled by Wes James as a result of interdisciplinary team for the Implementation of the Executive Order of Invasive Species. Lenoir City, Tenn.: TVA Watershed Team Office, unpublished report.

Karr, J. R. 1981. "Assessment of Biotic Integrity Using Fish Communities." *Fisheries* (Bethesda) 6(6):21-27.

Klatka, T. S. 2005. *Archaeological Investigations at the Resting Tree Slave Cemetery (44WG0562) Near the City of Bristol in Washington County, Virginia*. Report submitted to the Tennessee Valley Authority, Knoxville, Tennessee.

McDonough, T. A. and G. D. Hickman. 1999. "Reservoir Fish Assemblage Index Development - A Tool for Assessing Ecological Health in Tennessee Valley Authority Impoundment," in *Assessing the Sustainability and Biological Integrity of Water Resources Using Fish Communities*, 523-540. Edited by T. Simon. Washington, D.C.: CRC Press.

Parmalee, P. W. and A. E. Bogan. 1998. *The Freshwater Mussels of Tennessee.* Knoxville: The University of Tennessee Press.

Shumate, M. S. and P. Evans-Shumate. 1995. *Phase II Testing at Eight Historic Sites and Phase I Survey of the Waterman's Mill Site in Clear Creek Lake Community, Washington County, Virginia.* Report submitted to the Tennessee Valley Authority, Knoxville, Tennessee.

Southeastern Exotic Plant Pest Council (SE-EPPC). 2006. *Invasive Plants of the 13 Southeastern States.* Retrieved from <http://www.invasive.org/seweeds.cfm> (Accessed September 24, 2008).

Tennessee Department of Environment and Conservation (TDEC). 2000. *Watauga River Watershed of the Tennessee River Basin, Water Quality Management Plan. Nashville, Tennessee.* Retrieved from <http://www.state.tn.us/environment/wpc/watershed/> (accessed September 23, 2008).

———. 2006a. *South Fork Holston River Watershed of the Tennessee River Basin, Water Quality Management Plan, Nashville, Tennessee.* Retrieved from <http://www.state.tn.us/environment/wpc/watershed/> (accessed: September 23, 2008).

———. 2006b. *North Fork Holston River Watershed of the Tennessee River Basin, Water Quality Management Plan, Nashville, Tennessee.* Retrieved from <http://www.state.tn.us/environment/wpc/watershed/> (accessed September 23, 2008).

Tennessee Valley Authority (TVA). 2006. Finding of No Significant Impact (FONSI) Bristol Flood Damage Reduction Study and Environmental Assessment (EA). Request for TVA Section 26a and Land Use Approvals for Bristol, Tennessee, and Bristol, Virginia Washington County, Virginia and Sullivan County, Tennessee. March 8, 2006. TVA Project No. 2004-144.

U.S. Department of Agriculture. 2007. *Invasive and Noxious Weeds*. Retrieved from <http://plants.usda.gov/java/noxiousDriver> (September 18, 2008).

U.S. Army Corps of Engineers (USACE). 2004. *Environmental Assessment. Beaver Creek, Bristol, Tennessee/Bristol, Virginia, Flood Damage Reduction Study. U.S. Army Corps of Engineers, Nashville District. 65pp.*

6.0 GLOSSARY OF TERMS

100-year floodplain	The area inundated by the 1 percent annual chance (or 100-year) flood.
agricultural licensing	Some parcels or portions of parcels designated for other purposes or uses may also be suitable for interim agricultural licensing. These parcels have been identified, using the criteria contained in TVA's agriculture instruction. Normal tenure for a TVA agricultural license is five years. Land with extreme erosion potential may not be licensed for agricultural use unless erosion and sediment controls, including the use of best management practices, can be successfully implemented. Further investigation and/or mitigation of adverse impacts to natural or cultural resources may be required prior to approval of license agreements.
benthic	Refers to the bottom of a stream, river, or reservoir.
dam reservation	Lands generally maintained in a park like setting by TVA to protect the integrity of the dam structure, hydroelectric facilities, and navigation lock. The reservation also provides for public visitor access to the TVA dam facilities and recreation opportunities, such as public boat access, bank fishing, camping, picnicking, etc.
deciduous	Vegetation that sheds leaves in autumn and produces new leaves in the spring.
dissolved oxygen	The oxygen dissolved in water, necessary to sustain aquatic life. It is usually measured in milligrams per liter or parts per million.
ecoregion	A relatively homogeneous area of similar geography, topography, climate, and soils that supports similar plant and animal life.
endangered species	A species in danger of extinction throughout all or significant portions of its range or territory. Endangered species recognized by the *Endangered Species Act* (ESA) or similar state legislation have special legal status for their protection and recovery.
evergreen	Vegetation with leaves that stay green and persist all year.
evergreen-deciduous	Vegetation consisting of a mixture of plants that are both evergreen and deciduous often referred to as mixed deciduous.

floodplains	Any land area susceptible to inundation by water from any source by a flood of selected frequency. For purposes of the National Flood Insurance Program, the floodplain, as a minimum, is that area subject to a 1 percent or greater chance of flooding (100-year flood) in any given year.
flowage easement land	Privately owned lakeshore properties where TVA has (1) the right to flood the land as part of its reservoir operations, (2) no rights for vegetation management, and (3) the authority to control structures, under Section 26a of the *TVA Act.*
forest	Vegetation having tree crowns overlapping, generally forming 60-100 percent cover (Grossman et al. 1998).
hydrologic units	Hydrologic Unit Codes (HUCs) are cataloging units assigned to each watershed by the U.S. Geological Survey for the purpose of assessment and management activities.
macroinvertebrates	Bottom-dwelling aquatic animals without vertebrates, such as mollusks and arthropods.
maximum shoreline contour (MSC)	An elevation typically 5 feet above the top of the gates of a TVA dam. It is often the property boundary between TVA marginal strip property and adjoining private property.
prime farmland	Generally regarded as the best land for farming, these areas are flat or gently rolling and are usually susceptible to little or no soil erosion. Prime farmland produces the most food, feed, fiber, forage, and oil seed crops with the least amount of fuel, fertilizer, and labor. It combines favorable soil quality, growing season, and moisture supply and, under careful management, can be farmed continuously and at a high level of productivity without degrading either the environment or the resource base. Prime farmland does not include land already in or committed to urban development, roads, or water storage.
riparian	The communities of plants and animals that occur within the influence of a stream, river, or body of water.
riparian zone	An area of land that has vegetation or physical characteristics reflective of permanent water influence. Typically a streamside zone or shoreline edge.
riprap	Stones placed along the shoreline for bank stabilization and other purposes.
riverine	Having characteristics similar to a river.

Section 26a review process	Section 26a of the *TVA Act* requires TVA review and approval of plans for obstructions, such as docks, fills, bridges, outfalls, water intakes, and riprap, before they are constructed across, in or along the Tennessee River and its tributaries. Applications for this approval are coordinated appropriately with TVA programs and the U.S. Army Corps of Engineers (USACE). USACE issues a joint public notice for those applications that are not covered by a USACE nationwide, general, or regional permit. The appropriate state water pollution control agency must also certify that the effluent from outfalls meets the applicable water quality standards.
scrub-shrub	Woody vegetation less than about 20 feet tall. Species include true shrubs, young trees, and trees or shrubs that are small or stunted because of environmental conditions.
shoreline/shoreland	The line where the water of a TVA reservoir meets the shore when the water level is at the normal summer pool elevation.
substrates	The base or material to which a plant is attached and from which it receives nutrients.
threatened species	A species threatened with extinction throughout all or significant portions of its range or territory. Threatened species recognized by the ESA or similar state legislation have special legal status for their protection and recovery.
tributary reservoirs	Impoundments created by dams constructed across streams and rivers that eventually flow into the Tennessee River.
wetlands	As defined in *TVA Environmental Review Procedures*, "Wetlands are those areas inundated by surface or groundwater with a frequency sufficient to support and under normal circumstances do or would support a prevalence of vegetation or aquatic life that requires saturated or seasonably saturated soil conditions for growth and reproduction. Wetlands generally include swamps, marshes, bogs, and similar areas, such as sloughs, potholes, wet meadows, mud flats, and natural ponds.
wildlife management area	Land and/or water areas designated by state wildlife agencies, such as the Tennessee Wildlife Resources Agency, for the protection and management of wildlife. These areas typically have specific hunting and trapping regulations as well as rules regarding appropriate uses of these areas by the public.

woodland	Open stands of trees with crowns not usually touching, generally forming 25-60 percent cover (Grossman et al. 1998).