

CHAPTER 3

3.0 AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

This chapter describes the current conditions of various resources in the area of the nine mountain reservoirs and how these resources could be affected by implementation of a Mountain Reservoirs Land Management Plan (MRLMP). It begins with brief descriptions of each reservoir project. This is followed by a regional overview of potentially affected resources and descriptions of the anticipated impacts across the planning area. The remainder of Chapter 3 then presents more detailed descriptions of the affected resources and potential impacts for each reservoir.

3.1 The Mountain Reservoirs

This proposed land plan and EIS address nine TVA tributary reservoir projects in the southeast corner of Tennessee, the southwest corner of North Carolina, and northeast Georgia (Figure 1-1). The mountain reservoirs are operated for many purposes including flood control, augmentation of flows for navigation, hydropower production, water quality, recreation, and aquatic ecology. Several characteristics of these reservoirs are listed in Table 3-1.

Chatuge Reservoir

Chatuge Reservoir is located in Clay County, North Carolina, and Towns County, Georgia. The dam is on the Hiwassee River 4.5 miles upstream from Hayesville, North Carolina, and 2.5 miles downstream from the North Carolina-Georgia state line. This project was originally completed in 1942 without any hydroelectric generating facilities and was used to store water to augment generation at TVA's downstream Hiwassee and Apalachia dams as well as at TVA mainstream dams on the Tennessee River. The powerhouse with a single generating unit was completed in 1954.

Hiwassee Reservoir

Hiwassee Reservoir is located in Cherokee County, North Carolina. The dam is located on the Hiwassee River 20 miles downstream from Murphy, North Carolina. The concrete gravity dam contains two generating units with a combined capacity of 185,000 kilowatts. One unit is reversible and capable of pumping water from the tailwater of Apalachia Reservoir back into Hiwassee Reservoir. Construction began in 1936, and the dam was closed in 1940 with one operating generating unit. The second unit was placed into operation in 1956. Hiwassee Reservoir is fed by releases from TVA's Nottely and Chatuge dams and unregulated inflows from the 565-square-mile local drainage area.

Blue Ridge Reservoir

Blue Ridge Reservoir is on the Toccoa River in Fannin County, Georgia, and within the Chattahoochee National Forest. The dam is located west of Morganton, Georgia, and 2.5 miles east of Blue Ridge, Georgia. The Toccoa River becomes the Ocoee River when it enters Tennessee, and Blue Ridge Reservoir is the uppermost TVA project on this river system. Blue Ridge Dam was built by Tennessee Electric Power Company (TEPCO) and was completed in 1931. TVA purchased it and the reservoir in 1939 as a single-purpose power project. Blue Ridge Dam is constructed of earth fill with one primary generating unit

and a second small unit for providing minimum flows. Blue Ridge Reservoir's annual pool variation is primarily for power generation and also provides limited seasonal flood storage. The reservoir is periodically lowered to a much greater depth for dam safety inspections, and TVA is proposing an extended deep drawdown in the near future in order to repair the penstock and make other improvements to the dam.

Nottely Reservoir

Nottely Reservoir is located entirely in Union County, Georgia, and within the Chattahoochee National Forest. The dam is located southwest of Murphy, North Carolina, and 2.3 miles upstream from the Georgia-North Carolina state line. Nottely Reservoir is a multipurpose tributary project located on the Nottely River, a tributary of the Hiwassee River. The project was originally completed in 1942 without any hydroelectric generating facilities and was operated to augment generation at downstream dams. The powerhouse and single generating unit were completed in 1956.

Ocoee (1, 2, and 3) Reservoirs

The three Ocoee projects are located in Polk County, Tennessee. Ocoee 1 Reservoir (commonly known as Parksville Reservoir) is farthest downstream. The dam is located at Parksville, 16 miles east of Cleveland. Both the Ocoee 1 and Ocoee 2 projects were originally built by TEPCO and acquired by TVA in 1939. Ocoee 1 was originally a single-purpose power project and has little flood storage capacity. Most of the Ocoee 1 Reservoir shoreline is part of Cherokee National Forest.

Ocoee 2 Dam is located approximately 12.3 miles upstream from Ocoee 1 Dam and 5 miles downstream from Ocoee 3 Dam. The reservoir has no significant storage and is dependent on Ocoee 3 and Blue Ridge reservoirs for streamflow regulation. Ocoee 2 is unique in the TVA system as the dam diverts water into a 5-mile-long wooden flume, which conveys water to the powerhouse at River Mile 19.7. During routine power production operations, the entire flow of the river is diverted through the flume to the powerhouse. If excess water is being released upstream, some flow will be spilled at the Ocoee 2 Dam and flow through the original river channel. When water is not being diverted, the stretch of the Ocoee River between the Ocoee 2 Dam and powerhouse is heavily used for whitewater boating.

Ocoee 3 Dam is located approximately 5 miles upstream from Ocoee 2 Dam. In order to generate electricity, the dam diverts water into a 2-mile tunnel to the powerhouse at Ocoee River Mile (ORM) 25.0, 0.8 mile upstream from Ocoee 2 Dam. Ocoee 3 was completed in 1942 and is the only one of the four single-purpose power projects on the Toccoa/Ocoee River (Blue Ridge and Ocoee 1 and 2) that was built by TVA. Ocoee 3 Reservoir has a very limited storage volume capable of providing only daily flow regulation. Blue Ridge Reservoir, located upstream, provides some seasonal flow regulation.

Apalachia Reservoir

Apalachia Dam and Reservoir are located in Cherokee County, North Carolina, on the Hiwassee River 9.8 miles downstream from Hiwassee Dam and about 0.1 mile east of the Tennessee-North Carolina state line. The dam diverts water into an 8.3-mile pipeline and tunnel system that connects to the powerhouse 12 miles downstream of the dam in Polk County, Tennessee. Apalachia was constructed as a single-purpose power project. It has very limited storage in its normal operating range and is primarily a run-of-river project. Upstream seasonal storage is provided by Hiwassee, Chatuge, and Nottely reservoirs. Apalachia Reservoir also serves as the tail pond for the pump-turbine unit located immediately upstream at Hiwassee Dam. Almost all of the Apalachia Reservoir shoreline is

surrounded by the Nantahala National Forest and the powerhouse, and most of the pipeline/tunnel system is in Cherokee National Forest.

Fontana Reservoir

Fontana Reservoir is located in Graham and Swain Counties, North Carolina. The dam is 9.6 miles upstream from Cheoah Dam; 20 miles west of Bryson City, North Carolina; and 6.75 miles east of the Tennessee-North Carolina state line at Deals Gap. Fontana Dam was built during World War II to provide power for the war effort. It is TVA's highest dam and is one of the highest dams east of the Rocky Mountains. The Great Smoky Mountains National Park (GSMNP) borders the reservoir to the north, and the Nantahala National Forest borders the reservoir to the south. Fontana Reservoir has the greatest annual pool variation of any TVA reservoir.

Table 3-1. Reservoir Project Data

Reservoir	Dam Location	Length of Reservoir (miles)	Reservoir Surface (Acres)	Shoreline (miles)	June 1 Flood Guide (feet above msl*)	Top of Gates Elevation (feet above msl*)	Annual Pool Variation (feet)	Dam Location
Chatuge	HRM 121.0	13	6,840	128	1926	1928.0	8	HRM 121.0
Hiwassee	HRM 75.8	22.2	5,860	164.8	1521	1526.5	36	HRM 75.8
Blue Ridge	ToRM 53.0	11	3,180	68.1	1687	1691.0	19	ToRM 53.0
Nottely	NRM 21.0	20.2	3,950	102.1	1777	1780.0	15	NRM 21.0
Ocoee 1	ORM 11.9	7.5	1,930	47	829	837.7	9	ORM 11.9
Ocoee 2	ORM 24.2	negligible	negligible	negligible	N/A		N/A	ORM 24.2
Ocoee 3	ORM 29.2	7	360	24	1435	1435.0	7	ORM 29.2
Apalachia	HRM 66.0	9.8	1,070	31.5	1280	1280.0	8	HRM 66.0
Fontana	LTRM 61.0	29	10,230	237.8	1703	1710.0	50	LTRM 61.0

*Mean Sea Level
N/A = Not Applicable

HRM = Hiwassee River Mile
LTRM = Little Tennessee River Mile

NRM = Nottely River Mile
ORM = Ocoee River Mile

ToRM = Toccoa River Mile

3.1.1 Land Use

3.1.1.1 Affected Environment

Existing land use patterns along the shoreline and back-lying land have been influenced by whether TVA acquired the land and whether TVA has subsequently sold, transferred, or retained the land. TVA originally acquired 104,837 acres of land on the nine mountain reservoirs (Table 1-1). About 91 percent (95,462 acres) of this land has been transferred to other federal and state agencies for public use. The National Forest System land along the shorelines of the mountain reservoirs was originally acquired by TVA and transferred to the USFS. As described in Chapter 2, TVA typically retained the land below the MSC fronting the transferred lands; the transfer agreements allow for the management of these retained lands by the agencies consistent with their management of the adjacent back-lying land. TVA sold about 3,133 acres (3 percent) of the originally acquired land. Again, TVA typically retained the land below the MSC where these parcels were sold. The sale deeds typically allow for rights of ingress and egress across the TVA-retained strip of land, and therefore, the back-lying landowners typically have the right to apply to TVA for permits to construct private water use facilities on the TVA-retained land.

Most of the residential development along the reservoirs is on land TVA sold (with residential access rights across the retained land below the MSC) or on private land where TVA only has the right to flood to a certain elevation (Zone 1). Across the TVA reservoir system, 38 percent of the total shoreline is available for residential development, and a third of that shoreline had been developed by the mid-1990s (see Section 1.4).

In order to understand shoreline development trends on the mountain reservoirs better, TVA used aerial photography and Geographic Information System mapping to estimate the amount of shoreline that is available for residential development that has been developed. The proportion of developed residential shoreline ranges from 44 percent on Nottely Reservoir to 100 percent on the Ocoees, Hiwassee, and Apalachia (Table 3-2). The fully “built-out” reservoirs all have a relatively low proportion of the shoreline available for residential use. The residential development on the Ocoees is comprised of the “Cabin Sites” area on Ocoee 1 (Parksville Reservoir), and the cabins are located on National Forest System land under USFS special use permits (see Ocoee Projects Reservoir Land Plan Map). The vast majority of the residential use shoreline on Hiwassee Reservoir fronts the Bear Paw Community (see Hiwassee Reservoir Land Plan Map).

The ratio of developed to undeveloped shoreline on all reservoirs with undeveloped shoreline available for residential use has increased since the mid-1990s. This increase has been greatest on Chatuge Reservoir, which is now nearly three-quarters built out. Chatuge Reservoir also has the greatest proportion of shoreline, over half of the total shoreline, available for residential use. The differences between the amounts of shoreline available for residential development are based on differences in the way that TVA originally acquired land and later transferred and/or sold it. For example, Chatuge and Nottely reservoirs have more private shoreline available for residential use because TVA acquired less total acreage and more flowage rights than on the other mountain reservoirs. TVA’s Land Policy does not allow for additional land to be provided for residential use; therefore, the amount of shoreline available for residential use will not change as a result of the land planning process.

Table 3-2. Percent of Shoreline Open for Residential Development and Percent of Open Shoreline Developed

Reservoir	Percent of Total Shoreline Open for Residential Development*	Percent of Open Shoreline Developed
Chatuge	57	74
Hiwassee	4	100
Blue Ridge	38	71
Nottely	41	44
Ocoees	23	100
Apalachia	0**	100
Fontana	11	64

*Sum of flowage easement and residential access shoreline

**A negligible amount of residential shoreline development exists

TVA retained a total of 6,222 acres of land on the nine mountain reservoirs. Many of the parcels have existing land use agreements that commit a parcel to a specific use. The majority of the land use agreements are for uses such as utilities, highways, and other

public infrastructure. Many of these public infrastructure uses affect narrow linear tracts with small acreages.

Many of the land use agreements are for recreational use of TVA land, and the majority of those are for public recreation (Table 3-3). A large proportion of the 529 acres associated with the public recreation agreements are for campgrounds and day use areas developed by TVA and operated by local, county, and state government agencies; these include Poteete Creek Recreation Area on Nottely Reservoir and Clay County Park on Chatuge Reservoir. Other agreements are for municipal parks such as Konehete Park on Hiwassee Reservoir. The commercial recreation agreements include 25 for whitewater rafting on the Ocoee River downstream of the Ocoee 2 and 3 dams.

Table 3-3. Mountain Reservoirs Land Use Agreements by Category

Mountain Reservoirs Land Use Agreement Categories	2008	
	Number of Agreements	Acres (approximate)
Recreation		
Public Recreation	31	529
Commercial Recreation	35	473
Land Fronting National Forest System Lands	17	130
Project Operations		
Highways/Roads	46	731
Railroad	3	4
Municipal Uses (Office Buildings, Parking Lots, etc.)	8	9
Sufferance Agreements	2	2
Wastewater Treatment	7	14
Sewer Lines	7	5
Electric Lines	33	57
Telephone Lines	7	2
Water Lines	10	29
Other		
Sufferance Agreements	2	2
Private - Homes/Driveways	5	<1
Total	213	1987

Prime Farmland

Prime farmland is defined by the U.S. Department of Agriculture (USDA) as land that has the best combination of chemical and physical characteristics for meeting the nation’s short- and long-range needs for food and fiber. It could be cultivated land, pastureland, or forestland, but it is not urban, built-up land or covered by water. Concern over the conversion of prime farmland to urban or industrial use prompted the passage of the 1981 Farmland Protection Policy Act. This act requires that all federal agencies evaluate impacts to farmland prior to converting the land permanently to a nonagricultural land use. Form AD 1006, “Farmland Conversion Impact Rating,” must be completed by federal agencies with

assistance from the Natural Resources Conservation Service (NRCS) before action is taken.

Prime farmland soils surrounding the nine mountain reservoirs being evaluated as part of this environmental review are limited in acreage. The majority of soils designated as being prime farmland soils are found in narrow drainageways intersecting the various lakes and parcels of land that would be considered too small for intensive agricultural production. Based on acreage, those parcels containing sufficient prime farmland to warrant the completion of a Form AD 1006 are presented in the following sections. Although the acreage within selected parcels may warrant completion of a Form AD 1006, several factors that would require the consideration of alternative actions within each location may be missing. Primary among these are unit size, the availability of farm support services, distance from urban buildup, and compatibility with existing agricultural use.

3.1.1.2 Environmental Consequences

Under any of the alternatives, no significant direct or indirect impacts to land use are expected. The amount of shoreline available for residential development would not change, and the existing trends of increasing residential development in areas of the reservoirs currently available for development are more related to broad socioeconomic trends and would be unaffected by the land plan alternatives. Additionally, TVA's Land Policy prohibits allocation of additional lands or landrights for residential use or the disposal of reservoir lands for residential use. All alternatives are consistent with this policy.

Alternatives A and B would not result in any parcels changing from an undeveloped land use to a developed use. Alternative C would change five parcels (105.4 acres) from an undeveloped land use to a developed land use; however, at a minimum, only localized changes to land use patterns would result. When compared to the total scope of the MRLMP, these potential land use changes would be insignificant.

Alternative A

Selection of Alternative A would not result in any changes in existing land use for any of the planned parcels on any of the reservoirs. Two parcels (79 acres) on Hiwassee Reservoir that are currently undeveloped are allocated for Industrial and could potentially be developed. Most unplanned parcels are committed to their existing uses by transfer agreement covenants, deeded rights, or TVA land use agreements; therefore, the land use of the unplanned committed parcels also would not change. Unplanned parcels that are not committed to an existing use would be managed consistent with TVA's Land Policy and SMP and applicable laws, regulations, and EOs.

Alternative B

Alternative B would allocate all of the TVA lands to one of the seven zones and would not result in any changes in existing land use for any of the parcels. The land use of the committed parcels would not change.

Alternative C

Under Alternative C, the impacts on land use would be the same as under Alternative B on seven of the nine reservoirs. On Chatuge and Hiwassee reservoirs, an additional 27.2 acres would be allocated to Zone 5 (Industrial), and an additional 80.2 acres would be allocated to Zone 6 (Developed Recreation). The area allocated to Zone 4 (Natural

Resource Conservation) under Alternatives A and B would correspondingly decrease by 105.4 acres on Chatuge and Hiwassee reservoirs under Alternative C.

3.1.2 Recreation

3.1.2.1 Affected Environment

Most TVA mountain reservoir lands are available for some type of recreational use. TVA's Zone 6 (Developed Recreation) land use allocation typically includes lands managed for concentrated, active recreational activities that require capital improvements and maintenance. The types of uses allowed on Developed Recreation lands are described in Table 2-1 and include for-profit commercial facilities available to the public for a fee, public recreation facilities, and water-access facilities such as boat ramps and fishing piers.

TVA maintains recreation facilities such as picnic areas, beaches, and boat ramps on some properties managed for Zone 2 (Project Operations). Several of the dam and powerhouse reservations such as Ocoee 2 provide important recreation opportunities. TVA would continue to make these facilities available provided they are compatible with TVA's operational needs.

In May 2007, TVA completed a recreation analysis to support this planning effort. There were two primary objectives of the analysis: (1) to identify recreation needs on the nine mountain reservoirs and (2) to identify specific parcels on the mountain reservoirs suitable for and capable of meeting unmet recreation needs. TVA has recently inventoried water based recreation areas directly bordering the reservoir shorelines. This inventory includes the following ownership categories:

- Public (TVA, other federal, state, county/municipal)
- Private (private commercial areas operated for profit, noncommercial areas for members/residents only)
- Quasipublic (areas serving members of nonprofit organizations)

Only those recreation areas with some level of facility development and evidence of maintenance are included in the inventory. By these criteria, undeveloped lands managed by TVA or other public agencies were excluded. The results of this inventory are described in the reservoir-specific recreation sections.

High-priority recreation needs were determined by the National Survey on Recreation and the Environment (NSRE 1999-2005) demand data and comments received during public scoping. This information was then compared to existing recreation facilities on each reservoir. TVA then used the results of this comparison to evaluate the need for expansion of existing facilities or development of new facilities, often through a partnership, to meet projected recreation demands. Potential partnership opportunities include development of trails at several of the mountain reservoirs, development of courtesy piers, expansion of recreation facilities on Parcel 3 of Blue Ridge Reservoir, and stream access site development and management.

A Zone 6 capability/suitability analysis based on physical capabilities to support recreation uses and other factors was performed for each TVA parcel on the nine mountain reservoirs not committed to a long-term use. Thirteen parcels on four reservoirs were identified as capable of and suitable for Zone 6. Shoreline development and boating density data were

then considered to determine how trends in shoreline development from additional Zone 6 land allocations would affect future boating density and capacity; this, in turn, could affect the need to establish additional developed recreation facilities. Parcels 18 and 52 on Chatuge Reservoir are capable of and suitable for supporting future public recreation facilities. On Hiwassee Reservoir, Parcel 49 is capable of and suitable for expansion of a greenway trail, and Parcel 34 is capable of and suitable for water access.

While most developed recreation use occurs on parcels allocated to Zones 6, most dispersed recreation occurs on Zone 4 (Natural Resource Conservation). Dispersed recreation activities also occur on parcels allocated for other zones such as Zone 3 (Sensitive Resource Management), Zone 2, and Zone 6. These lands are managed for the particular objectives of the zone allocation but also support compatible passive recreation activities, which can include hunting, primitive camping (at undeveloped sites), birding and other wildlife viewing, hiking, bank fishing, biking, and picnicking.

TVA has recently begun an inventory and assessment of active dispersed recreation areas (Guerry 2005) to determine their location, type of use, size, and the amount and extent of ecological impact associated with dispersed recreation activities. The inventoried dispersed recreation areas are described below in the reservoir-specific recreation sections. This inventory does not include areas with more passive recreation uses such as hunting, wildlife observation, mountain biking, hiking, horseback riding, bank fishing, viewing and photographing nature, and picnicking.

Shoreline development and boating density were analyzed to determine how trends in shoreline development may affect future boating density and thus capacity issues. Based on the results of this analysis, no areas of the mountain reservoirs are expected to have boating densities high enough to exceed the local carrying capacity or reduce boating safety during the next decade (see Appendix K).

3.1.2.2 Environmental Consequences

None of the alternatives propose a change in the recreational uses of Zone 2 parcels.

Alternative A

Nineteen parcels totaling 594 acres are allocated for Recreation under Alternative A. Parcels previously allocated under the Forecast System that support a developed recreation use are designated Public or Commercial Recreation. Some parcels allocated to Reservoir Operations under Alternative A have also been utilized for developed recreation. In addition, under Alternative A, some unplanned parcels currently support developed recreation; however, the unplanned parcels and parcels allocated for Reservoir Operations with existing developed recreation use are committed to that use, through transfer agreement covenants or TVA licenses, leases, or easements.

Under Alternative A, TVA would not allocate any additional parcels for Public or Commercial Recreation use. The use of unplanned parcels and previously allocated Reservoir Operation parcels that are committed to developed recreation would not change. Therefore, any future demand for recreational needs would have to be met by expansion of recreation facilities in these existing areas. Selection of Alternative A would not significantly impact TVA's ability to develop additional recreation facilities to address identified unmet recreation needs. Potential environmental impacts would be insignificant, since parcels (both previously allocated and the unplanned parcels) utilized for developed recreation would not change. Any future development of new facilities would be limited to the existing

developed recreation areas. The potential for impacts from any new facilities would be subject to review under NEPA.

With the exception of two parcels (79 acres) on Hiwassee Reservoir allocated to Industrial, selection of Alternative A would not result in changes in existing land use of any parcels. Therefore, potential impacts to dispersed recreation would be primarily restricted to expansion of facilities within existing committed parcels (e.g., campground expansion). Potential impacts to dispersed recreation of this nature are expected to be insignificant. Unmet dispersed recreation needs would not be significantly impacted by selection of Alternative A.

Alternative B

Sixty-eight parcels totaling 1,081 acres are allocated to Zone 6 (Developed Recreation) under Alternative B (see Table 2-9). This is 49 more parcels totaling 487 acres more than allocated to Recreation under Alternative A.

Under Alternative B, all parcels that are currently committed to a developed recreation use would be allocated to Zone 6. These commitments include transfer agreement covenants and TVA licenses, leases, and easements. The vast majority of these parcels have developed recreation facilities. The parcels allocated to Zone 6 would include those previously allocated under Alternative A to Public Recreation as well as those parcels allocated to Reservoir Operations that have been utilized for developed recreation. In addition, the unplanned parcels under Alternative A that are committed to a developed recreation use would be allocated to Zone 6.

Under Alternative B, any future demand for recreational needs would have to be met by expansion of recreation facilities in these existing areas allocated to Zone 6. These areas are the same under Alternative B as under Alternative A, and since there would be no new parcels allocated for Developed Recreation, the potential environmental impacts would be the same. The potential for impacts from any new facilities within existing areas would be subject to review under NEPA. Alternative B would not change the land use of any parcels, and therefore, potential impacts to dispersed recreation would be restricted to those resulting from the expansion of existing facilities or resource management activities. Alternative B allocates the most parcels to zones supportive of dispersed recreational activities as well as to those that could accommodate unmet dispersed recreation needs.

Alternative C

Alternative C allocates 72 parcels totaling 1,161 acres to Zone 6 (Developed Recreation), an increase of four parcels and 80 acres over Alternative B (see Tables 2-8 and 2-9).

Potential impacts to recreation under Alternative C are identical to Alternative B with the exception of five parcels on Hiwassee and Chatuge reservoirs. Under Alternative C, two additional parcels on Hiwassee Reservoir and two additional parcels on Chatuge Reservoir would be allocated to Zone 6 (Developed Recreation). These parcels would be allocated to Zone 4 (Natural Resource Conservation) under Alternatives A and B. The total acreage for these four parcels is 80.2 acres (75.8 acres on Chatuge Reservoir and 4.4 acres on Hiwassee Reservoir). Allocation of these parcels to Zone 6 would shift the existing dispersed recreational use to recreational activities on these parcels associated with development of recreational facilities. These additional facilities would provide greater recreational opportunity on Chatuge and Hiwassee reservoirs.

Under Alternative C, a 27.2-acre parcel on Chatuge Reservoir would be allocated to Zone 5 (Industrial). Allocation of this parcel to Zone 5 would allow the parcel to be sold and developed for industrial use, which would eliminate dispersed recreation opportunities currently available on the parcel.

3.1.3 Terrestrial Ecology

3.1.3.1 Plant Communities

3.1.3.1.1 Affected Environment

The nine mountain reservoirs are in two watersheds, the Little Tennessee River watershed containing Fontana Reservoir, and the Hiwassee River watershed containing the other eight reservoirs. All of the reservoirs lie within the Southern Blue Ridge ecoregion (SBRE). According to Griffith et al. (1998, 2001, 2002), the SBRE is one of the richest centers of biodiversity in the eastern United States and one of the most floristically diverse. Eighty-four percent of the SBRE is forested, primarily with oak-dominated forests (Southern Appalachian Man and the Biosphere [SAMAB] 1996). Major forest types in this ecoregion are the Appalachian oak forest, oak-pine forest, northern hardwoods, cove hardwoods, and at the highest elevations in Tennessee and North Carolina, the southeastern spruce-fir forest. Shrub, grass, heath balds, and hemlock communities are also present (Griffith et al. 1998, 2001, 2002).

The SBRE within the mountain reservoirs area is subdivided into four regions based on soils and vegetation. These subdivisions are the Broad Basins ecoregion, the Southern Crystalline Ridges and Mountains ecoregion, the Southern Metasedimentary Mountains ecoregion, and the Southern Sedimentary Ridges ecoregion (ibid). The mountain reservoirs lands occur in all of these except for the Southern Sedimentary Ridges ecoregion. The Broad Basins ecoregion is drier and has lower elevations and less relief than the other more mountainous SBRE regions. The soils are mostly deep, well drained, and loamy to clayey Ultisols. This rolling foothills region is mostly forested with pastures and row crops found on terraces and floodplains. All of the Nottely, most of the Chatuge and Blue Ridge, and a small part of the Hiwassee and Ocoee 3 reservoirs lands are in the Broad Basins ecoregion.

The Southern Crystalline Ridges and Mountains ecoregion contains the highest and wettest mountains in north Georgia and western North Carolina and are underlain by pre-Cambrian-aged igneous and high-grade metamorphic rocks. The region is mostly forested with a few small areas of pastures and apple orchards. A small part of the Chatuge Reservoir lands is in this ecoregion.

According to Griffith et al. (1998, 2001, 2002), the Southern Metasedimentary Mountains ecoregion is composed of geologic materials that are mostly late pre-Cambrian. The mountains are steep, dissected, biologically diverse, and densely forested. The Appalachian oak forest and the northern hardwood forest (at high elevations) include a variety of oak and pine species as well as American beech, basswood, buckeye, hemlock, silverbell, yellow birch, and yellow poplar. Much of the region is public land managed by the USFS. All of the Appalachia and Fontana, most of the Hiwassee and Ocoee, and a small part of the Blue Ridge and Ocoee 2 reservoirs lands are in the Southern Metasedimentary Mountains ecoregion.

The physiognomic vegetative classes commonly found on lands on and around the mountain reservoirs are evergreen forest, evergreen-deciduous forest, deciduous forest,

shrublands, and herbaceous vegetation. Most of the evergreen forests are pine plantations dominated by loblolly pine. The evergreen-deciduous forest is primarily mixed pine-hardwood forests. Common canopy species are shortleaf, Virginia, and white pines; black, northern red, southern red, and white oaks; mockernut and pignut hickory; tulip poplar; and sweet gum. Common understory species include American holly, buffalo nut, black gum, Carolina allspice, flowering dogwood, red maple, sassafras, serviceberry, sourwood, black cherry, and mountain laurel. American chestnut stump sprouts are present on many dry ridges. Woody vines include Japanese honeysuckle, muscadine grape, poison ivy, and Virginia creeper. The herb layer contains many fern species as well as several species of wildflowers such as pink lady's slipper and sweet Betsy.

The most common deciduous forest types are oak-hickory forest on the dryer ridges and cove hardwood forest on the moister slopes. Dominant trees in the oak-hickory forests are black, chestnut, northern red, southern red, and white oaks, and mockernut, pignut, and shagbark hickories. Black gum, musclewood, red maple, and sourwood are common understory tree species, and huckleberries and mountain laurel occur in the shrub layer. The cove hardwood forests are dominated by tulip poplar, American beech, white oak, and yellow buckeye. Other canopy trees include black locust, silverbell, sourwood, and cucumber and Frazier magnolia. They have a diverse understory with Carolina allspice, flame azalea, flowering dogwood, hazelnut, and redbud often present. Eastern hemlock and rosebay rhododendron occur along streams in the cove hardwood forest. Much of the eastern hemlock in the area has recently been infected with the nonnative hemlock wooly adelgid. Without treatment, which can be difficult and expensive, most infected trees die in three to five years. Cove hardwood forests, which include bloodroot, Catesby's trillium, crane fly orchid, Miami-mist, jack-in-the-pulpit, sweet Betsy, Solomon's plume, and Solomon's seal, have a rich herbaceous layer.

Forested wetlands occur along the back of some reservoir coves and grade into scrub-shrub wetlands. Because of the steep terrain surrounding most of the reservoir lands, neither of these plant communities is extensive. These areas are dominated by black willow, buttonbush, and tag alder. In addition, persimmon is common along the shoreline, along with American sycamore, river birch, and silver maple. Herbaceous species such as netted chain fern, jewelweed, poison hemlock, waterwillow, and several species of grasses, rushes, and sedges are present. Herbaceous vegetation is commonly found along transmission line and roadway rights-of-way and grassy areas on the dam reservations.

A few areas of old-growth forests occur on the mountain reservoir lands; these areas are characterized by old living and large trees, natural canopy gaps, absence of invasive species, minimal past human disturbance, standing dead snags, and coarse woody debris (Davis 1996). Although old-growth forest habitat is rare in the southeastern U.S. (ibid), large areas of these forests occur in the GSMNP and in Cherokee and Nantahala national forests. These old-growth areas may represent around 0.5 percent (approximately 676,000 acres) of the total forest acreage (approximately 108,400,000 acres) in the southeastern U.S. Old-growth communities are valued as globally significant centers of biodiversity being the home to a vast number of plant and animal species. Standing and fallen trees and leaf litter provide shelter, nest and den sites, and foraging opportunities for mammals, salamanders, insects, spiders, other arthropods, and birds. In addition, these habitats serve critical abiotic functions such as building rich soil, acting as natural filtration systems for water and air, and storing carbon that would otherwise contribute to global climate change (Salk 2005). Old-growth forest areas are described in more detail in the reservoir-specific sections.

Invasive plants are present on some mountain reservoir lands. EO 13112 defines an invasive species as any 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 (NRCS 2007). Invasive plants often invade forested areas after some disturbance event and can reduce forest productivity, hinder forest use and management activities, and degrade diversity and wildlife habitat. They occur as trees, shrubs, vines, grasses, ferns, and forbs. Some of the invasive plants on the reservoir lands were intentionally planted in the area for erosion control, landscaping, or wildlife habitat enhancement purposes, while others were introduced elsewhere and have spread by various means onto the reservoir lands.

The more problematic invasive plants on mountain reservoir lands include oriental bittersweet, autumn olive, Chinese lespedeza, Chinese privet, Japanese honeysuckle, Japanese knotweed, Japanese stiltgrass, kudzu, mimosa, multiflora rose, princess tree, and tree-of-heaven (Southeastern Exotic Plant Pest Council 2006). 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. No plants listed on the 2006 *Federal Noxious Weed List* (NRCS 2007) are known to occur on the mountain reservoir lands. Oriental bittersweet is considered a Class C noxious weed in North Carolina, and its movement from quarantine areas is prohibited except under certificate or permit (North Carolina Department of Agriculture 2007).

3.1.3.1.2 Environmental Consequences

Alternative A

Under Alternative A, impacts on plant communities would likely be insignificant. Under Alternative A, two parcels, totaling 79 acres, could potentially change existing land use. On the remainder of the parcels planned in Alternative A, potential impacts would likely occur from the development of parcels already allocated to a development-oriented use. However, no new lands would be made available for development-oriented uses. In general, invasive species would continue to proliferate, which would result in a decrease in forest productivity, forest use, and management activities, as well as contribute to the degradation of plant diversity and wildlife habitat. Increasing development on private lands would create landscape disturbances that would assist in the spread of nonnative plant species along roadsides, in recreation areas, and in remaining forested lands.

Alternative B

Under Alternative B, impacts to plant communities would be similar to those under Alternative A. However, under Alternative B, the two Zone 5 parcels on Hiwassee Reservoir would be allocated to Zone 4, thus providing more protection to plant communities. Additional development of parcels with existing Project Operations and Developed Recreation land uses would affect plant communities, although most of these parcels contain common plant communities and most impacts would likely be insignificant. The allocation of several parcels to Zone 3 (Sensitive Resource Management) could highlight the need for resource management activities on these parcels and result in long-term beneficial effects on plant communities.

Alternative C

Under Alternative C, the impacts on plant communities would be generally similar to those under Alternative B except on the five parcels allocated to development-oriented uses. The impacts to plant communities on three of these parcels would be insignificant. Of the two remaining parcels, allocation of Parcel 10 on Chatuge Reservoir to Zone 5 (Industrial)

would result in the potential industrial development of the parcel, which would have a direct negative impact on the old-growth deciduous forest that occupies most of the tract. Although the destruction of the Parcel 10 old-growth forest would have adverse local impacts, the impacts on a regional basis would likely not be significant. Allocation of Parcel 77 on Chatuge Reservoir to Zone 6 (Developed Recreation) would result in the potential development of a public park such as the proposed ball field complex, which would have direct local impacts to plant communities, particularly if land clearing and grading would be required. Similar to Parcel 10 on Chatuge Reservoir, regional impacts from the development of Parcel 77 would be insignificant.

3.1.3.2 Wildlife Communities

3.1.3.2.1 Affected Environment

The SBRE contains the largest area of contiguous, mature forest habitat in the eastern U.S. (Franzreb and Phillips 1995). Forests in the SBRE provide globally significant habitat for many species, especially amphibians and land snails (Ricketts et al. 1996). The array of microclimates and diversity of habitats produce high levels of endemism and species richness. The high elevations found in the SBRE also provide habitat for relict populations of animals typically found at more northern latitudes.

Several forest types found within the SBRE occur on TVA lands. The diversity of forest types on these lands is somewhat limited due to the relatively low elevation of the TVA lands, and many of the more uncommon forest types and rare communities within the SBRE are found at higher elevations.

Deciduous forests provide a diversity of habitat for wildlife. Oak-hickory forest is the most abundant forest type in the eastern U.S. (Flather et al. 1999) and is prevalent on mountain reservoir lands. The numerous bird species that nest in deciduous forests include 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 scarlet tanager. Streams within deciduous forests provide nesting habitat for Acadian flycatchers, northern parulas, and Louisiana waterthrushes. 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 voles, short-tailed shrew, gray fox, least weasel, and bobcat.

Seepages, streams, and temporary ponds in deciduous forests provide habitat for numerous amphibians including American and Fowler's toads, green, northern cricket, and other frogs, spotted and other mole salamanders, red and mud salamanders, and northern dusky and other salamanders in the genus *Desmognathus*. Reptiles commonly found in deciduous forests especially near water include eastern fence lizard, ground skink, five-lined skink, eastern box turtle, eastern worm snake, black racer, and ring-necked snake.

Evergreen and evergreen-deciduous forests are also widespread around the mountain reservoirs. These habitats provide nesting for woodland birds including pine and yellow-throated warblers, great crested flycatcher, and chuck-will's-widow. Birds that winter in this forest type include red-breasted nuthatches, red crossbills, and pine siskins. Portions of this forest type were damaged by southern pine beetles in recent years. Several stands of dead pines exist on TVA lands, and TVA has performed salvage harvests in some stands. Dead pines provide foraging sites for woodpeckers and roosting sites for little brown, long-eared, and silver-haired bats and various reptiles. 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, six-lined racerunner, and a variety of salamanders, frogs, and toads, especially near wet areas.

Most of the TVA lands consist of narrow strips or small blocks of forest. Many of these lands are adjacent to larger contiguous blocks of forest contributing habitat to area-sensitive species of wildlife that favor interior woodland habitats. Many of these adjacent lands were formerly owned by TVA and transferred to other federal and state agencies. These lands combined with the TVA lands form large blocks of forested habitat adjacent to most of the mountain reservoirs.

Nonforested community types in the SBRE are dominated by pasturelands (SAMAB 1996). Pasturelands and other early successional habitats are common around some reservoirs, notably Nottely and Chatuge reservoirs. Early successional habitats provide habitat for a variety of bird species including eastern bluebird, eastern meadowlark, American crow, American kestrel, and red-tailed hawk. Amphibians and reptiles that use these habitats include spring peeper, chorus frog, and common garter snake.

Bird and mammal diversity greatly increases at edge habitats especially those between forested areas bordered by early successional habitats. Birds commonly found at these edge habitats include wild turkey, great crested flycatcher, white-eyed vireo, Carolina wren, blue-gray gnatcatcher, brown thrasher, blue-winged warbler, prairie warbler, common yellowthroat, yellow-breasted chat, indigo bunting, eastern towhee, field and song sparrow, and orchard oriole. Mammals expected at edges include eastern cottontail, woodchuck, eastern harvest mouse, red fox, coyote, long-tailed weasel, and striped skunk.

The reservoirs provide abundant open water habitats and associated riparian zones that are used by a variety of wildlife. Common species include great blue heron, green heron, belted kingfisher, common yellowthroat, and northern parula. Shallow embayments, especially those with emergent vegetation, provide foraging habitat for waterfowl. This habitat, however, is very limited on several of the reservoirs, especially during the winter, and consequently waterfowl numbers are relatively low. Common waterfowl include wood ducks, Canada geese, and mallards. Other waterfowl present include American black duck, gadwall, green-winged teal, ring-necked duck, lesser scaup, common goldeneye, bufflehead, hooded merganser, and common merganser.

Shorebird use of the mountain reservoirs is limited as most reservoirs have steep, rocky banks and limited foraging areas comprised of shallow embayments and exposed mud flats. Species such as spotted sandpiper that forage along the margins of reservoirs and killdeer that are not restricted to foraging on mud flats are commonly observed on the mountain lakes. Most of the mud flats available on the mountain reservoirs are small (<10 acres) and are comprised of rocky soils, providing poor quality habitat for most species of shorebirds.

Common amphibians found in the riparian zones include green frog, eastern narrowmouth toad, and Fowler's toad. Reptiles include northern water snake, common snapping turtle, and painted turtles. Common mammals include mink, muskrat, raccoon, and American beaver.

3.1.3.2.2 Environmental Consequences

Given the proximity and abundance of forested public lands adjacent to the TVA parcels, the overall small size of the TVA parcels, and the lack of external projects resulting in large-scale land use changes in the project area, none of the alternatives are expected to result in significant adverse impacts to wildlife.

Alternative A

Under Alternative A, two parcels (79 acres) on Hiwassee Reservoir could potentially change to a developed land use. Otherwise, potential changes in wildlife habitat would be restricted to changes in land use within undeveloped portions of existing developed parcels. These changes are expected to be minimal in a regional context; therefore, Alternative A would not result in significant loss of wildlife habitat or adverse impacts to wildlife populations.

Alternative B

Under Alternative B, all parcels would be allocated to zones that reflect their current existing use. Additionally, many parcels would be allocated to Zone 3 (Sensitive Resource Management) and Zone 4 (Natural Resource Conservation) providing protection to several parcels with uncommon habitats such as wetlands, seepages, and rock outcrops. Alternative B would potentially enhance the management of identified sensitive wildlife habitat and would not result in adverse cumulative impacts to terrestrial animal resources or their habitat.

Alternative C

Under Alternative C, five parcels totaling 105.4 acres would be allocated to Zone 6 (Developed Recreation) and Zone 5 (Industrial) instead of Zone 4 (Natural Resource Conservation) as under Alternative B. Some of these parcels such as Parcel 52 on Chatuge Reservoir offer little high-quality wildlife habitat; the exception is Parcel 10 on Chatuge Reservoir because of its old-growth forest. The development of recreation facilities on three of the four Zone 6 parcels would not likely adversely affect wildlife. Development of recreation facilities that require land clearing, such as the ball field proposal on Chatuge Parcel 77 would have negative local impacts to wildlife habitat. Allocation of Chatuge Parcel 10 would have localized adverse effects. Considering that Alternative C would only result in changes of land use on five parcels, this alternative would not result in cumulative impacts to wildlife populations in the project area.

3.1.4 *Endangered and Threatened Species*

3.1.4.1 *Affected Environment*

Plants and animals considered in this section include species listed as endangered or threatened under the Endangered Species Act (ESA) and candidates for such listing. They also include species listed as endangered, threatened, or other categories denoting the need for conservation by the States of Georgia, North Carolina, and Tennessee. The potential presence of these listed species, as well as suitable habitat for them, was first determined by querying databases maintained by TVA and other agencies of the occurrences of these species. Following this initial screening, TVA biologists conducted field investigations of many of the TVA lands to determine the presence of listed species and their habitats.

Species listed under the ESA (i.e., federally listed species) reported from the counties encompassing the mountain reservoirs are listed in Table 3-4. The range, status, and

habitat requirements of these species are described below. These species are also typically listed as endangered or threatened by the individual states in which they occur. The state-listed species not included in Table 3-4 are described in the reservoir-specific accounts. The U.S. Fish and Wildlife Service (USFWS) has designated critical habitat for the spotfin chub in the vicinity of Fontana Reservoir, as described below. No other designated critical habitat occurs in the immediate vicinity of the mountain reservoirs.

Table 3-4. Federally Listed as Endangered, Threatened, and Candidate Species Reported from the Mountain Reservoirs Area

Common Name	Scientific Name	Listing Status	Reservoir						
			Chatuge	Hiwassee	Blue Ridge	Nottely	Ocoees	Apalachia	Fontana
Plants									
Green pitcher plant*	<i>Sarracenia oreophila</i>	END	x						
Monkey-face orchid*	<i>Platanthera integrilabia</i>	CAND					x		
Rock gnome lichen	<i>Gymnoderma linear</i>	END							x
Ruth's golden aster*	<i>Pityopsis ruthii</i>	END					x	x	
Small whorled pogonia*	<i>Isotria medioloides</i>	THR		x	x	x		x	
Virginia spiraea*	<i>Spirea virginiana</i>	END							x
Mammals									
Northern flying squirrel*	<i>Glaucomys sabrinus coloratus</i>	END							x
Eastern cougar*	<i>Puma concolor cougar</i>	END							x
Indiana bat*	<i>Myotis sodalis</i>	END							x
Birds									
Piping plover*	<i>Charadrius melodus</i>	THR	x			x			
Red-cockaded woodpecker*	<i>Picoides borealis</i>	END					x	x	
Reptiles									
Bog turtle*	<i>Glyptemys muhlenbergii</i>	THR	x	x		x		x	x
Fish									
Spotfin chub*	<i>Erimonax monachus</i>	THR							x
Sicklefin redhorse*	<i>Moxostoma sp. 2</i>	CAND		x					x
Snails									
Noonday globe*	<i>Patera clarki Nantahala</i>	THR							x
Mussels									
Tan riffleshell*	<i>Epioblasma florentina walkeri</i>	END						x	
Slabside pearl mussel*	<i>Lexingtonia dolabelloides</i>	CAND						x	
Little-wing pearl mussel*	<i>Pegias fabula</i>	END							x
Cumberland bean*	<i>Villosa trabilis</i>	END						x	

*Species descriptions in the text

Status abbreviations: CAND = Candidate for listing, END = Endangered, THR = Threatened

The **green pitcher plant** is a carnivorous plant restricted to acidic seepage bogs and boggy stream edges in northeast Alabama, Georgia, and North Carolina. The only populations known from the mountain reservoirs area are in the vicinity of Chatuge Reservoir and are described in more detail below in Section 3.2.4.

The **monkey-face orchid** grows in swamp forests and sandy stream margins. Development, canopy closure, improper timber harvest techniques, and the encroachment of exotic invasive plants such as kudzu are major threats to this species.

Ruth's golden aster is known only from cracks or crevices of phyllite or greywacke boulders along the banks of or within the Hiwassee and Ocoee rivers in Polk County (Kral 1983, USFWS 1990a, TVA 2005b, NatureServe 2007). The construction of the dams on these rivers may have reduced the range of this species, and remaining populations are threatened by habitat changes resulting from post-impoundment river flows. The Ocoee and Apalachia populations are described in more detail in Sections 3.6.4 and 3.7.4.

Small whorled pogonia occurs in a variety of habitats throughout its range and is typically found on acidic soils, in dry to mesic second-growth, deciduous or deciduous-coniferous forests, typically with light to moderate leaf litter, an open herb layer (occasionally dense ferns), moderate to light shrub layer, and relatively open canopy (NatureServe 2007; USFWS 1992). The main threats to this species are habitat destruction and excessive collecting. It is known from the vicinity of five of the mountain reservoirs, and its status is described in more detail in the reservoir-specific sections.

Virginia spiraea is a shrub growing on rocky flood-scoured riverbanks and gravel bars in gorges or canyons in the central and southern Appalachian Mountains. Populations have been extirpated by impoundments, and other threats include riverbank development, habitat changes resulting from altered river flows, and the encroachment of exotic invasive species. Sexual reproduction is uncommon, and plants rely almost completely on vegetative reproduction, which could also account for the declining health of known populations. Virginia spiraea occurs in the Little Tennessee River watershed along the Cheoah River in Graham County, North Carolina, and along Abrams Creek in Blount County, Tennessee. It was not found on or in the immediate vicinity of any of the mountain reservoir lands.

Northern flying squirrels are primarily found in high elevations (>5,000 feet) within spruce-fir forests and in mixed conifer-northern hardwood forests of the Blue Ridge Physiographic Region. Although they can occur in forests of varying age and understory density, most records show a preference for old-growth forest with widely spaced, tall trees (USFWS 1990b). Northern flying squirrels occur in GSMNP but, because of their elevational range, do not occur on or in the immediate vicinity of any mountain reservoir lands.

Eastern cougars occupied a wide variety of habitats including swamps, riparian woodlands, and forests. This subspecies is believed to be extinct (USFWS 1990c) due to hunting by humans, habitat loss, and low prey populations during the 1800s. Two historic records from the vicinity of Fontana Reservoir were reported from the GSMNP.

Indiana bats roost in caves during the winter and typically form summer roosts under the bark of dead or dying trees (Menzel et al. 2001). Optimal summer roosts occur in forests with an open understory and usually near water (Romme et al. 1995). Indiana bats forage primarily in forested areas along streams or other corridors. Few caves occur in the mountain reservoirs area, and none known to be occupied by Indiana bats or suitable for

occupation by Indiana bats occur on or in the immediate vicinity of TVA mountain reservoir lands. Summer roosts have been reported from the GSMNP, Joyce Kilmer Memorial Forest, and Cheoah Reservoir. White Oak Blow Hole Cave near Cades Cove on the northern slopes of the GSMNP supports a wintering population of Indiana bats and is designated as critical habitat for this species.

Mature forests on mountain reservoir lands provide summer habitat for Indiana bats. In order to assess the suitability of forested habitat for Indiana bats, sites were sampled using a protocol based on Romme et al. (1995). Five forest variables were estimated at forested sites consisting of primarily deciduous trees. Average canopy cover, average height to bottom of canopy, and average diameter at breast height of overstory trees were used to indicate forest maturity. Subcanopy density was categorized as open (<5 percent), moderately dense (5-20 percent), dense (20-60 percent), and very dense (>60 percent). Potential roost trees included snags, hollow trees or trees with large cavities, and trees with exfoliating bark. Although the majority of Indiana bat summer roosts are found in dead or damaged trees (Menzel et al. 2001), we include trees with cavities and exfoliating bark to provide a conservative estimate of available roosting habitat. Percent exfoliating bark was used to categorize quality of potential roost trees. High-quality trees exhibited >25 percent of the remaining exfoliating bark, moderate trees 11-25 percent and low <11 percent. High-quality habitat plots contained a mature forest with a relatively open subcanopy and at least one moderate or high-quality potential roost tree. Low-quality habitat plots consisted of either an undeveloped forest or dense subcanopy or lacked potential roost trees. Most sample sites ranked as low-quality habitat. A site ranking as medium quality was measured on Chatuge Reservoir (Parcel 10); no high-quality sites were observed. The results of this sampling are described in more detail in the reservoir-specific sections.

Piping plovers nest on sand and gravel beaches along the Atlantic coast as far south as North Carolina and around the Great Lakes. The major threats to this bird are loss of nesting and coastal wintering habitat from shoreline development and degradation of this habitat from recreational activities. The piping plover is a rare spring and fall migrant in the Tennessee Valley, where it typically occurs on mud flats along reservoirs and other shallow-water beach-like habitats found at ash disposal areas and wildlife refuges. They tend to linger at inland stopover sites for one day or less (Pompei 2004). The only records of this species from the mountain reservoirs area are from Chatuge and Nottely reservoirs and are described in more detail in Sections 3.2.4 and 3.5.4.

Red-cockaded woodpeckers inhabit extensive old-growth pine forests with an open understory. This species formerly occurred in the western GSMNP near Chilhowee Reservoir downstream of Fontana Reservoir and in Cherokee National Forest adjacent to Ocoee 1 Reservoir. The last known occurrence of this species at the Ocoee site, and in the state of Tennessee, was in 1994 (Nicholson 1997). Red-cockaded woodpeckers have not been reported from the North Carolina or Georgia portions of the mountain reservoirs area. No suitable habitat for this species occurs on or near mountain reservoirs lands.

Bog turtles inhabit spring-fed sphagnum bogs and marshy meadows in the southern Appalachians (Herman and Pharr 1986). Clear, slow-moving rivulets or brooks with soft, highly organic substrates are required habitat features (Pitts 1978). Bog turtle habitat is largely ephemeral due to plant succession that creates drier habitats. The major threats to this species are loss of habitat due to wetland drainage and accelerated plant succession resulting from fire control and collecting for the pet trade. Habitat loss is more of a problem for bog turtles in the northeast U.S. than southern Appalachian populations, which are listed because of their similarity of appearance to northern populations. Bog turtles have been

reported near five of the mountain reservoirs; these occurrences are described in the reservoir-specific accounts.

Spotfin chubs occur in clear large creeks and medium-sized rivers with moderate current in the Tennessee River drainage. Adults prefer swift current with boulder substrate, and juveniles are commonly found over small gravel substrate in moderate current. Spawning can extend from May to mid-August (Etnier and Starnes 1993). The main threats to this fish have been loss of habitat due to impoundments, siltation, and other pollutants. It occurs in the Little Tennessee River in the Fontana Reservoir headwaters and other sites farther upstream. Critical habitats for the spotfin chub, within the scope of the MRLMP, have been established in Macon and Swain Counties, North Carolina, in the Little Tennessee River main channel from the backwaters of Fontana Reservoir upstream to the North Carolina-Georgia state line. See Section 3.8.4 for more information on this population.

The **sicklefin redhorse** is restricted to streams of the Blue Ridge Physiographic Province in the Hiwassee and Little Tennessee River systems of southwest North Carolina, and in upper Brasstown Creek (Hiwassee River system) in Towns County in north-central Georgia. In North Carolina, it occurs in the Hiwassee River system in Hiwassee River, Hanging Dog Creek, and Valley River, all in Cherokee County, and in Brasstown Creek in Clay County. In the Little Tennessee River system, it occurs in Little Tennessee River downstream of Franklin in Macon and Swain counties, lower Burningtown and Lotla creeks in Macon County, Tuckasegee River below Bryson City in Swain County, and lower Forney Creek, Swain County. Juveniles have been found in shallow waters of Hiwassee and Fontana reservoirs (NPS 2008).

The main threat to sicklefin redhorse is loss of habitat. Like many fish species in the southeast United States, the sicklefin redhorse has been negatively impacted by hydroelectric dams and sedimentation. Problems caused by dams include blockage of spawning migrations, reduced water temperatures, unstable water levels, bed scouring from power-generating releases, and low oxygenation from hypolimnetic releases from some dams. Sedimentation has reduced the amount of available gravel substrate. Gravel substrate serves two purposes for the redhorse: a required habitat for spawning and a required habitat for benthic macroinvertebrates upon which the redhorse feeds. Together, dams and sedimentation have served to substantially reduce the sicklefin redhorse range (NatureServe 2007, NPS 2008).

The **noonday globe** is a land snail that inhabits damp oak-hickory forests with thick undergrowth and rich, moist soils. It prefers steep, rocky areas with northern exposure or wet ravines, and is endemic to Nantahala Gorge in Swain County, North Carolina (LeGrand et al. 2006). See Section 3.8.4 for more information on the occurrence of this species in the Fontana Reservoir area.

The **tan riffleshell** is the headwaters form of a species that was once widespread in the Cumberland and Tennessee River systems. Its life history is poorly known. It prefers sand and gravel substrate associated with riffles (Parmalee and Bogan 1998). The main threats to the tan riffleshell are pollution, siltation, habitat perturbation, inundation, and loss of glochidial hosts. One of the few surviving populations of this species is in the Hiwassee River between Apalachia Dam and Apalachia Powerhouse, described in more detail in Section 3.7.4.

The **slabside pearl mussel** was formerly widespread in medium and large rivers in the Tennessee and Cumberland River systems. It is presently restricted to a few rivers in the upper Tennessee River drainage, including the Hiwassee River between Apalachia Dam and Apalachia Powerhouse (see Section 3.7.4). It inhabits substrate of sand, fine gravel, and cobble in strong currents (ibid). The main threats to this species are primarily the result of habitat loss and degradation. Chief among the causes of decline are impoundments, stream channel alterations, water pollution, and sedimentation (NatureServe 2007).

The **little-wing pearl mussel** inhabits clear, cool, high-gradient streams. It usually occurs on top of or partially imbedded in sand and fine gravel at the head of riffles in 6 to 10 inches of water. Acid mine drainage, domestic pollution, and impoundments of rivers that it inhabited have extirpated most of the isolated populations. It was formerly widespread in tributaries to the Cumberland and Tennessee rivers. Occurrences have been documented in the Hiwassee and Little Tennessee River basins, but it is likely nearly extirpated there (NatureServe 2007).

The **Cumberland bean** occurs in small rivers and streams in gravel or sand substrate with fast current in riffle areas (Parmalee and Bogan 1998). It previously occurred in several river systems in the Cumberland and Tennessee River drainages but is now restricted to a few sites in the upper portions of each of these drainages. One of these sites is the Hiwassee River between Apalachia Dam and Apalachia Powerhouse (see Section 3.7.4). The main threats to this species are impoundments, siltation, channelization, and water pollution.

The **bald eagle** (*Haliaeetus leucocephalus*) was removed from the federal list of endangered species in 2007 because of its widespread recovery. It is still listed as endangered in Georgia, threatened in North Carolina, and in need of management in Tennessee, and protected by the Bald and Golden Eagle Protection Act and the Migratory Bird Treaty Act. The USFWS issued the National Bald Eagle Management Guidelines to encourage conservation of the species (USFWS 2007). TVA is committed to following these guidelines.

Bald eagles occur on several of the mountain reservoirs and are most numerous during the winter. Nesting has only recently been documented on Hiwassee, Ocoee 1, and Fontana reservoirs. In this region, eagles typically build large nests in solitary pines among hardwoods on steep slopes. Breeding pairs can have a primary nest and several alternate nests in a small area.

TVA biologists assessed the potential for nesting habitat on each parcel visited; the presence of large snags, hardwood and pine trees over 20-inches diameter, and large blocks of forested habitat were considered ideal nesting habitat for bald eagles. Biologists also searched for nests at each parcel and scanned for adult birds along the shoreline to try to locate additional nests in the project area. The results of these surveys are described in more detail below in the reservoir-specific sections.

3.1.4.2 Environmental Consequences

Alternative A

Under Alternative A, potential changes in wildlife habitat would be restricted to changes in land use within undeveloped portions of developed parcels. No direct impacts to federally listed species are expected from these potential changes in land use. Unrelated to TVA's land management actions, cumulative impacts could be anticipated to populations of the

green pitcher plant and Ruth's golden aster. Under Alternative A, the two parcels (79 acres) on Hiwassee Reservoir that could potentially change to a developed land use have no federally listed species present.

The major source of potential impacts to listed aquatic species is ground disturbance activities in riparian areas, which could affect water quality. That is, the greater the soil disturbance from an activity, the greater the potential for adverse impacts to water quality and listed aquatic species due to runoff and resulting sedimentation. Due to the small amount of TVA land, in comparison to the overall land base, the state and federal environmental regulations, and the use of any identified impact reduction methods including TVA's Standards and Conditions/Best Management Practices (BMPs) (TVA 2005c), development opportunities on TVA lands would have no cumulative impacts to listed aquatic species.

Alternative B

Under Alternative B, the parcels containing listed plants and terrestrial animals would be allocated to Zone 3 (Sensitive Resource Management) and Zone 4 (Natural Resource Conservation), and no adverse direct, indirect, or cumulative impacts to these species would occur.

Due to the small amount of TVA land on the mountain reservoirs in comparison to the overall land base, the state and federal environmental regulations, and the use of any identified impact reduction methods including TVA's Standards and Conditions/BMPs (ibid), development opportunities on TVA lands would have no cumulative impacts to listed aquatic species. In fact, some beneficial effects to listed species may be recognized as a result of proposed allocations.

Alternative C

No endangered or threatened species occur on four of the five additional parcels allocated to more development-oriented uses. The fifth parcel, Parcel 10 on Chatuge Reservoir, contains suitable habitat for Indiana bats and bald eagles. Although the change in allocation would not directly affect these listed species, they could be affected by the anticipated subsequent industrial development of the tract. No adverse effects on listed plants or terrestrial animals are anticipated on any of the other lands being planned.

No federally or state-listed aquatic animal species are known to occur near any parcels proposed for development under Alternative C. Therefore, no impacts to listed aquatic species are expected to occur.

3.1.5 Wetlands

3.1.5.1 Affected Environment

Wetlands are ecologically important because of their beneficial effect on water quality, their moderation of flow regimes by retaining and gradually releasing water and value as wildlife habitat, and as areas of botanical diversity. Wetlands are typically transitional ecosystems between terrestrial and aquatic communities.

Wetlands are defined by TVA Environmental Review Procedures (TVA 1983) as:

[T]hose areas inundated or saturated by surface or ground water with a frequency sufficient to support, and that under normal circumstances would support, a prevalence of vegetation or aquatic life that requires saturated or seasonally soil conditions for growth and reproduction. Wetlands generally include swamps, marshes, bogs, and similar areas such as slough, potholes, wet meadows, mud flats, and natural ponds.

EO 11990 (Protection of Wetlands) directs federal agencies to minimize the destruction, loss, or degradation of wetlands and to preserve and enhance the natural and beneficial values of wetlands. In addition, activities in wetlands are regulated under the authority of the federal Clean Water Act and various state water quality protection regulations.

Wetlands on and near the mountain reservoirs are primarily riverine/floodplain forests located in the floodplains of rivers and streams and small areas of emergent/scrub-shrub wetlands (typically less than 0.10 acre) associated with reservoir shorelines. Isolated wetlands such as bogs, seeps, and fens are relatively rare. Emergent herbaceous wetlands as well as scrub-shrub wetlands are also uncommon on the mountain reservoirs.

For the purposes of the MRLMP, initial estimates of wetland type and extent for each reservoir were determined using USFWS National Wetlands Inventory (NWI) maps combined with data sets developed for TVA's 2004 *Reservoir Operations Study* (ROS). These data sources are based primarily on interpretation of aerial photographs. Land cover analysis conducted as part of the Southern Appalachian Assessment (SAMAB 1996) between June 1990 and September 1994 indicated wetlands comprised less than 0.01 percent of the total land area in both the Hiwassee and the Little Tennessee River watersheds.

The wetland area of each reservoir (see the reservoir-specific sections below) includes wetlands located along the entire reservoir shoreline as well as wetlands located adjacent to the reservoir shoreline that are within the groundwater influence area of the reservoir (TVA 2005a). The NWI data include wetlands located on all land adjacent to each reservoir regardless of ownership.

Field surveys were conducted to determine types and locations of wetlands on plannable parcels on each reservoir. Wetland determinations were performed according to the U.S. Army Corps of Engineers (USACE) standards, which require documentation of hydrophytic (i.e., wet-site) vegetation, hydric soil, and wetland hydrology (Environmental Laboratory 1987; Reed 1997; U.S. Department of Defense and U.S. Environmental Protection Agency 2003). Broader definitions of wetlands, such as that used by the USFWS (Cowardin et al. 1979), and the TVA Environmental Review Procedures definition (TVA 1983) were also considered in this review. Wetlands on TVA mountain reservoir lands are summarized by area and type in Table 3-5.

Table 3-5. Summary of Wetlands on TVA Mountain Reservoir Lands by Area and Type

Reservoir	Combined Aquatic Beds and Flats (acres)	Emergent (acres)	Forested (acres)	Scrub-Shrub (acres)	All Types (acres)
Chatuge	581	11	48	14	654
Hiwassee	23	15	21	106	165
Blue Ridge	2	2	1	0	5
Nottely	911	17	106	11	1,045
Ocoees 1, 2, and 3	20	115	6	103	244
Apalachia	0	0	2	4	6
Fontana	6	4	39	8	57
Totals	1,543	164	223	246	2,176

Using a TVA-developed modification of the Ohio Rapid Assessment Method (Mack 2001) specific to the TVA region (TVARAM), wetlands on uncommitted parcels were categorized by their functions, sensitivity to disturbance, rarity, and irreplaceability. Wetlands are classified into three categories according to their TVARAM scores. Category 1 wetlands are considered “limited quality waters” and represent degraded aquatic resources. Category 2 includes wetlands of moderate quality and wetlands that are degraded but have reasonable potential for restoration. Category 3 generally includes wetlands of very high quality or of regional/statewide concern such as wetlands that provide habitat for threatened or endangered species.

3.1.5.2 Environmental Consequences

Under any of the alternatives, wetlands present on any parcels would be protected under EO 11990. Any impacts to wetlands associated with ongoing or future project operations would be evaluated under NEPA and minimized to the extent practicable. These minor impacts would have a negligible effect on wetland resources in the project area.

Alternative A

There is a potential for some minor cumulative impacts to wetlands if Alternative A is chosen. Wetlands, at both ecoregion and watershed levels, are very limited and uncommon, and the relatively small, linear shoreline wetlands on the mountain reservoirs comprise important habitat. Gradual, incremental loss or alteration of these shoreline wetlands due to increased development would contribute to the overall trend of wetland loss reported by the Natural Resources Spatial Analysis Laboratory (NARSAL) (2007a) and SAMAB Cooperative (1996).

Data generated by TVA’s SMI EIS (TVA 1998) found that the presence of wetlands on or adjacent to TVA reservoir lands appears related to the development status of the shoreline. The study found that, within 0.25 mile of the shoreline, the proportion of total wetlands acreage was greater along undeveloped shorelines than along developed shorelines. This is partially explained by the fact that many wetlands occur in low-lying or floodprone areas where development is often restricted.

Traditionally, growth and development within the Hiwassee River watershed has occurred mostly along streams and rivers where lands are less steep (North Carolina Division of

Water Quality 1997). Wetlands are typically located along streams and rivers; thus, there would be increasing pressure and impacts on wetlands in these watersheds where wetlands are relatively scarce, making up less than 1 percent of the land area. Increasing commercial and residential development in the region points to the potential for incremental impacts to wetland habitats on the unplanned parcels for these reservoirs if development occurs.

Alternative B

No direct impacts to wetlands are associated with Alternative B, and this alternative is expected to have the least amount of adverse effects to wetlands. This alternative would allocate 147.2 acres to Zone 3 (Sensitive Resource Management) and 1,663.6 acres to Zone 4 (Natural Resource Conservation). Alternative B would allocate 14 parcels on Hiwassee and Chatuge reservoirs to Zone 3 specifically for wetland protection. Zone 4 parcels on Chatuge, Hiwassee, Blue Ridge, Nottely, and Fontana reservoirs are managed to protect and enhance habitat, which also affords protection to wetlands.

No cumulative impacts to wetlands would occur as the result of Alternative B, as wetlands on all TVA parcels would be protected in accordance with EO 11990 and project NEPA analysis.

Alternative C

Under Alternative C, TVA would allocate Parcel 10 to Zone 5 (Industrial) and Parcels 52 and 77 to Zone 6 (Developed Recreation) on Chatuge Reservoir. None of these Chatuge Reservoir parcels contain wetlands, and thus, there would be no effect to wetlands.

Under Alternative C, Parcels 34 and 49 on Hiwassee Reservoir would be changed from Zone 4 (National Resource Conservation) to Zone 6 (Developed Recreation). Neither of these parcels contains wetlands, and thus, no impacts to wetlands would occur.

No cumulative impacts to wetlands would occur as the result of Alternative C, as wetlands on TVA parcels would be protected under Zone 3 and Zone 4 allocations, and changes in allocation for specific parcels on Chatuge and Hiwassee reservoirs would have no direct impacts to wetlands.

3.1.6 Floodplains

3.1.6.1 Affected Environment

As a federal agency, TVA is subject to the requirements of EO 11988 (Floodplain Management). The objective of EO 11988 is “to avoid to the extent possible the long- and short-term adverse impacts associated with the occupancy and modification of floodplains and to avoid direct and indirect support of floodplain development wherever there is a practicable alternative” 43 *Federal Register* 6030 (10 February 1978). The EO is not intended to prohibit floodplain development in all cases but rather to create a consistent government policy against such development under most circumstances. It applies to all federal agencies that acquire, manage, or dispose of federal lands and facilities; undertake, finance, or assist construction and improvements; and conduct activities and programs affecting land use, including planning, regulating, and licensing. The EO requires that agencies avoid the 100-year floodplain unless there is no practicable alternative. The 500-year flood elevation is used to establish the “critical action floodplain.” A “critical action” is defined in the Water Resource Council Floodplain Management Guidelines as any activities for which even a slight chance of flooding would be too great. The 500-year flood elevation

is also used to control flood- damageable development for TVA projects and residential and commercial development on TVA lands.

Table 3-6 below provides the 50-, 100-, and 500-year flood elevations, January 1 target elevation, June 1 target elevation, and the MSC for each reservoir. The floodplains at each reservoir are described in more detail below in the reservoir-specific sections.

Table 3-6. Dam Operating Levels and Maximum Shoreline Contour for Mountain Reservoirs

Dam	50-Year Elevation (feet)	100-Year Elevation (feet)	500-Year Elevation (feet)	January 1 Flood Guide Level (feet)	June 1 Flood Guide Level (feet)	Maximum Shoreline Contour* (feet)
Chatuge	1928.5	1929.0	1931.0	1918.0	1926.0	1933.0
Hiwassee	1528.3	1529.0	1530.0	1485.0	1521.0	1532.0
Blue Ridge	1691.0	1691.0	1691.0	1668.0	1687.0	1695.0
Nottely	1781.9	1782.5	1785.5	1762.0	1777.0	1785.0
Ocoee 1	839.5	839.5	843.4	820.0+	829.0+	842.6
Ocoee 2	Not Available	1123.0(A)	1124.5(A)	N/A	N/A	Not Available
Ocoee 3	1437.5	1438.1	1439.7	N/A	N/A	1440.0
Apalachia	1281.6	1282.0	1283.0	N/A	N/A	1285.0
Fontana	1710.0	1710.0	1710.0	1653.0	1703.0	1720.0

*From the TVA Register Deed Provisions Applicable in the Sale of Reservoir Lands

A = Approximate Elevations

All elevations are National Geodetic Vertical Datum of 1929 except as noted (+ TEPCO datum)

August 2007

3.1.6.2 Environmental Consequences

Alternative A

Under Alternative A, for all reservoirs, the development and/or management of properties and evaluations of proposed actions would be done individually to ensure consistency with EO 11988. Potential development would generally consist of water use facilities and other repetitive actions in the floodplain that would result in minor floodplain impacts.

Alternative B

Under Alternative B, for all reservoirs, the potential adverse impacts to natural and beneficial floodplain values would be less than those under Alternative A because a substantial portion of the available land would be allocated for resource management and conservation activities.

Alternative C

For all of the reservoirs, the potential adverse impacts to natural and beneficial floodplain values under Alternative C would be somewhat greater than those expected under Alternatives A and B because more parcels of the available land on Chatuge and Hiwassee reservoirs would be allocated to zones allowing industrial and recreational development. Although there are impacts to floodplains of varying degrees under all alternatives, potential impacts to floodplain values would be insignificant.

3.1.7. Cultural Resources

In accordance with the National Historic Preservation Act (NHPA) of 1966 and the Archaeological Resources Protection Act (ARPA) of 1979, TVA protects historic properties located on TVA land or affected by TVA undertakings. A historic property is defined in 36 CFR § 800.16(l) as “any prehistoric or historic district, site, building, structure, or object included in, or eligible for inclusion in, the NRHP.

Prior to an undertaking, TVA must identify, evaluate, and assess effects on historic properties. An undertaking is defined under 36 Code of Federal Regulations (CFR) Section (§) 800.16(y) as

[a] project, activity, or program funded in whole or in part under the direct or indirect jurisdiction of a Federal agency, including those carried out by or on behalf of a Federal agency; those carried out with Federal financial assistance; and those requiring a Federal permit, license or approval.

TVA has operated large hydroelectric and/or flood control projects in the area for more than 70 years; efforts to aid and assist in the maintenance of federally recognized Indian tribes and to support the understanding of historic properties continue to be key parts of TVA land management strategy. TVA efforts in managing and protecting historic properties are an inherent responsibility of TVA as a member of these communities.

3.1.7.1 Archaeological Resources

3.1.7.1.1 Affected Environment

The Appalachian Highland region has been inhabited for at least 12,000 years. The areas around the major waterways of the region have been the focus of prehistoric habitation, resource acquisition, and ceremonial activity for all of this time. The intensification of prehistoric occupation of the Appalachian Highlands is indicated by the frequency of archaeological sites attributable to the succeeding series of temporal/cultural traditions beginning with the Paleo-Indian Stage (circa 12000-8000 B.C.) and continuing through the Archaic (8000-1200 B.C.), the Woodland (1200 B.C.-1000 A.D.), and the Mississippian (1000-1500 A.D.) stages. Following European contact, drastic cultural changes occurred, which for explanatory purposes have been divided into the Protohistoric-Contact Stage (1500-1750 A.D.) and the subsequent Historic era, which includes the Cherokee (1700 A.D.-present) and European- and African-American (1750 A.D.-present) occupations. The sustained presence of Native American groups in the Appalachian Highlands and their continuation of traditional religious and cultural practices are of great importance to communities of the region.

In an effort to gain an understanding of the prehistory of the region, archaeological investigations in the area began in the mid-19th century. George Featherstonaugh (1847), an English-born geologist charged with exploring the mineral resources of the country by the United States government, documented prehistoric lead mining pits in the region. His work was followed in the late 19th century with the work of James Mooney (n.d.) on villages and mounds, the Valentine Museum’s work at Peachtree Mound (Coe 1983), and Cyrus Thomas (1894) and the Smithsonian Institution’s search for the origins of mounds found throughout the United States. Following the Victorian era of American archaeology, little work was done in the region until the latter half of the 20th century (Wauchope 1966).

The results of archaeological testing on the mountain reservoirs are considered prior to undertaking site-specific activities. Previous surveys on these reservoirs documented 602

archaeological sites on or directly adjacent to TVA lands; the results of these surveys are described in more detail below in the reservoir-specific sections. Archaeological surveys have not been conducted on all of the lands involved in this land planning process, and many of the reported archaeological sites have not been assessed for their NRHP eligibility. Based on the results of these surveys and various consultations with the State Historic Preservation Officers (SHPOs) of Georgia, North Carolina, and Tennessee, and Tribal Historic Preservation Officers of various federally recognized Indian tribes within the region, many sites on MRLMP lands have been determined to be eligible or potentially eligible for listing in the NRHP (see Table 3-7). Few sites on the Ocoees have been assessed for their NRHP eligibility. Many archaeological sites also occur on mountain reservoir lands not managed by TVA.

Table 3-7. Summary of Archaeological Sites on Mountain Reservoirs Land Management Plan Lands Eligible for or Potentially Eligible for Listing in the NRHP

Number of sites	Reservoir						
	Chatuge	Hiwassee	Blue Ridge	Nottely	Ocoees	Apalachia	Fontana
	15	174	43	7	0	6	11

The area of potential effect (APE), as defined in 36 CFR § 800.16(d), is “the geographic area or areas within which an undertaking may directly or indirectly cause alterations in the character or use of historic properties, if any such properties exist.” For the MRLMP, TVA has identified the APE in North Carolina as approximately 1,024 acres of TVA land on Chatuge Reservoir, 931 acres on Fontana Reservoir, 1,007.4 acres on Hiwassee Reservoir, and 139.1 acres on Apalachia Reservoir. In Tennessee, the APE includes 706 acres of the Apalachia Dam Reservation including the penstock, powerhouse, and the Gee Creek Campground; 77.4 acres on Ocoee 1; 79.6 acres on Ocoee 2; and 218.3 acres on Ocoee 3. In Georgia, the APE includes 742 acres of Chatuge Reservoir, 469.5 acres on Blue Ridge Reservoir, and 828.6 acres on Nottely Reservoir.

3.1.7.1.2 Environmental Consequences

TVA will continue the present case-by-case reviews in TVA-controlled areas potentially subject to ground-disturbing actions such as dredging, shoreline development, or timber harvesting through phased identification and evaluation of historic properties. Archaeological resources within these areas would be avoided and protected whenever possible. If avoidance were not possible, then proper procedures would be implemented to mitigate any potential effects on the historic property. Under any alternative, the adverse effects to significant archaeological resources will be minimized by mitigation through data recovery excavations or other means pursuant to 36 CFR Part 800.

Alternative A

Under Alternative A, for all reservoirs, site-specific activities proposed in the future would be approved, mitigated, or denied according to the significance of the resources recorded. If mitigation were required, appropriate archaeological investigation would be necessary, and potentially impacted resources would be properly recorded and removed. Resources would be protected in the course of complying with regulatory requirements of the NHPA and ARPA.

Alternative B

Under Alternative B, all proposed soil-disturbing activities that occur on parcels that contain historic properties would be reviewed by a TVA archaeologist. TVA would take necessary steps to ensure compliance with regulatory requirements of the NHPA and ARPA.

The greatest potential for development would be in Zone 7 (Shoreline Access), and identification of archaeological resources within this zone would enable development to avoid the resources effectively. If the resources could not be avoided, then further investigations would be required to determine the resources' eligibility for inclusion in the NRHP. Under Alternative B, there are commitments to management of archaeological resources within Zone 3 (Sensitive Resource Management) and Zone 4 (Natural Resource Conservation), effectively preserving resources within the planned parcels.

TVA would execute separate programmatic agreements (PAs) in Georgia, North Carolina, and Tennessee for the identification, evaluation, and treatment of all historic properties in the APE. Until the PAs are executed, TVA will incorporate the phased identification, evaluation, and treatment procedure to effectively preserve historic properties as required by Section 106 of the NHPA.

TVA currently has a PA and an amendment to the PA with the Tennessee SHPO for the portion of Apalachia Reservoir in Tennessee (Appendix G). TVA anticipates executing separate PAs with the Georgia SHPO and North Carolina SHPO before this EIS is completed. TVA will provide the opportunity for federally recognized Indian tribes to comment on the PAs.

Significant recorded archaeological resources exist within and surrounding TVA parcels allocated to zones in which some type of development or ground-disturbing activity may potentially occur. On parcels where systematic archaeological surveys have not been conducted, significant archaeological resources may exist. Development of the parcels may adversely affect archaeological resources through ground-disturbing activities. Adverse effects may be averted through avoidance and/or protection of archaeological resources. Where adverse effects cannot be avoided, mitigation through archaeological excavations or other means would be required. Treatment plans resolving adverse effects would comply with the NHPA and ARPA.

Alternative C

Alternative C would be similar to Alternative B but involves the allocation of five additional parcels for development on Chatuge and Hiwassee reservoirs. Significant recorded archaeological resources exist within and surrounding the five additional parcels. On parcels where systematic archaeological surveys have not been conducted, archaeological resources may exist. Development of the five additional parcels may adversely affect archaeological resources through ground-disturbing activities. Adverse effects may be averted through avoidance and/or protection of archaeological resources. Where adverse effects cannot be avoided, mitigation through archaeological excavations or other means would be required. Treatment plans resolving adverse effects would comply with the NHPA and ARPA.

3.1.7.2 Historic Structures**3.1.7.2.1 Affected Environment**

Many small waterpower sawmills and gristmills were built in the 19th century on the smaller branches and creeks flowing to the Hiwassee River. The first major hydroelectric

development in the Hiwassee River Basin was in 1910-1912 when a power plant with an installed capacity of 18,000 kilowatts was built at Parksville on the Ocoee River. This development, Ocoee 1, was followed in 1913 by Ocoee 2 with an installed capacity of 19,900 kilowatts. To increase the amount of power, construction of the Blue Ridge Reservoir on the Toccoa River (the upper Ocoee River in Georgia) was begun in 1925 and completed in 1931. TVA acquired these three properties in August 1939 as a part of the TEPCO purchase.

Various private interests promoted large-scale waterpower developments on the Hiwassee River. The Swann Corporation, through its subsidiary the Hiwassee-Nolichucky Power Company, acquired the lands and interests of the Thompson Power Company in 1926 and, later, those of the George Peabody Wetmore Estate. These properties were between the Tennessee-North Carolina state line and U.S. Highway (US) 411. Although an extensive system of developments was proposed, plans were never completed, nor any construction authorized. TVA's Apalachia project now diverts the streamflow through a long tunnel paralleling the upper half of this stretch of river.

Under a special act of the North Carolina Legislature, the Carolina-Tennessee Power Company was incorporated in February 1909 to acquire lands and flowage rights along the Hiwassee River within North Carolina. In 1914, control of these power rights was acquired by two men from New York City. The Hiwassee River Power Company was incorporated in North Carolina by the Van Deventer interests of Knoxville, Tennessee, who in July 1914 began to acquire property along the river from the state line upstream to Murphy. The Carolina-Tennessee Power Company then instituted proceedings to acquire by condemnation flowage easements on the lands of the Hiwassee River Power Company and in December 1923, won on all proceedings in the Superior Court of Cherokee County, North Carolina. The case eventually reached the U.S. Supreme Court, which in June 1924 affirmed the decision of the lower court. The condemned lands were all below elevation 1,465, which was the upper limit proposed by the Carolina-Tennessee Power Company for a 150-foot dam just above the present Hiwassee Dam site. This company was reorganized in 1929 as the Southern States Power Company. Two small hydroelectric projects, which the company had acquired and operated, constituted its sole claim as an operating utility.

Prior to the creation of TVA, the USACE included five projects in its recommended development plan for navigation, flood control, and power in its March 1930 report to Congress, House Document 328, 71st Congress, 2nd Session, "Tennessee River and Tributaries, North Carolina, Tennessee, Alabama, and Kentucky."

In 1935, Congress authorized TVA to build Hiwassee Dam and Reservoir. The Southern States Power Company insisted that it was entitled to compensation based on the alleged value of the property at the site of an assumed hydroelectric development. TVA contended that compensation should be based on the ordinary market value of the land. The lower courts sustained the position of the power company, and the case was appealed to the U.S. Supreme Court, which in May 1943 reversed the decision of the lower court and remanded the case. Further proceedings were held in the district court in June 1944, but before the hearings were completed, a compromise was reached and the case settled by agreement eight years after TVA began construction on Hiwassee Dam.

TVA constructed Apalachia, Ocoee 3, Nottely, and Chatuge projects on an emergency basis during World War II and frequently referred to all of these dams and reservoirs as "The Hiwassee Projects." In fact, TVA 1948 provides detailed information about each of these dams and reservoirs. The timing of their construction reflects the dependence of

military preparedness upon aircraft, of aircraft upon aluminum, and of aluminum upon electric power. Despite this, they were integral parts of the unified development of the Tennessee River, and their construction was merely advanced in schedule by the necessities of war-born power demand.

Historic structures on or in the immediate vicinity of MRLMP lands that are listed in the NRHP include the Ocoee 1 hydroelectric station and the Ocoee 2 hydroelectric plant. Other dams and powerhouses are eligible for listing in the NRHP. These historic properties are described in more detail below in the reservoir-specific sections.

3.1.7.2.2 Environmental Consequences

Historic structures data were derived primarily from information that has been collected for various TVA projects. For any proposal with the potential to affect properties eligible or potentially eligible for listing in the NRHP (regardless of parcel zone allocation), a field check of the current status of these historical resources would be accomplished to determine the significance of the resource, and the proposal would be subject to the stipulations set forth in the PA. Nearly all of the historic structures are located on land adjacent to, rather than on, TVA land. These will be evaluated because they may be indirectly affected by changes in the visual character or setting resulting from actions on TVA lands.

Regardless of the alternative, proposed site-specific activities would be assessed in accordance with the PA to determine what historic features exist on TVA land and on adjacent lands within the APE. In addition, the significance of any historic structures present and the degree of potential impact of the action on historical resources would be determined under each of the alternatives.

Alternatives A and B

Under Alternatives A and B, the potential effects to historical structures would be restricted to potential land use changes within committed parcels for the mountain reservoirs, and any such changes could indirectly affect historic structures depending upon the visual characteristics of the proposed development and visibility of the development from the potentially affected structure. Because they could change the visual character of the surrounding area, activities on Developed Recreation parcels, particularly those developed for commercial recreation, have the potential to impact adjacent historic structures. Actions on parcels that are allocated to Project Operations also could visually affect adjacent historic structures. Because TVA would evaluate and avoid or mitigate adverse impacts to historic structures, impacts are expected to be insignificant.

Under Alternative B, Parcels 21, 26, and 40 on Hiwassee Reservoir have been allocated to Zone 3 (Sensitive Resource Management) for protection of historic and archaeological resources.

Alternative C

Under Alternative C, development of three parcels on Chatuge Reservoir and two parcels on Hiwassee Reservoir could change the visual character of the surrounding area and could potentially affect historic resources. These proposals, which include Industrial use on Parcel 10 and Developed Recreation on Parcels 52 and 77 on Chatuge Reservoir and Developed Recreation on Hiwassee Reservoir Parcels 34 and 49, would be evaluated on an individual basis to determine if there would be unavoidable adverse effects and to determine the mitigation measures, if any, needed to avoid those effects.

3.1.8 Managed Areas and Ecologically Significant Sites

3.1.8.1 Affected Environment

Managed areas include lands held in public ownership that are managed to protect and maintain certain ecological and/or recreational features. A management plan or similar document defines what types of activities are compatible with intended use of the managed area. Examples of managed areas include the GSMNP, Nantahala National Forest, Cherokee National Forest, and TVA Rock Raven Small Wild Area. A large portion of the TVA lands on the mountain reservoirs adjoins non-TVA-managed areas. The largest of these managed areas, some of which are in the vicinity of more than one mountain reservoir, are listed in Table 3-8.

Table 3-8. Large Managed Areas Adjacent to or in the Vicinity of TVA Mountain Reservoirs

Name	Authority	Associated Mountain Reservoirs
Chattahoochee National Forest	Federal	Blue Ridge, Chatuge, Nottely
Cherokee National Forest	Federal	Apalachia, Ocoee
Cherokee (South) State Wildlife Management Area	State	Apalachia, Ocoee
Great Smoky Mountains National Park	Federal	Fontana
Nantahala National Forest	Federal	Apalachia, Chatuge, Fontana, Hiwassee
Nantahala State Game Land	State	Apalachia, Chatuge, Fontana, Hiwassee

Ecologically significant sites are parcels of privately owned land that are identified by resource biologists as having significant environmental resources. Although no management plan is likely to be in place for such sites, there may be an active effort to acquire this land for public ownership or otherwise provide protection for the sensitive resource, e.g., a conservation easement. Examples of ecologically significant sites include Ocoee River Ruth’s golden aster sites, Goforth Creek Gorge site, and Walkertown Branch bog. Nationwide Rivers Inventory (NRI) streams are free-flowing river segments, i.e., distinct stretches of rivers that retain characteristics of a free-flowing river despite having some unregulated or man-made impoundments either upstream or downstream, recognized by the NPS as possessing remarkable natural or cultural values. Currently, more than 3,400 free-flowing river segments in the United States are listed as possessing one or more of these values. NRI streams in the plan area include portions of the Ocoee, Hiwassee, Little Tennessee, Nantahala, and Tuckasegee rivers.

3.1.8.2 Environmental Consequences

Overall, the efficient management and protection of TVA-designated natural areas and ecologically significant sites have benefited from the development and implementation of TVA RLMPs because each plan provides a systematic process for making these designations and for determining and implementing management objectives for these parcels. Additionally, because the mountain reservoirs are situated immediately adjacent to portions of three national forests and a national park, conservation of natural resources would likely remain a high priority for this region.

Alternative A

No TVA natural areas have previously been designated on or near Chatuge, Blue Ridge, Nottely, the Ocoees, Apalachia, or Fontana reservoirs. The TVA Raven Rock Small Wild Area is located on the Hiwassee Dam Reservation. All of the reservoirs are situated near areas managed by other federal entities (i.e., USFS, NPS), state, county, or municipal governments, and others, such as corporations or nonprofit organizations (e.g., The Nature Conservancy) and are adjacent to or near reservoir lands.

No adverse effects to TVA or other managed areas or ecologically significant sites would result from adoption of Alternative A.

Alternative B

Under Alternative B, no TVA natural areas are on Chatuge, Blue Ridge, Nottely, the Ocoees, Apalachia, or Fontana reservoirs, and no new TVA natural areas are proposed. Allocations made under Alternative B would not adversely affect natural areas in the vicinity of these reservoirs that are managed or owned by other entities.

For the Hiwassee Reservoir, no new TVA natural areas are proposed. Allocations made under Alternative B would not adversely affect TVA Raven Rock Small Wild Area or natural areas in the vicinity of Hiwassee Reservoir that are managed or owned by other entities. Under Alternative B, there would be no adverse effects to ecologically significant sites.

Alternative C

Under Alternative C, no TVA natural areas occur on or adjacent to the five affected parcels on Chatuge and Hiwassee reservoirs, and the parcels do not meet TVA criteria for designation as natural areas. Because of the distance (a minimum of 0.3 mile for the Zone 6 parcels and 0.7 mile for the Zone 5 parcel) between these parcels and existing non-TVA-managed areas, the selection of Alternative C and the subsequent Industrial and Developed Recreation allocations and use of these five parcels would not adversely affect managed areas. Under Alternative C, there would be no adverse effects to ecologically significant sites.

3.1.9 Visual Resources

The physical, biological, and man-made features seen in the landscape provide any selected geographic area with particular visual qualities and aesthetic character. The varied combinations of natural features and human alterations that shape landscape character also help define their scenic importance. The presence or absence of these features along with aesthetic attributes such as uniqueness, variety, pattern, vividness, contrast, and harmony make the visual resources of an area identifiable and distinct. The scenic value of these resources is based on human perceptions of intrinsic beauty as expressed in the forms, colors, textures, and visual composition seen in each landscape.

Consistent with its objectives for environmental leadership, TVA ensures that, to the extent practicable, land use and natural resource management activities proposed for lands under its control will not significantly degrade or destroy outstanding visual resources. In those limited situations where no practicable alternatives are identified and substantial visual impacts would occur, TVA may take reasonable and prudent measures to mitigate the anticipated impacts.

A visual analysis includes evaluating the extent and magnitude of potential changes in the visual environment that could result from the proposed actions. The objectives are to identify:

- The scenic and aesthetic character of the existing landscape.
- The degree of discernible contrast between the proposed action and the existing landscape.
- The location and sensitivity levels of viewpoints available to the public.
- The visibility of the proposed action from the public viewpoints.
- Any potential cumulative changes to the visual landscape.

The visual attributes of existing scenery, along with the anticipated attributes resulting from the proposed action, are reviewed and classified in the visual analysis process. The classification criteria are adapted from a scenic management system developed by the USFS (1995) and integrated with planning methods used by TVA.

Four categories of visual attributes are evaluated individually as described below, and the results help determine an overall scenic value.

1. Scenic attractiveness is the measure of outstanding natural features, scenic variety, seasonal change, and strategic location. It is based on the intrinsic beauty of landforms, rock outcrops, water bodies, and vegetation. Attractiveness is ranked in one of three classifications from distinctive to minimal.
2. Scenic integrity is the measure of visual unity and wholeness of the natural landscape character. It is based on the degree of disturbance in natural patterns, the presence of disruptive or discordant elements, and the relative harmony of human alterations. Integrity is ranked in one of four classifications from high to very low.
3. Human sensitivity is the expressed concern of people for the scenic qualities of the project area. Sensitivity includes considerations such as the type and number of viewers, frequency and duration of views, and viewer context of adjacent scenery. Concerns are also derived or confirmed by public input. Sensitivity is ranked in one of three classifications from high to low.
4. Viewing distance is the measure of how far an area can be seen by observers and the degree of visible detail. It is ranked in one of three classifications from foreground to background (Figure 3-1).

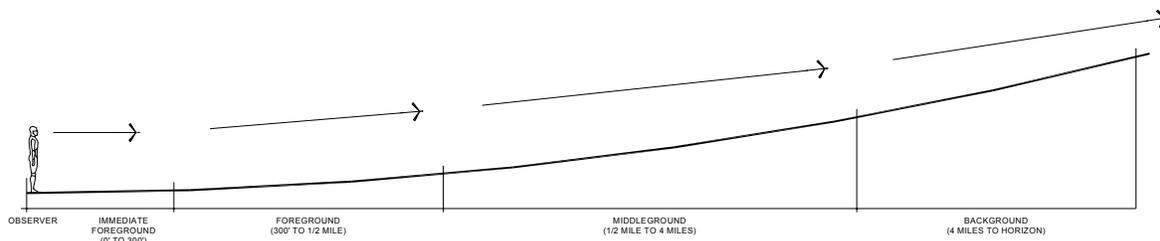


Figure 3-1. Viewing Distances

- Foreground is 0 to 0.5 mile from the observer where details of objects are clearly seen. Details are most distinct in the immediate foreground of 0 to 300 feet.
- Middleground is 0.5 to 4 miles where single objects or groups tend to merge into larger patterns with less distinguishable details. When viewed in this broader context, alterations may contrast strongly with larger natural patterns and make some middleground views more sensitive than the foreground.
- Background is from 4 miles to the horizon where objects are seen as broad outline patterns and forms. Details and colors are not normally discernible unless they are quite large, standing alone, or provide strong contrast.

The term "scenic visibility" is sometime used in visual analyses. Scenic visibility is composed of human sensitivity and viewing distance, which are interrelated, but evaluated and classified separately.

Visual absorption capacity is also considered when determining scenic value of a landscape. Absorption capacity indicates the relative ability of a landscape to accept human alteration with the least loss of scenic quality. It is based on characteristics of the natural features seen in the project area. As an example, alterations on a steep woodland slope with dense evergreen cover would create much greater visual contrast than similar actions on a gentle slope with a cover of mixed woodlands and pastures. Areas of greatest scenic value frequently have the least capacity to absorb visual change without substantial devaluation.

Overall scenic value is determined by evaluating the combined levels of the four attributes, along with absorption capacity. It is ranked in one of four classes ranging from "excellent" to "poor" as outlined in the TVA publication *Scenic Value Criteria for Scenery Inventory and Management* (see Appendix J).

3.1.9.1 Affected Environment

All of the mountain reservoir lands have distinctive scenic attractiveness and high scenic integrity. A variety of landforms, including rock, myriad vegetation, and other features, contrast with the reservoirs. Reservoir lands appear intact and unaltered, with minor deviations along the developed parcels. Most views from the water have high scenic visibility and are in the foreground and middleground of contrasting elements such as scenic bluffs along the shoreline and prominent peaks at greater distances.

As tributary reservoirs, the water levels of Chatuge, Hiwassee, Blue Ridge, Nottely, and Fontana reservoirs have considerable fluctuation during the year due to power generation

and flood control operations. The most scenic views are generally during the late spring and summer months when reservoir levels are highest and recreational use is greatest. The normal winter drawdown exposes a “bathtub ring” of bare earth and rock around the shoreline from late summer to spring. This drawdown zone is a dominant visual element that provides strong adverse contrast with the surrounding landscape. Much of this surrounding landscape ranks high in both scenic attractiveness and scenic integrity. Recreational use of the reservoirs is reduced from late fall to early spring, so the drawdown zone is most noticeable to residents and passing traffic on nearby roads. However, in some parts of the reservoirs, islands appear that may have some visual interest for boaters, motorists, and shoreline residents.

3.1.9.2 Environmental Consequences

Potential visual consequences were examined in terms of the likely difference between the existing landscape and the landscape as it might be altered by the proposed allocation changes. The assessment of visual change considered the sensitivity of viewing points available to the general public, their viewing distances, and visibility of proposed changes. In this assessment, scenic character is described using a variety of adjectives. Scenic integrity, which relates to degree of intactness or wholeness of the landscape character, is also an important factor. These measures help identify changes in visual character based on commonly held perceptions of landscape beauty and the aesthetic sense of place. Scenic value class is determined by combining the levels of scenic attractiveness, scenic integrity, and visibility. Scenic value class and the foreground, middleground, and background viewing distances for each reservoir are described in more detail below in the reservoir-specific sections.

Comparative scenic values of TVA lands were assessed during the development of the alternatives in order to identify areas for scenic protection and visual resource conservation. Those parcels having distinctive visual characteristics such as the islands, rock bluffs, steep, wooded ridges, wetlands, and flowering shallow water areas were evaluated for allocation to Zone 3 (Sensitive Resource Management). Land that provides valuable protective screening was also evaluated for this allocation. Parcels that possess attractive visual resources of less significance were allocated to Zone 4 (Natural Resource Conservation) under Alternatives B and C. Zone 4 also includes land that provides important protective screening. Activities that involve minor visible change such as recreational hiking, picnicking, bank fishing, and some selective forest management could take place under both zone allocations. Some resource management activities with more visible modifications could take place under the Zone 4 designation as long as the location and appearance were subordinate to maintaining the desired visual characteristics.

Under all of the alternatives, TVA’s land stewardship activities would benefit visual resource protection except for some activities that may occur under land use and 26a permitting. Activities occurring during the management of TVA lands typically include road access, illegal dump cleanup and prevention, construction and maintenance of access trails, wildlife and forest management, and providing parking areas within proximity of desired outdoor and recreational activities. These activities could provide greater opportunities for viewing natural scenery for pleasure from the water or land. For example, wildlife openings and agricultural leases could create positive visual contrast in the landscape. Controlled burns could enhance the aesthetic value of naturally appearing landscapes. Conducting timber harvests in some areas of the reservoirs could encourage successional forest cover that would enhance scenic integrity. The minor visual impacts following timber harvests and

other types of vegetation management are temporary and would diminish as the site revegetates.

Likewise, future natural areas and wetlands management activities could preserve and enhance the exceptional natural, scenic, or aesthetic qualities of landscapes that are suitable for low-impact public use. TVA attempts to monitor and remedy, to the extent practicable, abuses found in these areas, which can enhance opportunities for viewing naturally appearing landscapes. Historically, such abuses include illegal dumping, unauthorized ATV use, and other activities not permitted in some areas.

Lands having the greatest scenic qualities are often the most desirable for public preservation. Frequently, however, they are also the most sought after for development. Under all alternatives, TVA would continue to conduct environmental reviews including evaluation for potential visual impacts prior to the approval of any proposed development on public land. These reviews may prevent the most serious scenic disruptions or loss of visual resources by requiring mitigation measures to reduce potentially significant visual impacts.

Alternative A

Under Alternative A, for all reservoirs, a slow but noticeable decline in scenic resources, aesthetic quality, and visual landscape character are expected as demands for development are likely to continue to increase. This decline in scenic resources would likely reduce scenic class levels for some areas of the reservoirs by one level or more (e.g., from “excellent” to “good,” or from “fair” to “poor”). Areas with low scenic values are often influenced by small changes in visual character. Thus, reductions in scenic class level could be potentially significant for areas of common or minimal scenic quality or for those areas that have very little scenic importance. Parcels 35 and 36 on Hiwassee Reservoir are currently undeveloped; however, under Alternative A, they are allocated for Industrial, and development of those parcels would have visual impacts.

Alternatives B and C

Alternative B would allocate all of the TVA lands to one of the seven zones and would not result in any changes in existing land use for any of the parcels. The land use of the committed parcels would not change. Visual resources are not expected to be impacted.

Under Alternative C, the impacts on land use would be the same as under Alternative B on seven of the nine reservoirs. On Chatuge and Hiwassee reservoirs, an additional 27.2 acres would be allocated to Zone 5 (Industrial), and an additional 80.2 acres would be allocated to Zone 6 (Developed Recreation). These activities have the potential to reduce scenic attractiveness of the shoreline and the aesthetic sense of place.

3.1.10 *Water Quality and Aquatic Ecology*

3.1.10.1 *Affected Environment*

Water quality and the associated aquatic animal and plant populations in the mountain reservoirs and their tailwaters are influenced by a variety of factors. These include the size, geology, and land use conditions in the reservoirs’ upstream drainage areas, point and nonpoint discharges of pollutants, activities on lands adjacent to the reservoirs, and the operation of the reservoirs.

Reservoir Ecological Health

TVA developed the Reservoir Ecological Health Monitoring Program to determine reservoir health as compared to other reservoirs in the TVA system, to provide data for comparing future water quality conditions, and to be a screening program for targeting more detailed studies if the need arises (TVA 2006). TVA has monitored the ecological health of the mountain reservoirs on an annual or biennial basis since the early 1990s. Because of different methods and criteria used to assess the fish and benthic macroinvertebrates prior to 1994, the ecological health ratings described below are based on monitoring from 1994 through the present. The ecological health scoring system is based on the following five indicators, which are typically measured in the reservoir forebay area (a short distance upstream of the dam) and one or more areas farther upstream:

1. Dissolved oxygen (DO) is necessary in respiration of most aquatic organisms. Ideally, a reservoir has enough DO throughout the water column available to fish, insects, and zooplankton for respiration. Concentrations of DO in a reservoir both control and are controlled by many physical, chemical, and biological processes (e.g., photosynthesis, respiration, oxidation-reduction reactions, bacterial decomposition, temperature) that determine the assimilative capacity of a reservoir. Assimilative capacity is a water body's ability to receive wastewaters or other materials requiring oxygen for decomposition without deleterious effects and without damage to aquatic life. If concentrations are low enough and/or low levels are sustained long enough, it can adversely affect the health and diversity of aquatic organisms. DO levels are expressed in terms of milligrams/liter (mg/L).
2. Chlorophyll, a surrogate measure for the amount of algae (phytoplankton) in the water, is important because it provides insights into the level of primary productivity within a water body and can provide a measure of nutrient enrichment. Although some level of phytoplankton production is essential to maintain a healthy aquatic community, as concentrations increase, uses can be differentially affected. For example, fisheries such as largemouth bass in southeastern reservoirs can be enhanced as phytoplankton concentrations increase to relatively high levels. However, elevated phytoplankton concentrations are a concern because adverse ecological and use impacts could occur, such as reduced water clarity, more frequent algal blooms, higher oxygen demands and lower DO concentrations, increased periods of anoxic conditions and resultant anoxic byproducts (i.e., ammonia, sulfide, and dissolved manganese), more frequent water treatment problems, and higher water treatment cost.
3. Sediment quality is a measure of the amount of polychlorinated biphenyls (PCBs), pesticides, and metals in sediment on the bottom of the reservoir. Sediments at the bottoms of reservoirs serve as a repository for a variety of materials, especially chemicals that have a low solubility in water. If contaminated, bottom sediments can have adverse impacts on bottom fauna and can often be long-term sources of toxic substances to the aquatic environment. They may impact wildlife and humans through the consumption of contaminated food or water or through direct contact. These impacts may occur even though the water above the sediments meets water quality criteria. Thus, examination of reservoir sediments is useful to determine if toxic chemicals are present and if chemical composition is changing through time.
4. Benthic macroinvertebrates (large bottom-dwelling invertebrates such as worms, snails, mussels, and crayfish) are included in aquatic monitoring programs because of their importance to the aquatic food chain, and because they have limited

capability of movement, thereby preventing them from avoiding undesirable conditions. Data analyses that are indicative of good (and poor) water quality include taxa richness, relative abundance of organisms tolerant or intolerant of poor water quality, and proportions of samples with no organisms present.

5. Fish are included because they are important to the aquatic food chain and because they have a long life cycle that allows them to reflect water quality conditions over time. Fish are also important to the public for aesthetic, recreational, and commercial reasons. Ratings are based primarily on fish community structure and function using a metric known as the Reservoir Fish Assemblage Index. Also considered in the rating is the percentage of the sample represented by omnivore and insectivores, overall number of fish collected, and the occurrence of fish with anomalies such as diseases, lesions, parasites, deformities, etc. (TVA 2006).

Each indicator is evaluated separately, and the individual ratings are combined into a single, composite score for each reservoir, termed the Reservoir Ecological Health Rating. Recent trends in these five indicators, as well as the overall reservoir ecological health ratings, are described in the reservoir-specific sections.

The Reservoir Ecological Health Monitoring Program is one of five components of TVA's overall river and reservoir monitoring effort termed Reservoir Vital Signs Monitoring Program (RVSMP). The other four components of the RVSMP include: (1) examination of ecological conditions in tributary streams to the Tennessee River; (2) monitoring of toxic contaminants in fish flesh to determine their suitability for human consumption; (3) evaluating the number and size of important game fish species to help ensure their populations remain abundant and robust; and (4) sampling of bacteriological concentrations at recreational areas to evaluate their suitability for water contact recreation.

Fish Consumption Advisories

TVA maintains a program to examine contaminants in fish fillets from TVA reservoirs and their major tributary streams. TVA coordinates these fish tissue studies with state agencies in the Tennessee Valley because they are responsible for protecting public health and determining if a fish consumption advisory is needed. TVA assists the states by collecting fish from TVA reservoirs and checking the tissue for metals, pesticides, PCBs, and other chemicals that could affect human health. Typically, two species are monitored: channel catfish and largemouth bass. Fish consumption advisories have been issued in the past for Chatuge, Hiwassee, Blue Ridge, Nottely, Apalachia, and Fontana reservoirs.

Sport Fishing Index

A Sport Fishing Index (SFI) has been developed to measure sport fishing quality for various species in Tennessee and Cumberland River reservoirs. The SFI is based on the results of fish population sampling by TVA and state resources agencies and, when available, results of angler success as measured by state resource agencies (i.e., bass tournament results and creel surveys).

Swimming Advisories

TVA performs bacteriological monitoring at selected locations for compliance with regulatory limits and reports the results to state agencies and others. The states use this information, along with the results of their own studies, in deciding whether to issue water contact advisories. The most common cause of elevated bacteria levels at TVA recreational sites is populations of Canada geese.

State(s) Impaired Waters

Section 303(d) of the Clean Water Act requires states to maintain a list of water bodies (streams, lakes, and reservoirs) that do not meet water quality standards or have impaired uses. Impaired waters are those that have one or more properties that violate water quality standards. They are considered impaired by pollution and not fully meeting designated uses. TVA's ecological health ratings (i.e., "good," "fair," or "poor") are not directly comparable to state water quality designations, which identify water bodies as impaired, partially impaired, or unimpaired for various use categories. Impaired waters occur in the immediate watersheds of all of the mountain reservoirs except Apalachia Reservoir. They include streams flowing into several of the reservoirs, the reservoir tailwaters, as at Blue Ridge and Nottely, and the reservoirs themselves as at the Ocoees.

Water Supply

In the mountain reservoirs area, there are 15 municipal water suppliers utilizing surface water as their primary source of raw water. The 2005 average daily surface water demand among these suppliers was 9.595 millions of gallons per day (MGD).

3.1.10.2 Environmental Consequences

Increased development and intensive land use has the potential to result in some degree of negative impact to the aquatic environment whether from point source pollution such as industrial or sewage treatment plants, or nonpoint source pollution, which comes from many sources (typically defined as sources that are not required to have a National Pollutant Discharge Elimination System [NPDES] permit). Development and intensive land uses often increase the amount of impervious surface (i.e., roofs, roads, and paved areas), remove vegetation, and increase storm water runoff, thereby reducing the natural buffering/filtering effect of vegetated lands and increasing the potential for soil erosion and other nonpoint sources of pollution. The main areas of concern, in terms of impacts to the aquatic environment and consequently aquatic life, are increased turbidity and sedimentation, increased levels of nutrients, and increased levels of chemicals and bacteria from impervious surfaces, disturbed lands, managed lawns, and improper operation or failure of wastewater treatment systems.

Shoreline development also could alter the physical characteristics of adjacent fish and aquatic invertebrate habitats, which could result in changes in the quality of the aquatic communities. Habitat changes could have negative impacts if valuable spawning habitat (e.g., gravel, woody cover, etc.) or protective cover (e.g., stumps, brush, logs, boulders, etc.) are reduced. Additionally, habitat could be rendered unsuitable by excessive siltation and erosion, which could occur when riparian vegetation is cleared. Conversely, construction of docks and associated pilings and structures such as rock aggregation, while having potential short-term negative impacts during construction, could enhance shoreline habitat when constructed by providing shade and cover for some fish and aquatic invertebrates.

Under any of the alternatives, the potential environmental consequences would be similar, but the more development and/or land disturbance allowed by an alternative, the greater the potential for adverse environmental impacts. However, prior to any individual actions taken on any parcels in the future, TVA would conduct additional site-specific environmental reviews on a case-by-case basis and require appropriate site design and management practices using TVA's Standards and Conditions/BMPs (TVA 2005c) to minimize negative environmental impacts and help ensure the proposals best serve the needs and interest of the public. Further, any actual development of TVA and non-TVA lands must comply with

state and federal environmental regulations and applicants must often obtain permits specifically designed to prevent adverse impacts and violation of applicable water quality criteria.

Alternative A

Alternative A would not result in parcels changing from an undeveloped land use to a developed use. Parcels 35 and 36 on Hiwassee Reservoir are currently undeveloped but could potentially be developed for industrial use under Alternative A. Potential localized water quality and aquatic ecology impacts to Martin's Creek and the nearby Hiwassee River could occur if those parcels were developed for industrial use due to the steep terrain that characterizes the parcels. Due to the small amount of TVA land on the mountain reservoirs, in comparison to the overall area land base, the state and federal environmental regulations, and the use of any identified impact reduction methods including TVA's Standards and Conditions/BMPs (ibid), development opportunities on TVA lands would have insignificant cumulative impacts to water quality and aquatic ecology.

Alternative B

Under Alternative B, parcels would be allocated to zones that reflect current land use and would not result in parcels changing from an undeveloped land use to a developed use. Under this alternative, TVA would allocate more lands to Zone 3 (Sensitive Resource Management) and Zone 4 (Natural Resource Conservation). Adoption of Alternative B would have insignificant cumulative impacts to water quality and aquatic ecology.

Alternative C

Allocations under Alternative C are identical to those under Alternative B on seven of the nine reservoirs. On Chatuge and Hiwassee reservoirs, one parcel (27.2 acres) would be allocated to Zone 5 (Industrial) and four parcels (80.2 acres) would be allocated to Zone 6 (Developed Recreation) rather than Zone 4 (Natural Resource Conservation) as under Alternatives A and B. Because future proposed actions are subject to environmental review and a limited amount of TVA land is changing from an undeveloped land use to a developed use, cumulative impacts associated with Alternative C to water quality and aquatic life are anticipated to be insignificant.

3.1.11 Air Quality and Noise

3.1.11.1 Air Quality

3.1.11.1.1 Affected Environment

National Ambient Air Quality Standards (NAAQS) have been established to protect the public health and welfare for six pollutants: particulate matter, sulfur dioxide, carbon monoxide, ozone, nitrogen dioxide, and lead. An area where any air quality standard is violated may be designated as a nonattainment area for that pollutant, and emissions of that pollutant from new or expanding sources are carefully controlled. On March 12, 2008, the U.S. Environmental Protection Agency (USEPA) significantly strengthened its NAAQS for ground-level ozone. USEPA is revising the 8-hour primary ozone standard designed to protect public health to a level of 0.075 parts per million (ppm). The previous standard set in 1997 was 0.084 ppm. In addition to tightening the primary standard, USEPA is also strengthening the secondary 8-hour standard for ozone to the level of 0.075 ppm. The secondary standard is designed specifically to protect sensitive plants from damage caused by ozone exposure throughout the growing season. States must make recommendations to USEPA no later than March 2009 for areas to be designated attainment, nonattainment,

and unclassifiable. USEPA will issue final designations no later than March 2010 unless there is insufficient information to make these designation decisions, in which case USEPA will issue designations by March 2011. It is likely that, under these tightened ozone standards, some, and possibly all, of the counties in which the mountain reservoirs are located may be designated nonattainment for ozone. USEPA tightened the primary fine particle standard in December 2006. The new standard may result in some of these counties being designated nonattainment for particulate matter with a diameter less than or equal to 2.5 micrometers (PM_{2.5}). Recommendations for nonattainment areas were due from the states by December 2007, followed by official USEPA designations by December 2008.

All of the counties containing the mountain reservoirs are currently in attainment of the NAAQS except for the portion of Swain County, North Carolina, that is in the GSMNP, which is in nonattainment of the 8-hour ozone NAAQS. Most adjacent counties are in attainment of the NAAQS except for Blount, Sevier, and a portion of Cocke counties in Tennessee and a portion of Haywood County, North Carolina, which are in nonattainment of the 8-hour ozone NAAQS. Blount County is also in nonattainment of the PM_{2.5} NAAQS.

Prevention of significant deterioration (PSD) regulations are used to limit air pollutant emissions from new or expanding sources. Under these regulations, some national parks and wilderness areas are designated PSD Class I air quality areas and are specially protected. The Class I areas in the vicinity of the mountain reservoirs are the GSMNP immediately north and west of Fontana Reservoir, Joyce Kilmer/Slickrock Wilderness in Graham County, North Carolina, and Monroe County, Tennessee, and Cohutta Wilderness in Fannin County, Georgia. All of the mountain reservoirs are within at least 15 miles of one of these Class I areas.

3.1.11.1.2 Environmental Consequences

Because the current uses of the great majority of the TVA lands on the mountain reservoirs would not change under the alternatives, impacts to air quality would be minor. For Blue Ridge, Nottely, Fontana, Apalachia, and the Ocoee reservoirs, there is little to no difference in anticipated air quality impacts among the various alternatives. There is a somewhat greater potential for air quality impacts on Hiwassee and Chatuge reservoirs.

Alternative A

Under Alternative A, activities, either current or future associated with Project Operations, Recreation, and Natural Resource Conservation uses, as well as on unplanned lands, are not likely to cause any significant impacts to local air quality.

Currently, some of the ongoing land uses that result in air emissions include, but are not limited to, controlled-burning practices, land-clearing practices, construction/demolition projects, and lands open for motor vehicle use. These activities produce both fine particle emissions as well as nitrogen-oxide emissions, which are a precursor for ground-level ozone production.

The greatest potential for air quality effects is from industrial use, the present allocation for about 80 acres on Hiwassee Reservoir. Prior to approving any industrial development of this land, TVA would conduct an appropriate level of environmental review to document the extent of expected air quality impacts. Each such review that involved a parcel in or potentially affecting a nonattainment area for ozone and/or PM_{2.5} would require a conformity applicability determination pursuant to regulations implementing Section 176(c) of the Clean

Air Act to assure compatibility with measures in local plans for achieving attainment. Although there could be some minor decrease in air quality under Alternative A, any effects are expected to be insignificant.

Alternative B

Under Alternative B, the existing uses or future uses associated with the proposed allocations would be comparable to those under Alternative A. Under Alternative B, however, no land would be designated for industrial use. This would decrease the potential total air pollutant emissions as compared to Alternative A.

Alternative C

Under Alternative C, the existing future uses associated with the proposed allocations would be identical to those under Alternative B for seven of the nine reservoirs. Under Alternative C, however, on Chatuge and Hiwassee reservoirs, an additional 27.2 acres would be allocated to Zone 5 (Industrial) and an additional 73.8 acres would be allocated to Zone 6 (Developed Recreation).

The greatest potential for air quality effects under Alternative C is from industrial use. Depending on the industry involved, potential impacts can range from emissions related to construction/demolition activities to increased motor vehicle emissions and possibly direct emissions from the specific industry/plant.

Developed recreational use could similarly have impacts associated with construction/demolition activities and increased motor vehicle emissions.

3.1.11.2 Noise

3.1.11.2.1 Affected Environment

While there are many sources of noise, the greatest potential for noise impacts comes from industrial development. Power generation and substations also have the potential to impact noise, though typically to a lesser degree than industrial development. Developed recreation has the potential to impact noise levels depending on the location of the facilities and the type and intensity of the type of recreational use. For example, recreational facilities that support low-intensity uses, such as parks or open spaces, generate less noise than more intensive uses, such as ball fields or recreation complexes. Land allocated to Zone 4 (Natural Resource Conservation) and Zone 3 (Sensitive Resource Management) would have the least potential for noise impacts.

3.1.11.2.2 Environmental Consequences

Alternatives A and B

Under Alternatives A and B, noise impacts to Chatuge, Blue Ridge, Nottely, the Ocoees, Apalachia, and Fontana reservoirs are expected to be insignificant.

Alternative A allocates 78.9 acres for industrial use on Hiwassee Reservoir. Potential noise impacts due to industrial development would largely depend on the type of industry recruited. Depending on the type of industry, Alternative A may have more potential noise impacts than Alternative B, under which the noise impacts to Hiwassee Reservoir would be insignificant.

Alternative C

Under Alternative C, noise impacts would be insignificant on seven of the nine reservoirs. On Chatuge Reservoir, Alternative C allocates Parcel 10 (27.2 acres) to Zone 5 (Industrial), while Alternatives B does not plan any industrial use on Chatuge Reservoir. Potential noise impacts due to industrial development would largely depend on the type of industry recruited. Depending on the type of industry, Alternative C may have more potential noise impacts on Chatuge than Alternative B. Alternative C also would allocate more land on Chatuge and Hiwassee reservoirs to Zone 6 (Developed Recreation) than Alternatives A and B and therefore has a potential to result in additional noise impacts. Either Alternative A or C would have a greater potential for noise-related impacts than Alternative B.

3.1.12 Socioeconomics**3.1.12.1 Affected Environment**

Social and economic values and activities pertaining to the reservoir areas are derived primarily from the local communities and their livelihoods. The important overall socioeconomic conditions that could be impacted by the MRLMP include population, size of the labor force, types of jobs, unemployment levels, and income levels. Within the general subject of socioeconomic conditions is the specific subject of environmental justice, which relates to the amount and any concentrations of the population that are in poverty or are a racial or ethnic minority.

Socioeconomic conditions are analyzed at the county level for the counties in which the reservoirs are located. The counties are large enough to provide aggregate socioeconomic data for a general overview adequate for a primarily policy-level plan. Many important political decisions that affect social and economic activity are made at the county level, and most of the useful data are more readily available at the county level rather than at regional or local levels.

The primary drivers of the economy and population growth in the area are the housing and tourism sectors, which are dependent on the natural scenery associated with the reservoir and adjacent lands. Other major employers are local government, particularly education. While all the counties have some manufacturing, this sector is relatively minor due to steep terrain limiting the availability of industrial sites, lack of large water bodies for water supply and to treat large amounts of wastes, and few roads suitable for carrying large amounts of industrial traffic. Agriculture is a minor employer, but some counties have relatively large percentages of people employed in plant nurseries and production of Christmas trees and related greenery. Incomes tend to be lower and poverty rates higher than national averages because of fewer high-wage jobs such as manufacturing and professional services. Unemployment rates tend to be somewhat higher than national averages because of the decline of manufacturing jobs in recent years.

The counties are very rural, with low population densities and a few small towns. Most have high percentages of land in governmental ownership, particularly for national and state forests and the GSMNP. Populations of most of the counties have grown rapidly in recent years, especially for those counties with good roads connecting them to the Atlanta metropolitan area. On the other hand, populations have actually decreased in some of the counties with the poorest access to Atlanta or other nearby large population centers and the most land in governmental ownership and thus least available for second-home development. Minority populations are much lower than national averages except for Swain County, North Carolina, where many of the Eastern Band of Cherokee Indians live.

In the counties with large numbers of second homes, there are large influxes of vacationers, particularly in the summer. As an example, David Badger, the county manager of Cherokee County, North Carolina, noted (personal communication, November 7, 2007) that the population there can increase by as many as 10,000 people between April and October, compared to the resident population in 2006 of 26,309.

3.1.12.2 Environmental Consequences

Socioeconomic impacts of all of the alternatives are expected to be minor and insignificant. The overall TVA land base is small, and very few acres of TVA land have the potential to change use. The existing trends of increasing land development in the reservoirs area are the major factors influencing socioeconomic conditions and are expected to be unaffected by either continuing the existing management or making minor changes in management of TVA land because of the intrinsic attractiveness of the area.

Neither those in poverty nor the very small minority population in the area is likely to experience any disproportionate direct adverse effects as a result of any development proposal under any of the alternatives. In general, economic development proposals could benefit those in poverty by providing job opportunities. These proposals would be evaluated as appropriate in an environmental review process. Significant cumulative impacts could occur if several parcels were developed even if no single development caused significant impacts. However, the extent and degree of such impacts would depend on the specific proposals. Specific land use proposals could potentially have significant adverse environmental justice impacts by reducing affordable public access to the reservoir and lands for dispersed recreation. Alternative B provides the most zone allocations that support dispersed recreation, which provides recreation opportunities along the reservoirs for low-income populations.

Alternative A

Under Alternative A, most TVA parcels on all reservoirs would continue to be managed as they now are. Requests by local governments or private entities for use or transfer of TVA land would be reviewed on an individual basis. There could be requests that would result in socioeconomic impacts such as expansion of existing recreation areas or industrial development on Hiwassee Parcels 35 and 36. Direct, indirect, and cumulative impacts on socioeconomic conditions would be assessed at that time. Development trends in the area would continue, and new docks could be considered on the TVA land with existing shoreline access rights.

Alternative B

Under Alternative B, the allocations for all parcels are consistent with existing land use. New development would be restricted to parcels that are already supporting the allocated use, such as expansion of an existing campground on a parcel zoned for Developed Recreation. TVA would continue considering requests for private water use facilities on TVA parcels with deeded access rights. Alternative B would maintain the existing land use and character of the reservoirs by not proposing new uses; therefore, socioeconomic trends are not expected to be impacted by this alternative.

Alternative C

Under Alternative C, the allocation of Parcel 10 on Chatuge Reservoir to Zone 5 (Industrial) would create the potential for new jobs in the area that would be beneficial to the economy of the area. An additional benefit would be increased property taxes from private ownership of Parcel 10. Depending on the type of industrial development, this could have negative

socioeconomic impacts by lowering the value of nearby property and interest in residential development of available nearby property, at least relative to other properties in the area. The allocations of Parcel 52 and Parcel 77 on Chatuge Reservoir to Zone 6 (Developed Recreation) could enhance the attractiveness of the community and indirectly contribute to further population and economic growth. However, as noted above, the reservoir and scenery are the main economic drivers in the area, and high-intensity developed recreational use on Parcel 77 could be incompatible with the overall enjoyment of the reservoir and scenic quality. This could lower property values and interest in residential development of available nearby property.

Under Alternative C, the allocation of two parcels totaling 6 acres on Hiwassee Reservoir to recreational use would enhance the attractiveness of the area, thus possibly indirectly contributing to further population and economic growth. Under Alternative C, the change of these parcels to a walking trail and public river access would enhance the availability of parks in the area to low-income citizens. Increased public reservoir and river access sites and parks would benefit low-income residents in the area who may not have recreational opportunities available to them on private land.

3.2 Chatuge Reservoir

3.2.1 Land Use

An overview of land use for the mountain reservoirs region is provided in Section 3.1.1

3.2.1.1 Affected Environment

On Chatuge Reservoir, TVA initially purchased 3,557 acres of land (see Table 1-1) and has sold about 629 acres (17 percent). Most of these sale parcels are currently developed as residential areas, and a few have been developed as recreation areas. TVA transferred 1,161 acres to state or federal agencies for public use.

The 1,767 acres of TVA-retained land on Chatuge Reservoir have been divided into 109 parcels. The majority of these parcels (81) are committed to existing land uses (Table 2-2). Two parcels containing the Chatuge Dam Reservation account for 347 acres (20 percent) of the total TVA land base. Thirty-seven parcels are committed to residential access by deeded rights or previous policy. Thirteen parcels are committed to recreational uses such as commercial marinas, public campgrounds, or boat ramps by land use agreements. Land use agreements also commit eight parcels for public infrastructure such as municipal water treatment plants, wastewater treatment plants, and state highways. Five parcels front land that TVA transferred to the USFS for operation of the National Forest System. For a complete list of the committed uses for Chatuge Reservoir parcels, reference Appendix E.

Twenty-eight parcels, totaling 719 acres (Table 2-2), are considered uncommitted and are being considered for alternative uses in this plan. This is by far the largest amount of uncommitted land on any of the nine reservoirs being planned. The majorities of the uncommitted parcels are currently managed for natural resource conservation and dispersed recreation.

TVA owns approximately 52 percent of the total 128 miles of shoreline on Chatuge Reservoir (Table 1-2). Forty-eight percent of this shoreline was never owned by TVA; TVA only purchased flowage easements along this shoreline. Approximately 57 percent of the shoreline is available for residential development (Table 3-2), most of which is on private shoreline. TVA estimates that about 74 percent of the shoreline available for residential development is currently developed with residential subdivisions.

Towns and Clay counties are distinctly rural. The principal towns on or near the reservoir are Hiawassee and Young Harris (Georgia) and Hayesville (North Carolina). About 54 percent of Towns County land is in the Chattahoochee National Forest (USFS 2007a, Quickfacts 2007). About 48 percent of Clay County land is in the Nantahala National Forest (USFS 2007b, Quickfacts 2007). In recent years, development has increased on the privately owned land in both counties. Land use data for Towns County (NARSAL 2007b) show that from 1974 to 2005 high-intensity development increased from 36 to 205 acres, and low-intensity development increased from 1,332 to 6,793 acres. About 92,000 acres (approximately 85 percent) of the county remained in forest in 2005. Much of the development is attributed to retirees moving to the mountain areas of the state from Florida and improved highway access to the Atlanta area allowing both commuters and second-homeowners easier travel to and from the area. Neither Towns County nor Clay County has zoning. Regional land use data are discussed in more detail in the Section 3.2.12, Socioeconomics.

Towns and Clay Counties have a joint industrial park, the Clay-Towns Regional Industrial/Technology Park, which is about 20 acres in size and located just west of Georgia State Route (SR) 515/North Carolina SR 68 and less than a mile west of Chatuge Reservoir. The Towns County part of the park has several small and medium-sized industries; however, there are still sites available for development. The Clay County portion is still under development with no existing occupants.

Towns County, Hiwassee, and Young Harris have developed a draft joint comprehensive growth plan (Towns County 2007) as required by Georgia law. The plan recognizes the need for special attention to the impacts of development in specific areas along the outskirts of Hiwassee and along SRs 515 and 75 and US 76 near the reservoir. It also calls for waterfront protection along the reservoir generally and redevelopment in the core of Hiwassee. The plan recognizes that the reservoir waterfront is “nearing immediate capacity from development and has recently been confronted with new development types including high density and high activity land uses [and that the] county and town of Hiwassee must develop a long-range plan for the land use surrounding the lake and develop a means for implementing that plan.” It also states that increasing development along the reservoir threatens the character of communities. Furthermore, the plan calls for additional recreation facilities and specifically notes the need for additional park space in the vicinity of Hiwassee. The plan is scheduled for completion in 2009.

Parcels containing prime farmland surrounding Chatuge Reservoir are presented in Table 3-9.

Table 3-9. Acres of Prime Farmland in Selected Parcels – Chatuge Reservoir

Parcel Number	Acres of Prime Farmland	Zone Allocation	Description
1	72.3	2	Dam reservation
52	7	4	Open field with agricultural lease
73	8.9	4	Mixed forest providing informal recreation
84	17.2	4	Fronts USFS property
86	6	7	Fronts Cypress Point Subdivision
96	8	4	Highly visible point with upland forest
104	6.2	6	Fronts Ledford Chapel Boat Ramp
107	6.5	2	Municipal wells and treatment facility, Clay County

3.2.1.2 Environmental Consequences

Alternative A

As shown in Table 2-3, under Alternative A, the allocated land uses for the 1,481 acres that are planned (out of a total of 1,767 acres managed by TVA) would be, in descending order, Natural Resource Conservation (41.6 percent), Recreation (20.9 percent), and Project Operations (21.2 percent). No land would be allocated to Sensitive Resource Management or Industrial uses. Two small parcels previously forecast for Reservoir Operations (1 acre) that have existing permits for water use facilities would be allocated for Shoreline Access (0.1 percent).

Under Alternative A, TVA would not designate land uses for the 286 acres of TVA-managed land on Chatuge Reservoir that were not previously planned using the Forecast System. Of

the 57 previously unplanned parcels, representing 286 acres, only four parcels are uncommitted. The four uncommitted parcels total less than an acre and are all used for natural resource conservation. These parcels would continue to be managed according to TVA's Land Policy, SMP, and Section 26a regulations.

Under Alternative A, there would be no changes from current land use, and therefore, no impacts to prime farmlands are expected.

Alternative B

This alternative includes the 57 parcels (286 acres) not planned in the existing Forecast System so that all of Chatuge Reservoir's 1,767 acres would have a land management plan. Fifty-two of the previously unplanned parcels are committed to existing uses, which determined their allocation for this alternative. The four small, uncommitted parcels were allocated based on their existing land use, which would be consistent with a Zone 4 (Natural Resource Conservation) allocation. Alternative B does not include any allocations that are inconsistent with the actual current land use.

Under Alternative B on Chatuge Reservoir, TVA would allocate 141 additional acres to Zone 4 (Natural Resource Conservation) for a total of approximately 876 acres (49.6 percent), and approximately 44.2 additional acres to Zone 6 (Developed Recreation) for a total of 414.2 acres (23.4 percent). Allocations to Zone 2 (Project Operations) would increase by approximately 7.2 acres to a total of 381.2 acres (21.6 percent). Zone 7 (Shoreline Access) would receive new allocations totaling about 79 acres (4.5 percent), and Zone 3 (Sensitive Resource Management) would receive new allocations totaling 16.7 acres (0.9 percent). No land would be allocated to Zone 5 (Industrial).

No significant changes to land use are expected to occur on Chatuge Reservoir under Alternative B because the allocations are consistent with existing land use on all parcels.

Under Alternative B, no impacts to prime farmlands are expected.

Alternative C

Under Alternative C, all of Chatuge Reservoir's 1,767 acres would have a land management plan. Alternative C would allocate to Zone 4 (Natural Resource Conservation) 101 acres less than Alternative B for a total of approximately 775 acres (43.9 percent). Under Alternative C, 73.8 additional acres would be allocated to Zone 6 (Developed Recreation) for a total of 488 acres (27.6 percent), and 27.2 acres (1.5 percent) would be allocated to Zone 5 (Industrial). The difference between Alternatives B and C, which affects three parcels (Parcel 10, 52, and 77) on Chatuge Reservoir, is shown in Table 2-8.

Parcel 10. This 27.2-acre parcel is characterized by slopes supporting old-growth deciduous forest. Alternative C would allocate it to Zone 5 (Industrial) thus allowing for the sale of the parcel for potential industrial businesses in the future. The proposal for industrial use of this parcel was made by representatives of BRMEMC during the public scoping period. The proposal states that industrial use of Parcel 10 would complement the nearby Clay-Towns Regional Industrial/Technology Park, approximately 0.5 mile west of Parcel 10.

With the exception of Parcel 10, the land use along the shoreline in Woods Creek embayment is predominantly residential; however, there is a large undeveloped private tract adjacent to the parcel to the north. The change of Parcel 10 from Zone 4 to Zone 5 would result in a loss of open space in Woods Creek embayment thus potentially changing

the character of the existing residential neighborhoods in the area. However, the loss of open space would be minor in the context of the large amount of TVA and USFS land retained on the reservoir that is currently utilized for dispersed recreation and visual character.

The proposal would add to the availability of land for industrial development. Specific impacts on the site, such as development of infrastructure required for industrial use, and indirect impacts, such as traffic, would be addressed at the time development of a specific industrial project is proposed and sale of the parcel is considered. TVA's Land Policy specifies a preference for water-based industry that requires water access for either navigation or water supply.

Parcel 52. This 9.4-acre shoreline parcel is primarily an open field that is currently maintained in fescue under an agricultural license. Under Alternative C, this parcel would be allocated to Zone 6 (Developed Recreation). Public comments received during public scoping from Towns County, Town of Hiawassee officials, and the Georgia Department of Natural Resources propose a public recreational area or city park possibly including a year-round launching ramp, fishing piers, and trails.

The change of Parcel 52 from Zone 4 to Zone 6 would result in a loss of farmland in a mountainous county with relatively limited farmland, but the acreage is very small and contributes very little to the agricultural production in the area. Impacts to prime farmlands would be evaluated under the Farmland Protection Policy Act prior to conversion and are expected to be minimal due to surrounding land usage, urban buildup, and compatibility with existing agricultural use in the area. With increasing residential and other development in the vicinity, the parcel will become more isolated from other agricultural activity. The Towns County Joint Comprehensive Plan calls for more parks near the town of Hiawassee. The land use of the adjacent area is predominantly commercial along the US 76 corridor in that area, with residential neighborhoods across the lake. Potential future development proposals would be reviewed under NEPA and would require the use of BMPs. Disturbance of the existing forested shoreline would be minimized, and any sensitive resources present on the parcel would be avoided.

Parcel 77. This is a highly visible parcel located near the center of the reservoir. The change of Parcel 77 from Zone 4 to Zone 6 would result in a loss of forested open space in this region of Chatuge Reservoir, thus potentially changing the character of the views from existing residential neighborhoods in the area and across the reservoir, such as Cedar Cliff. However, the loss of open space would be minor in the context of the large amount of TVA and USFS land retained on the reservoir that is currently utilized for dispersed recreation and visual character. The land use of the surrounding area is predominantly low-density residential use with the exception of Parcel 78, which is a large island located directly to the northwest. The Georgia Mountain Fairgrounds and Towns County Park are located across the reservoir directly to the south.

Allocating Parcel 77 to Zone 6 would shift land use from a natural setting supporting dispersed recreation such as hiking, bank fishing, and informal camping to a developed setting potentially containing recreation facilities and associated infrastructure such as roads, parking lots, and lights. However, the change from Public Recreation under Alternative A to Zone 6 would still provide a type of recreation. It also would be consistent with the comprehensive plan's call for more parks near Hiawassee.

Intensive development of the parcel for the proposed multiple field sports complex could be incompatible with adjacent low-density residential use due to impacts of noise, traffic, and nighttime lighting. Loss of forest along the reservoir, noise, and nighttime lighting could also cause impacts of concern to recreational users of the reservoir and residents living across the reservoir. The degree of impact could be limited with sensitive design of the complex and restrictions on late night use.

Under Alternative C, proposed allocations for conversion to recreational and industrial development on Parcels 10 and 77 do not involve prime farmlands.

3.2.2 Recreation

An overview of the recreation resource for the mountain reservoirs is provided in Section 3.1.2.

3.2.2.1 Affected Environment

Fourteen TVA parcels on Chatuge Reservoir have developed recreation facilities. TVA actively manages some of these parcels; however, the USFS and state and county agencies manage most of the parcels, either through TVA land transfer agreements or through landrights provided by licenses, leases, or easements. In addition to the TVA and other public land that provides recreational opportunities, the private sector also provides needed amenities such as marinas and recreational vehicle (RV) campgrounds. These public and private developed recreation areas are summarized in Table 3-10.

There are 10 campgrounds on Chatuge Reservoir. Five are commercial campgrounds located on private property, and the remaining campgrounds are located either on TVA land or on back-lying land that TVA transferred to other public agencies. Jackrabbit Mountain Campground, located adjacent to Parcel 75, is operated by the USFS and includes a boat ramp, fishing piers, and other recreational amenities. Clay County operates Gibson Cove (Parcel 3) and Clay County Park (Parcel 5), which includes a day use recreation area. Towns County operates Chatuge Woods Campground (Parcel 13). The Georgia Mountain Fair Inc. operates certain recreational camping and day use amenities located within Towns County Park (Parcel 28) in the town of Hiawassee.

There are 16 recreation areas that contain at least one boat ramp, nine of which are privately operated. Five of the ramps are operated by public entities, including the ramp on the Chatuge Dam Reservation (Parcel 1) that is managed by TVA.

There are four commercial marinas operating on Chatuge Reservoir. Salale Lodge Marina, Chatuge Cove Marina, and Boundary Waters Resort and Marina are located on private land. The Ridges Resort and Marina is located partially on private land and partially on TVA Parcel 16. Two marinas have been certified as a TVA Clean Marinas: Boundary Waters Resort and Marina and The Ridges Resort and Marina.

There are four public fishing piers located on Chatuge Reservoir. The piers at Ledford Chapel Boat Ramp (Parcel 104) and US 64 near Shooting Creek Bridge (Parcel 90) are managed by the North Carolina Wildlife Resources Commission. Georgia Mountain Fair manages the fishing pier adjacent to the boat ramp at Towns County Park. As previously mentioned, the USFS manages a handicap-accessible fishing pier at Jackrabbit Mountain Campground. TVA partnered with the other agencies in the construction of all of the public fishing piers.

Three stream access sites are located downstream of Chatuge Reservoir. TVA manages the access site on the Hiwassee River immediately below Chatuge Dam (Parcel 109). There is an informal access site below Mission Dam at Hiwassee River Mile (HRM) 105.7R (right bank) on Duke Energy property. Clay County manages the Shallowford Bridge Stream Access Site (Parcel FBRA-1, 4) located at HRM 108.3L (left bank) under a memorandum of agreement with TVA.

The land used for the Georgia Mountain Fairgrounds (Parcel 27) in Towns County is made available for public recreation purposes under a permanent easement to the Georgia Mountain Fair Inc. This unique recreational area hosts the Georgia Mountain Fair each year and provides tremendous benefits for the local and regional tourism economy. The adjacent Towns County Park (Parcel 28) also provides supporting infrastructure for the fairgrounds and other facilities such as ball fields. The Towns County multipurpose building located on Parcel 63 contains a gymnasium and fitness center on land made available by TVA to Towns County under a recreation easement.

As shown in Table 3-10, there are many diverse developed recreation opportunities on Chatuge Reservoir that enhance the quality of life and economic prosperity of the region.

Table 3-10. Developed Recreation Facilities on Chatuge Reservoir

Area Name	County, State	Sector	Operator	Land Ownership	Parcel Number	Campground	Marina	Picnic Tables	Boat Ramp	Stream Access	Paved Trails	Fishing Piers	Other
Chatuge Shores Golf Course	Clay, N.C.	Private	Commercial	Private	N/A								X
Ho Hum Campground	Clay, N.C.	Private	Commercial	Private	N/A	X	X		X				X
Lakeview Cottages and Marina	Clay, N.C.	Private	Commercial	Private	N/A		X	X	X				X
Penland Point Campground	Clay, N.C.	Private	Commercial	Private	N/A	X	X	X	X				X
Chatuge Cove Marina	Clay, N.C.	Private	Commercial	TVA/ Private	N/A	X	X	X	X				X
Mission Dam Tailwater*	Clay, N.C.	Public	Duke Energy	Private	N/A					X			
US 64 Fishing Piers	Clay, N.C.	Public	State of N.C.	State of N.C.**	90						X	X	
Ledford Chapel Recreation Area	Clay, N.C.	Public	State of N.C.	State of N.C.**	104				X			X	
Chatuge Dam Reservation	Clay, N.C.	Public	TVA	TVA	1			X	X				X
Chatuge Tailwater Stream Access*	Clay, N.C.	Public	TVA	TVA	1			X					
Clay County Park	Clay, N.C.	Public	Clay County	TVA	5	X		X			X		X
Gibson Cove Recreation Area	Clay, N.C.	Public	Clay County	TVA	3	X			X		X		X
Shallowford Bridge Stream Access*	Clay, N.C.	Public	Clay County	TVA	FBRA-1,4			X		X			
Jackrabbit Mountain Recreation Area	Clay, N.C.	Public	USFS	USFS**	85	X		X	X			X	X
Boundary Waters Resort and Marina	Towns, Ga.	Private	Commercial	Private	N/A		X	X	X			X	
Lake Chatuge Chalets	Towns, Ga.	Private	Commercial	Private	N/A								X
Lower Bell RV Park	Towns, Ga.	Private	Commercial	Private	N/A	X	X		X				

Area Name	County, State	Sector	Operator	Land Ownership	Parcel Number	Campground	Marina	Picnic Tables	Boat Ramp	Stream Access	Paved Trails	Fishing Piers	Other
Salale Lodge	Towns, Ga.	Private	Commercial	Private	N/A	X	X	X	X				X
Serenity Cove Cabins	Towns, Ga.	Private	Commercial	Private	N/A				X				X
The Ridges Resort and Marina	Towns, Ga.	Private	Commercial	Private/TVA	16		X	X	X		X	X	X
Chatuge Woods Campground	Towns, Ga.	Public	Towns County	TVA	13	X			X				X
US 76 Picnic Area; Park and Ride	Towns, Ga.	Public	N.C. Department of Transportation (NCDOT)	TVA	45			X					
Towns County Multipurpose Center	Towns, Ga.	Public	Towns County	TVA	63								X
Towns County Park	Towns, Ga.	Public	Georgia Mountain Fair Inc.	TVA	28	X		X	X		X		X
Georgia Mountain Fair	Towns, Ga.	Public	Georgia Mountain Fair Inc.	TVA	27						X	X	X
Lake Chatuge Recreation Area	Towns, Ga.	Public	USFS	USFS**	32				X				

FBRA = Fowler Bend acquisition number (assigned for river access tracts on Hiwassee Reservoir)

N/A = Not applicable

* = Stream access site

** = TVA retained below MSC

Dispersed Recreation

Dispersed recreation has historically provided important recreation opportunities on Chatuge Reservoir. The following table is a summary of Chatuge Reservoir parcels with identified heavy dispersed recreational use.

Table 3-11. Dispersed Recreation Areas on Chatuge Reservoir

Recreation Area	Parcel Number	Number of Sites
Bell Creek	67	2
Lower Bell	70	4
Mull Road Dispersed Recreation Area	77	7

Some of the larger uncommitted parcels on Chatuge Reservoir that accommodate substantial dispersed recreation of a more passive nature such as hunting and hiking include the following: Parcel 4 with 33.6 acres, Parcel 6 with 210.7 acres, Parcel 10 with 27.2 acres, Parcel 15 with 53.2 acres, Parcel 73 with 55.2 acres, Parcel 74 with 47 acres, Parcel 77 with 66.4 acres, Parcel 78 with 108.3 acres, Parcel 88 with 26.4 acres, and Parcel 96 with 29.9 acres.

3.2.2.2 Environmental Consequences

Alternative A

Under Alternative A, previously planned parcels on Chatuge Reservoir allocated for recreation comprise 370 acres (20.9 percent) of the 1,767 acres managed by TVA. All of the previously allocated parcels for recreation under the Forecast System were for Public Recreation. In addition, under Alternative A, six parcels that currently support Developed Recreation are unplanned; however, the unplanned parcels are all committed to that use primarily through transfer agreements to the USFS.

Under Alternative A, TVA would not allocate any additional parcels for Public or Commercial Recreation use. The unplanned parcels would continue to be used for that purpose. Therefore, any future demand for recreational needs would have to be met by expansion of recreation facilities in these existing areas. Under Alternative A, potential environmental impacts would be insignificant since parcels utilized for Developed Recreation would not change. The potential for impacts from any new facilities would be subject to future review and potential mitigation under NEPA.

Under Alternative A, dispersed recreation could continue on both the planned and unplanned land. Alternative A does not propose changing the land use of any of these parcels; therefore, potential impacts to dispersed recreation would be restricted to expansions within existing committed parcels (e.g., campground expansion). Potential impacts to dispersed recreation of this nature are expected to be insignificant.

Alternative B

Under Alternative B, the 16 Chatuge Reservoir parcels (414 acres, 23.4 percent) that are committed to a Developed Recreation use will be allocated to Zone 6. Of the parcels currently committed to Developed Recreation, six parcels (161 acres) are in Clay County, North Carolina, and nine parcels (253 acres) are in Towns County, Georgia. These commitments include transfer agreement covenants, licenses, leases, and easements. With the exception of Parcel 18, all of the parcels committed to Developed Recreation currently support recreational land use with existing facilities. The parcels allocated to Zone 6 would include those previously allocated under Alternative A to Public Recreation. In addition, the six unplanned parcels (a total of 44.2 acres) under Alternative A that are committed to Developed Recreation uses would be allocated to Zone 6.

Under Alternative B, any future demand for recreational needs would have to be met by expansion of recreation facilities in these existing areas allocated to Zone 6 (Developed Recreation). These areas are the same under Alternative B as under Alternative A, and since there would be no new parcels allocated for Developed Recreation, the potential environmental impacts would be the same. The potential for impacts from any new facilities within existing areas would be subject to future review and potential mitigation under NEPA and therefore should be insignificant.

Alternative B aligns with existing land use and does not propose changing land use of any parcels; therefore, potential impacts to dispersed recreation would be restricted to expansions within existing committed parcels. Potential impacts to dispersed recreation of this nature are expected to be insignificant.

Alternative C

Under Alternative C, land proposed for Zone 6 on Chatuge Reservoir would total 488 acres (27.6 percent), which is an additional 73.8 acres more than is allocated to Zone 6 under

Alternative B. Specifically, TVA would consider three proposals that differentiate this alternative from Alternative B.

Parcel 10. Alternative C allocates Parcel 10 to Zone 5 (Industrial). This undeveloped parcel currently provides dispersed recreation opportunities. Parcel 10 is the only TVA land in Woods Creek embayment. The Zone 5 allocation could result in the sale of the parcel for industrial development, thus eliminating dispersed recreation opportunities on the 27-acre parcel.

Parcel 52. Alternative C allocates Parcel 52 to Zone 6 (Developed Recreation) for public recreation purposes. During public scoping, Towns County, the Town of Hiawassee officials, and the Georgia Department of Natural Resources proposed a public recreational area or city park on this parcel, including possible amenities such as a year-round launching ramp, fishing piers, and trails. A Zone 6 allocation would allow future consideration of these uses by TVA. This allocation is also consistent with the Towns County, Hiawassee, Young Harris Joint Comprehensive Plan referenced in Section 3.2.1.1.

The suitability/capability analysis indicated that Parcel 52 ranked high for both public parks and water access, primarily due to gentle shoreline slope near deep water, central location in an area of identified need, good road access, and high level of interest by local and regional stakeholders.

Parcel 77. Alternative C allocates Parcel 77 to Zone 6 (Developed Recreation) for public recreation purposes. During public scoping, Towns County officials requested that Parcel 77 be made available for construction of a multiple field sports complex and associated recreational facilities. Zone 6 would accommodate this proposed use.

The suitability/capability analysis indicated that Parcel 77 ranked high for consideration of a public park for some criteria due to its large land base, high degree of forestation, and shoreline slope. The criteria for location scored lower due to uncertainties regarding need for a developed park at this location. A public park can accommodate a variety of recreational uses ranging in number and type of facilities and in frequency and intensity of use. There are many developed recreational opportunities in this area of the reservoir, with 253 acres of TVA land being utilized for developed recreation in Towns County alone. Additionally, the heavy dispersed recreational use of Parcel 77 indicates it is meeting a recreational demand in the area.

Alternative C would provide overall greater developed recreational opportunities and less dispersed recreation on Chatuge Reservoir than Alternative B.

3.2.3 Terrestrial Ecology

An overview of terrestrial ecology (plant and wildlife communities) is provided in Section 3.1.3.

3.2.3.1 Plant Communities

3.2.3.1.1 Affected Environment

The physiognomic vegetative classes commonly found on lands within and around Chatuge Reservoir are evergreen forest, evergreen-deciduous forest, deciduous forest, shrublands, and herbaceous vegetation.

Most of the evergreen forests are in the form of pine plantations where loblolly pine is dominant, along with shortleaf and Virginia pine. Several areas, including Parcels 4, 72, 73, and 76, have numerous dead pines due to southern pine bark beetle infestation. Some of these areas, such as Parcel 4, have had recent salvage harvests and are regenerating with young pine trees.

Evergreen-deciduous forest, the most common forest type, is dominated by stands of mixed pine-hardwood trees.

Deciduous forest occurs mainly as oak-hickory forest (mesic to xeric), mesic cove hardwood forest on slopes, and forested wetlands near the reservoir edges grading into scrub-shrub wetlands. During field surveys, Parcel 10 was classified as being a part of the Southern Appalachian Oak Forest System and has old-growth forest stand characteristics. Black, northern red, southern red, and white oaks were dominant species with buffalo nut, flame azalea, flowering dogwood, sweetshrub, and American chestnut sprouts in the understory. Large dead American chestnut logs were present.

The cove hardwood forests are found on mesic slopes around the reservoir. Areas found on Parcels 6 and 91 are a special type of cove hardwood forest, the globally rare (G2G3) plant community known as the Southern Appalachian Cove Forest. These forests have a rich herbaceous layer with American columbo, bloodroot, Catesby's trillium, crane fly orchid, Miami-mist, Jack-in-the-pulpit, sweet Betsy, Solomon's plume, and Solomon's seal, to name just a few.

Forested wetlands are found along the back of coves along the reservoirs and grade into scrub-shrub wetlands (shrublands). Within the shrublands vegetative class is the globally rare (G1) community, Southern Appalachian Low Mountain Seepage Bog. This rare plant community is known only from one site in Towns County, Georgia, and two sites, one of which is probably no longer present, in Clay County, North Carolina, where it is associated with the presence of the endangered green pitcher plant. Both extant sites are located on Non-TVA Shoreland (Zone 1). Fire may have been a natural disturbance in this community type, as suggested by the presence of species more typical of fire-maintained communities of the coastal plain. It is found on shallow slopes, at about 1,500-1,800 feet elevation and has a palustrine hydrology, fed by acidic seepage. Both extant sites are heavily altered by grazing, fire, cultivation, and drainage efforts. It is unlikely that the Southern Appalachian Low Mountain Seepage Bog community occurs on other Chatuge Reservoir lands, or on other MRLMP lands.

Herbaceous vegetation is commonly found along transmission line and roadway rights-of-way as well as grassy areas within the dam reservations and commercial recreation areas.

Under Alternative C, the land use of Parcels 10, 52, and 77 would change. Parcel 10 is a 27.2-acre tract of land with a variety of vegetative types present. These include mixed evergreen-deciduous forest, dominated by old-growth oak-hickory-pine with scattered American chestnut in the understory. Old-growth forests are characterized by having old living and large trees for the species on site, natural canopy gaps, an absence of exotic species, minimum past human disturbance, and standing dead snags. Several of the largest trees are estimated to be over 100 years old. Deciduous forest, dominated by more mesic species such as tulip poplar, red maple, and American beech also occur on Parcel 10. The old-growth forest occupies all but about 2 acres of Parcel 10, which is surrounded by pasture and other cleared lands. Woody plants commonly found along the Parcel 10 shoreline were mountain laurel, flame azalea, river birch, and persimmon. A state-listed

species, American columbo, was present in the herb layer along with pink lady's slipper, Catesby's trillium, little brown jug, and various fern species. In addition to the flame azalea and mountain laurel, other flowering shrubs such as flowering dogwood and Carolina allspice were present.

Parcel 52, a 9.4-acre tract, has been highly disturbed and composed predominantly of exotic invasive species including Japanese honeysuckle, multiflora rose, oriental bittersweet, and tree-of-heaven.

Parcel 77, a 66.4-acre tract was dominated by mixed evergreen-deciduous forest, which includes loblolly pine, shortleaf pine, Virginia pine, white oak, chinquapin, tulip poplar, and red maple. Wildflowers found in the herb layer were pink lady's slipper, crane fly orchid, Catesby's trillium, and Solomon's seal. The land shows signs of human disturbance by the evidence of off-road vehicle use and the presence of exotic invasive species. The invasive species present were Chinese privet, Japanese honeysuckle, kudzu, multiflora rose, Russian olive, and sericea lespedeza. Planted eastern hemlocks also showed signs of being infected with the Hemlock wooly adelgid.

Most of the planned TVA parcels around Chatuge Reservoir have various species of invasive nonnative plants. Oriental bittersweet occurs on Parcels 52 and 82. Other invasive species on Chatuge Reservoir lands include autumn olive, Chinese lespedeza, Chinese privet, Japanese honeysuckle, Japanese stiltgrass, kudzu, mimosa, multiflora rose, oriental bittersweet, princess tree, Russian olive, sericea lespedeza, and tree-of-heaven.

3.2.3.1.2 Environmental Consequences

Alternative A

The plant community types found on and around the majority of Chatuge Reservoir parcels are common and representative of the SBRE, and the existing uses under Alternative A would result in no significant impacts to terrestrial plant communities on these parcels.

Under Alternative A, parcels containing rare or uncommon plant communities (Parcels 6, 10, and 91) on Chatuge Reservoir could be negatively impacted if not managed to protect these botanical resources from development. TVA would assess any proposed future action that could affect these uncommon plant communities and take appropriate measures to minimize potential impacts.

Oriental bittersweet, a Class C North Carolina invasive species, is found on Parcels 52 and 82, and other high-priority invasive species occur on several other Chatuge Reservoir parcels. Under Alternative A, TVA's ability to manage these invasive species would not change from the present situation. TVA currently prioritizes invasive species management efforts based on several factors, including the availability of resources, potential for partnerships, and threat to sensitive resources.

Alternative B

Under Alternative B, the rare and uncommon plant communities found on Parcels 6, 10, and 91 would be protected from development by allocating these parcels to Zone 4 (Natural Resource Conservation); therefore, no significant impacts to these uncommon terrestrial plant communities are expected on these parcels as a result of Alternative B.

Under Alternative B, TVA's ability to manage invasive species would not change from the present situation. TVA currently prioritizes invasive species management efforts based on several factors, including the availability of resources, potential for partnerships, and threat to sensitive resources.

Alternative C

Under Alternative C, a Zone 5 (Industrial) allocation on Parcel 10 would have a direct negative impact on the old-growth deciduous forest, which occupies most of the tract. A change of allocation and the subsequent industrial development would result in the destruction of some or all of the old-growth forest. Any remaining old-growth forest would be more vulnerable to the introduction of invasive species, which would contribute to the degradation of plant diversity and wildlife habitat. Old-growth oak-hickory-pine forest occurs on about 13 percent of both the nearby Nantahala and Chattahoochee National Forests (USFS 2003, 2004b, R. Harper, USFS Southern Research Station Forest Inventory and Analysis, personal communication, May 2008). No estimate is available of its prevalence on mountain reservoirs lands. Although the destruction of the Parcel 10 old-growth forest would have adverse local impacts, the impacts on a regional basis would likely not be significant.

Under Alternative C, Parcels 52 and 77 would be allocated to Zone 6 (Developed Recreation). Parcel 52 contains only common plant communities and therefore would not be significantly impacted. Parcel 77 is discussed further in Section 3.2.4.1. The impacts of Alternative C on the remaining 1,664 acres (94 percent) on Chatuge Reservoir would be the same as under Alternative B.

Under Alternative C, TVA's ability to manage invasive species would not change from the present situation. TVA currently prioritizes invasive species management efforts based on several factors, including the availability of resources, potential for partnerships, and threat to sensitive resources.

3.2.3.2 Wildlife Communities

3.2.3.2.1 Affected Environment

Chatuge Reservoir lands contain a mixture of evergreen, evergreen-deciduous, deciduous, and early successional habitats. Habitats range from large tracts of mature oak-hickory forest to small areas of old-field and wetland habitats. For a description of vegetation and wetland resources, see Section 3.3.3.1 (Plants) and Section 3.2.5 (Wetlands).

Most of the species of wildlife observed on Chatuge Reservoir are regionally abundant. Species observed in recent field surveys include spring peeper, northern cricket frog, bullfrog, brown thrasher, gray catbird, blue-gray gnatcatcher, indigo bunting, northern cardinal, common yellowthroat, green heron, great egret, belted kingfisher, Canada geese, mallard, beaver, opossum, and coyote.

The proposed alternatives could result in allocation changes on Parcels 10, 52, and 77. Parcel 10 (27.2 acres) is comprised of old-growth mixed evergreen deciduous forest. This parcel is bordered by herbaceous fields and residential area to its west and open water to the east, resulting in a largely fragmented parcel. The parcel provides little habitat for species favoring interior woodland habitat, but it provides overall good habitat for a variety of woodland species of wildlife. Parcel 52 contains 9.4 acres of lakefront property consisting of approximately 6 acres of herbaceous field dominated by fescue and approximately 3 acres of trees along the shoreline with linear wetlands. The landscape

surrounding the parcel is relatively disturbed by roads including US 76 and residential and commercial development, limiting the quality of wildlife habitat. Parcel 77 (66.4 acres) contains a mixture of upland hardwoods and pine of varying quality. The parcel receives a moderate amount of dispersed recreation. Typical woodland species of wildlife can be found on this parcel.

Approximately 650 acres of mud flat habitat become exposed when reservoir levels are lowered on Chatuge Reservoir. Mud flats on the reservoir are small (<10 acres), have steep gradients, and are not considered favorable shorebird habitat. Larger mud flats occur at the confluence of the Hiwassee River and Hightower Creek near Parcel 47, Sutton Branch, Woodring Branch, and Bell Creek. Most of these flats are bordered by private land.

3.2.3.2.2 Environmental Consequences

Alternative A

Under Alternative A, no parcels are allocated for Sensitive Resource Management, and a smaller percentage (41.6 percent) of land is utilized for Natural Resource Conservation than under Alternatives B and C. Under Alternative A, the majority of unplanned parcels front existing residential developments with existing access rights and therefore would not change. Under Alternative A, the existing uses of TVA parcels on Chatuge Reservoir would not change, and wildlife habitat and overall impacts to terrestrial animal resources would be insignificant.

Alternative B

Alternative B would reflect current use, and no immediate changes in land use would be expected. Alternative B would result in no land allocated to Zone 5 (Industrial). New allocations for parcels not previously planned under Alternative A include 16.7 acres (0.9 percent) allocated to Zone 3 (Sensitive Resource Management) and an additional 141 acres (876 acres total or 49.6 percent) allocated to Zone 4 (Natural Resource Conservation). These changes in allocations under Alternative B would benefit wildlife and their habitat. Alternative B differs little from Alternative A but would provide more habitat for wildlife than Alternative C.

Alternative C

Under Alternative C, the Zone 5 (Industrial) allocation on Parcel 10 would result in the loss of most of the 27.2 acres of old-growth forest habitat. Given the amount of forested habitats in the vicinity, impacts to wildlife in the region are expected to be minimal.

Under Alternative C, Parcel 52 would change from Zone 4 (Natural Resource Conservation) to Zone 6 (Developed Recreation). The proposed development of a year-round boat ramp, fishing piers, and walking trails on this parcel is expected to result in minimal impacts to wildlife or wildlife habitats, while improving river access. This access would be beneficial to wildlife-based recreation including fishing and wildlife viewing.

Under Alternative C, the allocation of Parcel 77 would be changed to Zone 6 (Developed Recreation). The area currently receives dispersed public use including bank fishing, hiking, and informal camping. The proposed change to Developed Recreation would allow consideration of a proposed multiple field sports complex. A public recreation use of this scope would result in the loss of some forested habitat resulting in impacts to terrestrial wildlife.

Alternative C is expected to result in more impacts to wildlife and wildlife habitat than Alternatives A and B. Overall, the impacts of Alternative C to wildlife resources are expected to be minimal given the amount of forested public lands in the vicinity.

3.2.4 Endangered and Threatened Species

A regional overview of endangered and threatened species is provided in Section 3.1.4.

3.2.4.1 Affected Environment

One federally listed as endangered plant (green pitcher plant), four Georgia state-listed plants, and one North Carolina state-listed plant are known to occur within five miles of Chatuge Reservoir (Table 3-12). The two known extant populations of the green pitcher plant are on lands protected by The Nature Conservancy (NatureServe 2007) and located on or near Non-TVA Shoreland (Zone 1). TVA owns a flowage easement on one of the sites. During field surveys in May 2006, no additional populations of green pitcher plants were found on unplanned parcels. Undocumented populations of North Carolina and Georgia state-listed species were found. American columbo was found on Parcels 6, 10, and 102, a small population (13 trees) of butternut was located on Parcel 77, and pink lady’s slipper was observed on Parcels 6, 15, 77, and 96. The state-listed plants found on unplanned parcels and the federally listed species reported from Chatuge Reservoir lands are discussed in more detail below.

Table 3-12. Federally and State-Listed as Endangered, Threatened, and Other Species of Conservation Concern Known From the Vicinity of Chatuge Reservoir in Towns County, Georgia, and Clay County, North Carolina

Common Name	Scientific Name	Federal Status	Ga. Rank (Status)	N.C. Rank (Status)
Plants				
American columbo*	<i>Frasera caroliniensis</i>	--	--	SR-P (S2S3)
Butternut*	<i>Juglans cinerea</i>	--	SPCO (S2)	--
Green pitcher plant*	<i>Sarracenia oreophila</i>	END	END (S1)	E-SC (S1)
Large yellow lady’s slipper	<i>Cypripedium parviflorum var. pubescens</i>	--	UNUS (S3)	--
Manhart sedge	<i>Carex manhartii</i>	--	THR (S2S3)	--
Pink lady’s slipper*	<i>Cypripedium acaule</i>	--	UNUS (S4)	--
Amphibians				
Eastern hellbender*	<i>Cryptobranchus alleghaniensis alleghaniensis</i>	--	RARE (S2)	SPCO (S3)
Bird				
Piping plover*	<i>Charadrius melodus</i>	THR	THR (S1)	THR (S2)
Reptile				
Bog turtle*	<i>Glyptemys muhlenbergii</i>	THR	THR (S1)	THR

-- = Not applicable

*Species descriptions in the text

Rank abbreviations: S1 = Critically imperiled; S2 = Imperiled; S3 = Rare or uncommon; S4 = Widespread, abundant, and apparently secure

Status abbreviations: END = Endangered, E-SC = Endangered (requires monitoring), RARE = Rare, SPCO = Special concern, SR-P = Significantly Rare-Peripheral, THR = Threatened, UNUS = Special concern due to commercial exploitation

American columbo: Also referred to as Carolina gentian, it is found in three localities around Chatuge Reservoir including Parcel 10. North Carolina is on the edge of the range of this species. According to Weakley (2006), habitat is usually rich forest over mafic rocks,

upper slopes of cove hardwood forest, and floodplain forest. Habitat loss and fragmentation may be impacting some populations, and intensive forest management could eliminate the species (NatureServe 2007).

Butternut trees may reach a height of 30-60 feet and a diameter of 1-2 feet at maturity. Butternut prefers moist, rich soils but can also grow on drier, rocky sites. Although this tree was once common throughout its range, populations have been declining due to threats from a fungal disease and excessive shading. One population was found during field surveys at an old homestead.

Green pitcher plant: Three populations of this federally listed as endangered plant are known from the Chatuge Reservoir area, one extant and one historic in Clay County, North Carolina, and one extant in Towns County, Georgia. All are on shallow slopes, at about 1,500-1,800 feet elevation, and have a palustrine hydrology fed by acidic seepage. All have been altered considerably by grazing, fire, cultivation, and drainage efforts. The Towns County population occurs on Zone 1 (non-TVA) land and is owned and managed by The Nature Conservancy. This population is monitored yearly. The extant North Carolina population is located adjacent to Zone 1 land and is also owned and managed by The Nature Conservancy.

Pink lady's slipper is found on dry to mesic acid forest usually under pine or other conifers (Weakley 2006). This showy pink orchid is frequently harvested by plant diggers but rarely survives being transplanted and is exceedingly difficult to nursery propagate. This species is not tracked in North Carolina but considered to be "unusual" in Georgia due to its commercial exploitation. Pink lady's slipper was observed on four parcels, three in Georgia (6, 15, and 77) and one in North Carolina (99).

Two federally listed and one state-listed animal species have been reported from Chatuge Reservoir area (Table 3-12). Neither of these species, or other listed animal species, was observed during field investigations in 2006.

Eastern hellbenders are found in large and midsized, fast-flowing, rocky rivers, typically at elevations below 2,500 feet (Petranka 1998). Hellbenders are known from Hightower Creek and Norton Branch in Georgia and Shooting Creek in North Carolina, which are all tributaries to the Hiwassee River. Historic records are known from along the Hiwassee River in areas that are now flooded by Chatuge Reservoir. Most parcels are along the reservoir and do not contain any quality eastern hellbender habitat. A riverine section of the Hiwassee River downstream of the dam flows through Parcel 1 and also is adjacent to Parcels 107 and 109. Hellbenders are expected to be present in this riverine reach near these parcels.

A single historical observation of a **piping plover** (see Section 3.1.4) was reported from Chatuge Reservoir on July 29, 1983. Most of the mud flats on Chatuge Reservoir are less than 10 acres in size; however, larger flats exist at the confluence of Hiwassee River and Hightower Creek. Results of recent surveys for shorebirds on the reservoir indicate that shorebirds use the reservoir on a limited basis.

Three bog-like areas, all in Zone 1, occur on Chatuge Reservoir and provide potential habitat for the **bog turtle** (see Section 3.1.4). All three have been altered considerably by grazing, fire, cultivation, and drainage efforts. Bog turtles are not known from these sites.

Although not reported from areas surrounding Chatuge Reservoir, habitats were assessed for suitability for Indiana bats (*Myotis sodalis*) and bald eagles (*Haliaeetus leucocephalus*). The suitability of Indiana bat habitat on most reservoirs was measured as low except for Parcel 10 on Chatuge Reservoir. Most forested parcels provided suitable nesting habitat for bald eagles.

No federally or state-listed aquatic species are known from the vicinity of Chatuge Reservoir lands.

3.2.4.2 Environmental Consequences

Aquatic Animals

Under any of the alternatives, there are no federally listed or state-listed aquatic species known in the vicinity of parcels on Chatuge Reservoir; therefore, there would be no impacts.

Alternative A

Plants

Under Alternative A, parcels containing state-listed as threatened and endangered plant species (Parcels 6, 10, 15, 77, and 102) would be managed for Natural Resource Conservation. This allocation does not allow residential, industrial, or recreational development; therefore, no significant impacts to sensitive botanical resources are expected as a result of Alternative A.

Terrestrial Animals

Under Alternative A, there would be no impacts on federally listed terrestrial animal species or their habitat, because no populations are known on most TVA parcels. Under Alternative A, parcels would be allocated to reflect their current use. Parcels 35 and 36 could ultimately be developed for industrial use. No listed species or their habitats are known from these sites.

Alternative B

Plants

Similar to Alternative A, under Alternative B, listed plant species found on Parcels 6, 10, 15, 77, and 102 would be allocated to Zone 4 (Natural Resource Management) to prevent residential development, industrial, or recreation development; therefore, no significant impacts to sensitive botanical resources are expected as a result of Alternative B.

Terrestrial Animals

Under Alternative B, the planned and unplanned parcels would be allocated to reflect their existing current uses, and no immediate changes in land use are expected. Alternative B would result in no land allocated to Zone 5 (Industrial) and would include new allocations for parcels not previously represented under Alternative A including 16.7 acres (0.9 percent) allocated to Zone 3 (Sensitive Resource Management), and an additional 141 acres (876 acres total or 49.6 percent) would be allocated to Zone 4 (Natural Resource Conservation). These changes in allocations under Alternative B may result in fewer potential future changes in land use, which may benefit listed terrestrial animals and their habitats.

Alternative C

Plants

Under Alternative C, Parcel 10 would be changed to Zone 5 (Industrial) use. Clearing of the old-growth forest to accommodate this allocation would result in habitat loss and the

possible extirpation of a population of American columbo, a North Carolina state-listed as rare species that was located on the parcel during a field review in May 2006. The state boundary between Georgia and North Carolina runs through this parcel, and this species is listed in North Carolina but not Georgia. Although this population could be eliminated, there would be no significant impacts to the viability of the species across its range.

Alternative C also allocates Parcels 52 and 77 to Zone 6 (Developed Recreation). The construction of a large, high-intensity developed recreation area, such as the proposed multiple field sports complex on Parcel 77, would have a negative impact on a population of butternut and pink lady's slipper found on this parcel. Because of the small size of the pink lady's slipper population, its loss would not significantly impact the species. The small population of butternut was presumably planted around an old homestead, and removal of the trees would not significantly alter the genetic diversity of this species. With the exceptions of these two species, no other known populations of listed plants are known to occur within the surrounding area of Chatuge Reservoir. The development of recreation facilities on Parcel 52 would not affect listed plants.

Terrestrial Animals

Similar to Alternative B, Alternative C allocates several parcels with suitable habitat for protected species to Zone 3 (Sensitive Resource Management) and Zone 4 (Natural Resource Conservation). However, Alternative C allocates Parcel 10, a largely forested tract to Zone 5 (Industrial). This parcel provides suitable habitat for Indiana bats due to the presence of various snags. The parcel also represents suitable roosting habitat for bald eagles. The allocation changes would not likely result in impacts to these listed species; however, any future projects at this site would require surveys for Indiana bats and bald eagles. The allocation of Parcels 52 and 77 to Zone 6 (Developed Recreation) and the subsequent development of recreation facilities would not affect listed terrestrial animals.

3.2.5 Wetlands

A regional overview of the wetlands resource for the mountain reservoirs is provided in Section 3.1.5.

3.2.5.1 Affected Environment

Table 3-13 shows estimates of wetland acreage based on NWI data for Chatuge Reservoir. Vegetated wetlands are generally uncommon due to the steep topography of the banks. NWI imagery indicates 581 acres of aquatic bed and flats features, which are both periodically flooded. These areas are mudflats, aquatic/submerged plant beds, or beaches/bars depending on season, weather patterns, and reservoir-level management. The remaining acreage is emergent, scrub-shrub, and forested wetlands.

Table 3-13. Wetland Acreage - Chatuge Reservoir

Combined Aquatic Beds and Flats (acres)	Emergent (acres)	Forested (acres)	Scrub-Shrub (acres)	All Types (acres)
581	11	48	14	654

Source: National Wetlands Inventory

Most wetlands are less than 0.10 acre in size. Many tracts on Chatuge Reservoir have scattered, very narrow shoreline fringe wetlands consisting primarily of river birch. Other species associated with wetlands on Chatuge Reservoir include buttonbush, black willow, sycamore, soft rush, sedges, and jewelweed.

3.2.5.2 Environmental Consequences

The impacts of the various alternatives on wetlands would be similar, and none would be adverse. Under Alternatives A and B, parcels containing wetlands would generally continue to be managed as they have been in the past, and actions with the potential to affect wetlands would be assessed prior to their implementation. Under Alternative C, an additional three parcels would be allocated to development-oriented uses; none of these parcels contain wetlands.

3.2.6 Floodplains

An overview of floodplains in the mountain reservoirs area is provided in Section 3.1.6.

3.2.6.1 Affected Environment

The affected area extends from the lower limit of the dam reservation at about HRM 120.0 upstream to about HRM 132.0 in Chatuge Reservoir. The 100-year flood elevations for the Hiwassee River downstream of the dam vary from elevation 1,804.5 feet above mean sea level (msl) at HRM 120.0 to elevation 1,811.8-feet msl at HRM 121.0 (downstream of Chatuge Dam). The 500-year flood elevations for the Hiwassee River downstream of the dam vary from elevation 1,809.6-feet msl at HRM 120.0 to elevation 1,816.5-feet msl at HRM 121.0. Tabulations of the 100- and 500-year flood elevations are included in Appendix H.

The main watercourse in Chatuge Reservoir is the Hiwassee River. The 100-year flood elevation for Chatuge Reservoir is 1,929.0-feet msl from the dam (HRM 121.0) to the upper end of the reservoir at about HRM 132.0. The 500-year flood elevation for Chatuge Reservoir is 1,931.0-feet msl from the dam to the upper end of the reservoir.

3.2.6.2 Environmental Consequences

The environmental consequences of each alternative are discussed in Section 3.1.6. None of the alternatives would have adverse effects on Chatuge Reservoir floodplains.

3.2.7. Cultural Resources

An overview of cultural resources in the mountain reservoirs area is provided in Section 3.1.7.

3.2.7.1 Archaeological Resources

3.2.7.1.1 Affected Environment

Chatuge Reservoir has been the focus of several archaeological surveys (Adams and Messik 1997, 1999; Brown and Rogers 1993; Gage and Herrmann 2006; Gunn and Lilly 1993) and one Phase III archaeological survey (Gunn 1992). These include areas both above and below Chatuge Dam. A survey of 80 linear miles and 603 acres of various shoreline tracts and public lands was conducted between November 1996 and September 1998. As a result, 215 archaeological resources were recorded or revisited, only 11 of which were considered potentially eligible or undetermined for listing in the NRHP. During the winter of 2005-2006, approximately 17.7 miles of reservoir shoreline were surveyed and

25 sites identified or revisited. Ten were considered potentially eligible for listing in the NRHP.

A survey of Chatuge Woods Public Use Area was conducted in 1993 (Gunn 1993). No archaeological sites were identified during the field investigations. To the west on Woods Creek, a site was investigated for potential adverse effects from a proposed development (Stoops 1990).

Below Chatuge Dam, a Phase III archaeological survey was conducted in the area of a proposed weir infusion dam (Gunn 1992). This site, which was determined to be eligible, was not adversely affected by the construction activities.

Parcel 77 was systematically surveyed for archaeological resources in 1998. Recorded archaeological resources exist within and surrounding this parcel. Eight archaeological resources were identified during the survey, but none are considered eligible for the NRHP. Development of this tract is not expected to adversely affect archaeological resources eligible for the NRHP.

Parcels 10 and 52 have not been systematically surveyed for archaeological resources. Recorded archaeological resources exist in the vicinity of Parcels 10 and 52, and archaeological resources likely exist within these parcels.

3.2.7.1.2 Environmental Consequences

As described in Section 3.1.7.1.2, TVA proposes to implement PAs in Georgia and North Carolina for the identification, evaluation, and treatment of all historic properties on this reservoir potentially affected by this land planning effort. Until the PAs are executed, TVA will incorporate the phased identification, evaluation, and treatment procedure to effectively preserve historic properties including archaeological resources as required by Section 106 of the NHPA. TVA would adhere to the terms of these PAs under all alternatives, and no adverse impacts on archaeological resources are expected. No archaeological resources eligible for the NRHP occur on Parcel 10, which would be allocated to Zone 5 (Industrial) under Alternative C. The other two parcels allocated to more development-oriented uses under Alternative C have not been surveyed. Development of these parcels may adversely affect significant archaeological resources through ground-disturbing activities. Adverse effects may be averted through avoidance and/or protection of archaeological resources. Where adverse effects cannot be avoided, mitigation through archaeological excavations or other means would be required. Treatment plans resolving adverse effects would comply with the NHPA and ARPA.

3.2.7.2 Historic Structures

3.2.7.2.1 Affected Environment

Chatuge Dam is named for a Cherokee Indian settlement. Historic properties located on Chatuge Reservoir include the dam, powerhouse, spillway, and historic highway bridge as well as a historic brick roadhouse and beer garden. None of these are presently listed in the NRHP. Adjacent to TVA lands are several historic properties associated with the development of the area.

3.2.7.2.2 Environmental Consequences

Under all alternatives, TVA would implement the PAs described above in Section 3.1.7.1.2. These PAs would include historic structures, and with their implementation, no adverse effects on historic structures are anticipated. Until the PAs are implemented, TVA would

individually evaluate actions with the potential to affect historic structures as required by Section 106 of the NHPA.

Alternative A

Under Alternative A, potential impacts to historic structures would be restricted to potential land use changes committed to Project Operations and Recreation. Expansions in existing public and commercial recreation areas could change the visual character of the surrounding areas, therefore, having the potential to impact adjacent historic structures. This situation would apply to future developments on Parcel 13, Chatuge Woods Campground. Actions on Parcel 1 (Chatuge Dam Reservation), which is allocated for Project Operations, also could visually affect adjacent historic structures.

Thus, potential effects, especially indirect visual effects, are possible under Alternative A. However, because these potential effects would be identified along with possible mitigation measures and because TVA would reserve the option to deny land use requests that would have unavoidable adverse effects, potential effects to historic structures under Alternative A would be insignificant.

Alternative B

Under Alternative B, potential impacts would be the same as Alternative A.

Alternative C

Under Alternative C, the effects would be similar to those described for Alternative A and Alternative B. However, development of three parcels on Chatuge Reservoir could change the visual character of the surrounding area, which could potentially affect historic structures. These proposals, which include Industrial use on Parcel 10 and Developed Recreation on Parcels 52 and 77, would be evaluated on an individual basis to determine if there would be unavoidable adverse effects and to determine the mitigation measures, if any, needed to avoid those effects; therefore, insignificant impacts would likely occur.

3.2.8 Managed Areas and Ecologically Significant Sites

Managed areas, ecologically significant sites, and NRI streams are defined in Section 3.1.8.

3.2.8.1 Affected Environment

Table 3-14 lists managed areas within 3 miles of Chatuge Reservoir. The areas are grouped by closest distance to the reservoir; areas on TVA lands but managed by other entities through a letter of agreement or land use agreement with TVA are listed as “on reservoir” and those areas abutting or less than 0.1 mile from reservoir lands are listed as “adjacent.”

Table 3-14. Managed Areas Within 3 Miles of Chatuge Reservoir

Name	Type of Area	Authority	State	Closest Distance to Reservoir
Walker Point Homeowners Association Nature Area	Managed area (MA)	Local (TVA letter of agreement)	N.C.	On reservoir
Clay County Park	MA	Local (TVA land use agreement)	N.C.	On reservoir

Name	Type of Area	Authority	State	Closest Distance to Reservoir
Towns County Park/Georgia Mountain Fairgrounds	MA	Local (TVA land use agreement)	Ga.	On reservoir
Chatuge Woods County Park and Campground	MA	Local (TVA land use agreement)	Ga.	On reservoir
Nantahala National Forest	MA	Federal	N.C.	Adjacent
Nantahala State Game Land	MA	State	N.C.	Adjacent
Chattahoochee National Forest	MA	Federal	Ga.	Adjacent
Reed Branch Wet Meadow	MA	Nonprofit organization	Ga.	Adjacent
Eller Seepage Bog Preserve	MA	Nonprofit organization	N.C.	Adjacent
Swallow Creek Wildlife Management Area	MA	State	Ga.	0.1 mile east
Southern Nantahala Wilderness	MA	Federal	Ga.	1.8 miles east

No NRI streams or ecologically significant sites are within 3 miles of Chatuge Reservoir.

3.2.8.2 Environmental Consequences

No managed areas occur on or adjacent to the three tracts proposed for more development-oriented uses under Alternative C. Managed areas are adjacent to or near several other Chatuge Reservoir parcels. The allocations of these parcels under Alternatives A, B, and C are generally compatible with the managed areas, and no adverse impacts are anticipated from any of the alternatives.

Because no ecologically significant sites occur within 3 miles of Chatuge Reservoir, none of the alternatives would impact such sites.

3.2.9 Visual Resources

The general visual environment of the mountain reservoirs is described in Section 3.1.9.

3.2.9.1 Affected Environment

The Chatuge Reservoir and floodplain areas include islands, secluded coves, and wetlands that are framed by high wooded ridges. Since the scenic features of the landscape are not limited by land boundaries, the attractive landscape character extends across TVA public and private land alike. The natural elements together with the communities and other cultural development provide a scenic, rural countryside.

Land uses adjacent to Chatuge Reservoir are similar to other reservoirs in the mountainous areas of north Georgia and North Carolina. They include USFS lands, residential development, public parks, and sporadic industrial features. The reservoir offers abundant water-recreation opportunities along with a variety of scenery. Most creek embayments are broadly open at the mouth, and some wind over a mile to their headwaters.

Among the scenic resources of Chatuge Reservoir, the water body itself is the most distinct and outstanding aesthetic feature. The horizontal surface provides visual balance and contrast to the islands and wooded hillsides. The reservoir weaves around the ridges and bends, changing views periodically seen from the water. It also links the other landscape features together. Views across the water are satisfying and peaceful to most observers.

Islands are another significant visual feature. The islands provide scenic accents and visual reference points throughout the reservoir and serve as visual buffers for less

desirable views. They also provide a pleasing foreground frame for the distant shoreline or background.

Other important scenic features include the secluded coves and steep, wooded ridges that occur around the reservoir. The isolated coves with wooded shoreline provide relatively private locations for dispersed recreation activities. Significant elevation changes along the shoreline provide a dramatic contrast to the surrounding reservoir and gently sloping countryside, particularly when they are viewed from background distances.

The shoreline upstream from the dam appears natural. Slopes and ridgelines seen from the reservoir are heavily vegetated during the growing season and provide positive visual contrast to the reservoir. There is little development in the foreground and middleground distances, with the exception of Gibson Cove Campground to the southwest. Views of the shoreline to the southeast from the reservoir are mainly of undisturbed USFS land.

Upstream of the dam, Clay County Park can be seen to the east from the reservoir. Shoreline views include water use facilities and a small beach area. Farther upstream, views are dominated by numerous residential developments along the shoreline, from Cedar Cliff, Amber Lane, and Heather Cove to the upper reaches of the reservoir along the Hiwassee River. Scenic attractiveness is common. Scenic integrity is moderate.

3.2.9.2 Environmental Consequences

Alternatives A and B

Under Alternatives A and B, parcels would be allocated based on existing land use. Potential impacts to scenic resources would be limited to visual changes within existing developed areas such as an expansion of a recreation area into an undeveloped portion of a parcel. Scenic resources impacts of this nature are expected to be minimal, as TVA would individually consider proposed changes in these areas. Alternative B calls for a slight increase in the Zone 3 (Sensitive Resource Management) and Zone 4 (Natural Resource Conservation) total acreage (i.e., 16.7 acres and an additional 141 acres, respectively) from Alternative A, which would provide additional protection to the existing visual character of Chatuge Reservoir.

Alternative B would provide the most protection to Chatuge's visual resources of the three alternatives. Scenic integrity would remain moderate or higher. Alternative B would help preserve the scenic landscape character of Chatuge Reservoir for long-term public enjoyment.

Alternative C

Under Alternative C, lands allocated to Zone 4 (775 acres) would be less than under Alternative B (876 acres) and slightly more compared to Alternative A (736.5 acres). An additional 27.2 acres would be allocated to Zone 5 (Industrial) than under Alternatives A and B. Under Alternative C, a total of 488 acres would be allocated to Zone 6 (Developed Recreation), approximately 73.8 acres more than Alternative B. Zone 7 (Shoreline Access) lands considered would be the same as Alternative B, 78.4 acres.

Although overall impacts would be insignificant, Alternative C would result in minor adverse impacts on the visual landscape character. Under Alternative C, Parcel 10 would potentially be sold and developed for industrial use and Parcels 52 and 77 would be allocated for developed recreational uses. For these parcels and land within their viewsheds, scenic value class and aesthetic sense of place would be reduced. However, scenic integrity would remain moderate or higher for the entire reservoir.

3.2.10 *Water Quality and Aquatic Ecology*

An overview of water quality and aquatic ecology for the mountain reservoirs area is provided in Section 3.1.10.

3.2.10.1 **Affected Environment**

Chatuge Reservoir is a headwater reservoir with no upstream impoundments that alter flow patterns and physical and chemical characteristics of runoff. An average annual discharge (1990-2005) of 439 cubic feet per second (cfs) results in an average water retention time of about 269 days. The long retention time results in Chatuge Reservoir becoming thermally stratified in the summer. Once stratification is established, oxygen in the deeper water cannot be replenished from the air or from contact with the oxygen-rich surface water. This results in low DO concentrations in the lower strata of the water column as DO is depleted by the natural process of decaying organic material. As part of TVA's Lake Improvement Plan (LIP), an aerating weir was constructed in November 1992 to improve minimum flow and DO levels in the releases from the dam.

Chatuge Reservoir is located in the Blue Ridge Physiographic Province. Due to the geologic characteristics of the region, streams in the watershed have naturally low concentrations of nutrients and dissolved minerals. Consequently, the reservoir is expected to have low productivity (i.e., low chlorophyll concentrations). More than 37 percent of the watershed lies within two national forests, the Nantahala National Forest in North Carolina and Chattahoochee National Forest in Georgia, affording some protection to water quality (Hiwassee River Watershed Coalition Inc. 2007).

Reservoir Ecological Health

Chatuge Reservoir was monitored on a biennial cycle from 1994 through 1998. After a substantial drop in the reservoir's ecological health score in 1998, monitoring has been conducted annually. Figure 3-2 shows the reservoir ecological health scores for Chatuge Reservoir from 1994 through 2006.

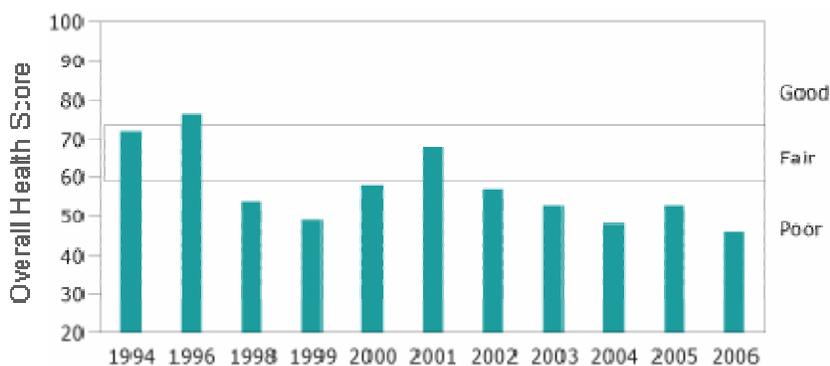


Figure 3-2. Chatuge Reservoir Ecological Health Ratings, 1994-2006

For the past nine years, Chatuge Reservoir has rated “poor” every year with the exception of 2001 when it rated “fair,” primarily because of improved DO conditions and lower average chlorophyll concentrations (see Table 3-15). The lack of spring rains and near record low runoff in 2001 likely reduced the amount of nutrients and organic material brought

into the reservoir. As a result, chlorophyll concentrations were lower, and oxygen levels in deeper strata were higher (owing to less demand to decompose organic materials). Low flows also reduce the rate at which the colder bottom water is displaced by warmer inflows, further reducing the rate of decomposition.

Table 3-15. Chatuge Reservoir Water Quality and Sediment Ratings, Reservoir Vital Signs Monitoring Data, 1991-2006

	Monitoring Years													
	1991	1992	1993	1994	1996	1998	1999	2000	2001	2002	2003	2004	2005	2006
Chatuge Forebay														
Dissolved Oxygen	Poor	Fair	Fair	Fair	Fair	Poor	Poor	Fair	Fair	Poor	Poor	Fair	Fair	Poor
Chlorophyll	Good	Good	Good	Good	Good	Fair	Good	Good	Good	Good	Fair	Poor	Poor	Poor
Sediment	NS	NS	Good	Fair	Good	Poor	Fair	Fair	Fair	Good	Fair	Fair	Fair	Fair
Chatuge Shooting Creek														
Dissolved Oxygen	NS	NS	Fair	Fair	Good	Poor	Poor	Poor	Fair	Poor	Poor	Fair	Poor	Poor
Chlorophyll	NS	NS	Good	Good	Good	Fair	Fair	Good	Good	Fair	Poor	Poor	Poor	Fair
Sediment	NS	NS	Fair	Fair	Good	Poor	Poor	Poor	Poor	Poor	Good	Poor	Poor	Poor

NS = Not sampled

Since 1998, the ratings for four indicators—DO, sediment quality, bottom life, and chlorophyll—have fluctuated, but a shift in overall reservoir scores has resulted from more frequent and concurrent low ratings for these indicators.

A plan was completed in 2007 to address water quality in Chatuge Reservoir (Hiwassee River Watershed Coalition Inc. 2007). This plan was developed by the Hiwassee River Watershed Coalition in cooperation with TVA and other agencies. The Chatuge plan is based on modeling of the watershed and reservoir, and recommends actions necessary to improve water quality to an ecological health score of “fair.”

Dissolved Oxygen

DO ratings have fluctuated between “fair” and “poor” all years monitored except in 1996 when DO rated “good” at the Shooting Creek monitoring location. The “poor/fair” ratings for DO at both monitoring locations are due to the presence of low concentrations (<2 mg/L) in the lower water column during late summer and autumn (August through October).

Chlorophyll

Average chlorophyll concentrations have shown a trend of increasing at both locations since TVA began monitoring Chatuge Reservoir in 1991. Chlorophyll ratings have fluctuated between “fair” and “poor” since 2003. Prior to 2003, chlorophyll rated “good” or “fair” all years.

Sediment Quality

Sediment quality ratings also have fluctuated (good, fair, and poor) due to elevated levels of one or more metals (chromium, copper, and nickel). Typically, sediment rates “fair” at the forebay due to elevated concentration of copper and “poor” at the Shooting Creek site due to elevated concentrations of chromium, copper, and nickel.

Benthic Monitoring

At HRM 122 and Shooting Creek Mile 1.5, benthic community scores ranged from “poor” to “fair” over the eight years sampled—most recently scoring “fair” (Table 3-16).

Table 3-16. Recent (1999-2006) Benthic Community Ratings for Chatuge Reservoir

Station	1999	2000	2001	2002	2003	2004	2005	2006
Forebay	Poor	Poor	Fair	Fair	Fair	Poor	Fair	Fair
Forebay (Shooting Creek)	Poor	Poor	Fair	Fair	Fair	Fair	Poor	Fair

Fisheries Monitoring

The RVSMF added annual fish sampling on Chatuge Reservoir in 1999. A list of fish species commonly found in Chatuge Reservoir can be found in Appendix I. The fish community in Chatuge Reservoir has consistently rated “fair” at both the forebay and midreservoir sampling stations.

In 2004, Chatuge Reservoir rated below the Valleywide SFI average for black bass and largemouth bass, and above for spotted bass (Table 3-17).

Table 3-17. Sport Fishing Index Scores for Selected Sport Fish Species in Chatuge Reservoir, 2006

Fish Species	2006 Score	2006 Valleywide Average
Black Basses	32	36
Largemouth Bass	32	33
Spotted Bass	40	31

Swimming Advisories

There are no state advisories against swimming in Chatuge Reservoir. TVA performed *Escherichia coli* (*E. coli*) bacteria monitoring at seven locations in 2007: US 64 gravel pile informal swimming site, informal swim site off Ledford Chapel Road at Pitts Cove, Chatuge Dam Reservation-Chatuge Circle boat ramp, Clay County Park beach, Bell Creek informal swim site, Towns County Park & Georgia Mountain Fair Recreation Area beach, and Clay County Park swim site (Gibson Cove Recreation Area).

Fish Consumption Advisories

The State of Georgia has issued a fish consumption advisory for spotted bass in the Georgia portion of Chatuge Reservoir because of mercury contamination. The state advises people not to eat more than one meal a week of spotted bass between 12 and 16 inches in length. The State of North Carolina has issued a statewide fish consumption advisory for largemouth bass because of mercury contamination.

TVA collected channel catfish and largemouth bass from Chatuge Reservoir for tissue analysis in autumn 2004. The results, which were similar to those of previous years, were provided to state agencies in Georgia and North Carolina. TVA will sample fish tissue from Chatuge Reservoir again in autumn 2008.

State(s) Impaired Waters

The North Carolina Division of Water Quality and the Georgia Environmental Protection Division assigned use support ratings to waters in the Hiwassee River Basin. Twelve miles of monitored streams are listed as impaired (Table 3-18) (North Carolina Department of

Environment and Natural Resources [NCDENR] 2007a; Georgia Environmental Protection Division [GAEPD] 2006).

Table 3-18. Summary of Impaired Waters in the Immediate Watershed of Chatuge Reservoir

Stream/River Name	State	Miles	Description	Water Quality Stressor/Source
Hiwassee River	Ga.	10	Upstream of Chatuge Reservoir	Fecal coliform/ nonpoint
Bearmeat Creek	Ga.	2	Tributary to Hiwassee River	Biota impacted/ nonpoint

There are two permitted NPDES discharges in Chatuge Reservoir, the town of Hiwassee Wastewater Treatment Plant (WWTP) and Jackrabbit Mountain Recreation Area.

Water Supply

The town of Hiwassee, Georgia, currently withdraws water from Chatuge Reservoir. The 2005 average daily water demand was 0.96 MGD.

3.2.10.2 Environmental Consequences

Alternative A

Under Alternative A, the allocated land uses for the 1,481 acres that are planned (out of a total of 1,767 acres managed by TVA) would be, in descending order, Natural Resource Conservation (41.6 percent), Recreation (20.9 percent), Project Operations (21.2 percent) and Shoreline Access (0.1 percent) (see Section 3.2.1). No land would be allocated to Sensitive Resource Management or Industrial uses. Of the 56 unplanned parcels, representing 286 acres, only four parcels totaling less than an acre are uncommitted; they would continue to be used for Natural Resource Conservation.

Any proposed use of TVA land would be subject to environmental reviews, which would require the protection of water quality through either restricted development or the use of BMPs (TVA 2005c) to minimize impacts. Therefore, Alternative A is not expected to have a significant impact on water quality and aquatic life.

Alternative B

Under Alternative B, 52 of the previously unplanned parcels are committed to existing uses, which determined their allocation for this alternative. The four small, uncommitted parcels were allocated based on their existing land use, which would be consistent with a Zone 4 (Natural Resource Conservation) allocation. Alternative B does not include any allocations that are inconsistent with the actual current land use on a parcel. Therefore, no significant changes to land use are expected on Chatuge Reservoir under this alternative. Overall, resultant water quality conditions, and in turn impacts to aquatic life, are not expected to differ significantly between Alternatives A and B.

Alternative C

Under Alternative C, the allocation of Parcel 10 (27.2 acres) to Zone 5 (Industrial) and Parcels 52 and 77 (75.8 acres) to Zone 6 (Developed Recreation) rather than to Zone 4 (Natural Resource Conservation) as in Alternatives A and B would increase the potential for adverse water quality and aquatic life impacts, with the extent of any impacts being

dependent on the specifics of future development. Industrial and large-scale recreation developments would require land clearing and grading and could negatively impact much of the existing riparian vegetation, increase the amount of impervious surfaces, and increase the amount of pollutants entering the reservoir. However, all development and operation of industrial and recreational facilities would be subject to BMPs, and any future actions on TVA land would be subject to environmental review. Further, new facilities with permitted discharges would be required to meet permit limits specifically designed to prevent adverse impacts and violation of applicable water quality criteria. Therefore, insignificant impacts to water quality and aquatic life are anticipated as a result of allocations associated with Alternative C.

3.2.11 Air Quality and Noise

An overview of the air quality of the mountain reservoirs area is provided in Section 3.1.11. Noise has previously been discussed in Section 3.1.11.2.

3.2.11.1 Affected Environment

The two counties that contain Chatuge Reservoir as well as the adjacent counties are currently in attainment of the NAAQS.

The nearest PSD Class I areas are the GSMNP, which is located about 30 miles northeast, Joyce Kilmer/Slickrock Wilderness, which is located about 15 miles northeast, and Cohutta Wilderness, which is located about 30 miles west of Chatuge Reservoir.

3.2.11.2 Environmental Consequences

The greatest potential for air quality effects is from industrial use. No parcels would be available for industrial use under Alternatives A and B; Parcel 10 would be allocated to Zone 5 (Industrial) under Alternative C. An appropriate level of environmental review would be done to document the extent of expected air quality impacts when a proposed land use request is received. Each such review that involved a parcel in or potentially affecting a nonattainment area for ozone and/or PM_{2.5} would require a conformity applicability determination pursuant to regulations implementing Section 176(c) of the Clean Air Act to assure compatibility with measures in local plans for achieving attainment. Because of the small amount of acreage involved and because of regulatory controls, industrial development under Alternative C is not expected to result in any significant effects to air quality.

3.2.12 Socioeconomics

The socioeconomic conditions of the mountain reservoirs area are described in Section 3.1.12.

3.2.12.1 Affected Environment

3.2.12.1.1 Population and Economy

Population: Tables 3-19 and 3-20 describe the population of the Chatuge Reservoir area. Towns County, Georgia, had a population of 9,319 in 2000, an increase of 65.3 percent since 1980. This was a higher rate than in both Georgia and the nation. Clay County, North Carolina, had a population of 8,775 in 2000, an increase of 32.6 percent since 1980. This was a higher rate than for the nation but not for North Carolina. The rate of growth in both counties, states, and the nation was higher from 1990 to 2000 than from 1980 to 1990. In both decades, the rate of growth in Towns County was higher than in Clay County, so

although there were fewer residents in Towns County in 1980, by 2000 its population was greater than the population in Clay County.

Estimates for 2006 indicate that the population of Towns County has grown an additional 12.9 percent since 2000. This remains a faster rate than the nation but is not quite as fast as in Georgia. During this period, the population in Clay County is estimated to have grown 14.1 percent, a faster rate than in Towns County, North Carolina, and the nation.

Projections through 2020 indicate that both counties will continue to have faster population growth rates than either state or the nation over that time. The rate for Towns County is expected to be slower than for 1980-2000, but the rate for Clay County is expected to be greater than for 1980-2000.

Table 3-19. Population – Towns County, Georgia, and Clay County, North Carolina

Area	1980	1990	2000	2006 (Estimate)	2020 (Projection)	Density (persons per square mile) 2000
Towns County, Ga.	5,638	6,754	9,319	10,525	13,627	55.9
Clay County, N.C.	6,619	7,155	8,775	10,008	12,502	40.9
Georgia	5,462,982	6,478,216	8,186,453	9,363,941	11,463,602	141.4
North Carolina	5,880,095	6,628,637	8,049,313	8,856,505	10,885,758	165.2
United States	226,545,805	248,709,873	281,421,906	299,398,484	335,804,546	79.6

Source: U.S. Census Bureau (undated a-e), extrapolations from Georgia Office of Planning and Budget (2005), and North Carolina Office of State Budget and Management (2007)

Table 3-20. Recent and Projected Population Changes – Towns County, Georgia, and Clay County, North Carolina (Percentage Growth)

Area	1980-1990	1990-2000	1980-2000	2000-2006	2000-2020	1980-2020
Towns County, Ga.	19.8	38.0	65.3	12.9	46.2	141.7
Clay County, N.C.	8.1	22.6	32.6	14.1	42.5	88.9
Georgia	18.6	26.4	49.9	14.4	40.0	109.8
North Carolina	12.7	21.4	36.9	10.0	35.2	85.1
United States	9.8	13.2	24.2	6.4	19.3	48.2

Source: Calculated from data in Table 3-19

These counties are decidedly rural in distribution of population. As noted in Table 3-19, the population densities in both counties are much lower than in either state or the nation. The largest town in the two counties is Hiawassee, Georgia (Towns County) with 808 residents in 2000. About 85 percent of the population in Towns County is outside incorporated towns. About 97 percent of the population in Clay County is outside incorporated towns.

Economy: Table 3-21 contains the most recent annual data regarding the amounts and types of employment, amounts of unemployment, and incomes in the area. In 2005, Towns County had 5,879 people employed on average, and Clay County had 3,618. Both counties have a considerably higher percentage of farmers than either state or the nation, a considerably lower percentage of workers employed in manufacturing and slightly more employees in retail. Both counties have lower percentages of government employees than their states, but the percentage is higher in Clay County than in the nation. The average unemployment rate for 2006 was lower in both counties than either state or the nation. Per capita personal income in 2005 was considerably lower in Towns County and much lower in Clay County than in either the state or the nation.

Table 3-21. Employment, Unemployment, and Income – Towns County, Georgia, and Clay County, North Carolina

Area	Employment, 2005	Employment (percent of total)					Unemployment Rate, 2006	Per Capita Personal Income 2005
		Farm	Manufacturing	Retail Trade	Government	Other		
Towns County, Ga..	5,879	2.7	4.0	11.2	10.2	71.8	3.4	27,085
Clay County, N.C.	3,618	5.6	5.6	13.0	14.5	61.3	3.9	23,230
Georgia	5,197,037	1.4	9.0	10.7	14.5	64.5	4.6	30,914
North Carolina	5,119,512	1.4	11.5	10.8	15.7	60.5	4.8	31,041
United States	174,249,600	1.7	8.5	10.9	13.7	65.2	4.6	34,471

Source: U.S. Bureau of Economic Analysis (undated); Georgia Department of Labor (undated), North Carolina Employment Security Commission undated

Many local workers in the area commute outside their home county to jobs—up to 70 percent in Clay County, as noted by David Penland, Clay County Planner (personal communication, November 11, 2007). In addition, Mr. Penland and North Carolina Department of Community Affairs Planner Ginny Faust (personal communication, November 13, 2007) explained that increasing land values due to the demand for vacation homes in the region are making it difficult for local residents to find affordable housing.

3.2.12.1.2 Environmental Justice

The minority population in the Chatuge Reservoir area is very small (Table 3-22). In Towns County, Georgia, 3.5 percent of the total population was estimated to be minorities in 2006, which was far below the state average of 41.1 percent and the national average of 33.6 percent. In Clay County, North Carolina, 3.3 percent of the total population was estimated to be minorities in 2006, which was far below the state average of 32.1 percent and the national average of 33.6 percent. The estimated poverty rate in Towns County in 2004 was 11.9 percent, slightly lower than the state rate of 13.7 percent and the national average of 12.7 percent. The estimated poverty rate in Clay County in 2004 was 12.7 percent, slightly lower than the state rate of 13.8 percent and the national average of 12.7 percent. There are no concentrations of low-income residents or minorities in the vicinities of Parcels 10 and 77, which could be developed under Alternative C.

Table 3-22. Minority Population, 2006, and Poverty, 2004 – Towns County, Georgia, and Clay County, North Carolina

Area	Population Total	Minority Population			Poverty Percent Below Poverty Level
		Nonwhite	White Hispanic	Percent Minority	
Towns County Ga.	10,525	168	197	3.5	11.9
Clay County, N.C.	10,008	211	116	3.3	12.7
Georgia	9,363,941	3,205,172	640,521	41.1	13.7
North Carolina	8,856,505	2,298,351	543,059	32.1	13.8
United States	299,398,484	59,652,230	41,001,760	33.6	12.7

Source: U.S. Census Bureau (undated d and 2004)

3.2.12.2. Environmental Consequences

Alternative A and B

Under Alternatives A and B, existing uses of the Chatuge Reservoir parcels would continue, and there would be no socioeconomic impacts and no effects on minority or low-income populations.

Alternative C

Under Alternative C, the industrial use of Parcel 10 would create the potential for new jobs in the area that would be beneficial to the economy of the area. As explained by TVA Economic Development Environmental Coordinator Denny Painter (personal communication, November 16, 2007), the agency's experience with industrial development indicates that, assuming a campus-style development compatible with the area, about 250,000 to 350,000 square feet of industries could ultimately be created. A typical ratio of one employee per 1,000 square feet would result in a range in round numbers of 250-350 jobs. Because manufacturing jobs generally pay above-average wages, this would be beneficial to the economy of the area. With unemployment rates low, it is likely that at least some of the jobs would be taken by workers living outside the two counties, so not all of the economic benefits would be experienced in the two counties. However, some of these workers might choose to move to the two counties, thus leading to additional economic growth and population growth above the current projections. If as many as 350 jobs were created, this number would still be less than 5 percent of total employment and would probably be created over a number of years, so the jobs would not be significant in putting major demands on community services. If Alternative C were selected, TVA would likely sell Parcel 10 at public auction, and any subsequent private ownership of the parcel could result in an increase in property taxes.

As noted in Section 3.1.12.1, the primary economic drivers in the area are the housing and tourism sectors, which are dependent on the natural scenery associated with the reservoir and adjacent lands. Allocating Parcel 10 to Zone 5 (Industrial) would potentially result in a change in land use from a natural setting to an industrial setting. Depending on the type of industrial development, this could have negative socioeconomic impacts by lowering the value of nearby property and interest in residential development of available nearby property, at least relative to other properties in the area. Socioeconomic impacts as a result of this change are expected to be insignificant when considered in a regional context.

The change of Parcel 52 from Zone 4 (Natural Resource Conservation) to Zone 6 (Developed Recreation) as a potential deepwater boat launching ramp, walking trails, and/or city park would enhance the attractiveness of the area by creating more parks near Hiwassee, Georgia, thus possibly indirectly contributing to further population and economic growth.

The change of Parcel 77 from Zone 4 (Natural Resource Conservation) to Zone 6 (Developed Recreation) for the potential development of a sports complex would also create an additional public park, thus possibly enhancing the attractiveness of the community and indirectly contributing to further population and economic growth. A multiple field sports complex could allow the hosting of regional and national sports tournaments, thus increasing economic benefits from tourism. However, as noted above, the reservoir and scenery are the main economic drivers in the area, and as noted in Section 3.2.1, a multiple field sports complex at this location could be incompatible with enjoyment of the reservoir and scenic quality. This could have a negative socioeconomic effect by lowering property values and interest in residential development of available nearby property, at least relative to other properties in the area. Because the parcel is in an exposed location visible from much of the reservoir and surrounding land, these negative effects could be experienced over a fairly large area.

Under Alternative C, the allocation of Parcel 10 to Zone 5 for industrial development would potentially benefit low-income populations by creating jobs. Under Alternative C, the allocation of Parcel 77 to Zone 6 for development of ball fields and a walking trail would

potentially benefit low-income populations by enhancing the availability of parks near Hiawassee. As noted above, there are no nearby concentrations of low-income or minority populations to potentially suffer disproportional adverse impacts by the development of either parcel. Under Alternative C, allocation of Parcel 52 to recreation development would not be expected to have disproportional adverse impacts to minority or low-income populations due to the type of development of surrounding land and the type of development expected.

3.3 Hiwassee Reservoir

3.3.1 Land Use

An overview of land use for the mountain reservoirs region is provided in Section 3.1.1.

3.3.1.1 Affected Environment

TVA initially purchased 19,046 acres and nearly all of the shoreline (see Table 1-1) for Hiwassee Reservoir. Since the purchase, TVA has transferred about 17,280 acres (91 percent) of the original land base primarily to the USFS. TVA sold about 759 acres, most of which now comprises the Bear Paw Community. TVA retained 1,007 acres in 72 parcels. The majority of these (58 parcels), totaling 784 acres are considered committed to existing land uses (Table 2-2). Dam Reservation and other land supporting TVA Project Operations account for 300 acres (30 percent) of the total TVA land base on the reservoir. Ten parcels are committed to recreational uses such as commercial marinas and county parks by land use agreements. Land use agreements also commit 11 parcels for public infrastructure such as railroad and state highway rights-of-way. Ten parcels front land that TVA transferred to the USFS for operation of the National Forest System. Only three parcels are committed to residential access by deeded rights or previous policy. For a complete list of the committed uses for Hiwassee Reservoir parcels, reference Appendix E.

Fourteen parcels totaling 223 acres (Table 2.2) are considered uncommitted and are being considered for alternative uses in this plan. This is the second-largest amount of land on any of the nine reservoirs being planned. The majority of the uncommitted parcels is currently managed for natural resource conservation and dispersed recreation.

Nearly all of the 164.8 miles of shoreline on Hiwassee Reservoir is owned by TVA (Table 1-2). Eighty-six percent of this shoreline is land TVA retained fronting land transferred to the USFS. Only about 4 percent of the total shoreline is available for residential development; the remaining 96 percent of the shoreline does not have private water-access rights. All of the shoreline available for residential development on Hiwassee Reservoir has been developed, the vast majority of which is in Bear Paw subdivision. While TVA estimates that all the shoreline available for residential access has been developed, there are still individual undeveloped lots available within existing subdivisions.

Cherokee County, North Carolina, is predominantly rural. Murphy is the only town near the reservoir. About a third of the land in the county is in the Nantahala National Forest (USFS 2007b, Quickfacts 2007). In recent years, development has increased on the privately owned land in the county. Much of the development is attributed to retirees moving to the state from Florida and improved highway access to the Atlanta area, allowing both commuters and second-homeowners easier travel to and from the area. According to County Manager David Badger (personal communication, November 7, 2007), the population of Cherokee County can increase by as many as 10,000 people between April and October; there are about 37,500 parcels of property in the county, and nearly half of these parcels are owned by nonresidents. According to Mr. Badger, 4,000 acres of the county are Cherokee Indian tribal lands. Cherokee County does not have a zoning ordinance. Additional information regarding the regional land use and demographics is provided in Section 3.3.12, Socioeconomics.

Parcels containing prime farmland surrounding Hiwassee Reservoir are listed in Table 3-23.

Table 3-23. Acres of Prime Farmland on Hiwassee Reservoir

Parcel Number	Total Parcel Acres	Prime Farmland Acres	Zone Allocation
16	NA	7.1	4
26	12.6	12.6	3
40	21.3	20	3
46	16.9	16.9	3
52	14.6	13.9	3
54	9.8	9	3
61	23.2	19.2	6
62	11.6	6.9	3

N/A = Not applicable

3.3.1.2 Environmental Consequences

Alternative A

As shown in Table 2-3, under Alternative A, the allocated land uses for the 957 acres which are planned (out of a total of 1,007 acres managed by TVA) are, in descending order, Natural Resource Conservation (47 percent), Project Operations (36.3 percent), Industrial (7.8 percent), and Recreation (3.9 percent). No land is allocated to Sensitive Resource Management or Industrial uses. One small parcel (<1 acre) that was previously planned as a portion of the original Dam Reservation and later sold (Fowler Bend) has access rights for water use facilities and is allocated for Shoreline Access (0.1 percent).

Parcels 35 and 36 are allocated to Industrial based on the Forecast System designation and could potentially be developed for industrial use if Alternative A were selected. However, given the steep terrain of the parcels and the requirements for industrial use of TVA land as stipulated by TVA's Land Policy, it is unlikely that industrial use would be allowed on the parcels.

Under Alternative A, TVA would not designate land uses for over 50 acres of TVA land on Hiwassee Reservoir that is not planned with the Forecast System. The exact acreage of TVA land fronting National Forest System lands is unknown and therefore not included in the Natural Resource Conservation and Recreation allocation acreage totals. Of the 20 unplanned parcels, representing over 50 acres, only one parcel is uncommitted. The uncommitted parcel is less than an acre and is allocated for Natural Resource Conservation. This parcel would continue to be managed according to TVA's Land Policy, SMP, and Section 26a regulations.

Under Alternative A, no impacts to prime farmlands are expected.

Alternative B

Under Alternative B, all of Hiwassee Reservoir's 1,007 acres would be planned, including the 20 parcels not planned under Alternative A. Nineteen of the previously unplanned parcels are committed to existing uses, which determined their allocation for this alternative. One small (<1 acre) uncommitted parcel was allocated based on existing land use, which was consistent with Zone 4 (Natural Resource Conservation). Alternative B does not include any allocations that are inconsistent with the actual current land use.

Under Alternative B, TVA would allocate 439.2 acres (43.6 percent) to Zone 4 (Natural Resource Conservation), a decrease of 33.6 acres from Alternative A. This is primarily a result of allocating land in Zone 4 for Alternative A to Zone 3 (Sensitive Resource Management) for Alternative B. Alternative B increases Zone 3 allocations from none in Alternative A to 118 acres on 12 parcels (11.7 percent). Land allocated to Zone 6 (Developed Recreation) would increase slightly over Alternative A to 40.6 acres (4 percent). The exact acreage of the previously unplanned acreage for the TVA land fronting the National Forest System lands is unknown and therefore not included in the Zones 4 and 6 acreage totals. Zone 7 (Shoreline Access) would receive additional allocations totaling about 42.9 acres (4.3 percent). Allocations to Zone 2 (Project Operations) would stay the same as Alternative A at 366 acres (36.3 percent). No land would be allocated to Zone 5 (Industrial).

No significant changes to land use are expected to occur on Hiwassee Reservoir under Alternative B because the allocations are consistent with existing land use on all parcels. Under Alternative B, no impacts to prime farmlands are expected.

Alternative C

Under Alternative C, all of Hiwassee Reservoir's 1,007 acres would be planned. As shown in Tables 2-7 and 2-8, land allocated to Zone 4 (Natural Resource Conservation) on Hiwassee Reservoir would decrease by 4.4 acres to 435 acres but would still be the primary use at 43 percent of the total. Land allocated to Zone 6 (Developed Recreation) would increase by 4.4 acres to 45 acres (4.5 percent) from lands allocated under Alternative B.

The differences in Alternatives B and C affect Parcels 34 and 49, which would be allocated to Zone 6 (Developed Recreation). These requested allocation changes are for proposals received during scoping for a water-access site along the Hiwassee River for wade fishing (Parcel 34) and an extension of the Heritage Riverwalk Trail (Parcel 49).

Parcel 34. This 2.4-acre parcel is located between Harshaw Road and the Hiwassee River in Murphy, North Carolina. The adjacent land use for Parcel 34 consists of state highway right-of-way and former agricultural fields. The Hiwassee River at this location is riverine in nature and development of a water-access site on Parcel 34, with a narrow access corridor through Parcel 40, would provide a public access point for wade fishing in the river or for launching a canoe or other nonmotorized personal watercraft. Future development would retain or enhance existing vegetated buffers along the river and utilize BMPs including storm water controls. Allocating Parcel 34 to Zone 6 would allow for a partnership to be formed for the development of a water-access site in the future.

Parcel 49. This 2.0-acre parcel is linear in nature and parallels highway and railroad rights-of-way along most of its length. Adjacent land use includes forested river corridors and wetlands. Comments received during scoping from Town of Murphy officials, Heritage Partners, and others requested the use of Parcel 49 for the continuation of the Heritage Riverwalk Trail. Allocation of Parcel 49 to Zone 6 would allow future requests for trail development to be considered by TVA. Future development of the trail segment would feature low-impact design and avoid sensitive resources such as wetlands.

Under Alternative C, proposed allocations for conversion to recreational development on Parcels 34 and 49 would not affect prime farmlands.

3.3.2 Recreation

An overview of the recreation resource for the mountain reservoirs area is provided in Section 3.1.2.

3.3.2.1 Affected Environment

Thirteen TVA parcels on Hiwassee Reservoir support developed recreation facilities. TVA actively manages some of these parcels; however, the USFS and state, county, and city agencies manage most of the parcels through either TVA land transfer agreements or landrights provided by licenses, leases, or easements. In addition to the TVA and other public land that provide recreational opportunities, the private sector also provides needed amenities, such as marinas and RV campgrounds. These developed recreation areas are summarized in Table 3-24.

There is one campground on Hiwassee Reservoir at Hanging Dog Recreation Area that is owned and operated by the USFS. In addition to the campground, the recreation area also includes picnic tables, a boat ramp, a paved walking trail, fishing piers, and other recreational amenities.

Ten recreation areas contain boat ramps, one of which is privately operated. The remaining nine are operated by public entities, including the ramps on the Hiwassee Dam Reservation (Parcel 3) and Micken Branch (Parcel 12) that are managed by TVA. The ramps at Micken Branch and Hanging Dog Recreation Area are both low-water ramps that serve the left bank and right bank of the reservoir, respectively. The construction of the ramp at Hanging Dog is an example of a partnership project between TVA, the USFS, the North Carolina Wildlife Resources Commission, and others that has been developed to provide a needed recreational facility.

There are four commercial marinas operating on Hiwassee Reservoir: Mountain View Marina (Parcel 6), Duke's Hide-A-Way Marina (Parcel 62), Harbor Cove Marina (Parcel 8), and Shook's Marina (Parcel 64). Mountain View Marina at Bear Paw (Parcel 6) has been certified as a TVA Clean Marina.

Four public fishing piers are located on Hiwassee Reservoir. The piers at Hanging Dog Recreation Area and Cherokee Lake Picnic Area (Parcel 14) are managed by the USFS. The two fishing piers at Konehete Park (Parcel 61) are managed by Cherokee County. There is no stream access site located near Hiwassee Reservoir.

There is one day use area with several facilities on Hiwassee Reservoir. A large portion of Konehete Park is located on land (Parcel 61) provided by TVA to the Town of Murphy and Cherokee County through a long-term easement for public recreation. The portion on TVA land provides picnic tables, pavilions, a paved walking trail, fishing piers, children's play equipment, and ball fields.

Table 3-24. Recreation Facilities on Hiwassee Reservoir

Area Name	County, State	Sector	Operator	Land Ownership	Parcel Number	Campground	Marina	Picnic Tables	Boat Ramp	Stream Access	Paved Trails	Fishing Piers	Other
Bear Paw Pavilion	Cherokee, N.C.	Private	Commercial	Private	7								X
Mountain View Marina	Cherokee, N.C.	Private	Commercial	Private**	6		X	X	X				X
Duke's Hide-A-Way Marina	Cherokee, N.C.	Private	Commercial	USFS**	62		X		X				
Harbor Cove Marina	Cherokee, N.C.	Private	Commercial	USFS**	8		X		X				
Shook's Marina	Cherokee, N.C.	Private	Commercial	USFS**	64		X		X				
Bealtown Ramp	Cherokee, N.C.	Public	Town of Murphy	TVA	22				X				
Hiwassee Dam Reservation	Cherokee, N.C.	Public	TVA	TVA	1, 2, 3			X	X				X
Konehete Park	Cherokee, N.C.	Public	Cherokee County	TVA/City	61			X			X	X	X
Micken Branch Ramp	Cherokee, N.C.	Public	TVA	TVA	12				X				
Hanging Dog Recreation Area	Cherokee, N.C.	Public	USFS	USFS	N/A	X		X	X		X	X	
Ramsey Bend Ramp	Cherokee, N.C.	Public	USFS	USFS	N/A				X				
Cherokee Lake Picnic Area	Cherokee, N.C.	Public	USFS	USFS**	14			X				X	
Grape Creek Boat Ramp	Cherokee, N.C.	Public	N.C.	USFS**	61				X				

** = TVA retained below MSC

Dispersed Recreation

Dispersed recreation has historically provided important recreation opportunities on Hiwassee Reservoir. The following table is a summary of parcels heavily utilized for dispersed recreation that have been identified on Hiwassee Reservoir.

Table 3-25. Dispersed Recreation Areas on Hiwassee Reservoir

Recreation Area	Parcel Number	Number of Sites
Micken Branch	10, 11	3
Payne Street	65	1
McCalley Bottoms	52	1

Some of the larger uncommitted parcels on Hiwassee Reservoir that accommodate high levels of dispersed recreation of a more passive nature such as hunting and bank fishing include the following: Parcel 4 with 33.6 acres, Parcel 10 with 112.8 acres, and Parcel 36 with 69.1 acres.

3.3.2.2 Environmental Consequences

Alternative A

Under Alternative A, TVA lands previously allocated to Recreation on Hiwassee Reservoir total 38.9 acres (3.9 percent). One parcel allocated for Public Recreation and five parcels allocated to Project Operations under the Forecast System have been utilized for developed recreation; these parcels include Konehete Park in Murphy. In addition, under Alternative A, five parcels that currently support developed recreation are unplanned;

however, the unplanned parcels and parcels allocated for Project Operations with existing developed recreation use are all committed to that use through transfer agreement covenants or TVA licenses, leases, or easements.

Under Alternative A, TVA would not allocate any additional parcels for Public or Commercial Recreation use. The unplanned parcels and previously allocated Project Operation parcels that are committed to developed recreation would continue to be used for that purpose. Therefore, any future demand for recreational needs would have to be met by expansion of recreation facilities in these existing areas. Under Alternative A, potential environmental impacts would be insignificant since parcels (both previously allocated and the unplanned parcels) utilized for developed recreation would not change. Any future development of new facilities would be limited to the existing developed recreation areas. The potential for impacts from any new facilities would be subject to review and potential mitigation under NEPA.

Alternative A would not change the land use of any parcels; therefore, potential impacts to dispersed recreation would be restricted to expansions within existing committed parcels (e.g., campground expansion). Potential impacts to dispersed recreation of this nature are expected to be insignificant.

Alternative B

Under Alternative B, parcels allocated to Zone 6 (Developed Recreation) would comprise a total of approximately 40.6 acres (4 percent) of the TVA lands on Hiwassee Reservoir. This acreage is more than would be allocated to Zone 6 under Alternative A and includes an additional 1.7-acre parcel fronting Mountain View Marina, but does not include uncalculated acreage of four other previously unplanned parcels that front three other marinas and a USFS recreation area. Eleven parcels on Hiwassee Reservoir are committed to developed recreation and would be allocated to Zone 6. These commitments include transfer agreement covenants and TVA licenses, leases, and easements. All of the parcels committed to developed recreation on Hiwassee Reservoir currently support recreational land use with existing facilities. The parcels allocated to Zone 6 would include those previously allocated under Alternative A to Public Recreation as well as those five parcels allocated to Reservoir Operations that have been utilized for developed recreation.

Under Alternative B, any future demand for recreational needs would have to be met by expansion of recreation facilities in these existing areas allocated to Zone 6. These areas are the same under Alternative B as under Alternative A, and since there would be no new parcels allocated for Developed Recreation, the potential environmental impacts would be the same. The potential for impacts from any new facilities within existing areas would be subject to review and potential mitigation under NEPA and therefore should be insignificant.

Alternative B does not propose changing land use of any parcels; therefore, potential impacts to dispersed recreation would be restricted to expansions within existing committed parcels. Potential impacts to dispersed recreation of this nature are expected to be insignificant.

Alternative C

Under this alternative, two parcels, 34 and 49, totaling 4.4 acres allocated to Zone 4 (Natural Resource Conservation) under Alternative B would be allocated to Zone 6 (Developed Recreation).

Parcel 34. Alternative C would allocate Parcel 34 to Zone 6 (Developed Recreation) for water-access purposes. Formerly, this area has been utilized for agriculture under a TVA agricultural license. Recent construction of the new US 64 corridor resulted in a decrease in size of the parcel and cancellation of the agricultural license. The suitability/capability analysis for Parcel 34 indicated this parcel ranked high for water access due primarily to the gentle shoreline slope, proximity to Murphy, good road access, and high level of interest from local and state stakeholders. Development of a water-access site at this location would provide for public access to the Hiwassee River for wade fishing and nonmotorized boating such as canoeing or tubing.

Parcel 49. Alternative C would allocate Parcel 49 to Zone 6 (Developed Recreation) for public recreation purposes. Town of Murphy officials, Heritage Partners, and others submitted comments during the public scoping period requesting the use of Parcel 49 for future phases of the Heritage Riverwalk Trail that originates in Konehete Park. The existing trail is heavily utilized by the public and is an asset to the area providing for a walking trail in a natural setting in downtown Murphy. Allocation of Parcel 49 to Zone 6 for public recreation would allow future requests for trail development to be considered by TVA. The recreational analysis of Parcel 49 indicated it is suitable for and capable of supporting public recreation use primarily due to its high degree of forestation, its location in an area of need, and the very high level of interest by local stakeholders.

Alternative C would provide increased recreational opportunities on Hiwassee Reservoir; therefore, this alternative would provide beneficial impacts to the recreation resource.

3.3.3 Terrestrial Ecology

An overview of terrestrial ecology (plant and wildlife communities) is provided in Section 3.1.3.

3.3.3.1 Plant Communities

3.3.3.1.1 Affected Environment

The physiognomic vegetative classes commonly found on Hiwassee Reservoir lands are evergreen forest, evergreen-deciduous forest, deciduous forest, shrublands, and herbaceous vegetation. Most of the evergreen forests are in the form of pine plantations. Mixed pine-hardwood forests dominate the region with smaller areas of deciduous forest (mainly the Appalachian oak forest, northern hardwood forest, and cove hardwood forest). Scrub-shrub wetland communities occur along the backs of coves along the reservoir, and herbaceous vegetation is commonly found along transmission line and roadway rights-of-way and grassy areas on the dam reservation.

Most of the evergreen forests are in the form of pine plantations where loblolly pine is dominant, along with shortleaf and Virginia pine. Several areas showed evidence of harvesting due to pine bark beetle infestation and were in the process of regenerating with young pine trees. Evergreen-deciduous forest, the most common forest type, is dominated by stands of mixed pine-hardwood trees. Deciduous forest occurs mainly as oak-hickory forest (mesic to xeric), mesic cove hardwood forest on slopes, and forested wetlands near the reservoir edges grading into scrub-shrub wetlands. Oak-hickory forests common on xeric ridges grade into more mesic slopes.

The cove hardwood forests found on Parcels 4 and 10 are considered to be a special type of cove hardwood forest, the globally rare (G2G3) plant community known as the Southern

Appalachian Cove Forest. These areas have a rich herbaceous layer, an overstory dominated by tulip poplar, American beech, white oak, and yellow buckeye, and a diverse understory of shrubs and small trees. Eastern hemlock, rosebay, mountain laurel, and horse-sugar occur along the streams on the parcels.

Forested wetlands were found along the backs of coves along the reservoirs and grade into scrub-shrub wetlands (shrublands). Hillside and bluff seeps in three locations along the banks of the reservoir on Parcel 4 were classified according to NatureServe (2007) as the globally rare (G2) Montane Low-Elevation Seep plant community. Several varieties of ferns are present, including cinnamon fern, maidenhair spleenwort, marginal shield fern, New York fern, royal fern, and southern lady fern. American alumroot, foamflower, jewelweed, and turtlehead were also observed along with spicebush, southern bushy honeysuckle, and silverbell. Forested and scrub-shrub wetlands occur along the shoreline of the Hiwassee River in Murphy on Parcels 21, 26, 31, 40, 42, 44, 46, 52, 54, 55, 62, and 63. Parcels 27, 32, 34, 39, 43, and 58 are early successional bottomland hardwood forest with American sycamore and sweet gum as the dominant canopy species and diverse subcanopy, shrub, and herbaceous layers.

The old quarry site on the dam reservation (Parcel 2) contained a large wetland with several hundred plants of wax myrtle (*Myrica cerifera*), a woody shrub common to the coastal plain and not known from the SBRE. It could not be determined if this is a “natural” population or if the shrubs were planted as part of the quarry reclamation.

Herbaceous vegetation is commonly found along transmission line and roadway rights-of-way as well as grassy areas within the dam reservations and commercial recreation areas.

The allocated uses of Parcels 34 and 49 vary among the alternatives. Parcel 34 is a 2.4-acre tract that is currently composed of an agricultural field and mixed deciduous forest. Woody species found in the forested areas were American beech, American sycamore, black locust, honey locust, loblolly pine, red maple, river birch, and tulip poplar. The shrub layer was diverse with American holly, black willow, buttonbush, and Chinese privet. Many wildflower species were found in the herb layer. Parcel 49 is a 2.0-acre upland-forested area. Species present are common scrub-shrub wetland plants that include black willow, box elder, buttonbush, river birch, silver maple, and planted bald cypress. Japanese honeysuckle, Japanese knotweed, Japanese stiltgrass, and multiflora rose are all invasive species found on this parcel.

Most of the TVA parcels around Hiwassee Reservoir have various species of invasive plants. These included autumn olive, Chinese lespedeza, Chinese privet, Japanese honeysuckle, Japanese knotweed, Japanese stiltgrass, kudzu, mimosa, multiflora rose, oriental bittersweet, princess tree, and tree-of-heaven.

3.3.3.1.2 Environmental Consequences

Alternative A

Under Alternative A, the previously allocated parcels containing rare plant communities (Parcels 4, 10) may be negatively impacted if not managed to protect sensitive resources. Under Alternative A, Parcel 4 has a committed recreation easement area, and Parcel 10 is allocated to Public Recreation with no existing recreational facilities. Any proposed development under Alternative A would be subject to additional review under NEPA to evaluate impacts to the listed species. Under Alternative A, plant communities on the

remaining Hiwassee Reservoir parcels are common, and therefore, no impacts are anticipated to these parcels.

Alternative B

The impacts of Alternative B on plant communities would be similar to those of Alternative A. The potential impacts of additional development on Parcels 4 and 10 would be evaluated prior to being approved. TVA's ability to manage invasive species would not change from the present situation. TVA currently prioritizes invasive species management efforts based on several factors including the availability of resources, potential for partnerships, and threat to sensitive resources. No significant impacts to plant communities on Hiwassee Reservoir are expected as a result of Alternative B.

Alternative C

The impacts of Alternative C on plant communities on Hiwassee Reservoir lands would be the same as for Alternative B. Alternative C would not have adverse impacts on plant communities. Under Alternative C, TVA's ability to manage these invasive species would not change from the present situation. TVA currently prioritizes invasive species management efforts based on several factors including the availability of resources, potential for partnerships, and threat to sensitive resources.

3.3.3.2 Wildlife Communities

3.3.3.2.1 Affected Environment

Wildlife habitats on Hiwassee Reservoir lands include a mixture of evergreen, evergreen-deciduous, deciduous, and early successional habitats. Hiwassee Reservoir lands also have rock shelters and cliffs, a rock quarry, and abandoned buildings. A rock shelter on Parcel 4 on the slope overlooking the Hiwassee River contained evidence of nesting by vultures. Rock shelters also provide habitat for a variety of small mammals, reptiles, and amphibians. Abandoned buildings on Parcel 1 also provide habitat for a variety of wildlife. Small wetlands occur on Parcels 2, 4, and 10 (see Section 3.3.5, Wetlands), providing habitat for wildlife. The seeps on Parcel 4 provide habitat for salamanders, and the small mud flat on Parcel 10 provides habitat for shorebirds. Wildlife observed during field surveys included northern water snake, dusky salamander, yellow warbler, and common yellowthroat.

Parcel 34 is comprised primarily of early successional habitat dominated by fescue. Parcel 49 is a long linear forested parcel between a railroad and a wetland. Approximately 620 acres of mud flat habitat become exposed when reservoir levels are lowered on Hiwassee Reservoir. Mud flats on the reservoir are small (<10 acres) or are long, linear margins of streams and rivers. Larger mud flats occur at HRM 93 near the mouth of the Nottely River and Persimmon Creek. All mud flats are bordered by USFS lands.

3.3.3.2.2 Environmental Consequences

Alternative A

Under Alternative A, no TVA land is allocated for Sensitive Resource Management and 78.9 acres are allocated for Industrial use. Uncommon terrestrial wildlife habitats found on the lands (i.e., seepages, rock outcrop) are not likely to be impacted by future activities around the reservoir. Impacts from Alternative A to terrestrial animals are expected to be minimal.

Alternative B

Under Alternative B, TVA would allocate 118.3 acres (11.7 percent) to Zone 3 (Sensitive Resource Management), approximately 439.2 acres (43.6 percent) to Zone 4 (Natural Resource Conservation), and no lands to Zone 5 (Industrial). These allocations would benefit terrestrial animals.

Alternative C

Alternative C would allocate 4.4 acres more to Zone 6 (Developed Recreation) than Alternative B. The affected parcels are 34 and 49. The changes would allow the development of a proposed river access area and a proposed extension of the Heritage Riverwalk Trail. Alternative C would result in more impacts to wildlife habitat than Alternatives A and B. However, impacts of the proposed activities to wildlife habitat and terrestrial animal resources on Hiwassee Reservoir are expected to be minimal.

3.3.4 Endangered and Threatened Species

A regional overview of endangered and threatened species is provided in Section 3.1.4.

3.3.4.1 Affected Environment

Several species of plants and animals listed as endangered, threatened, or of other conservation concern are known from Cherokee County and the Hiwassee Reservoir area (Table 3-26). These include two federally listed species, the small whorled pogonia and the bog turtle; one candidate for federal listing, the sicklefin redhorse; and several state-listed species.

Listed species found or likely to occur on TVA lands on Hiwassee Reservoir or in their vicinity are described in more detail below.

Table 3-26. Federally and State-Listed as Endangered, Threatened, and Other Species of Conservation Concern Known in the Vicinity of Hiwassee Reservoir in Cherokee County, North Carolina

Common Name	Scientific Name	Federal Status	State Rank	State Status
Plants				
Ash-leaved bush-pea	<i>Thermopsis fraxinifolia</i>	--	S3	THR
Broad-leaved tickseed	<i>Coreopsis latifolia</i>	--	S1S2	END
Manhart sedge	<i>Carex manhartii</i>	--	S2	END
Mountain camellia*	<i>Stewartia ovata</i>	--	S2	SR-P
Porter's reedgrass	<i>Calamagrostis porteri</i>	--	S1	END
Sedge	<i>Carex purpurifera</i>	--	S1	SR-P
Sedge	<i>Carex ruthii</i>	--	S2	THR
Small white leek	<i>Allium tricoccum</i>	--	S1S2	S-CE
Small whorled pogonia	<i>Isotria medioloides</i>	THR	S1	END
Stachys	<i>Stachys clingmanii</i>	--	S1S2	THR
Tawny cotton-grass	<i>Eriophorum virginicum</i>	--	S1S2	THR
Amphibians				
Eastern hellbender*	<i>Cryptobranchus alleghaniensis alleghaniensis</i>	--	S3	SPCO

Common Name	Scientific Name	Federal Status	State Rank	State Status
Mole salamander*	<i>Ambystoma talpoideum</i>	--	S2	SPCO
Mountain chorus frog*	<i>Pseudacris brachyphona</i>	--	SH	SPCO
Seepage salamander*	<i>Desmognathus aeneus</i>	--	S3	RARE
Birds				
Bald eagle	<i>Haliaeetus leucocephalus</i>	--	S3	THR
Blue-winged warbler*	<i>Vermivora pinus</i>	--	S2	RARE
Common raven*	<i>Corvus corax</i>	--	S3	NOST
Northern saw-whet owl*	<i>Aegolius acadicus</i>	--	S2	THR
Reptile				
Bog turtle	<i>Glyptemys muhlenbergii</i>	THR	S2	THR
Invertebrate				
Carolina scorpion*	<i>Vaejovis carolinianus</i>	--	S2?	NOST
Hiwassee crayfish*	<i>Cambarus hiwasseeensis</i>	--	S3?	SPCO
Fish				
Sicklefin redhorse*	<i>Moxostoma sp. 2</i>	CAND	S?	NOST
Olive darter	<i>Percina squamata</i>	--	S2	SPCO
Snail				
A freshwater snail*	<i>Elimia christyi</i>	--	S1	END
Mussels				
Spike*	<i>Elliptio dilatata</i>	--	S1	SPCO
Tennessee clubshell*	<i>Pleurobema oviforme</i>	--	S1?	END
Tennessee pigtoe*	<i>Fusconaia barnesiana</i>	--	S1	END
Wavy-rayed lampmussel*	<i>Lampsilis fasciola</i>	--	S1	SPCO

-- = Not applicable

*Species descriptions in the text

Rank abbreviations: S1 = Critically imperiled; S2 = Imperiled; S3 = Rare or uncommon; SH = State historical, ? = inexact or uncertain

Status abbreviations: CAND = Candidate for listing, END = Endangered, NOST = No state status, RARE = Rare, SPCO = Special concern, THR = Threatened

Mountain camellia is a wide ranging but infrequently occurring shrub threatened by land use conversion, habitat fragmentation, and interspecific factors (NatureServe 2007). According to Weakley (2006), it is found in mesic forest and often found in openings of rhododendron thickets. A previously undocumented population of 30+ individuals of mountain camellia was discovered on mesic slopes on the southwest portion of Parcel 4.

Eastern hellbenders are known from the Hiwassee River both upstream and downstream of Hiwassee Reservoir. Suitable habitat for the species (see Section 3.2.4) exists within Persimmon Creek adjacent to Parcel 15.

Mole salamanders inhabit upland hardwood forests or mixed pine-hardwood forests surrounding vernal ponds or other breeding sites (Petranka 1998). During the summer months, they spend most of their time in underground burrows. Populations of mole salamanders are known from areas near the Nottely River. Habitat for this species exists within Parcels 18, 19, 33, 65, and 54. This area is highly fragmented by roads and residential areas and is therefore not considered high-quality habitat for this species. Mole salamander habitat was not found on parcels outside of Murphy, North Carolina, but may be present on large forested tracts.

Mountain chorus frogs inhabit upland hardwood forests surrounding vernal ponds or other breeding sites. Numerous populations of this species are known from the Hiwassee Reservoir area. A historic population is known from near Murphy. Though habitat exists along the Hiwassee River in Murphy, this habitat is of low quality due to the amount of fragmentation and human disturbances in the area.

Seepage salamanders occur in and around seepages or in terrestrial habitats adjoining small streams. They frequent moist leaf litter but are occasionally found beneath logs, moss mats, and other surface objects (Petranka 1998). Habitat for this species exists on Parcels 1, 2, 3, 4, and 10.

In 2007, a **bald eagle** nested on Parcel 18 along the Nottely River about 2 miles from Murphy. Potential bald eagle nesting habitat exists on Parcels 1, 2, 3, 4, and 10.

Blue-winged warblers nest in early to midsuccessional habitats typically containing a mixture of woody shrubs, herbaceous vegetation, and trees. Habitat for this species exists within the transmission line rights-of-way found on Parcels 1 and 2.

Common ravens are known to nest on rock ledges within or adjacent to forested landscapes. They once had a widespread distribution in the southern Appalachians but are currently only common in the SBRE. Recent evidence suggests that ravens are expanding their range. Suitable nesting habitat occurs in the abandoned rock quarry on Parcel 2. Adult birds were observed in the area, but no nests were located.

Northern saw-whet owls nest in mixed hardwood/spruce and fir forests and high elevation hardwood forests typically above 4,500 feet msl in the southern Appalachians. There is only one known record of this species within 3 miles of Hiwassee Reservoir. Typical nesting habitat for saw-whet owls does not exist on any parcels on Hiwassee Reservoir.

No suitable habitat for **bog turtle** species exists on the TVA lands on Hiwassee Reservoir.

Carolina scorpions are found under rocks and the bark of dead pines in deciduous and mixed evergreen-deciduous forests. Abundant pine snags in the area are suitable habitat for this species. Carolina scorpions were located on Parcels 3 and 10.

The **sicklefin redhorse** (see Section 3.1.4) is a candidate fish species for federal listing. The TVA Natural Heritage database indicated this species has been collected in the vicinity of Parcels 5 and 18 on Hiwassee Reservoir. However, habitat consistent with that which would support this species can be found in both the Hiwassee and Valley River reaches within the vicinity of these parcels.

Elimia christyi (a freshwater snail) has only recently been differentiated from the knotty elimia (*Elimia interrupta*) and is only known from the Hiwassee River, Shuler Creek, and Valley River, Cherokee County in North Carolina, and Coker Creek and the Hiwassee River in Polk County, Tennessee (Minton et al. 2004). It has also been reported by Johnson et al. (2005) from the Hiwassee River inside and adjacent to Cherokee National Forest. *Elimia christyi* is tracked by the TVA Heritage Program because it has a global rank of G2 (very rare and imperiled within the world).

The **spike mussel** is a generalist in relation to the size of rivers it inhabits. It can be found living on firm substrate of coarse sand and gravel in moderate to strong current. The spike

is a state-listed freshwater mussel species that has been collected in the vicinity of Parcels 22 and 24 (Parmalee and Bogan 1998).

Tennessee clubshell prefers substrate of coarse gravel and sand in small shallow creeks and rivers with good current (ibid). The Tennessee clubshell is a state-listed freshwater mussel species, which has been collected in the vicinity of Parcel 24.

The **Tennessee pigtoe** is a state-listed freshwater mussel species. Three subspecies of pigtoe have been recognized because of variations in outline, dimension, color, and pattern. These variations have been attributed to their range in habitat from headwater to big river (ibid). The form of pigtoe documented in the Hiwassee Reservoir is *Fusconaia barnesiana*, not one of the subspecies. In general, the pigtoe appears to prefer small to medium-sized rivers with moderate current, water less than 2 feet deep, and a substrate composed of coarse sand, silt, and gravel. Tennessee pigtoe has been collected in Hiwassee Reservoir in the vicinity of Parcel 24.

The **wavy-rayed lampmussel** inhabits depths of 3 feet or less and is tolerant of habitat conditions unfavorable to many similar species. It prefers substrate of mud, sand, and gravel in moderate current (ibid). The wavy-rayed lampmussel is a state-listed freshwater mussel that has been collected in the Hiwassee River in the vicinity of Parcels 22, 24, and 25.

Hiwassee crayfish is restricted to Towns and Union counties in Georgia and Clay and Cherokee counties in North Carolina (NatureServe 2007). Habitat for crayfish is primarily separated according to each species' burrowing ability. All crayfish are able to burrow to some extent, and this ability will help determine the range of habitats in which a species can be found. The Hiwassee crayfish is in a genus that, as a group, is much more adept at burrowing than other groups. As a result, they possess a greater habitat range than other crayfish genera and can be found in caves as well as dry water bodies (NatureServe 2008). The verified occurrence of the Hiwassee crayfish in Hiwassee Reservoir is located in the vicinity of Parcel 24 but not close enough to warrant inclusion in this analysis.

3.3.4.2 Environmental Consequences

Alternative A

Plants

Under Alternative A, the previously allocated parcel containing rare terrestrial plant communities (Parcel 4) may be negatively impacted if not managed to protect these botanical resources. Under Alternative A, Parcel 4 is committed by an informal recreation easement. Any future proposal for development would be subject to further environmental review to protect the plant resources.

Terrestrial Animals

Under Alternative A, there would be no impacts to federally listed terrestrial animal species or their habitat because no populations are known on most TVA parcels. Under Alternative A, parcel allocations reflect current use. Parcels 35 and 36 could ultimately be developed for industrial. No listed species or their habitats are known from these sites.

A bald eagle nest was located on Parcel 18 in 2007. Although recently removed from the Endangered Species List, bald eagles are protected by the Bald and Golden Eagle Protection Act and the Migratory Bird Treaty Act. TVA places an appropriate buffer zone

around eagle nests as described in the National Bald Eagle Management Guidelines (USFWS 2007). This species would not be impacted by allocations prescribed under Alternative A. No other federally listed species are reported from TVA land on Hiwassee Reservoir.

Forested areas on Hiwassee Reservoir lands ranked low in their suitability as summer roost habitat for Indiana bats because of the lack of suitable roosting trees, the young age of most stands, and the presence of thick midstory layers. Suitable habitat for state-listed species and species considered uncommon by North Carolina Natural Heritage Program occurs on numerous parcels. Under Alternative A, most parcels having potential habitat for state-listed or uncommon species are planned as Project Operations or Natural Resource Conservation, resulting in no impacts to these species.

Aquatic Animals

As documented in Table 3-26, eight listed species are known from Hiwassee Reservoir: one federal candidate species, sicklefin redhorse, and seven state-listed species. Seven of the eight species have been documented in and around Hiwassee Reservoir near Murphy, North Carolina. The olive darter and Hiwassee crayfish are located in tributaries to the reservoir; however, these species are not close enough to any parcels to warrant inclusion in this analysis. The wavy-rayed lampmussel has been documented from the Nottely River near Parcel 16. The Nottely River is a tributary of Hiwassee Reservoir. The Nottely River record is located near unplanned land currently utilized for Natural Resource Conservation. USFS property surrounds this parcel, which affords a great deal of protection to the watershed on this reach of the Nottely River and, in turn, the lampmussel. If shoreline development were to occur at some point in the future, it could alter the physical characteristics of adjacent fish and aquatic invertebrate habitats, which could result in dramatic changes in the quality of the fish community; further environmental review would be warranted.

One of the sicklefin redhorse records, near Parcel 69, is in a similar situation. Under Alternative A, the shoreline is currently unplanned but utilized for Natural Resource Conservation and is surrounded by USFS land. Therefore, the sicklefin redhorse in this area would not be affected under Alternative A. Populations of the Tennessee pigtoe, spike, Tennessee clubshell, and wavy-rayed lampmussel have all been documented more than 0.5 mile upstream of parcels near the Murphy, North Carolina, area and therefore would not be affected by TVA land allocations.

The sicklefin redhorse, wavy-rayed lampmussel, spike, and freshwater snails occur in the vicinity of several Hiwassee Reservoir parcels. Under Alternative A, all parcels in the vicinity of listed species would remain under their current use. Impoundment and sedimentation have been the primary reasons for the decline of listed aquatic species in the Tennessee River drainage. With the exception of Parcels 35 and 36, which were allocated for Industry under the Forecast System, the current parcel uses are not expected to alter the status of these species in Hiwassee Reservoir. Due to the proximity of these sensitive aquatic species to Parcels 35 and 36, any future development on these parcels would require environmental review by TVA.

Alternative BPlants

Under Alternative B, the state-listed plant species found on Parcel 4 would be managed for Zone 4 (Natural Resource Conservation) which is consistent with the current land use. Any future proposal for development would be subject to further environmental review to protect the plant resources.

Terrestrial Animals

Under Alternative B, the allocation of parcels would reflect their current use. Parcel 18 and other suitable habitat for state-listed species would be placed in Zone 2 (Project Operations), Zone 3 (Sensitive Resource Management), and Zone 4 (Natural Resource Conservation), protecting these resources. Alternative B would result in similar levels of protection to listed species as Alternative A. No lands would be allocated to Zone 5 (Industrial), which would benefit the species by providing additional habitat for protected species in the area.

Aquatic Animals

Under Alternative B, most parcels in the vicinity of listed aquatic species would be allocated to Zone 3 (Sensitive Resource Management) on the Hiwassee Reservoir. A sicklefin redhorse record has been documented in the vicinity of Parcel 69. The back-lying property to this parcel is USFS land. The parcel would be allocated to Zone 4 (Natural Resource Conservation). Although not as stringent as Zone 3, Zone 4 still affords aquatic species in the vicinity of this parcel an extra degree of protection. With the implementation of these Zone 3 and Zone 4 allocations, along with environmental review of proposed activities on TVA lands and the use of BMPs, no impacts to listed species in Hiwassee Reservoir would occur as a result of Alternative B.

Alternative CPlants

Under Alternative C, the proposed recreational development of Parcels 34 and 49 would not affect listed plants. The state-listed plants found on Parcel 4 would be managed for Zone 4 (Natural Resource Conservation), which is consistent with the current land use. Any future proposal for development would be subject to further environmental review to protect the plant resources.

Terrestrial Animals

Alternative C would not result in impacts to federally or state-listed terrestrial animals or their habitat. Under Alternative C, Parcel 34 and 49 would be changed from Zone 4 to Zone 6 (Developed Recreation). Parcels 34 and 49 have limited value for listed animals given the amount of disturbance in the surrounding urban landscape. No state-listed species are expected on Parcels 34 and 49. Additional parcels that have potential habitat for state-listed or uncommon species would be allocated to Zone 2 (Project Operations), Zone 3 (Sensitive Resource Management), or Zone 4 (Natural Resource Conservation), resulting in no impacts to these species.

Aquatic Animals

Under Alternative C, Parcels 34 and 49 on Hiwassee Reservoir would be allocated to Zone 6 (Developed Recreation). The proposed facilities are designed for low-impact recreational activities (stream access for wade fishing and an extension of a river walk trail) and

together only total 4.4 acres. With proper implementation of BMPs during construction, and in consideration of the extremely low percentage of acreage involved in the overall total being assessed, these allocations would not affect listed aquatic species located in the vicinity of the parcels.

3.3.5 Wetlands

A regional overview of the wetlands resource for the mountain reservoirs is provided in Section 3.1.5.

3.3.5.1 Affected Environment

Table 3-27 shows estimates of wetland acreage based on NWI data for all of Hiwassee Reservoir. NWI imagery indicates 23 acres of aquatic beds and flats, which are both periodically flooded and unvegetated. These areas are mud flats, aquatic/submerged plant beds, or beaches/bars depending on season, weather patterns, and reservoir water levels. The remaining acreage is emergent, scrub-shrub, and forested wetlands. Scrub-shrub wetlands are the most common type of wetlands found on Hiwassee Reservoir.

Table 3-27. Wetland Acreage - Hiwassee Reservoir

Combined Aquatic Beds and Flats (acres)	Emergent (acres)	Forested (acres)	Scrub-Shrub (acres)	All Types (acres)
23	15	21	106	165

Source: National Wetlands Inventory

Due to the steep shorelines and topography on many tracts, reservoir fringe wetlands are limited on Hiwassee Reservoir. Wetlands in general are confined to the backs of coves along the reservoir and grade back into scrub-shrub wetlands. Emergent wetlands are generally less than 0.1 acre in size and are composed of species such as jewelweed, soft rush, hypericum, water willow, and smartweed. Wetland shrub and tree species common on this reservoir include black willow, buttonbush, rose mallow, and tag alder. In addition, persimmon is common along the shoreline along with American sycamore, river birch, and silver maple.

Hillside and bluff seeps were found in three locations along the banks of Hiwassee Reservoir on Parcel 4. These small, high-quality (Category 3) wetlands are classified as Montane Low-Elevation Seeps by NatureServe (2007) and are ranked as a globally rare (G2) plant community. The vegetation in these areas is described in Section 3.3.3.1. Wetlands of this type are listed as habitats of special concern in the *North Carolina Wildlife Resources Commission Wildlife Action Plan* (2007).

A diverse, high-quality (Category 3) emergent/scrub-shrub wetland has developed in the quarry on Parcel 2. These wetland habitats have developed in the low-lying, poorly drained areas created by quarry and excavation activities. Parcel 10 contains a high-quality emergent/scrub-shrub wetland associated with Bear Pen Creek. This parcel contains broad floodplain areas, mud flats, and an important mix of relatively uncommon wetland habitats.

Wetlands on Parcel 34 are restricted to a narrow shoreline strip of early successional fringe wetlands. There are no wetlands on Parcel 49.

3.3.5.2 Environmental Consequences

The impacts of the various alternatives on wetlands would be similar, and none would be adverse. Under Alternatives A and B, parcels containing wetlands would generally continue to be managed as they have been in the past, and actions with the potential to affect wetlands would be assessed prior to their implementation. Under Alternative C, two additional parcels would be allocated to development-oriented uses. Due to the nature of the proposed developments, any impacts to wetlands would be insignificant. Additionally, these proposed developments would be subject to further environmental review prior to implementation.

3.3.6 Floodplains

An overview of floodplains in the mountain reservoirs area is provided in Section 3.1.6.

3.3.6.1 Affected Environment

The affected area extends from the lower limit of the dam reservation at about HRM 75.0 upstream to about HRM 97.8 in Hiwassee Reservoir. The 100- and 500-year flood elevations for the Hiwassee River downstream of the dam have not been determined.

There are three main watercourses in Hiwassee Reservoir: the Hiwassee River, the Valley River, and the Nottely River. Tabulations of the 100- and 500-year flood elevations are included in Appendix H.

The 100-year flood elevations for the Hiwassee River vary from 1,529.0-feet msl at Hiwassee Dam (HRM 75.8) to elevation 1,535.3-feet msl at the upper end of TVA's landrights at about HRM 97.8. The 500-year flood elevations for the Hiwassee River vary from elevation 1,530.0-feet msl at Hiwassee Dam to elevation 1,536.3-feet msl at the upper end of TVA's landrights.

The 100-year flood elevations for the Valley River vary from 1,529.0-feet msl at the mouth (HRM 95.74) to elevation 1,543.9-feet msl at the upper end of TVA's landrights at about HRM 2.2. The 500-year flood elevations for the Valley River vary from elevation 1,530.0-feet msl at the mouth to elevation 1,546.0-feet msl at the upper end of TVA's landrights.

The 100-year flood elevations for the Nottely River vary from 1,529.0-feet msl at the mouth (HRM 91.81) to elevation 1,534.3-feet msl at the upper end of TVA's landrights at about HRM 6.5. The 500-year flood elevations for the Nottely River vary from 1,530.0-feet msl at the mouth to elevation 1,536.1-feet msl at the upper end of TVA's landrights.

3.3.6.2 Environmental Consequences

The environmental consequences of each alternative are discussed in Section 3.1.6. The boat ramp development on Parcel 34 of Hiwassee Reservoir would have minor impacts to floodplains. None of the alternatives would have adverse effects on floodplains.

3.3.7 Cultural Resources

An overview of cultural resources in the mountain reservoirs area is provided in Section 3.1.7.

3.3.7.1 Archaeological Resources

3.3.7.1.1 Affected Environment

Hiwassee Reservoir was the focus of a large-scale survey in the fall and winter of 1993 and 1994 (Riggs and Kimball 1996). This survey examined approximately 3,390 acres exposed during a maintenance drawdown and 777 acres of above-pool properties on the dam reservation and reservoir. A total of 255 archaeological resources were identified or revisited with 155 considered probably or potentially eligible for listing in the NRHP. Additional portions of Hiwassee Reservoir were surveyed in the winter of 2005-2006 (Gage and Herrmann 2006). Seventeen sites were recorded or revisited, and 13 of these were considered potentially eligible for listing in the NRHP.

Additional surveys have been conducted on the Hiwassee River (Abbott 1994, Thomas et al. 2006) and the Valley River in association with NCDOT and TVA projects. The survey of 14 tracts on both rivers near Murphy, North Carolina, identified nine archaeological sites, eight of which are considered potentially eligible for listing in the NRHP.

Parcel 49 was systematically surveyed for archaeological resources in 2006 (Thomas et al. 2006). Recorded archaeological resources exist within the vicinity of this parcel. While no archaeological sites were recorded within this parcel, the survey did not include deep testing for deeply buried archaeological resources. Parcel 34 has not been systematically surveyed for archaeological resources. Recorded archaeological resources exist in the vicinity and are likely to exist within this parcel.

3.3.7.1.2 Environmental Consequences

As described in Section 3.1.7.1.2, TVA proposes to implement a PA in North Carolina for the identification, evaluation, and treatment of all historic properties potentially affected by this lands planning effort. Until the PA is executed, TVA will incorporate the phased identification, evaluation, and treatment procedure to effectively preserve historic properties, including archaeological resources, as required by Section 106 of the NHPA. TVA would adhere to the terms of the PA under all alternatives, and no adverse impacts on archaeological resources are expected.

The development of recreation facilities on Parcels 34 and 49 may adversely affect significant archaeological resources through ground-disturbing activities. Adverse effects may be averted through avoidance and/or protection of archaeological resources. Where adverse effects cannot be avoided, mitigation through archaeological excavations or other means would be required. Treatment plans resolving these adverse effects would comply with the NHPA and ARPA.

3.3.7.2 Historic Structures

3.3.7.2.1 Affected Environment

Hiwassee Dam is the second tributary storage dam constructed by TVA and is similar in arrangement and appearance to Norris Dam. Historic properties located on or adjacent to Hiwassee Reservoir lands include the dam, the powerhouse, and Hunter's Ferry Crossing, a ferry used during the Trail of Tears removal. A former Louisville and Nashville Railroad (L&N) bridge is located on Parcel 49, and the L&N depot is on adjacent lands. The L&N depot is now a Trail of Tears interpretive center. Concrete remnants of historic World War II structures (Torpedo Testing Facility), part of a secret operation for testing depth charges

and missiles, begun in 1942 and continuing through the Cold War, are eligible for listing in the NRHP.

3.3.7.2.2 Environmental Consequences

Under all alternatives, TVA would implement the PAs described above in Section 3.1.7.1.2. These PAs would include historic structures, and with their implementation, no adverse effects on historic structures are anticipated. Until the PAs are implemented, TVA would individually evaluate actions with the potential to affect historic structures as required by Section 106 of the NHPA.

Alternative A

Under Alternative A, because they could change the visual character of the surrounding area, activities on parcels allocated for development could have a potential to impact adjacent historic structures. Thus, potential effects, especially indirect, visual effects, are possible under Alternative A. However, because these potential effects would be identified, along with possible mitigation measures prior to implementation of any proposal, and because TVA would reserve the option to refuse any land use request that would have unavoidable adverse effects, potential effects to historic structures are expected to be insignificant.

Alternative B

Under Alternative B, the allocations reflect existing land use, and there are no proposed land use changes for any parcel on Hiwassee Reservoir. Parcels 21, 26, and 40 have been allocated to Zone 3 (Sensitive Resource Management) for protection of historic and archaeological resources. Therefore, no significant impacts to historic structures are anticipated under Alternative B.

Alternative C

Under Alternative C, the effects would be similar to those described for Alternative A. However, proposed actions could affect the former L&N bridge on Parcel 49 and the L&N depot on adjacent lands. For reasons stated under Alternative A, these effects are expected to be insignificant.

3.3.8 *Managed Areas and Ecologically Significant Sites*

Managed areas, ecologically significant sites, and NRI streams are defined in Section 3.1.8.

3.3.8.1 *Affected Environment*

Table 3-28 lists managed areas within 3 miles of Hiwassee Reservoir. The areas are grouped by closest distance to the reservoir; areas on TVA lands that are managed by TVA (i.e., Raven Rock) and those managed by other entities through a letter of agreement or land use agreement with TVA are listed as “on reservoir.” Areas abutting or less than 0.1 mile from reservoir lands are listed as “adjacent.”

Table 3-28. Managed Areas and Ecologically Significant Sites Within 3 Miles of Hiwassee Reservoir

Name	Type of Area	Authority	Location County, State	Closest Distance to Reservoir
Raven Rock TVA Small Wild Area	Managed area (MA)	Federal	Cherokee, N.C.	On reservoir
Nantahala National Forest	MA	Federal	Cherokee, N.C.	Adjacent
Nantahala State Game Land	MA	State	Cherokee, N.C.	Adjacent
Cherokee Indian Reservation (Henson Donation)	MA	Federal	Cherokee, N.C.	Adjacent
Cherokee Indian Reservation (Tract No. 7)	MA	Federal	Cherokee, N.C.	0.3 mile east
Cherokee Indian Reservation (Tract No. 2)	MA	Federal	Cherokee, N.C.	0.8 mile east

No ecologically significant sites or NRI streams are within 3 miles of Hiwassee Reservoir.

3.3.8.2 Environmental Consequences

Alternatives A and B would not change the existing uses of Hiwassee Reservoir lands and would not affect managed areas or ecologically significant sites. Neither of the parcels (34 and 49) proposed to be allocated to Zone 6 (Developed Recreation) under Alternative C is suitable for natural area designation or near an existing natural area or ecologically significant site. Alternative C would not affect managed areas or ecologically significant sites.

3.3.9 Visual Resources

The general visual environment of the mountain reservoirs is described in Section 3.1.9.

3.3.9.1 Affected Environment

The visual landscape surrounding Hiwassee Reservoir has a predominantly natural, undisturbed appearance. Extensive tree-covered ridges frame the reservoir and provide a naturally appearing landscape that is scenic and relatively harmonious. Among the scenic resources of Hiwassee Reservoir, the water body itself is the most distinct and outstanding aesthetic feature. The horizontal surface provides visual balance and contrast to the islands and wooded hillsides. Middleground views across the water provide a tranquil sense of place to most observers.

Most of Hiwassee Reservoir is surrounded by relatively undisturbed USFS and Cherokee Indian land. Scenic values vary from excellent to good, and scenic integrity is high. In areas of moderate development, residences, roads, marinas, and boat-launching ramps are scattered around the shoreline. These facilities create a strong adverse contrast with the natural landscape character. Scenic attractiveness of these moderately developed areas is common, and scenic integrity is moderate to low.

3.3.9.2 Environmental Consequences

Alternative A

The environmental consequences of Alternative A are discussed in Section 3.1.9.2.

Alternative B

Alternative B would allocate no land for Industrial use (78.9 acres less than Alternative A) and would allocate 366.4 acres to Zone 2 (Project Operations), the same amount as Alternative A. Depending upon proposed future use of Zone 2 land, commitments or mitigation may be recommended on a case-by-case basis to avoid or reduce potential visual impacts.

Alternative B calls for the allocation of 118.3 acres to Zone 3 (Sensitive Resource Management). There is currently no acreage allocated for sensitive resource management activities under Alternative A. Additionally, Natural Resource Conservation lands would be reduced from 472.8 acres in Alternative A to approximately 439.2 acres in Alternative B, resulting in a loss of 33.6 acres of lands currently managed for Natural Resource Conservation.

The allocation of approximately 41 acres to Zone 6 (Developed Recreation) land and 42.9 acres to Zone 7 (Shoreline Access) represents existing land use and would not be a change from Alternative A. However, the use could potentially have long-term minor cumulative impacts. New structures, such as covered boat slips, could potentially reduce scenic class when viewing these structures from the water. As individual permits are reviewed for these lands, adherence to the SMP and requiring any necessary commitments to protect visual resources would likely minimize these impacts.

Alternative B would result in minor adverse impacts to visual resources and potentially greater benefits than Alternative A. Scenic class level likely would not be reduced by more than one level, the threshold of significance. Implementation of Alternative B would help preserve the scenic landscape character of Hiwassee Reservoir for long-term public enjoyment.

Alternative C

Under Alternative C, visual impacts would be similar to those described in Alternative B. Relative to Alternative B, Alternative C allocates two more parcels totaling 4.4 acres to Zone 6 (Developed Recreation) with a corresponding decrease in acreage allocated to Zone 4 (Natural Resource Conservation). The developments proposed for the two Zone 6 tracts are unlikely to cause adverse visual impacts. The overall impacts to visual resources from implementation of Alternative C would be minor.

3.3.10 Water Quality and Aquatic Ecology

An overview of water quality and aquatic ecology for the mountain reservoirs area is provided in Section 3.1.10.

3.3.10.1 Affected Environment

Hiwassee Reservoir is the largest reservoir in the upper Hiwassee River watershed with an average annual discharge (1990-2005) of 2,377 cfs, resulting in an average retention time of about 90 days. Because of the long retention time, Hiwassee Reservoir becomes thermally stratified in the summer. This results in low DO concentrations in the lower strata of the water column as DO is depleted by the natural process of decaying organic material.

Hiwassee Reservoir is located in the Blue Ridge Physiographic Province. Due to the geologic characteristics of the region, streams in the watershed have naturally low concentrations of nutrients and dissolved minerals. Consequently, the reservoir is expected

to have low productivity (low chlorophyll concentrations). Hiwassee Reservoir is fed by releases from TVA's Nottely and Chatuge dams in addition to unregulated inflows from the 565-square-mile local drainage area. Discharges from Chatuge and Nottely Dams account for about 35 percent of the total flow into the reservoir. Land use in the watershed remains largely forested, with the Nantahala National Forest in North Carolina and Chattahoochee National Forest in Georgia making up a large percent of the forested lands (NCDENR 2007a).

Reservoir Ecological Health Rating

Figure 3-3 shows the reservoir ecological health scores for Hiwassee Reservoir from 1994 through 2006. Areas sampled on Hiwassee Reservoir include the forebay at HRM 67.0 (area of the reservoir nearest the dam) and the midreservoir at HRM 85.0.

The overall ecological health condition for Hiwassee Reservoir rated "good" for the first time in 2006, but only one point above the "fair" category. The reservoir rated "fair" in all previous years monitored. The most notable improvement in 2006 was the benthic macroinvertebrate indicator, which received the highest score to date at both locations, rating "fair" as compared to "poor" and "low fair" in previous years (Table 3-29).

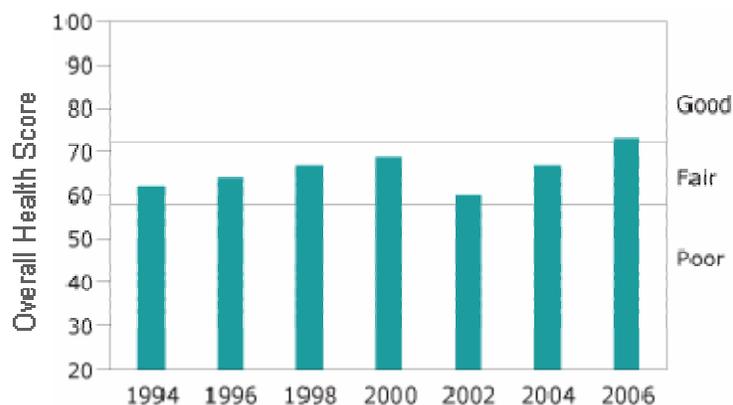


Figure 3-3. Hiwassee Reservoir Ecological Health Ratings, 1994-2006

Dissolved Oxygen

DO in the forebay rated "poor" or "low fair" each year. Although low DO (<2 mg/L) water has encompassed a relatively small percentage of the water column each year, a large percentage of the reservoir bottom is often exposed to low concentrations, resulting in the "poor" and "low fair" ratings. The midreservoir site has experienced only limited concentrations of low DO, rating "high fair" prior to 2000 and "good" thereafter.

Often, deep tributary reservoirs, such as Hiwassee, stratify into temperature-distinct layers in the summer. As a result, water discharged from the base of the dam into the tailwater can be very cold and have low DO, impairing water quality in the tailwater. As part of the LIP, TVA mitigates this on Hiwassee Reservoir by using two methods. Perforated hoses are suspended above the reservoir bottom to inject oxygen into the water before it is pulled

into the turbines. Oxygen is then introduced again into the water by the agitation of the turbine before leaving the turbine by turbine venting, resulting in improved water quality.

Chlorophyll

Average chlorophyll concentrations have exhibited a fairly consistent increase at the midreservoir site since monitoring began in 1991, rating “good” the first three years monitored, “fair” in 1994 and 1996, and “poor” since 1998. Chlorophyll has been more variable at the forebay, but there remains an overall trend of increasing concentrations. Chlorophyll at the forebay rated “good” the first three years monitored and “poor” or “fair” since 1994 with the exception of a “good” rating in 1998.

Sediment Quality

Sediment quality at both locations is usually “good.” However, very low levels of chlordane were detected in 1993 and 1998 at both reservoir locations; no other metals or contaminants have recorded concentrations above background levels.

Table 3-29. Hiwassee Reservoir Water Quality and Sediment Ratings, Reservoir Vital Signs Monitoring Data 1991-2006

	Monitoring Years									
	1991	1992	1993	1994	1996	1998	2000	2002	2004	2006
Hiwassee Forebay										
Dissolved Oxygen	Poor	Poor	Fair	Poor	Poor	Fair	Poor	Poor	Fair	Poor
Chlorophyll	Good	Good	Good	Poor	Fair	Good	Fair	Poor	Poor	Fair
Sediment	NS	NS	Fair	Good	Good	Fair	Good	Good	Good	Good
Hiwassee Midreservoir										
Dissolved Oxygen	Fair	Fair	Fair	Fair	Fair	Fair	Good	Good	Good	Good
Chlorophyll	Good	Good	Good	Fair	Fair	Poor	Poor	Poor	Poor	Poor
Sediment	NS	NS	Fair	Good	Good	Fair	Good	Good	Good	Good

NS = Not sampled

Benthic Monitoring

All benthic community scores rated “poor” to “fair” for the seven years during which benthic samples were taken. The reservoirs most recent score was “fair” in 2006 (Table 3-30).

Table 3-30. Recent (1994-2006) Biennial Benthic Community Ratings for Hiwassee Reservoir

Station	1994	1996	1998	2000	2002	2004	2006
Forebay	Poor	Poor	Poor	Poor	Poor	Fair	Fair
Midreservoir	Poor	Poor	Poor	Poor	Poor	Poor	Fair

Fisheries Monitoring

The RVSMP has included fish sampling every other year on the Hiwassee Reservoir from 1994. A list of fish species commonly found in Hiwassee Reservoir can be found in Appendix I. The fish community in Hiwassee Reservoir has consistently rated “good” for both the forebay and midreservoir sampling sites.

Hiwassee Reservoir provides opportunities for sport anglers, particularly those interested in basses and walleye. In 2006, Hiwassee Reservoir rated below average for largemouth bass and above average for smallmouth bass, spotted bass, and walleye (Table 3-31).

Table 3-31. Sport Fishing Index Scores for Selected Sport Fish Species in Hiwassee Reservoir, 2006

Fish Species	2006 Score	2006 Valleywide Average
Black Basses	36	36
Largemouth Bass	26	33
Smallmouth Bass	40	30
Spotted Bass	36	31
Walleye	48	33

Swimming Advisories

There are no state advisories against swimming in Hiwassee Reservoir. TVA performed *E. coli* bacteria monitoring at two locations in 2007: Hanging Dog Recreation Area beach and Shallowford Bridge canoe access site/Sweetwater Park.

Fish Consumption Advisories

The State of North Carolina has issued a statewide fish consumption advisory for largemouth bass because of mercury contamination. TVA collected channel catfish and largemouth bass from the reservoir for tissue analysis in autumn 2004. The results, which were similar to those of previous years, were provided to state agencies in North Carolina. TVA will analyze fish from Hiwassee Reservoir again in autumn 2008.

State(s) Impaired Waters

The North Carolina Division of Water Quality and the Georgia Environmental Protection Division assigned use support ratings to waters in the Hiwassee River basin. A total of 39.4 miles of monitored streams are listed as impaired (Table 3-32) (NCDENR 2007a and GAEPD 2006).

Table 3-32. Summary of Impaired Waters in the Immediate Watershed of Hiwassee Reservoir

Stream/River Name	State	Miles	Description	Water Quality Stressor/Source
Martins Creek	N.C.	8.8	From source to Hiwassee River	Habitat degradation/ agriculture
Persimmon Creek	N.C.	5.9	From source to Lake Cherokee	Habitat degradation/ unknown
Valley River	N.C.	7.7	From Venegeance Creek near Marble to Marble Creek above Murphy	Turbidity/multiple sources
Brasstown Creek	Ga.	11	Little Bald Cove to state line	Fecal coliform/ nonpoint

Stream/River Name	State	Miles	Description	Water Quality Stressor/Source
Corn Creek	Ga.	2	Tributary to Brasstown Creek, Young Harris	Fecal coliform/nonpoint
Mill Creek	Ga.	2	Pheasant Branch tributary to Hiwassee River	Fecal coliform, pH/nonpoint
Yewell Branch	Ga.	2	Darr Cove to Brasstown Creek	Fecal coliform/nonpoint

There are two major permitted NPDES discharges in the immediate watershed: Andrews WWTP discharges up to 1.5 MGD to the Valley River, and the Murphy WWTP discharges up to 0.925 MGD to the Hiwassee River. Minor permitted NPDES discharges include Hayesville WWTP and Andrews WWTP.

Water Supply

No municipal water suppliers currently withdraw water from Hiwassee Reservoir. The towns of Murphy, North Carolina, and Andrews, North Carolina, currently have water intakes in Hiwassee Reservoir’s supporting watershed. The 2005 average daily water demands for these intakes were 0.92 MGD (Murphy) and 0.6 MGD (Andrews), a total daily average demand of 1.52 MGD.

3.3.10.2 Environmental Consequences

Alternative A

Under Alternative A, 472.8 acres out of the 1,007 acres managed by TVA on Hiwassee Reservoir are allocated to Natural Resource Conservation, which affords a certain degree of protection to water quality and aquatic life through more restrictions on development and increased protection of riparian vegetation. Under Alternative A, 0.4 acre is allocated to Shoreline Access, and 38.9 acres are allocated for Recreation. No parcels are allocated to Sensitive Resource Management, the most protective land allocation designation. Twenty parcels (approximately 50.2 acres) would remain unplanned; however, all but one parcel are committed to their existing use, which for the most part is fronting USFS lands.

Alternative A includes 78.9 acres on two parcels allocated for Industrial use, which have never been developed. Industrial development has a greater potential to adversely impact water quality and aquatic life than other allocations. Industrial development of Parcels 35 and 36 would require extensive land clearing and grading on the steep terrain. Industrial development would also result in the potential for extensive impervious surfaces and possible point source pollution to the Hiwassee River. New facilities with permitted discharges would be required to meet permit limits specifically designed to prevent adverse impacts and violation of applicable water quality criteria.

Potential water quality and associated aquatic life impacts, such as erosion and nutrient runoff, would be expected to be higher from parcels designated for Industrial, Developed Recreation, or Shoreline Access use where more development and intensive land use might occur. However, the extent of any impacts would be dependent on the specifics of future development, and any proposed actions on TVA land would be subject to environmental review. With use of identified impact reduction methods including BMPs (TVA 2005c), future activities under Alternative A would not significantly impact water quality or aquatic life.

Alternative B

Under Alternative B, all of Hiwassee Reservoir's 1,007 acres would be planned including the 20 parcels not planned under Alternative A. Nineteen of the previously unplanned parcels are committed to existing uses, which determined their allocation for this alternative. One small (<1 acre) uncommitted parcel was allocated based on existing land use which was consistent with Zone 4 (Natural Resource Conservation). Alternative B does not include any allocations that are inconsistent with the actual current land use, and no lands would be available for Industrial use. Overall, resultant water quality conditions, and in turn impacts to aquatic life would be insignificant.

Alternative C

As with Alternative B, no parcels would be planned for industrial use under Alternative C on Hiwassee Reservoir. All but two parcels would be allocated the same as in Alternative B. Parcels 34 and 49, a total of 4.4 acres, would be allocated to Zone 6 (Developed Recreation) instead of Zone 4 (Natural Resource Conservation). The proposed access site for wade fishing (Parcel 34) and extension of the Heritage Riverwalk Trail (Parcel 49) are not anticipated to impact water quality and aquatic life.

3.3.11 Air Quality and Noise

An overview of the air quality of the mountain reservoirs area is provided in Section 3.1.11. Noise has previously been discussed in Section 3.1.11.2.

3.3.11.1 Affected Environment

The county that contains Hiwassee Reservoir and the adjacent counties are currently in attainment of the NAAQS.

The nearest PSD Class I areas are the GSMNP, which is located about 30 miles northeast, Joyce Kilmer/Slickrock Wilderness, which is located about 15 miles northeast, and Cohutta Wilderness, which is located about 30 miles west of Hiwassee Reservoir.

3.3.11.2 Environmental Consequences

Under Alternative C, the changes from Alternatives A and B include the allocation of two parcels totaling 4.4 acres to Zone 6 (Developed Recreation) instead of Zone 4 (Natural Resource Conservation). The types of development proposed for these two parcels are not expected to result in any significant effects to air quality.

Comparing the three alternatives, Alternative B would have the least effect on air quality due to the least acreage allocated for development, followed by Alternative C with 4.4 acres allocated for recreation. Alternative A would likely have the greatest potential impact with 78.9 acres allocated for Industrial use.

The greatest potential for air quality effects is from industrial use. No parcels would be available for industrial use under Alternative B or C. Under Alternative A, an appropriate level of environmental review would be done to document the extent of expected air quality impacts if a proposed land use request is received. Each such review that involved a parcel in or potentially affecting a nonattainment area for ozone and/or PM_{2.5} would require a conformity applicability determination pursuant to regulations implementing Section 176(c) of the Clean Air Act to assure compatibility with measures in local plans for achieving attainment. Because of the small amount of acreage involved and because of

regulatory controls, industrial development under Alternative A is not expected to result in any significant effects to air quality.

3.3.12 Socioeconomics

The socioeconomic conditions of the mountain reservoirs area are described in Section 3.1.12.

3.3.12.1 Affected Environment

3.3.12.1.1 Population and Economy

Population: Tables 3-33 and 3-34 describe the population of the area. Cherokee County had a population of 24,298 in 2000, an increase of 28.3 percent since 1980. This was a lower rate than was in the state but higher than was in the nation. The rate of growth in the county, state, and nation was higher from 1990 to 2000 than from 1980 to 1990.

Estimates for 2006 indicate that the population of Cherokee County has grown an additional 8.3 percent since 2000. This remains a faster rate than the nation but is not quite as fast as in the state as a whole.

Projections through 2020 indicate that the county will continue to have faster population growth than the nation over that time, but not as fast as population growth in the state. The rate for the county is projected to be greater than for 1980-2000.

Table 3-33. Population – Cherokee County, North Carolina

Area	1980	1990	2000	2006 (Estimate)	2020 (Projection)	Density (persons per square mile) 2000
Cherokee County	18,933	20,170	24,298	26,309	31,702	53.4
North Carolina	5,880,095	6,628,637	8,049,313	8,856,505	10,885,758	165.2
United States	226,545,805	248,709,873	281,421,906	299,398,484	335,804,546	79.6

Source: U.S. Census Bureau (undated a-e) and North Carolina Office of State Budget and Management (2007)

Table 3-34. Recent and Projected Population Changes – Cherokee County, North Carolina (Percentage Growth)

Area	1980-1990	1990-2000	1980-2000	2000-2006	2000-2020	1980-2020
Cherokee County	6.5	20.5	28.3	8.3	30.5	67.4
North Carolina	12.7	21.4	36.9	10.0	35.2	85.1
United States	9.8	13.2	24.2	6.4	19.3	48.2

Source: Calculated from data in Table 3-33

The county is decidedly rural in distribution of population. As noted in Table 3-33, the population density is substantially lower than the state and much lower than the nation. The largest town in the county is Andrews, with 1,602 residents in 2000. About 87 percent of the population in the county is outside incorporated towns.

Economy: Table 3-35 contains the most recent annual data on the amounts and types of employment, amounts of unemployment, and incomes in the area. In 2005, Cherokee County had 13,422 people employed on average. The county has a higher percentage of farmers, manufacturing employees, and retail employees than either the state or the nation.

The county has a lower percentage of government employees and employees in the general “other” category than the state or nation. The average unemployment rate for 2006 in the county was higher than either the state or the nation. Per capita personal income in 2005 was much lower in the county than in the state or nation.

Table 3-35. Employment, Unemployment, and Income – Cherokee County, North Carolina

Area	Employment, 2005	Employment (percent of total)					Unemployment Rate, 2006	Per Capita Personal Income, 2005
		Farm	Manufacturing	Retail Trade	Government	Other		
Cherokee County	13,422	2.2	12.2	17.9	12.1	55.5	5.4	21,814
North Carolina	5,119,512	1.4	11.5	10.8	15.7	60.5	4.8	31,041
United States	174,249,600	1.7	8.5	10.9	13.7	65.2	4.6	34,471

Source: U.S. Bureau of Economic Analysis (undated) and North Carolina Employment Security Commission (undated)

Cherokee County is geographically in the center of a bowl defined by the surrounding counties. Therefore, it has historically been a regional trade center with a more balanced economy than the surrounding counties. As with all the counties in the region, the increasing land values due to the demand for vacation homes is making it more difficult for local residents to find affordable housing (Ginny Faust, North Carolina Department of Community Affairs, personal communication, November 13, 2007;; Melody Adams, Graham County, personal communications, November 9, 2007).

3.3.12.1.2 Environmental Justice

Environmental justice is concerned with the possibility of disproportionate impacts to minority and low-income populations. The minority population in the Hiwassee Reservoir area is small (Table 3-36). In Cherokee County, 6.4 percent of the total population was estimated to be minorities in 2006, which was far below the state average of 32.1 percent and the national average of 33.6 percent. The estimated poverty rate in the county in 2004 was 15.1 percent, higher than the state rate of 13.8 percent and the national rate of 12.7 percent.

Table 3-36. Minority Population, 2006, and Poverty, 2004 – Cherokee County, North Carolina

Area	Population, 2006				Percent Below Poverty Level, 2004
	Total	Nonwhite	White Hispanic	Percent Minority	
Cherokee County	26309	1310	366	6.4	15.1
North Carolina	8,856,505	2,298,351	543,059	32.1	13.8
United States	299,398,484	59,652,230	41,001,760	33.6	12.7

Source: U.S. Census Bureau (undated d and 2004)

3.3.12.2 Environmental Consequences

Alternative A

Under Alternative A, there is no change in existing land use for any of the planned parcels on Hiwassee Reservoir and therefore no socioeconomic impacts. Parcels 35 and 36 (79 acres) are allocated under the Forecast System for Industrial use but remain

undeveloped primarily because the steep terrain is unsuitable for industrial development. It is unlikely under Alternative A that industrial use would be feasible for these parcels.

Alternative B

Under Alternative B, existing uses of Hiwassee Reservoir parcels would continue, and there would be no socioeconomic impacts. Under Alternative B, land would no longer be available for industrial use. This could result in some potential loss of economic development opportunities, with the associated socioeconomic impacts, although, as noted in Alternative A, such development in the future is unlikely.

Alternative C

Under Alternative C, the use of two parcels totaling 4.4 acres for recreational use would enhance the attractiveness of the area, thus possibly indirectly contributing to further population and economic growth. Under Alternative C, the change of these parcels to a walking trail and stream access for wade fishing would enhance the availability of parks in the area to those with low income. As under Alternative B, land would no longer be available for industrial use under Alternative C. This could result in some potential loss of economic development opportunities, with the associated socioeconomic impacts, although, as noted in Alternative A, such development in the future is unlikely.

The potential negative economic effect noted above of increased land prices due to all of the alternatives is expected to be too small to have any especially pronounced impact on low-income or minority populations in the area.

3.4 Blue Ridge Reservoir

3.4.1 Land Use

An overview of land use for the mountain reservoirs region is provided in Section 3.1.1.

3.4.1.1 Affected Environment

On Blue Ridge Reservoir, TVA initially purchased 6,495 acres of land from Toccoa Electric Power Company, a subsidiary of TEPCO (see Table 1-1). Of the originally purchased acreage, TVA has sold about 106 acres (1.6 percent). Most of these sale tracts now contain residential developments, although some support recreation uses. In 1940, TVA transferred about 5,919 acres (91 percent) to the USFS. In 1994, the USFS reconveyed 18 small, narrow parcels to TVA. At the time of the reconveyance, many of the parcels were encumbered with shoreline facilities permitted under special use permits granted by the USFS authorizing the improvements and allowing parties whose lots adjoined the 1,700-foot contour access and use of the public shoreland for permitted private water use facilities (docks) and other minor improvements. Although these parcels do not have deeded or implied rights for shoreline access, TVA considers permitting docks at these locations based on the historical encumbrances and has allocated these parcels for shoreline access in all alternatives in the draft MRLMP.

The TVA-retained land on Blue Ridge Reservoir consists of 470 acres divided into 42 parcels. The majority of these parcels (38) are committed to existing land uses (Table 2-2). The dam reservation and other land supporting TVA project operations account for 293 acres (62 percent of TVA Blue Ridge Reservoir lands). Fourteen parcels front land that TVA transferred to the USFS for operation of the National Forest System. Thirteen parcels are committed to residential access by deeded rights or previous policy. Two are committed to recreational uses by land use agreements including a commercial marina and a county park. Two parcels are committed due to the presence of sensitive resources. For a complete list of the committed uses for Blue Ridge Reservoir parcels, reference Appendix E.

Four parcels totaling 12.9 acres (Table 2-2) are considered uncommitted and are being considered for alternative uses in this plan. All of the uncommitted parcels are currently managed for natural resource conservation and dispersed recreation.

TVA owns approximately 79 percent of the total 68 miles of shoreline on Blue Ridge Reservoir (Table 1-2). The remainder was never owned by TVA, although TVA purchased flowage easements along this private shoreline. Approximately 38 percent of the shoreline is available for residential development (Table 3-2). TVA estimates that about 71 percent of this shoreline is currently developed with residential subdivisions.

Fannin County, Georgia, is predominantly rural. The town of Morganton lies along the eastern shore of the reservoir near its downstream end and the town of Blue Ridge lies about 2 miles west of the reservoir, also near the downstream end. McCaysville, Georgia, is the only other incorporated town in the county. About 43 percent of the land in the county is in the Chattahoochee National Forest (USFS 2007a, Quickfacts 2007). In recent years, development has increased on the privately owned land in the county. Land use data for Fannin County (NARSAL 2007b) show that from 1974 to 2005 high-intensity development increased from 51 to 493 acres, and low-intensity development increased from 1,535 to 12,563 acres. About 221,000 acres (approximately 90 percent) of the county remained in

forest in 2005. Much of the development is attributed to retirees moving to the state from Florida and improved highway access to the Atlanta area allowing both commuters and second-homeowners easier travel to and from the area.

One parcel on Blue Ridge Reservoir contains prime farmland. Prime farmland makes up 10.7 acres of the 287.0-acre Parcel 1, which includes the dam reservation.

3.4.1.2 Environmental Consequences

Alternative A

As shown in Table 2-3, under Alternative A, the allocated land uses for the 298 acres that are planned (out of a total of 470 acres managed by TVA) would be wholly represented by two allocations. The dam reservation, representing 287 acres (61.1 percent) is allocated to Project Operations. The remaining 11 acres (2.3 percent) of land planned in Alternative A are allocated to Recreation. Under Alternative A, the remaining allocation zones are not represented on any parcel of Blue Ridge Reservoir.

Under Alternative A, TVA would not designate land uses for over 172 acres of TVA land on Blue Ridge Reservoir that were not planned with the Forecast System (Table 2-4). It should also be noted that the unplanned parcel acreage for the TVA land fronting the USFS is unknown and therefore not included in the Natural Resource Conservation and Recreation allocation acreage totals. Of the 40 unplanned parcels, only four parcels are uncommitted. The acreage for the uncommitted parcels totals 12.9 acres and is all allocated to Natural Resource Conservation. Under Alternative A, these parcels would continue to be managed according to TVA's Land Policy, SMP, and Section 26a regulations.

Under Alternative A, no impacts to prime farmlands are expected because the only prime farmland on any TVA parcels is on the dam reservation, which would continue to be protected.

Alternatives B and C

Under both Alternatives B and C, all of Blue Ridge Reservoir's 42 parcels, totaling 470 acres, would be planned (Table 2-5) including the 40 parcels not previously planned under Alternative A. Thirty-six of the previously unplanned parcels are committed to existing uses, which would not change under these alternatives. The remaining four uncommitted parcels would be allocated based on existing land use, which is consistent with a Zone 4 (Natural Resource Conservation) allocation. Alternatives B and C do not include any allocations that are inconsistent with the actual current land use.

Under Alternatives B and C, Zone 3 (Sensitive Resource Management) and Zone 4 allocations would increase from none under Alternative A to 12 acres (2.5 percent) and 28 acres (6 percent), respectively. Land allocated to Zone 6 (Developed Recreation) would increase slightly more than Alternative A to 15 acres (3.2 percent). It should also be noted that the previously unplanned acreage for the TVA land fronting the USFS land is unknown and therefore is not included in the Zones 4 and 6 acreage totals. Zone 7 (Shoreline Access) would receive additional allocations totaling about 122 acres (26 percent) primarily due to planning the land the USFS reconveyed to TVA. Allocations to Zone 2 (Project Operations) would increase to slightly more than under Alternative A, to 293 acres (62.3 percent). No land would be allocated to Zone 5 (Industrial).

Under Alternatives B and C, no impacts to prime farmlands are expected.

3.4.2 Recreation

An overview of the recreation resource for the mountain reservoirs is provided in Section 3.1.2.

3.4.2.1 Affected Environment

Eight TVA parcels on Blue Ridge Reservoir have developed recreation facilities. TVA does not actively manage any of these parcels. The USFS manages Parcels 15, 37, and 40 in conjunction with management of the Lake Blue Ridge Recreation Area, Morganton Point Recreation Area, and Lakewood Landing Boat Ramp, respectively. Fannin County maintains the roadside picnic area along Old US 76 through a public recreation license agreement with TVA. These developed recreation areas are summarized in Table 3-37.

There is one campground currently operating on Blue Ridge Reservoir. Morganton Point Recreation Area behind Parcel 37 is operated by the USFS on land transferred to the USFS by TVA. The campground on the Lake Blue Ridge Recreation Area was recently decommissioned by the USFS.

Four recreation areas contain at least one boat ramp. The ramps are located at Morganton Point Recreation Area, Lakewood Landing, and the Lake Blue Ridge Recreation Area and are operated by the USFS. Lake Blue Ridge Marina operates three ramps: two ramps for typical pool elevations and a deep-water ramp for use during periodic deep drawdown of the reservoir.

Lake Blue Ridge Marina is the only commercial marina on the reservoir. It is located on private property, TVA Parcels 5 and 6, and a portion is located on City of Blue Ridge property.

There are no public fishing piers located on Blue Ridge Reservoir.

Three stream access sites are located near Blue Ridge Reservoir. TVA manages the access site on the Blue Ridge Dam Reservation (Parcel 1). The Curtis Switch Toccoa River site (Parcel TOCA-4) located downstream at Toccoa River Mile (ToRM) 7.6R is managed by Fannin County. The Shallowford Bridge site (Parcel TOCA-5) on the Upper Toccoa River at ToRM 67.7L is not developed. The USFS manages the Sandy Bottom Stream Access Site located at ToRM 69.3L.

Table 3-37. Recreation Facilities on or Near Blue Ridge Reservoir

Area Name	County, State	Sector	Operator	Land Ownership	Parcel Number	Campground	Marina	Picnic Tables	Boat Ramp	Stream Access	Paved Trails	Fishing Piers	Other
Lake Blue Ridge Marina	Fannin, Ga.	Private	Commercial	Private/City**	5, 6		X		X				
Morganton Dry Boat Storage	Fannin, Ga.	Private	Commercial	Private**	N/A								X
Robin's Nest Cottages and Motel	Fannin, Ga.	Private	Commercial	Private**	N/A								X
Blue Ridge Dam Reservation*	Fannin, Ga.	Public	TVA	TVA	1			X		X			
Roadside Park	Fannin, Ga.	Public	Fannin County	TVA	3			X					
Curtis Switch*	Fannin, Ga.	Public	Fannin County	TVA	TOCA-4					X			
Sandy Bottom*	Fannin, Ga.	Public	USFS	USFS	N/A	X				X			
Blue Ridge Recreation Area	Fannin, Ga.	Public	USFS	USFS**	16				X				
Lakewood Landing Ramp	Fannin, Ga.	Public	USFS	USFS**	40				X				
Morganton Point Recreation Area	Fannin, Ga.	Public	USFS	USFS**	37	X		X	X				X

* = Stream access site
 ** = TVA retained below MSC

Dispersed Recreation

Dispersed recreation has historically been an important recreation opportunity on Blue Ridge Reservoir but primarily takes place on USFS lands. TVA does not have an inventory of these areas.

3.4.2.2 Environmental Consequences

Alternative A

Under Alternative A, one parcel is allocated for Developed Recreation, comprising a total of 2.3 percent (11 acres) of the lands on Blue Ridge Reservoir. This parcel was allocated under the Forecast System for Public Recreation. In addition, under Alternative A, four unplanned parcels that currently support developed recreation are committed to this use through transfer agreement covenants or TVA licenses, leases, or easements.

Under Alternative A, TVA would not allocate any additional parcels for Public or Commercial Recreation use. The unplanned parcels that are committed to developed recreation would continue to be used for that purpose. Therefore, any future demand for recreational needs would have to be met by expansion of recreation facilities on these parcels. Under Alternative A, potential environmental impacts would be insignificant since the parcels (both previously allocated and the unplanned parcels) utilized for developed recreation would not change. The potential for impacts from any new facilities would be subject to review and potential mitigation under NEPA.

Alternative A does not propose changing land use of any parcels; therefore, potential impacts to dispersed recreation would be restricted to expansions within existing committed parcels (e.g., campground expansion). Potential impacts to dispersed recreation of this nature are expected to be insignificant.

Alternatives B and C

Under Alternatives B and C, parcels allocated to Zone 6 (Developed Recreation) would comprise a total of 15 acres (3.2 percent) of all of the TVA lands on Blue Ridge Reservoir, approximately 4 acres more than would be allocated for Developed Recreation under Alternative A. Five parcels on Blue Ridge Reservoir committed to a developed recreation use would be allocated to Zone 6. These commitments include transfer agreement covenants and TVA licenses, leases, and easements. All of the parcels committed to developed recreation on Blue Ridge Reservoir currently support recreational land use with existing facilities. The parcels allocated to Zone 6 in Alternatives B and C include those previously allocated under Alternative A to Public Recreation, as well as the unplanned parcels under Alternative A that are currently committed to developed recreation uses.

Under Alternatives B and C, any future demand for recreational needs would have to be met by expansion of recreation facilities in areas allocated for Zone 6. These areas are the same under Alternatives B and C as under Alternative A, and since there would be no new parcels allocated for Developed Recreation, the potential environmental impacts would be the same. The potential for impacts from any new facilities within existing areas would be subject to review and potential mitigation under NEPA.

Under Alternatives B and C, there is no proposed change in land use of any parcels; therefore, potential impacts to dispersed recreation would be restricted to expansions within existing committed parcels. Potential impacts to dispersed recreation of this nature are expected to be insignificant.

3.4.3 Terrestrial Ecology

An overview of terrestrial ecology (plant and wildlife communities) is provided in Section 3.1.3.

3.4.3.1 Plant Communities

3.4.3.1.1 Affected Environment

The vegetative physiognomic classes on Blue Ridge Reservoir lands are evergreen-deciduous forest, deciduous forest, and shrublands in the form of forested and emergent wetlands and herbaceous vegetation found along transmission lines, roadway rights-of-way, as well as grassy areas within the dam reservation and commercial recreation sites.

Evergreen-deciduous forest surrounds the reservoir as part of the Chattahoochee National Forest and is composed of an oak-hickory-pine association. Loblolly pine, shortleaf pine, and Virginia pine are present along with basswood, black cherry, hickories, sourwood, and various oak species.

Deciduous forest and shrublands occur mainly as oak-hickory forest (mesic to xeric) and forested wetlands near the reservoir edges grading into scrub-shrub wetlands. Oak-hickory forests common on xeric ridges grade into more mesic slopes dominated by tulip poplar, American beech, white oak, and yellow buckeye.

A high-quality forested wetland on the dam reservation (Parcel 1) and emergent wetlands on Parcel 25 were identified during field surveys in April 2006. Both areas can be classified as Southern Appalachian Seepage Wetlands and are characterized by the presence of *Sphagnum* moss (NatureServe 2007). In the forested wetland, American beech, trilobed red maple, muscle wood, flame azalea, serviceberry, and spicebush were found in the

canopy and shrub layer. The herbaceous layer was rich in wildflowers with arrow arum, cinnamon fern, fly poison, foam flower, galax, Indian cucumber, kidney-leaf grass-of-parnassus, little brown jug, and mountain oxalis. The emergent-shrubland was scattered with small trees/shrubs of buttonbush, river birch, tag alder, and trilobed red maple. Small green rein orchid and southern water plantain were found growing with various rushes and sedges.

Herbaceous vegetation is found along transmission lines and roadway rights-of-way, as well as grassy areas within the dam reservation and commercial recreation sites. Tall fescue is the dominant grass, with broomsedge and Japanese stiltgrass present.

Invasive species occur on most of the TVA parcels around Blue Ridge Reservoir. Among the species present are Chinese privet, Japanese honeysuckle, Japanese stilt grass, Johnson grass, kudzu, multiflora rose, and sericea lespedeza. All of these species have the potential to adversely impact the native plant communities.

3.4.3.1.2 Environmental Consequences

The uses of Blue Ridge Reservoir lands would be similar under all alternatives, and all of the alternatives would have little impact on plant communities. No rare or unique plant communities occur on Blue Ridge Reservoir lands. Under all alternatives, TVA's ability to manage invasive species would not change from the present situation. TVA currently prioritizes invasive species management efforts based on several factors including the availability of resources, potential for partnerships, and threat to sensitive resources.

3.4.3.2 **Wildlife Communities**

3.4.3.2.1 Affected Environment

Blue Ridge Reservoir properties contain evergreen, evergreen-deciduous, deciduous, and early successional habitats similar to those observed on other mountain reservoirs. Wetlands were identified on Parcels 1, 25, and 35 (see Section 3.4.5). Dusky salamander, three-lined salamander, southern two-lined salamander, spring peepers, Fowler's toads, and Cope's gray treefrogs were observed in these wetlands. Other wildlife including pine, blue-winged, and hooded warblers, scarlet tanager, downy woodpecker, blue-headed vireo, Carolina Wren, northern cardinal, and yellow-breasted chat were also observed during field surveys.

Few mud flats exist on Blue Ridge Reservoir. A small mud flat occurs at the mouth of Star Creek at Parcel 35. Portions of this wetland extend onto private land.

3.4.3.2.2 Environmental Consequences

Under all alternatives, the uses of TVA lands on Blue Ridge Reservoir would remain the same as their current uses. The Zone 3 (Sensitive Resource Management) allocations under Alternatives B and C would result in greater recognition of wetland habitats on two parcels, although this would likely have little effect on the management of the wetlands. The impacts on wildlife from all of the alternatives would be similar and insignificant.

3.4.4 **Endangered and Threatened Species**

A regional overview of endangered and threatened species is provided in Section 3.1.4.

3.4.4.1 Affected Environment

One federally listed species, the small whorled pogonia, is known from Fannin County and seven state-listed species are known from the vicinity of Blue Ridge Reservoir (Table 3-38). Four of the six populations of the threatened small whorled pogonia are known from Fannin County and are within 5 miles of Blue Ridge Reservoir. This species and its suitable habitat were not found during surveys of TVA lands on Blue Ridge Reservoir. A small population of pink lady's slipper was found along an access road during a previous field survey, and the plants were relocated in January 2002 to minimize impacts to them from a TVA construction project. No other populations of pink lady's slipper were found within the project area.

Table 3-38. Federally and State-Listed as Endangered, Threatened, and Other Species of Conservation Concern Known From the Blue Ridge Reservoir Area

Common Name	Scientific Name	Federal Status	State Rank	State Status
Plants				
Pink lady's slipper	<i>Cypripedium acaule</i>	--	S4	UNUS
Small whorled pogonia	<i>Isotria medeoloides</i>	THR	S2	END
Amphibian				
-				
Eastern hellbender	<i>Cryptobranchus alleghaniensis alleghaniensis</i>		S2	RARE
Fish				
River redhorse*	<i>Moxostoma carinatum</i>	--	S2	RARE
Wounded darter	<i>Etheostoma vulneratum</i>	--	S2	END
Tangerine darter*	<i>Percina aurantiaca</i>	--	S1	THR
Dusky darter*	<i>Percina sciera</i>	--	S1	RARE
Olive darter	<i>Percina squamata</i>	--	S1	THR

-- = Not applicable

*Species descriptions in the text

Rank abbreviations: S1 = Critically imperiled; S2 = Imperiled; S4 = Widespread, abundant, and apparently secure

Status abbreviations: END = Endangered, RARE = Rare, THR = Threatened, UNUS = Special concern due to commercial exploitation

No federally or state-listed terrestrial animal species have been previously reported from the vicinity of Blue Ridge Reservoir, and none were observed during field investigations in 2006. Six state-listed aquatic species are known to occur in the vicinity of Blue Ridge Reservoir and tailwater (Table 3-38). However, only three of these species, the river redhorse, tangerine darter, and dusky darter, are known or are likely to occur near TVA lands on Blue Ridge Reservoir. The eastern hellbender occurs in the Toccoa River and its tributaries and likely occurs in the numerous streams flowing into Blue Ridge Reservoir.

River redhorse occurs in swift water of medium to large rivers, rarely entering smaller streams. Records of the river redhorse are found in the tailwater of Blue Ridge Reservoir downstream of Parcel 1.

Tangerine darter occurs in clearer portions of large to moderate-sized headwater tributaries of the Tennessee River. It is usually found in deeper riffles and runs with boulders, rubble, and bedrock most of the year but moves into deeper pools in winter (Etnier and Starnes 1993). Most records in the vicinity are found in tributaries of Blue Ridge Reservoir. However, one record is known from the Blue Ridge tailwater near Parcel 1.

Dusky darter is found in larger creeks and rivers where it frequents areas with moderate current, debris-strewn areas, undercut banks, vegetation, and brush. Over-wintering occurs in deeper waters (ibid). One record of the dusky darter is known near Parcel 35 in Star Creek.

3.4.4.2 Environmental Consequences

Alternative A

Plants

Under Alternative A, no known populations of listed plants occur on TVA lands on Blue Ridge Reservoir; therefore, this alternative is not expected to adversely impact rare plant populations.

Terrestrial Animals

Under Alternative A, all planned parcels are allocated for Project Operations or Recreation. These allocations are not expected to result in adverse impacts to listed terrestrial animals or their habitats.

Aquatic Animals

Occurrences of the river redhorse and tangerine darter, both state-listed, are known downstream of Blue Ridge Dam in the vicinity of Parcel 1. Activities on this parcel could potentially affect these two state-listed species; however, individual actions on Parcel 1 would be subject to environmental review to assess and mitigate impacts on aquatic species. Therefore, these species would not be affected by Alternative A.

The state-listed dusky darter is known to occur upstream of Parcel 35. Under Alternative A, Parcel 35 would remain unplanned. Any future actions on Parcel 35 would be subject to environmental review to assess and mitigate impacts to aquatic species, and therefore, the dusky darter would not be affected by Alternative A.

Alternatives B and C

Plants

Under Alternatives B and C, no known populations of listed plants occur on TVA lands on Blue Ridge Reservoir; therefore, this alternative is not expected to affect listed plants.

Terrestrial Animals

Under Alternatives B and C, 40 new parcels would be planned. The proposed allocations under these alternatives would result in additional protection of wetland habitats as described above. Some parcels would be allocated to Zone 7 (Shoreline Access). None of the parcels support listed terrestrial animals, and there would be no impacts on these species.

Aquatic Animals

Under Alternatives B and C, Parcel 1 would remain allocated to Zone 2 (Project Operations). Potential impacts to state-listed species in the vicinity of Parcel 1 would be the

same as those under Alternative A. Under Alternatives B and C, Parcel 35 would be allocated to Zone 3 (Sensitive Resource Management). This zone allocation would have beneficial effects to the dusky darter because of its stringent restrictions on land use, which would in turn improve water quality.

3.4.5 Wetlands

A regional overview of the wetlands resource for the mountain reservoirs is provided in Section 3.1.5.

3.4.5.1 Affected Environment

Wetlands are very uncommon on Blue Ridge Reservoir parcels. Of the nine reservoirs surveyed for the MRLMP, Blue Ridge Reservoir has the least amount of wetland acreage. NWI data (Table 3-39) indicate a total of 5 acres of wetlands. While NWI data indicate no scrub-shrub wetlands, very small (<0.1 acre) areas of scrub-shrub wetlands were observed during field surveys of Parcels 22 and 23.

Table 3-39. Wetland Acreage - Blue Ridge Reservoir

Combined Aquatic Beds and Flats (acres)	Emergent (acres)	Forested (acres)	Scrub-Shrub (acres)	All Types (acres)
2	2	1	0	5

Source: National Wetlands Inventory

Field surveys identified a high-quality forested wetland on the dam reservation (Parcel 1) and an emergent wetland on Parcel 25. Both areas can be classified as Southern Appalachian Seepage Wetlands and are characterized by the presence of *Sphagnum* moss (NatureServe 2007). In the forested wetland, American beech, trilobed red maple, muscle wood, flame azalea, serviceberry, and spicebush were found in the canopy and shrub layer. The herbaceous layer included arrow arum, cinnamon fern, fly poison, foam flower, galax, Indian cucumber, kidney-leaf grass-of-parnassus, little brown jug, and mountain oxalis. The emergent/scrub-shrub wetland contained scattered areas of small trees/shrubs of buttonbush, river birch, tag alder, and trilobed red maple. Small green rein orchid and southern water plantain were found growing with various rushes and sedges.

Parcel 1 also contains a high-quality forested wetland associated with a creek just downstream of the dam. This wetland contains a diverse mix of wetland habitats and plant communities. Parcel 15 contains an emergent/forested wetland at the back of the cove with a diverse mix of wetland habitat and plant communities.

3.4.5.2 Environmental Consequences

The impacts of the various alternatives on wetlands would be similar, and none would be adverse. Under all alternatives, parcels containing wetlands would generally continue to be managed as they have been in the past, and actions with the potential to affect wetlands would be assessed under NEPA prior to their implementation.

3.4.6 Floodplains

An overview of floodplains in the mountain reservoirs area is provided in Section 3.1.6.

3.4.6.1 Affected Environment

The area affected extends from the lower limit of the Dam Reservation at about ToRM 52.4 upstream to about ToRM64 in Blue Ridge Reservoir. The 100-year flood elevations for the Toccoa River downstream of the dam vary from 1,552.8-feet msl at ToRM 52.4 to 1,554.2-feet msl at ToRM 53.0 (downstream of Blue Ridge Dam). The 500-year flood elevations for the Toccoa River downstream of the dam vary from 1,556.9-feet msl at ToRM 52.4 to 1,558.7-feet msl at ToRM 53.0. Tabulations of the 100- and 500-year flood elevations are included in Appendix H.

The main watercourse in Blue Ridge Reservoir is the Toccoa River. The 100-year flood elevation for the Toccoa River is 1,691.0 from Blue Ridge Dam (ToRM 53.0) to the upper end of the reservoir at about ToRM 64.0. The 500-year flood elevation for the Toccoa River is also 1,691.0 from the dam to the upper end of the reservoir.

3.4.6.2 Environmental Consequences

The environmental consequences of each alternative are discussed in Section 3.1.6. None of the alternatives would have adverse effects on Blue Ridge Reservoir floodplains.

3.4.7 Cultural Resources

An overview of cultural resources in the mountain reservoirs area is provided in Section 3.1.7.

3.4.7.1 Archaeological Resources

3.4.7.1.1 Affected Environment

Blue Ridge Reservoir was the focus of a large-scale archaeological survey in fall and winter 1993-1994 (Riggs and Kimball 2005) when the reservoir pool was lowered to 1,615 feet msl for dam maintenance work. A total of 85 archaeological sites were investigated during the survey of approximately 2,100 acres of exposed shoreline and lake bed. Of the 85 sites, 47 are considered potentially eligible for listing in the NRHP.

Prior to this survey, an archaeological survey of the Blue Ridge Dam access road was conducted (Ahlman 2002a). A single site was identified and determined not to meet the eligibility criteria for inclusion in the NRHP. A portion of the area surveyed for the proposed access road was also investigated in 1993 during an archaeological reconnaissance of the Blue Ridge Hydro Plant upgrade (Pace 1993). Two sites, including the one reinvestigated during the access road survey (Ahlman 2002a), were identified. Both were determined not to meet the eligibility criteria for inclusion in the NRHP.

Portions of the reservoir were also surveyed during the winter of 2005-2006. Twelve archaeological sites were identified or revisited, eight of which were considered potentially eligible for listing in the NRHP.

In 2001, TVA's Cultural Resources staff conducted a survey of 23 acres for the proposed discharge outlet built during the maintenance of the Blue Ridge Dam penstock (Pritchard 2001). The survey, which was conducted on an area west of Blue Ridge Dam as well as on an associated soil disposal area on Nottely Reservoir near Nottely River Mile (NRM) 23.5, did not identify any archaeological resources.

In 1992, a survey of a proposed river regulation structure, associated roadbed, and a buffer zone along the right bank of the Toccoa River below Blue Ridge Dam and Creaseman

Branch was conducted (Pace 1993). As a result, several archaeological sites were identified, two of which are considered potentially eligible for listing in the NRHP.

3.4.7.1.2 Environmental Consequences

Because no changes to existing land uses are proposed under any of the alternatives, the potential for impacts to archaeological resources is low. As described in Section 3.1.7, TVA proposes to implement a PA in Georgia for the identification, evaluation, and treatment of all historic properties potentially affected by this lands planning effort. Until the PA is executed, TVA will incorporate the phased identification, evaluation, and treatment procedure to effectively preserve historic properties, including archaeological resources, as required by Section 106 of the NHPA. TVA would adhere to the terms of this PA under all alternatives, and no adverse impacts on archaeological resources are expected.

3.4.7.2 **Historic Structures**

3.4.7.2.1 Affected Environment

The Toccoa Electric Power Company, a subsidiary of TEPCO, built the Blue Ridge Hydroelectric Plant on the Toccoa River near the town of Blue Ridge, Georgia. Initial operation of the plant began on July 1, 1931, with one 25,000-kilovolt-ampere Westinghouse generator, driven by an S. Morgan Smith waterwheel of 30,000 horsepower. This facility was the most modern plant of the TEPCO system.

The design of the Blue Ridge Plant had a number of rather unusual features. The spillway was built in a conveniently located saddle between two hills adjacent to the dam so that the spillway is entirely separate from the dam itself. A reinforced concrete intake tower was provided that is 26 feet in diameter and 192 feet high. Water from this tower is conveyed to the turbine through a steel penstock 1,050 feet long and 14 feet in diameter. This penstock is enclosed in reinforced concrete.

The intake tower is equipped with caterpillar-type broom gates that measure 7 feet by 14 feet. These gates are motor driven and may be operated from the switchboard or from the intake tower.

A surge tank was built adjacent to the powerhouse to relieve pressure surges that might result from rapid wicket gate closure. This surge tank is made of steel and is of the nonoverflow differential type. It is 30 feet in diameter and 180 feet high.

The generator and electrical equipment in the powerhouse were made largely automatic in operation so as to require a minimum number of attendants. TEPCO used six employees to operate the plant—a superintendent, a chief operator, and four operators. The original Woodward Type A actuator was replaced with a Woodward cabinet-type actuator by TVA circa 1965, and the plant is currently remotely operated.

Besides Blue Ridge Dam and Powerhouse, there are four brick houses that are considered historic properties, as they are potentially eligible for listing in the NRHP.

3.4.7.2.2 Environmental Consequences

Because no changes to existing land uses are proposed under any of the alternatives, the potential for impacts to historic structures is low. Under all alternatives, TVA would implement the PAs described above in Section 3.1.7.1.2. These PAs would include historic structures, and with their implementation, no adverse effects on historic structures are

anticipated. Until the PAs are implemented, TVA would individually evaluate actions with the potential to affect historic structures as required by Section 106 of the NHPA.

3.4.8 Managed Areas and Ecologically Significant Sites

Managed areas, ecologically significant sites, and NRI streams are defined in Section 3.1.8.

3.4.8.1 Affected Environment

Table 3-40 lists managed areas within 3 miles of Blue Ridge Reservoir. The areas are grouped by closest distance to the reservoir; areas abutting or less than 0.1 mile from reservoir lands are listed as “adjacent.”

Table 3-40. Managed Areas and Ecologically Significant Sites Within 3 Miles of Blue Ridge Reservoir

Name	Type of Area	Authority	Location County, State	Nearest Distance From Reservoir
Chattahoochee National Forest	Managed area (MA)	Federal	Fannin, Ga.	Adjacent
Rich Mountain State Wildlife Management Area	MA	State	Gilmer, Ga.	2.1 miles south

No ecologically sensitive sites or NRI streams are within 3 miles of Blue Ridge Reservoir.

3.4.8.2 Environmental Consequences

None of the alternatives for Blue Ridge Reservoir would change existing land uses, and therefore, no impacts to managed areas or ecologically significant sites are anticipated.

3.4.9 Visual Resources

The general visual environment of the mountain reservoirs is described in Section 3.1.9.

3.4.9.1 Affected Environment

The landscape character of the Blue Ridge Reservoir is naturally appearing, as seen from the shoreline in middleground and background distances, interspersed with a variety of development along the shoreline, as seen in the foreground from the reservoir. Much of the shoreline has been protected through natural resource conservation. Many of the back-lying properties along these shorelines are managed by the USFS and have excellent scenic class. Development along the reservoir includes Blue Ridge Marina and the USFS's Morganton Point Recreation Area.

The appearance of the reservoir immediately upstream of the dam remains visually intact when viewed in the middleground. The wide expanse of water body absorbs man-made alterations along the shoreline such as water use facilities when viewed from these distances. In the foreground, when viewed out of context with the reservoir as an intact unit, these facilities tend to dominate the character of the shoreline. There are numerous undeveloped coves farther upstream from the dam. These coves have natural settings available to boaters and fisherman.

Along the Toccoa River and Wilscott Creek, the river channel narrows and views are mainly in the foreground distances as the river undulates with natural topography. There are fewer residential developments and water use facilities along this section of the reservoir. Scenic attractiveness is common. Scenic integrity is moderate.

3.4.9.2 Environmental Consequences

None of the alternatives for Blue Ridge Reservoir would change existing land uses, and therefore, no adverse impacts to visual resources are anticipated. Scenic integrity would remain moderate or higher. Implementation of the alternatives would help preserve the scenic landscape character of Blue Ridge Reservoir for long-term public enjoyment.

3.4.10 Water Quality and Aquatic Ecology

An overview of water quality and aquatic ecology for the mountain reservoirs area is provided in Section 3.1.10.

3.4.10.1 Affected Environment

The rate of discharge of water from Blue Ridge Reservoir averages about 615 cfs, which results in an average retention time of 158 days. Because of the long retention time, Blue Ridge Reservoir becomes thermally stratified in the summer. This results in low DO concentrations in the lower strata of the water column as DO is depleted by the natural process of decaying organic material, and thus, water discharged into the tailwater can be very cold and have low DO, impairing water quality. As part of the LIP, a small hydroturbine unit was installed to operate whenever the main unit is off to maintain minimum flows. Additionally, DO in the releases is improved by turbine venting and an oxygen-injection system.

Water quality in Blue Ridge Reservoir can be affected by many factors, both from TVA public land along the reservoir and from land use practices throughout the reservoir's watershed. The watershed is mountainous and forested, with a significant portion of the basin lying within the Chattahoochee National Forest. Because the reservoir is located in the Blue Ridge Physiographic Province, the streams in the watershed have naturally low concentrations of nutrients and dissolved minerals. Consequently, the reservoir is expected to have low productivity (low chlorophyll concentrations).

Reservoir Ecological Health

Figure 3-4 shows the reservoir ecological health scores for Blue Ridge Reservoir from 1994 through 2005. Blue Ridge Reservoir was sampled in the forebay at ToRM 54.1. The ecological health score for the reservoir is consistently among the highest of all reservoirs monitored (see Table 3-41) with scores ranging from 80 to 96. The 2005 score (81) was at the low end of the historic range due primarily to the "poor" rating for chlorophyll. The 2005 chlorophyll rating was the highest summer average to date and the first "poor" rating for chlorophyll.

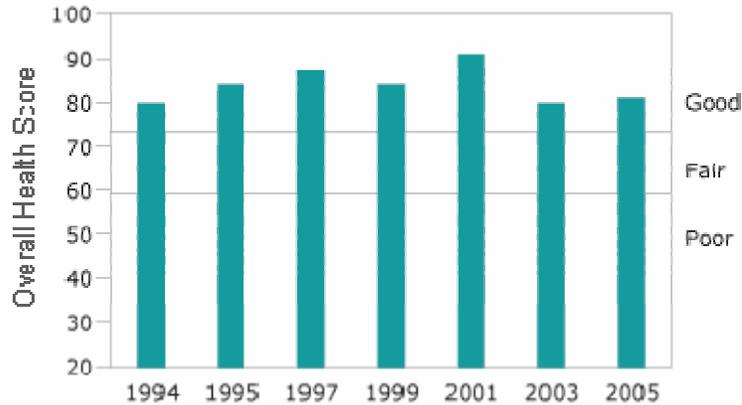


Figure 3-4. Blue Reservoir Ecological Health Ratings, 1994-2005

Dissolved Oxygen

DO rated “good” eight out of ten years. DO rated a “high-fair” in 1995 and 1997 due to a small area of low DO (<2 mg/L) near the bottom.

Chlorophyll

Average chlorophyll concentrations were within the expected range all years and rated “good,” with the exception of 2005, which rated “poor.”

Sediment Quality

Sediment quality has rated “good” all years except in 1995 when low levels of dichlorodiphenyldichloroethylene (DDE) were detected.

Table 3-41. Blue Ridge Reservoir Water Quality and Sediment Ratings, Reservoir Vital Signs Monitoring Program (Monitoring Data 1991-1995, 1997, 1999, 2001, 2003, 2005)

	Monitoring Years									
	1991	1992	1993	1994	1995	1997	1999	2001	2003	2005
Blue Ridge Forebay										
Dissolved Oxygen	Good	Good	Good	Good	Fair	Fair	Good	Good	Good	Good
Chlorophyll	Good	Good	Good	Good	Good	Good	Good	Good	Good	Poor
Sediment	NS	NS	Good	Good	Fair	Good	Good	Good	Good	Good

NS = Not sampled

Benthic Monitoring

Benthic community scores rated “good” four of the seven years sampled, “poor” two of the seven years, and “fair” one of the seven years (Table 3-42).

Table 3-42. Recent (1994-2005) Biennial Benthic Community Ratings for Blue Ridge Reservoir

Station	River Mile	1994	1995	1997	1999	2001	2003	2005
Forebay	54.1	Poor	Good	Good	Fair	Good	Poor	Good

Fisheries Monitoring

The RVSMP began biennial fish sampling on Blue Ridge Reservoir in 1994. A list of fish species commonly found in Blue Ridge Reservoir is in Appendix I. The fish community in Blue Ridge Reservoir rated “good” five of the seven years monitored and “fair” in 1997 and 2003 (Table 3-43).

Table 3-43. Recent (1994-2005) Biennial Reservoir Fish Assemblage Index Ratings for Blue Ridge Reservoir

Station	1994	1995	1997	1999	2001	2003	2005
Forebay	Good	Good	Fair	Good	Fair	Good	Good

In 2006, Blue Ridge Reservoir rated below the SFI Valleywide average (Table 3-44).

Table 3-44. Sport Fishing Index Scores for Selected Sport Fish Species in Blue Ridge Reservoir, 2006

Fish Species	2006 Score	2006 Valleywide Average
Black Basses	28	36
Largemouth Bass	30	33
Smallmouth Bass	22	30

Swimming Advisories

There are no state advisories against swimming in Blue Ridge Reservoir. TVA performed *E. coli* bacteria monitoring at two USFS locations in 2007: Lake Blue Ridge Recreation Area boat ramp and Morganton Point Recreation Area swim site.

Fish Consumption Advisories

A fish consumption advisory is in effect for Blue Ridge Reservoir because of mercury contamination. The State of Georgia advises against eating more than one meal per week of channel catfish greater than 16 inches in length or white bass or largemouth bass between 12 and 16 inches in length from Blue Ridge Reservoir.

TVA collected channel catfish and largemouth bass from the reservoir for tissue analysis in autumn 2005. The results, which were similar to those of previous years, were provided to state agencies in Georgia. TVA will analyze fish from Blue Ridge Reservoir again in autumn 2009.

State(s) Impaired Waters

The Georgia Environmental Protection Division assigned use support ratings to waters in the Blue Ridge Reservoir watershed based on available biological, chemical, and/or

physical data. A total of 22 miles of monitored streams are listed as impaired (Table 3-45) (GAEPD 2006).

Table 3-45. Impaired Waters in the Watershed of Blue Ridge Reservoir

Stream/River Name	State	Miles	Description	Water Quality Stressor/Source
Cooper Creek	Ga.	3	Tributary to Toccoa River/ Fannin County	Fecal coliform/ nonpoint
Toccoa River	Ga.	7	Downstream of Blue Ridge Reservoir	Fecal coliform/ nonpoint
Toccoa River	Ga.	10	Big Creek to Blue Ridge Reservoir	Fecal coliform/ nonpoint
Weaver Creek	Ga.	2	Fannin County	Biota impacted/ nonpoint

Water Supply

No municipal water suppliers currently withdraw water from Blue Ridge Reservoir or its supporting watershed. However, the City of Blue Ridge has a municipal water intake directly below Blue Ridge Dam on Parcel 1.

3.4.10.2 Environmental Consequences

Alternative A

Under Alternative A, all but two of the 42 parcels (half of the land area) are unplanned with the exception of the Blue Ridge Dam Reservation (Parcel 1; 287 acres) and a roadside picnic area (Parcel 3; 11 acres). Most unplanned parcels have a committed use, primarily fronting USFS lands or existing residential developments. The four uncommitted parcels total 12.9 acres and are allocated to Natural Resource Conservation. The extent to which a proposed land use might affect water quality and aquatic life depends on the nature and extent of development. Any proposed actions on TVA land would be assessed for compliance with TVA's Land Policy, SMP, and Section 26a regulations. Individual environmental reviews would identify potential adverse impacts and mitigation to protect the aquatic environment; TVA would then take appropriate measures to address these impacts. Therefore, use of TVA lands under Alternative A should not significantly impact water quality or aquatic life.

Alternatives B and C

Allocations for Alternatives B and C on Blue Ridge Reservoir are identical (Section 3.4.1). No significant changes to land use are expected to occur on Blue Ridge Reservoir under either alternative because the allocations are consistent with existing land use on all parcels. Therefore, no significant impacts to water quality and aquatic life are expected in association with these alternatives.

3.4.11 Air Quality and Noise

An overview of the air quality of the mountain reservoirs area is provided in Section 3.1.11. Under all of the alternatives, the existing uses of Blue Ridge Reservoir lands would not change and there would be no adverse impacts to air quality. Noise has previously been discussed in Section 3.1.11.2.

3.4.12 Socioeconomics

The socioeconomic conditions of the mountain reservoirs area are described in Section 3.1.12.

3.4.12.1 Affected Environment

3.4.12.1.1 Population and Economy

Population: Tables 3-46 and 3-47 contain data regarding the population of the area. Fannin County, Georgia, had a population of 19,798 in 2000, an increase of 34.2 percent since 1980. This was a much lower rate than in the state but a higher rate than in the nation. The rate of growth in the county, state, and nation was higher from 1990 to 2000 than from 1980 to 1990.

Estimates for 2006 indicate that the population of Fannin County has grown an additional 12.7 percent since 2000. This remains a slower rate than the state but much faster than the nation.

Projections through 2020 indicate that the county will have a slightly greater population growth rate than the state and a much greater rate than the nation over that time. The county's growth rate from 2000-2020 is projected to be faster than for 1980-2000, but the state and national rates are projected to be less than for 1980-2000.

Table 3-46. Population – Fannin County, Georgia

Area	1980	1990	2000	2006 (Estimate)	2020 (Projection)	Density (persons per square mile) 2000
Fannin County	14,748	15,992	19,798	22,319	28,139	51.3
Georgia	5,462,982	6,478,216	8,186,453	9,363,941	11,463,602	141.4
United States	226,545,805	248,709,873	281,421,906	299,398,484	335,804,546	79.6

Source: U.S. Census Bureau (undated a-e) and extrapolations from Georgia Office of Planning and Budget (2005)

Table 3-47. Recent and Projected Population Changes – Fannin County, Georgia (Percentage Growth)

Area	1980-1990	1990-2000	1980-2000	2000-2006	2000-2020	1980-2020
Fannin County	8.4	23.8	34.2	12.7	42.1	90.8
Georgia	18.6	26.4	49.8	14.4	40.0	109.8
United States	9.8	13.2	24.2	6.4	19.3	48.2

Source: Calculated from data in Table 3-46

The county is decidedly rural in distribution of population. As noted in Table 3-46, the population density is substantially lower than the state and much lower than the nation. The largest of the three incorporated towns in the county is Blue Ridge, Georgia, with 1,210 residents in 2000. About 87 percent of the county's population lives outside of the incorporated towns.

Economy: Table 3-48 contains the most recent annual data regarding the amounts and types of employment, amounts of unemployment, and incomes in the area. In 2005, Fannin County had 10,069 people employed on average. The county has a higher percentage of farmers and retail employees than either the state or the nation. The county has a much lower percentage of manufacturing employees and a lower percentage of government

employees than the state or nation. The average unemployment rate for 2006 in the county was lower than either the state or the nation. Per capita personal income in 2005 was considerably lower in the county than in the state and much lower than in the nation.

Table 3-48. Employment, Unemployment, and Income – Fannin County

Area	Employment, 2005	Employment (percent of total)					Unemployment Rate, 2006	Per Capita Personal Income 2005
		Farm	Manufacturing	Retail Trade	Government	Other		
Fannin County	10,069	2.5	4.1	13.9	9.8	69.7	4.0	23,846
Georgia	5,197,037	1.4	9.0	10.7	14.5	64.5	4.6	30,914
United States	174,249,600	1.7	8.5	10.9	13.7	65.2	4.6	34,471

Source: U.S. Bureau of Economic Analysis (undated) and Georgia Department of Labor (undated)

3.4.12.1.2 Environmental Justice

Environmental justice is concerned with the possibility of disproportionate impacts to minority and low-income populations in the area. The minority population in the Blue Ridge Reservoir area is small (Table 3-49). In Fannin County, 3.6 percent of the total population was estimated to be minorities in 2006, which was far below the state average of 41.1 percent and the national average of 33.6 percent. The estimated poverty rate in the county in 2004 was 13.2 percent, lower than the state rate of 13.7 percent but higher than the national rate of 12.7 percent.

Table 3-49. Minority Population, 2006, and Poverty, 2004 – Fannin County

Area	Population, 2006				Percent Below Poverty Level, 2004
	Total	Nonwhite	White Hispanic	Percent Minority	
Fannin County	22,319	547	252	3.6	13.2
Georgia	9,363,941	3,205,172	640,521	41.1	13.7
United States	299,398,484	59,652,230	41,001,760	33.6	12.7

Source: U.S. Census Bureau (undated d and 2004)

3.4.12.2 Environmental Consequences

The current land uses at Blue Ridge Reservoir would continue under all of the alternatives. Other than the possible expansion of existing recreation facilities, there would be little development that would affect socioeconomic conditions. None of the alternatives would result in disproportionate impacts on minority or disadvantaged populations.

3.5 Nottely Reservoir

3.5.1 Land Use

An overview of land use for the mountain reservoirs region is provided in Section 3.1.1.

3.5.1.1 Affected Environment

On Nottely Reservoir, TVA initially purchased 3,136 acres of land (see Table 1-1) and has sold about 276 acres (9 percent). Most of these sale parcels now contain residential developments although some support recreation uses. TVA transferred about 2,031 acres (65 percent) to the USFS.

TVA presently manages 829 acres of land divided into 42 parcels on Nottely Reservoir. The majority of these parcels (39) are committed to existing land uses (Table 2-2). The dam reservation is considered a committed land use and accounts for 51 percent (422.6 acres) of the total TVA land on Nottely Reservoir. Six parcels are committed to residential access by deeded rights or previous policy. One is committed to recreational use by land use agreement for public recreation (Poteete Creek Recreation Area). Land use agreements also commit one parcel for public infrastructure (Notla Water Authority Treatment Plant). Twenty-eight parcels front land that TVA transferred to the USFS for operation of the National Forest System. For a complete list of the committed uses for Nottely Reservoir parcels, reference Appendix E.

Three parcels totaling 121 acres (Table 2-2) are considered uncommitted and are being considered for alternative uses in this plan. All of the uncommitted parcels are currently managed for natural resource conservation, dispersed recreation, and/or vegetative buffers.

TVA owns approximately 47 percent of the total 102 miles of shoreline on Nottely Reservoir (Table 1-2). Fifty-three percent of the shoreline was never owned by TVA, and TVA only purchased flowage easements along this private shoreline. Approximately 41 percent of the shoreline is available for residential development (Table 3-2); the vast majority of this is privately owned. TVA estimates that about 44 percent of the shoreline available for residential development is currently developed.

Union County, Georgia, is predominantly rural. Blairsville is the only town near the reservoir and lies at its upstream end. About 47 percent of the land in the county is in the Chattahoochee National Forest (USFS 2007a, Quickfacts 2007). In recent years, development has increased on the privately owned land in the county. Land use data for Union County (NARSAL 2007b) show that from 1974 to 2005 high-intensity development increased from 71 to 445 acres and low-intensity development increased from 1,845 to 14,110 acres. Much of the development is attributed to retirees moving to the state from Florida and improved highway access to the Atlanta area allowing both commuters and second-homeowners easier travel to and from the area.

Blairsville has a 153-acre industrial park just west of the city near the upper end of the reservoir. The park has several small and medium-size industries. Several tracts remain available for development. There is other industrial and commercial development, as well as an airport west of the industrial park.

No prime farmlands occur on the TVA lands on Nottely Reservoir.

3.5.1.2 Environmental Consequences

Alternative A

As shown in Table 2-3, under Alternative A, the land uses of the 658 acres that are planned (out of a total of 829 acres managed by TVA) are represented by three land use allocations. The Dam Reservation and a parcel committed to use by the Notla Water Authority Facility encompass 443 acres (53.4 percent) and are allocated to Project Operations. The remaining acreage of land planned under Alternative A consists of two parcels (Parcels 2 and 4) that are allocated to Natural Resource Conservation (123 acres; 14.8 percent) and one parcel (Parcel 4) committed to Recreation (92 acres; 11.1 percent).

Under Alternative A, TVA would not designate land use allocations for over 170 acres of TVA land, consisting of 37 parcels, on Nottely Reservoir that are not planned with the Forecast System (Table 2-4). Of the 37 unplanned parcels, only two parcels are uncommitted. The acreage of the two unplanned, uncommitted parcels totals 0.3 acre, and they are both used for natural resource conservation. These parcels would continue to be managed according to TVA's Land Policy, SMP, and Section 26a regulations.

Under Alternative A, there would be no impacts to prime farmlands because no prime farmlands exist on the TVA parcels on Nottely Reservoir.

Alternatives B and C

Under Alternatives B and C, all of Nottely Reservoir's 42 parcels totaling 829 acres would be planned (Table 2-5). Thirty-five of the 37 previously unplanned parcels are committed to existing uses that determine their allocation under this alternative. The remaining three uncommitted parcels would be allocated based on existing land use, which is consistent with a Zone 4 (Natural Resource Conservation) allocation. Alternatives B and C do not include any land allocations that differ from the current land use.

Under Alternatives B and C, TVA would allocate 270 acres (32.6 percent) to Zone 4 (Natural Resource Conservation), an increase of 320 acres over Alternative A. This is primarily a result of allocating the previously unplanned land fronting the USFS land to Zone 4. Land allocated to Zone 6 (Developed Recreation) would increase by 3 acres to a total of 95 acres (11.5 percent). A new Zone 7 (Shoreline Access) allocation would total about 21 acres (2.5 percent). Zone 2 (Project Operations) allocations would remain the same (53.4 percent). No land would be allocated to Zone 3 (Sensitive Resource Management) or Zone 5 (Industrial).

No significant changes to land use are expected to occur on Nottely Reservoir under Alternative B or C because the allocations are consistent with existing land use on all parcels.

Under Alternatives B and C, no impacts to prime farmlands are expected.

3.5.2 Recreation

An overview of the recreation resources for the mountain reservoirs is provided in Section 3.1.2.

3.5.2.1 Affected Environment

Three TVA parcels on Nottely Reservoir support developed recreation facilities. Poteete Creek Campground and Recreation Area is located on Parcel 4 and is managed by Union

County under a public recreation license agreement. Facilities located at Poteete Creek include long- and short-term campsites, a swim beach, a boat ramp, fishing piers, and pavilions. Parcel 13 fronts Jack's Creek Boat Ramp, which is managed by the USFS. Parcel 37 fronts Deaverton Boat Ramp on land owned by TVA and the USFS and is managed by Union County by Special Use Permit from the USFS. These developed recreation areas are summarized in Table 3-50.

There are three campgrounds on Nottely Reservoir. In addition to Poteete Creek Campground, which is located on TVA land, there are two commercial campgrounds on private property.

Eight recreation areas contain at least one boat ramp, three of which are privately operated. Five of the ramps are operated by public entities including the ramp on the Nottely Dam Reservation (Parcel 1) that is managed by TVA. There are two ramps at Deaverton, one for typical pool elevation and one for low water conditions.

There are two commercial marinas operating on Nottely Reservoir, Cozy Cove Marina and Nottely Marina, which are privately operated.

Two public fishing piers are located on Nottely Reservoir. The piers at Lake Nottely RV Park are managed by a commercial operator. The fishing pier at Poteete Creek (Parcel 4) is managed by Union County. There is no stream access site located near Nottely Reservoir.

As shown on Table 3-50, Union County manages recreation facilities on Nottely Reservoir on TVA and USFS lands, in addition to land owned by Union County. Meeks Park is a county-owned park in the extreme upper end of the reservoir that has several ball fields, picnic pavilions, and an extensive trail system. Revenue generated by the operation of the TVA-owned Poteete Creek Campground allows the Union County Recreation Department to provide recreational services for the county.

Table 3-50. Recreation Facilities on Nottely Reservoir

Area Name	County, State	Sector	Operator	Land Ownership	Parcel Number	Campground	Marina	Picnic Tables	Boat Ramp	Stream Access	Paved Trails	Fishing Piers	Other
Canal Lake Campground	Union, Ga.	Private	Commercial	Private	N/A	X							
Cozy Cove Marina	Union, Ga.	Private	Commercial	Private	N/A		X		X				X
Lake Nottely RV Park	Union, Ga.	Private	Commercial	Private	N/A	X			X			X	
Nottely Marina	Union, Ga.	Private	Commercial	Private	N/A		X		X				
Nottely Dam Reservation	Union, Ga.	Public	TVA	TVA	1			X	X				X
Poteete Creek Recreation Area	Union, Ga.	Public	Union County	TVA	4	X		X	X			X	X
Canal Lake Ramp	Union, Ga.	Public	Union County	USFS**	22				X				
Davenport Mountain ATV Trails	Union, Ga.	Public	USFS	USFS**	10								X
Jack's Creek Ramp	Union, Ga.	Public	Union County	USFS**	13				X				

Area Name	County, State	Sector	Operator	Land Ownership	Parcel Number	Campground	Marina	Picnic Tables	Boat Ramp	Stream Access	Paved Trails	Fishing Piers	Other
Deaverton Ramp	Union, Ga.	Public	Union County	TVA/ USFS**	37				X				
Meeks Park	Union, Ga.	Public	Union County	County	N/A			X			X		X

N/A = Not applicable
 ** = TVA retained below MSC

Dispersed Recreation

Nottely Reservoir lands have historically provided important recreational opportunities. The following table is a summary of areas identified by TVA as being heavily used for dispersed recreation areas on Nottely Reservoir.

Table 3-51. Dispersed Recreation Areas on Nottely

Recreation Area	Parcel Number	Number of Sites
Nottely Dam Reservation, including Nottely Cliffs	1 and 2	8

Parcel 2 (120.6 acres) also accommodates a high level of dispersed recreation of a more passive nature, such as hiking and bank fishing.

3.5.2.2 Environmental Consequences

Alternative A

Under Alternative A, one 91.9-acre parcel of previously planned land on Nottely Reservoir is used for developed recreation. Parcel 4 was previously allocated under the Forecast System for Public Recreation for Poteete Creek Campground. In addition, two unplanned parcels with boat ramps currently support developed recreation and are committed to this use through a transfer agreement with the USFS.

Under Alternative A, TVA would not allocate any additional parcels for Public or Commercial Recreation use. The unplanned parcels that are committed to developed recreation would continue to be used for that purpose. Therefore, any future demand for recreational needs would have to be met by expansion of recreation facilities in these existing areas. Under Alternative A, potential environmental impacts would be insignificant since parcels (both previously allocated and the unplanned parcels) utilized for developed recreation would not change. The potential for impacts from any new facilities would be subject to review and potential mitigation under NEPA.

Alternative A does not propose changing land use of any parcels; therefore, potential impacts to dispersed recreation would be restricted to expansions within existing committed parcels (e.g., campground expansion). Potential impacts to dispersed recreation of this nature are expected to be insignificant.

Alternatives B and C

Under Alternatives B and C, parcels allocated to Zone 6 (Developed Recreation) would comprise a total of 11.5 percent (95 acres) of TVA lands on Nottely Reservoir, 3 acres more than are used under Alternative A for developed recreation. Three parcels committed to a developed recreation use would be allocated to Zone 6. These commitments include the transfer agreement with the USFS and the license to Union County for Poteete Creek Recreation Area. All of the parcels committed to developed recreation on Nottely Reservoir currently support recreation with existing facilities. The parcels allocated to Zone 6 in Alternatives B and C include the one previously allocated under Alternative A to Public Recreation, as well as the two unplanned parcels under Alternative A that are committed to developed recreation uses.

Under Alternatives B and C, any future demand for recreational needs would have to be met by expansion of recreation facilities in the areas allocated to Zone 6. These areas are the same under Alternatives B and C as under Alternative A, and since there would be no new parcels allocated for Developed Recreation, the potential environmental impacts would be the same. The potential for impacts from any new facilities within existing areas would be subject to review and potential mitigation under NEPA and therefore should be insignificant.

Alternatives B and C do not propose changing land use of any parcels; therefore, potential impacts to dispersed recreation would be restricted to expansions within existing committed parcels. Potential impacts to dispersed recreation of this nature are expected to be insignificant.

3.5.3 Terrestrial Ecology

An overview of terrestrial ecology (plant and wildlife communities) is provided in Section 3.1.3.

3.5.3.1 Plant Communities

3.5.3.1.1 Affected Environment

The physiognomic vegetative classes commonly found on and around Nottely Reservoir lands are evergreen forest, evergreen-deciduous forest, deciduous forest, shrublands, and herbaceous vegetation. According to TVA (2004), 88 percent of the shoreline is forested, with 9 percent being used for agricultural practices.

A small percentage of the forests are evergreen forests and these are loblolly pine plantations. Evergreen-deciduous forest, the most common forest type, is dominated by stands of mixed pine-hardwood trees. Deciduous forest occurs mainly as oak-hickory forest (mesic to xeric), mesic cove hardwood forest on slopes, and forested wetlands near the reservoir edges grading into scrub-shrub wetlands. Oak-hickory forests common on xeric ridges grade into more mesic slopes.

Forested wetlands were found in bottom areas near the dam and along the backs of coves along the reservoirs and grade into scrub-shrub wetlands (shrublands). A population of small green wood orchid was found along with spike moss and white turtlehead.

Herbaceous vegetation is commonly found along transmission line and roadway rights-of-way as well as grassy areas on the dam reservation and commercial recreation areas.

Purple sprangletop, bahia grass, and tall fescue were common grasses observed during field surveys.

Most of the TVA parcels around Nottely Reservoir have various species of invasive plants present, including autumn olive, Chinese lespedeza, Chinese privet, Japanese honeysuckle, Japanese knotweed, Japanese stiltgrass, kudzu, multiflora rose, princess tree, and tree-of-heaven.

3.5.3.1.2 Environmental Consequences

Alternative A

Under Alternative A, since there are no uncommon terrestrial plant communities known to occur around Nottely Reservoir, no impacts to these botanical resources are expected.

Alternatives B and C

Under Alternatives B and C, there would be a 147.1 (54.4 percent) increase in acreage allocated to Zone 4 (Natural Resource Conservation). Since the plant communities are common and representative of the region, no significant impacts to the plant communities on Nottely Reservoir lands are expected from Alternatives B and C.

Under all alternatives, TVA's ability to manage invasive species would not change from the present situation. TVA currently prioritizes invasive species management efforts based on several factors including the availability of resources, potential for partnerships, and threat to sensitive resources.

3.5.3.2 **Wildlife Communities**

3.5.3.2.1 Affected Environment

Wildlife habitats on Nottely Reservoir lands are similar to those observed on other mountain reservoirs and include a mixture of evergreen, evergreen-deciduous, deciduous, and early successional habitats. Parcel 1 is the largest TVA parcel on Nottely Reservoir and contains a mixture of hardwood forest interspersed with old-field habitats. Small seepages were also identified on this parcel. Wildlife observed during field surveys include mallard, ovenbird, Kentucky and black and white warblers, yellow-billed cuckoo, American redstart, eastern kingbird, and barn swallows.

Approximately 1,000 acres of mud flat habitat become exposed when reservoir levels are lowered on Nottely Reservoir. Larger mud flats occur along the Nottely River at NRM 37, Poteete Branch, Youngcane Creek, and Ivylog Creek. Most mud flats are bordered by private land.

3.5.3.2.2 Environmental Consequences

Alternative A

Under Alternative A, most parcels (28 of the unplanned parcels) front USFS lands with an existing use for natural resource conservation. Six of the parcels front residential subdivisions. Under Alternative A, no adverse impacts to wildlife on Nottely Reservoir would be expected.

Alternatives B and C

Alternatives B and C would allocate a total of 270 acres, or about a third of Nottely Reservoir lands to Zone 4 (Natural Resource Conservation). No additional lands would be

allocated to development-oriented uses with the potential to adversely affect wildlife. The impacts of Alternatives B and C would be similar to those of Alternative A and would not adversely affect wildlife or their habitats.

3.5.4 Endangered and Threatened Species

A regional overview of endangered and threatened species is provided in Section 3.1.4.

3.5.4.1 Affected Environment

Federally and state-listed as endangered, threatened, and other species of conservation concern, known from the vicinity of Nottely Reservoir, are listed in Table 3-52. Three populations of the federally listed small whorled pogonia are reported from Union County. No populations were found during field surveys of Nottely Reservoir lands. Pink lady's slipper was observed on three parcels: Parcel 1, Parcel 4, and Parcel 6.

Table 3-52. Federally and State-Listed as Endangered, Threatened, and Other Species of Conservation Concern Known From the Nottely Reservoir Area

Common Name	Scientific Name	Federal Status	State Status (Rank)	
			Ga.	N.C.
Plants				
Pink lady's slipper	<i>Cypripedium acaule</i>	--	UNUS (S4)	--
Small whorled pogonia	<i>Isotria medeoloides</i>	THR	THR (S2)	--
Amphibian				
Eastern hellbender*	<i>Cryptobranchus alleganiensis alleganiensis</i>	--	RARE (S2)	--
Bird				
Piping plover*	<i>Charadrius melodus</i>	THR	THR (S1)	THR (S2)
Mammal				
Least weasel*	<i>Mustela nivalis</i>	--	NOST (S1)	--
Reptile				
Bog turtle	<i>Glyptemys muhlenbergii</i>	THR	THR (S1)	--

-- = Not applicable

*Species descriptions in the text

Rank abbreviations: S1 = Critically imperiled; S2 = Imperiled; S4 = Widespread, abundant, and apparently secure

Status abbreviations: NOST = No state status; RARE = Rare, THR = Threatened; UNUS = Special concern due to commercial exploitation

Two federally listed animals have been reported from Union County and an additional three state-listed terrestrial animals have been reported from the vicinity of Nottely Reservoir (Table 3-52). No suitable habitat for the bog turtle (see Section 3.1.4) occurs on Nottely Reservoir lands. The blotched chub is known to occur upstream of Nottely Reservoir lands but would not be affected by any of the alternatives.

Eastern hellbenders are known from the Nottely River and its tributaries. Hellbenders likely occur in the tailwater in the vicinity of Parcel 1. Hellbenders are unlikely to occur in the vicinity of other Nottely Reservoir lands.

Piping plovers were reported from Nottely Reservoir on August 2-3, 1991. Mud flats potentially used by this species exist at Poteete Branch and Youngcane and Ivylog creeks. Most of the exposed shoreline lacks the silty mud that is preferred by shorebirds. Results of recent surveys for shorebirds on the reservoir indicate that shorebirds use the reservoir on a limited basis. Piping plovers have not been observed during shorebird surveys on the reservoir, and no recent observations have been reported.

Least weasels inhabit a variety of sites including old fields, hedgerows, and forested areas (Linzey 1998). Habitat for this species occurs within the Nottely Reservoir project area.

3.5.4.2 Environmental Consequences

Alternative A

Plants

The three known populations of state-listed plants on Nottely Reservoir lands occur on parcels used for Project Operations, Natural Resource Conservation, and Developed Recreation. These uses would continue under Alternative A, and TVA would assess under NEPA the potential impacts to these species that could result from any proposed actions on these parcels. Alternative A is unlikely to result in adverse impacts to listed plants.

Terrestrial Animals

No federally listed species are reported from TVA planning parcels on Nottely Reservoir. Forested areas on lands ranked low in their suitability as summer roost habitat for Indiana bats because of the lack of suitable roosting trees, young age of most stands, and the presence of thick midstory layers.

Under Alternative A, planned parcels would be allocated according to their current use. The vast majority of unplanned parcels are also committed to the existing land use. Adoption of Alternative A would not result in impacts to listed terrestrial animals.

Aquatic Animals

The blotched chub is known to occur in tributary streams at the upper end of Nottely Reservoir. However, these occurrences are not known near any TVA parcels, and Alternative A would not affect this listed fish.

Alternatives B and C

Plants

Under Alternatives B and C, the Georgia state-listed pink lady's slipper found on Parcel 6 would be managed for Zone 4 (Natural Resource Conservation) and no significant impacts to this population are expected. However, small populations of pink lady's slippers found on Parcel 2 (Zone 2, Project Operations) and Parcel 4 (Zone 6, Developed Recreation) could be impacted by dam operations or human disturbance within the recreational area. Populations of pink lady's slipper consisting of less than 100 plants are considered by Georgia Heritage botanists not worthy of protection, and therefore, no significant impacts to this species are expected. No other known populations of listed plant species occur within the surrounding area of Nottely Reservoir; therefore, no significant impacts are expected.

Terrestrial Animals

Under Alternatives B and C, the proposed allocations of planned parcels would reflect their current uses. These alternatives would allocate approximately 270 acres (32.6 percent) to Zone 4 (Natural Resource Conservation) and no acres to Zone 3 (Sensitive Resource Management) or Zone 5 (Industrial). Under Alternatives B and C, an additional 147 acres would be allocated to Zone 4 than under Alternative A, which should benefit animal species in the project area.

Aquatic Animals

Under Alternatives B and C, potential impacts to the blotched chub would be the same as those described under Alternative A.

3.5.5 Wetlands

A regional overview of the wetlands resource for the mountain reservoirs is provided in Section 3.1.5.

3.5.5.1 Affected Environment

Vegetated wetlands are generally uncommon on Nottely Reservoir due to the steep topography of the banks. NWI imagery for the entire reservoir indicates a little over 900 acres of aquatic beds and flats features that are both periodically flooded and unvegetated (Table 3-53). These include mud flats, areas of submerged/aquatic plants, or beaches/bars depending on season, weather patterns, and reservoir-level management. Forested wetlands on Nottely Reservoir are the second most common wetland type and are associated with the backs of coves where tributary streams enter the reservoir.

Table 3-53. Wetland Acreage - Nottely Reservoir

Combined Aquatic Beds and Flats (acres)	Emergent (acres)	Forested (acres)	Scrub-Shrub (acres)	All Types (acres)
911	17	106	11	1,045

Source: National Wetlands Inventory

3.5.5.2 Environmental Consequences

The impacts of the various alternatives on wetlands would be similar, and none would be adverse. Under all alternatives, parcels containing wetlands would generally continue to be managed as they have been in the past, and actions with the potential to affect wetlands would be assessed under NEPA prior to their implementation.

3.5.6 Floodplains

An overview of floodplains in the mountain reservoirs area is provided in Section 3.1.6.

3.5.6.1 Affected Environment

The affected area extends from the lower limit of the dam reservation at about NRM 20.2 upstream to about NRM 40.0 in Nottely Reservoir. The 100-year flood elevations for the Nottely River downstream of the dam vary from elevation 1,606.2-feet msl at NRM 20.2 to elevation 1,614.1-feet msl at NRM 21.0 (downstream of Nottely Dam). The 500-year flood elevations for the Nottely River downstream of the dam vary from elevation 1,612.1-feet msl

at NRM 20.2 to elevation 1,618.7-feet msl at NRM 21.0. Tabulations of the 100- and 500-year flood elevations are included in Appendix H.

The main watercourse in Nottely Reservoir is the Nottely River. The 100-year flood elevation for the Nottely River is 1,782.5-feet msl from Nottely Dam (NRM 21.0) to the upper end of Nottely Reservoir at about NRM 40.0. The 500-year flood elevation for the Nottely River is 1,785.5-feet msl from the dam to the upper end of Nottely Reservoir.

3.5.6.2 Environmental Consequences

The environmental consequences of each alternative are discussed in Section 3.1.6. None of the alternatives would have adverse effects on Nottely Reservoir floodplains.

3.5.7 Cultural Resources

An overview of cultural resources in the mountain reservoirs area is provided in Section 3.1.7.

3.5.7.1 Archaeological Resources

3.5.7.1.1 Affected Environment

Nottely Reservoir was the subject of a large archaeological survey conducted on 59 miles of noncontiguous shoreline (Adams and Messick 1997). A total of 157 archaeological sites were identified or revisited. Of these, only 10 were considered potentially eligible for listing in the NRHP. During the winter of 2005-2006, 16.4 miles of the reservoir shoreline were surveyed, and 17 sites were recorded or revisited (Gage and Herrmann 2006). Five of these were considered potentially eligible for listing in the NRHP.

Several surveys were also undertaken for the reconveyance of former TVA land back to TVA from the USFS (Seckinger 1977; Wynn 1986, 1988). A survey was undertaken for the Poteete Creek Campground (Hubbert 1981) during which two archaeological sites were identified. Both sites were heavily eroded, and both were considered ineligible for listing in the NRHP.

3.5.7.1.2 Environmental Consequences

Because no changes to existing land uses are proposed under any of the alternatives for Nottely Reservoir, the potential for impacts to archaeological resources is low. As described in Section 3.1.7, TVA proposes to implement a PA in Georgia for the identification, evaluation, and treatment of all historic properties potentially affected by this lands planning effort. Until the PA is executed, TVA will incorporate the phased identification, evaluation, and treatment procedure to effectively preserve historic properties, including archaeological resources, as required by Section 106 of the NHPA. TVA would adhere to the terms of this PA under all alternatives, and no adverse impacts on archaeological resources are expected.

3.5.7.2 Historic Structures

3.5.7.2.1 Affected Environment

Nottely Dam was closed on January 24, 1942, and its contribution to the war effort consisted of the storage and release of water as required for the regulation of flow at Hiwassee Dam and other downstream plants. A single hydropower-generating unit was added in 1956. Nottely Dam and Powerhouse are considered to be historic properties, as they are potentially eligible for listing in the NRHP.

3.5.7.2.2 Environmental Consequences

Because no changes to existing land uses are proposed under any of the alternatives for Nottely Reservoir, the potential for impacts to historic structures is low. Under all alternatives, TVA would implement the PA described above in Section 3.1.7.1.2. This PA would include historic structures, and with its implementation, no adverse effects on historic structures are anticipated. Until the PA is implemented, TVA would individually evaluate actions with the potential to affect historic structures as required by Section 106 of the NHPA.

3.5.8 **Managed Areas and Ecologically Significant Sites**

Managed areas, ecologically significant sites, and NRI streams are defined in Section 3.1.8.

3.5.8.1 **Affected Environment**

Table 3-54 lists these managed areas within 3 miles of Nottely Reservoir. The areas are grouped by closest distance to the reservoir; areas abutting or less than 0.1 mile from reservoir lands are listed as “adjacent.”

Table 3-54. Managed Areas and Ecologically Significant Sites Within 3 Miles of Nottely Reservoir

Name	Type of Area	Authority	Location County, State	Closest Distance to Reservoir
Chattahoochee National Forest	Managed area (MA)	Federal	Union, Ga.	Adjacent
Nantahala National Forest	MA	Federal	Cherokee, N.C.	1.8 miles north
Georgia Mountain Branch Experiment Station	MA	Federal	Union, Ga.	2.0 miles southeast

No ecologically significant sites or NRI streams are within 3 miles of Nottely Reservoir.

3.5.8.2 **Environmental Consequences**

None of the alternatives for Nottely Reservoir would change existing land uses, and therefore, no impacts to managed areas or ecologically significant sites are anticipated.

3.5.9 **Visual Resources**

The general visual environment of the mountain reservoirs is described in Section 3.1.9.

3.5.9.1 **Affected Environment**

Nottely Reservoir shoreline has been moderately to heavily developed for residential use with the exception of recreational areas and shoreline that is managed by the USFS. The reservoir is wide just upstream of the dam, and views from the water are mainly restricted to the middleground distances. Islands obscure longer views of the reservoir but enhance the scenic quality of the reservoir by providing a naturally appearing landscape that contrasts with shoreline development.

There are numerous undeveloped coves on Nottely Reservoir. Most of these coves are broad at the mouth and can extend several miles to their headwaters. Wooded shoreline and steep slopes adjacent to the water provide relatively private locations for fishing and overnight boat anchorage. Steep ridgelines adjacent to the reservoir provide a dramatic

contrast to the surrounding reservoir and gently sloping countryside, particularly when they are viewed from background distances.

A large recreation area (Poteete Creek Campground) and USFS land comprise large contiguous lands, which help preserve substantial stretches of undeveloped shoreline. Scenic values vary from excellent to good, and scenic integrity is high in this area. On other areas of the reservoir, numerous residences can be seen scattered around the shoreline along with a variety of water use facilities. The scenic value is moderately good, but scenic integrity is low. Concentrations of dwellings and related water use facilities are visually dominant on some parts of Nottely Reservoir where they create a strong adverse contrast with the natural landscape. Scenic value is fair, and scenic integrity is very low.

3.5.9.2 Environmental Consequences

Under all alternatives, the existing uses of TVA Nottely Reservoir lands would continue, and there would be no additional lands allocated to more development-oriented uses with the potential to adversely affect scenery. Future development along Zones 6 (Developed Recreation) and 7 (Shoreline Access) shorelines could affect visual resources. New structures, such as covered boat slips, could potentially reduce scenic class when viewing these structures from the water. As individual permits are reviewed for these lands, adherence to the SMP and any necessary commitments to protect visual resources would likely minimize these impacts. Under all alternatives, scenic integrity would remain moderate or higher, and much of the scenic landscape character of Nottely Reservoir would be maintained for long-term public enjoyment.

3.5.10 Water Quality and Aquatic Ecology

An overview of water quality and aquatic ecology for the mountain reservoirs area is provided in Section 3.1.10.

3.5.10.1 Affected Environment

Long-term (1990-2005) flows from Nottely Dam average about 389 cfs, which results in an average retention time of 220 days. Because of the long retention time, Nottely Reservoir becomes thermally stratified in the summer. Once stratification is established, oxygen in the deeper water cannot be replenished from the air or from contact with the oxygen-rich surface water. This results in low DO concentrations in the lower strata of the water column as DO is depleted by the natural process of decaying organic material. As a result, water discharged into the tailwater can be very cold and have low DO, impairing water quality. TVA mitigates this on Nottely Reservoir by forcing air into the water as it passes through the turbine. If additional aeration is needed, oxygen is injected into the reservoir above the dam.

Nottely Reservoir is located in the Blue Ridge Physiographic Province. Due to the geologic characteristics of the region, streams in the watershed have naturally low concentrations of nutrients and dissolved minerals. Consequently, the reservoir is expected to have low productivity (low chlorophyll concentrations). Nottely is a headwater reservoir with no upstream impoundments that alter flow patterns and physical and chemical characteristics of runoff. A majority of the watershed lies within the boundaries of the Chattahoochee National Forest.

Reservoir Ecological Health

Figure 3-5 shows the reservoir ecological health scores for Nottely from 1994 through 2005. The monitoring to derive these scores has been conducted at a forebay site at NRM 23.5 and a midreservoir station at NRM 31.0.

Since 1994, the ecological health of Nottely Reservoir rated “poor” in six of the eight years monitored. In 2001, Nottely rated “fair” with the highest score (68) to date. Because of the substantially higher score in 2001, Nottely Reservoir was sampled again in 2002 when it rated “poor.” In 2003 and 2005, Nottely Reservoir’s ecological health rating again was low with a “low fair” (only one point above the “poor” category) and “poor” rating, respectively, indicating the higher rating in 2001 was only temporary. Year 2001 had near-record low runoff during the first half of the year (January through May). The higher ecological health score was likely the result of the unusually dry conditions, which led to substantially improved DO conditions (the only “good” rating for DO) in the forebay and lower chlorophyll concentrations.

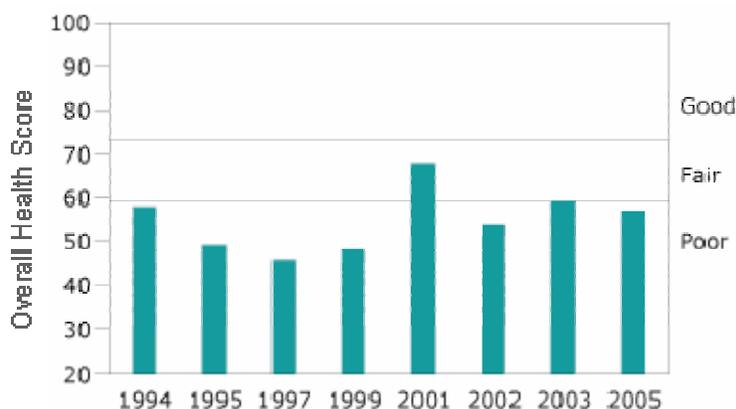


Figure 3-5. Nottely Reservoir Ecological Health Ratings, 1994-2005

Dissolved Oxygen

DO has rated “poor” except for a “good” rating at the forebay in 2001 and a “fair” rating at the midreservoir in 2005. In the forebay, a large proportion of the water column typically contains low DO levels (<2 mg/L) during mid- to late summer. Year 2001 was an exception, as oxygen concentrations were significantly higher and rated “good.” DO typically rates “poor” at the midreservoir, but significant rain events in late summer 2005 helped replenish oxygen in the upper reaches of the reservoir.

Sediment Quality

Sediment quality has been “good” at both locations with the exception of a “fair” rating at the midreservoir in 1995, the result of low concentration of DDE being detected. A “good” rating means no pesticides or PCBs were detected and concentrations of metals were within expected background levels.

Chlorophyll

Average chlorophyll concentrations at both locations indicate a general trend of increasing since the early 1990s. Ratings at the forebay have shifted from “good” and “fair” ratings to “fair” and “poor,” while concentrations have been high enough to rate “poor” most years at the midreservoir.

Table 3-55. Nottely Reservoir Water Quality and Sediment Ratings, Reservoir Vital Signs Monitoring Data 1991-2005

	Monitoring Years										
	1991	1992	1993	1994	1995	1997	1999	2001	2002	2003	2005
Nottely Forebay											
Dissolved Oxygen	Poor	Poor	Poor	Poor	Poor	Poor	Poor	Good	Poor	Poor	Poor
Sediment	NS	NS	Good								
Chlorophyll	Good	Good	Good	Fair	Good	Poor	Poor	Fair	Fair	Poor	Poor
Nottely Midreservoir											
Dissolved Oxygen	NS	NS	Poor	Fair							
Sediment	NS	NS	Good	Good	Fair	Good	Good	Good	Good	Good	Good
Chlorophyll	NS	NS	Fair	Poor							

NS = Not sampled

Benthic Monitoring

At the forebay, benthic community scores rated “poor” with the exception of 1994 and 2001, when it rated “fair.” The midreservoir sampling station scored “good” five of the eight years monitored, “fair” two of the years, and “poor” one year (Table 3-56).

Table 3-56. Recent (1994-2005) Benthic Community Ratings for Nottely Reservoir

Station	River Mile	1994	1995	1997	1999	2001	2002	2003	2005
Forebay	23.5	Fair	Poor	Poor	Poor	Fair	Poor	Poor	Poor
Midreservoir	31	Good	Poor	Fair	Fair	Good	Good	Good	Good

Fisheries Monitoring

The RVSMF began annual fish sampling on Nottely Reservoir in 1994. A list of fish species commonly found in Nottely Reservoir can be found in Appendix I. The fish community in Nottely Reservoir has consistently rated “fair” at both the forebay and midreservoir sampling stations.

In 2004, the SFI rated above the Valleywide average for black bass and spotted bass, and below for largemouth bass (Table 3-57).

Table 3-57. Sport Fishing Index Scores for Selected Sport Fish Species in Nottely Reservoir, 2004

Fish Species	2004 Score	2004 Valleywide Average
Black Basses	36	32
Largemouth Bass	28	31
Spotted Bass	32	28

Swimming Advisories

There are no state advisories against swimming in Nottely Reservoir. TVA performed *E. coli* bacteria monitoring at five locations in 2007: Poteete Creek Recreation Area Beach, Nottely Dam Reservation Boat Ramp, Jack's Creek Boat Ramp, Union County Recreation Complex at Butternut Creek Mile 1.0, and Nottely Dam Reservation "Bluff" informal swim area.

Fish Consumption Advisories

There are two fish consumption advisories in effect at Nottely Reservoir. The State of Georgia advises against eating more than one meal per week of largemouth bass greater than 12 inches or striped bass greater than 16 inches because of mercury contamination.

TVA collected channel catfish and largemouth bass from Nottely Reservoir for tissue analysis in autumn 2005. The results, which were similar to those of previous years, were provided to state agencies in Georgia. TVA will analyze fish from Nottely Reservoir again in autumn 2009.

State(s) Impaired Waters

The Georgia Environmental Protection Division assigned use support ratings to waters in the Nottely Reservoir watershed based on available biological, chemical, and/or physical data. A total of 24 miles of monitored stream are listed as impaired (Table 3-58) (GAEPD 2006).

Table 3-58. Impaired Waters in the Watershed of Nottely Reservoir

Stream/River Name	State	Miles	Description	Water Quality Stressor/Source
Butternut Creek	Ga.	2	Blairsville	Biota impacted, fecal coliform /nonpoint
Lower Youngcane Creek	Ga.	2	Headwaters to Youngcane Creek	Biota impact/ nonpoint
Nottely River	Ga.	8	US 19 to Nottely Reservoir	Fecal coliform/ nonpoint
Nottely River	Ga.	6	Right/left forks to US 19	Fecal coliform/ nonpoint
Nottely River	Ga.	2	Downstream of Nottely Reservoir	Biota Impacted/ dam releases
Youngcane Creek	Ga.	4	Little Youngcane Creek to Nottely Reservoir	Fecal coliform/ nonpoint

Water Supply

Notla Water Authority currently withdraws water from Nottely Reservoir, and the city of Blairsville, Georgia, currently has an intake in Nottely Reservoir's supporting watershed. The 2005 average daily water demand for these intakes were 0.61 MGD (Notla) and 0.314 MGD (Blairsville), a total daily average demand of 0.924 MGD.

3.5.10.2 Environmental Consequences

Alternative A

Under Alternative A, the allocated land uses for the 658 acres that are planned are represented by three land use allocations: Project Operations (443 acres), Natural Resource Conservation (123 acres), and Recreation (92 acres) (Section 3.5.1). TVA would not designate land use allocations for over 170 acres of TVA land on Nottely Reservoir that are not planned with the Forecast System (Table 2-4). Of the 37 unplanned parcels, only two parcels are uncommitted. The acreage for the unplanned, uncommitted parcels total less than an acre, and both parcels are used for natural resource conservation.

Under Alternative A, any proposed use of TVA public land on Nottely Reservoir would be assessed for compliance with TVA's Land Policy, SMP, and Section 26a regulations. Proposals would be subject to environmental reviews, which would require the protection of water quality through either restricted development or the commitment to use BMPs to minimize impacts. Therefore, activities under Alternative A should not significantly impact water quality and aquatic life.

Alternatives B and C

Allocations under Alternatives B and C are identical on Nottely Reservoir. No significant changes to land use are expected to occur on Nottely Reservoir under either alternative because the allocations are consistent with existing land use on all parcels. Therefore, no significant impacts to water quality and aquatic life are expected in association with these alternatives.

3.5.11 Air Quality and Noise

An overview of the air quality of the mountain reservoirs area is provided in Section 3.1.11. Under all of the alternatives, the existing uses of Nottely Reservoir lands would not change, and there would be no adverse impacts to air quality. Noise has previously been discussed in Section 3.1.11.2.

3.5.12 Socioeconomics

The socioeconomic conditions of the mountain reservoirs area are described in Section 3.1.12.

3.5.12.1 Affected Environment

3.5.12.1.1 Population and Economy

Population: Tables 3-59 and 3-60 contain data regarding the population of the area. Union County, Georgia, had a population of 17,289 in 2000, an increase of 84.1 percent since 1980. This was a much higher rate than in the state or the nation. The rate of growth in the county, state, and nation was higher from 1990 to 2000 than from 1980 to 1990.

Estimates for 2006 indicate that the population of Union County has grown an additional 19.5 percent since 2000. This remains a faster rate than the state and much faster than the nation.

Projections through 2020 indicate that the county will continue to have much faster population growth than the state and the nation over that time. All of those rates are projected to be less than for 1980-2000.

Table 3-59. Population – Union County

Area	1980	1990	2000	2006 (Estimate)	2020 (Projection)	Density (persons per square mile) 2000
Union County	9,390	11,993	17,289	20,652	28,345	53.4
Georgia	5,462,982	6,478,216	8,186,453	9,363,941	11,463,602	141.4
United States	226,545,805	248,709,873	281,421,906	299,398,484	335,804,546	79.6

Source: U.S. Census Bureau (undated a-e) and extrapolations from Georgia Office of Planning and Budget (2005)

Table 3-60. Recent and Projected Population Changes – Union County (Percentage Growth)

Area	1980-1990	1990-2000	1980-2000	2000-2006	2000-2020	1980-2020
Union County	27.7	44.2	84.1	19.5	63.9	201.9
Georgia	18.6	26.4	49.9	14.4	40.0	109.8
United States	9.8	13.2	24.2	6.4	19.3	48.2

Source: Calculated from data in Table 3-59

The county is decidedly rural in distribution of population. As noted in Table 3-59, the population density is substantially lower than the state and much lower than the nation. The only incorporated town in the county is Blairsville, Georgia, with 659 residents in 2000. About 96 percent of the population in the county lives outside of the city.

Economy: Table 3-61 contains the most recent annual data regarding the amounts and types of employment, amounts of unemployment, and incomes in the area. In 2005, Union County had 9,850 people employed on average. The county has a higher percentage of farmers, retail employees, and government employees than either the state or the nation. The county has a much lower percentage of manufacturing employees than the state or nation. The average unemployment rate for 2006 in the county was lower than either the state or the nation. Per capita personal income in 2005 was lower in the county than in the state and much lower than in the nation.

Table 3-61. Employment, Unemployment, and Income – Union County, Georgia

Area	Employment, 2005	Employment (percent of total)					Unemploy- ment Rate, 2006	Per Capita Personal Income, 2005
		Farm	Manufac- turing	Retail Trade	Govern- ment	Other		
Union County	9,850	4.3	3.1	14.7	15.8	62.1	3.7	25,135
Georgia	5,197,037	1.4	9.0	10.7	14.5	64.5	4.6	30,914
United States	174,249,600	1.7	8.5	10.9	13.7	65.2	4.6	34,471

Source: U.S. Bureau of Economic Analysis (undated) and Georgia Department of Labor (undated)

3.5.12.1.2 Environmental Justice

The minority population in the Nottely Reservoir area is small (Table 3-62). In Union County, Georgia, 3.2 percent of the total population was estimated to be minorities in 2006, which was far below the state average of 41.1 percent and the national average of 33.6 percent. The estimated poverty rate in the county in 2004 was 12.7 percent, lower than the state rate of 13.7 percent and equal to the national rate of 12.7 percent.

Table 3-62. Minority Population, 2006, and Poverty, 2004 – Union County

Area	Population, 2006				Percent Below Poverty Level, 2004
	Total	Nonwhite	White Hispanic	Percent Minority	
Union County	20652	452	210	3.2	12.7
Georgia	9,363,941	3,205,172	640,521	41.1	13.7
United States	299,398,484	59,652,230	41,001,760	33.6	12.7

Source: U.S. Census Bureau (undated d and 2004)

3.5.12.2 Environmental Consequences

The current land uses at Nottely Reservoir would continue under all of the alternatives. Other than the possible expansion of existing recreation facilities and construction of private water use facilities by adjacent residential landowners, there would be little development that would affect socioeconomic conditions. None of the alternatives would result in disproportionate impacts on minority or disadvantaged populations.

3.6 Ocoees (1, 2, and 3) Reservoirs

3.6.1 Land Use

An overview of the land use for the mountain reservoirs is provided in Section 3.1.1.

3.6.1.1 Affected Environment

As a result of the complex design of the Ocoee dams, reservoirs, water diversion systems, and powerhouses, TVA's land ownership is also complex. It consists of approximately 375 acres on 39 parcels including reservations at each dam and powerhouse, land overlying the Ocoee 3 tunnel, and a narrow strip along Ocoee 1 Reservoir fronting National Forest System land. All of these parcels are considered committed and TVA is not proposing changes in use or management. As shown in Table 1-1, TVA initially purchased 7,785 acres of land (4,135 acres for Ocoee 1, 389 acres for Ocoee 2, and 3,261 acres for Ocoee 3) for the reservoirs. Ninety three percent (7,277 acres) of the lands were later transferred to the USFS, and 133 acres (1.7 percent) were sold.

TVA retained 375 acres of land divided into 39 parcels on the Ocoee projects. All of the parcels are committed to existing land uses. The dam reservation, powerhouse reservation, and other land supporting TVA project operations account for 100 percent of the calculated acreage. As previously mentioned, the acreage of the narrow strip of TVA-retained land fronting the land TVA transferred to the USFS has not been calculated; therefore, the committed uses associated with those parcels are not represented in the committed acreage total. However, there are 27 such parcels on Ocoee 1 that are committed through the transfer agreement with the USFS. Most of this land is used for natural resource conservation and dispersed recreation, and some of the land is managed for developed recreation where it fronts recreational facilities managed or leased by the USFS. The Ocoee 2 and 3 projects are completely committed to project operations, although a significant amount of recreation also occurs on the parcels.

TVA owns 100 percent of the approximately 110 miles of shoreline on the Ocoee projects (Table 1-2). This shoreline either fronts land TVA retained for project operations or fronts the land TVA retained fronting the land transferred to the USFS. The USFS manages most of the land along all three reservoirs, and there is no shoreline along the reservoir available for residential access.

Parcels containing prime farmland surrounding Ocoee 1 Reservoir are presented in Table 3-63. Little, if any, prime farmland soils are found in the areas surrounding Ocoee 2 and 3 reservoirs.

Table 3-63. Acres of Prime Farmland in Selected Parcels – Ocoee 1 Reservoir

Parcel Number	Total Parcel Acreage	Acres	Zone Allocation	Description
1	60.1	9.8	2	Dam Reservation (Overlook)
2	17.3	9.6	2	Dam Reservation (Sugarloaf Mountain Recreation Area)

3.6.1.2 Environmental Consequences

Alternative A

As shown in Table 2-3, under Alternative A, TVA allocated all of its 375 acres on the Ocoee reservoirs for Project Operations. Under the Forecast System, no acreage was allocated to any other use. The Forecast System does not provide a land use plan for the TVA-retained land fronting the land TVA transferred to the USFS. This land is considered committed to the back-lying use and will continue to be managed by the USFS according to the conditions of the transfer agreement and subsequent USFS permits. The acreage of these parcels is unknown.

There would be no potential for change in land use under Alternative A because all of the parcels on the Ocoees are committed to their existing uses as shown in Table 2-2.

No impacts to prime farmlands are expected.

Alternatives B and C

Under Alternatives B and C, no changes would be made to the previously allocated uses under Alternative A; all parcels allocated for Project Operations under Alternative A would be allocated to Zone 2 (Project Operations) under Alternatives B and C. The previously unplanned narrow strip of TVA land fronting the National Forest System property would be allocated to a zone compatible with its current use, either to Zone 4 (Natural Resource Conservation) or to Zone 6 (Developed Recreation) where the lands front USFS developed recreation areas. The acreage for these narrow strips of TVA-retained land fronting USFS land is unknown and therefore not included in the Zones 4 and 6 acreage totals. These narrow strip parcels would continue to be managed as they now are, and their individual land uses would not change. Alternatives B and C would not affect prime farmland.

3.6.2 Recreation

An overview of the recreation resource for the mountain reservoirs is provided in Section 3.1.2.

3.6.2.1 Affected Environment

Whitewater Rafting Recreation

In 1984, TVA entered into a 35-year agreement with the State of Tennessee to provide 116 days of controlled water releases for recreation purposes between Ocoee 2 Dam and an area at Caney Creek below Ocoee 2 Powerhouse. In addition, TVA granted an easement to the state over certain lands owned by TVA (Ocoee 2 Parcels 1 and 3) for access and take-out areas for the operation, management, and maintenance of a whitewater recreation area. The agreement also provided for \$1 million to be placed in an interest-bearing trust fund for the state's operation and management of the area.

Ocoee 2 Dam Reservation (Parcel 3) functions doubly as a put-in location for Ocoee River whitewater rafting. The heavily used public recreation area includes parking and drop-off areas for local outfitters, restroom facilities, a pedestrian access ramp to the river, and a picnic area. This point is a staging area for over 200,000 rafters and kayakers that visit the river each year. The put-in location and the river course below are heavily used from late March through early November.

Most of the recreation facilities on Ocoee parcels are allocated for Project Operations due to the presence of dams and powerhouses.

Ocoee 1 (Parksville)

There are 10 TVA parcels on Ocoee 1 (Parksville) Reservoir that support developed recreation facilities. These developed recreation areas are summarized in Table 3-64.

Seven parcels front the USFS cabin sites (area of the reservoir with rustic private cabin sites allowed by the USFS under 20-year recreation residence special use permits), two parcels front private camps on USFS lands, and five parcels front USFS day use areas and campgrounds.

The one public campground on Ocoee 1 (Parksville) Reservoir, Parksville Campground (Parcel 17), is owned and operated by the USFS.

There is one commercial marina operating on Ocoee 1 (Parksville) Reservoir. Lake Ocoee Inn and Marina (Parcel 4) is privately operated, and this marina was certified as a TVA Clean Marina in October 2005.

Four recreation areas contain at least one boat ramp: one at Lake Ocoee Inn and Marina, and three operated by the USFS.

There are two stream access sites located near Ocoee 1 (Parksville) Reservoir. TVA manages the access site on the Parksville Dam Reservation (Parcel 1). The State of Tennessee manages the Big Creek Private Paddler Take-Out (Parcel 19).

There is one day use area with significant facilities on Ocoee 1 (Parksville). Sugarloaf Mountain Park is owned by TVA and operated by the State of Tennessee on Parcel 2 of the dam reservation. It provides restrooms, picnic tables, grills, interpretive signs, and a 1:10 scale model of the 1996 Olympic whitewater section of the Ocoee River.

Table 3-64. Recreation Facilities on Ocoee 1 (Parksville) Reservoir

Area Name	County, State	Sector	Operator	Land Ownership	Parcel Number	Campground	Marina	Picnic Tables	Boat Ramp	Stream Access	Paved Trails	Fishing Piers	Other
Lake Ocoee Inn and Marina	Polk, Tenn.	Private	Commercial	USFS**	4		X		X				X
Parksville Dam Reservation*	Polk, Tenn.	Public	TVA/State of Tenn.	TVA	1, 2			X		X			X
East Parksville Boat Ramp	Polk, Tenn.	Public	USFS	USFS**	13				X				
Kings Slough Ramp	Polk, Tenn.	Public	USFS	USFS**	23				X				
Mac Point Beach	Polk, Tenn.	Public	USFS	USFS**	15			X					X
Parksville Beach	Polk, Tenn.	Public	USFS	USFS**	7			X					X
Parksville Boat Ramp	Polk, Tenn.	Public	USFS	USFS**	13				X				

Area Name	County, State	Sector	Operator	Land Ownership	Parcel Number	Campground	Marina	Picnic Tables	Boat Ramp	Stream Access	Paved Trails	Fishing Piers	Other
Parksville Campground	Polk, Tenn.	Public	USFS	USFS**	17	X							X
Big Creek Private Paddler Take-Out *	Polk, Tenn.	Public	Tenn.	USFS**	19					X			X
Camp Ocoee	Polk, Tenn.	Quasi-Public	YMCA	USFS**	23								X
Camp Cherokee	Polk, Tenn.	Quasi-Public	First Baptist Church of Cleveland	USFS**	21								X

* = Stream access site

** = TVA retained below MSC

Ocoee 2

Two TVA parcels on Ocoee 2 Reservoir and associated river reaches support developed recreation facilities. Facilities on Parcels 1 and 3 include stream access areas for commercial and private boaters, restroom facilities, and picnic tables (Table 3-65).

Table 3-65. Recreation Facilities on Ocoee 2 Reservoir

Area Name	County, State	Sector	Operator	Land Ownership	Parcel Number	Campground	Marina	Picnic Tables	Boat Ramp	Stream Access	Paved Trails	Fishing Piers	Other
Caney Creek (Middle Take-out) *	Polk, Tenn.	Public	State of Tenn.	TVA	3					X			X
Rogers Creek (Upper Take-out and Middle Put-in) *	Polk, Tenn.	Public	State of Tenn.	TVA/USFS	1			X		X			X

* = Stream access site

Ocoee 3

Two TVA parcels on Ocoee 3 Reservoir support developed recreation facilities (Table 3-66). The only campground on Ocoee 3 Reservoir lands is Thunder Rock Campground, located immediately downstream of the Ocoee 3 Powerhouse on Parcel 5. It is managed by the USFS under a public recreation license agreement with TVA.

One stream access site is located in the Ocoee 3 watershed. The State of Tennessee manages the access site on the Upper Ocoee Put-In (Parcel 1).

Table 3-66. Recreation Facilities on Ocoee 3 Reservoir

Area Name	County, State	Sector	Operator	Land Ownership	Parcel Number	Campground	Marina	Picnic Tables	Boat Ramp	Stream Access	Paved Trails	Fishing Piers	Other
Upper Ocoee Put-In *	Polk, Tenn.	Public	State of Tenn.	TVA	1					X			X
Thunder Rock Campground	Polk, Tenn.	Public	USFS	TVA	5	X		X					X
USFS Whitewater Center	Polk, Tenn.	Public	USFS	USFS	N/A			X					X

N/A = Not applicable

* = Stream access site

Dispersed Recreation

Inventory data was only collected for on-reservoir recreation areas. Due to the riverine nature of Ocoee 2 and 3 reservoirs, a large majority of the recreation areas are not in the table provided. There are many recreation areas on surrounding lands that are managed by the USFS which are dispersed in nature.

3.6.2.2 Environmental Consequences

Alternative A

Under Alternative A, no land is allocated to Zone 6 (Developed Recreation) on the three Ocoee reservoirs. However, under Alternative A, 16 unplanned parcels currently support developed recreation. The unplanned parcels are all committed to a developed recreation use through a transfer agreement with the USFS.

Under Alternative A, TVA would not allocate any additional parcels for Public or Commercial Recreation use on any of the Ocoee reservoirs. The unplanned parcels that are committed to developed recreation would continue to be used for that purpose. Therefore, any future demand for recreational needs would have to be met by expansion of recreation facilities in these existing areas. Many of the Project Operations parcels also support recreational use such as Thunder Rock Campground. Under Alternative A, potential environmental impacts would be insignificant since parcels utilized for developed recreation (both unplanned and planned parcels) would not change. The potential for impacts from any new facilities would be subject to review and potential mitigation under NEPA.

Under Alternative A, no land use changes are proposed of any parcels, and therefore, potential impacts to dispersed recreation would be restricted to expansions within existing committed parcels (e.g., campground expansion). Potential impacts to dispersed recreation of this nature are expected to be insignificant.

Alternatives B and C

Under Alternatives B and C, 16 narrow strip parcels are allocated to Zone 6 (Developed Recreation) on the Ocoee reservoirs lands. All of these parcels are committed to a developed recreation use and would be allocated to that use as Zone 6. All of the parcels

currently support recreational use with existing facilities. The parcels allocated to Zone 6 under Alternatives B and C include those unplanned parcels under Alternative A that are committed to developed recreation uses.

Under Alternatives B and C, any future demand for recreational needs would have to be met by expansion of recreation facilities in these existing areas allocated to Zone 6. These areas are the same under all alternatives, and since there would be no new parcels allocated to Developed Recreation, the potential environmental impacts would be the same. The potential for impacts from any new facilities within existing areas would be subject to review and potential mitigation under NEPA and therefore should be insignificant.

3.6.3 Terrestrial Ecology

An overview of terrestrial ecology (plant and wildlife communities) is provided in Section 3.1.3.

3.6.3.1 Plant Communities

3.6.3.1.1 Affected Environment

The physiognomic vegetative classes commonly found on lands within and around the Ocoee reservoirs are evergreen forest, evergreen-deciduous forest, deciduous forest, shrublands, and herbaceous vegetation. Most of the evergreen forests are in the form of pine plantations. Mixed pine-hardwood forests dominate the region with smaller areas of deciduous forest (mainly oak-hickory dry forest on the ridges and more mesic hardwood forest with beech on the slopes). Scrub-shrub wetland communities occur along the banks of the river, and herbaceous vegetation is commonly found along transmission line and roadway rights-of-way and grassy areas within the dam and powerhouse reservations.

A small percentage of the forests are considered to be evergreen forests and consist of small stands of Virginia pine and small stands of white pine. Evergreen-deciduous forest, the most common forest type, is dominated by stands of mixed pine-hardwood trees. Several species of xeric ferns (hairy lip fern and cliff-brake fern) occur on rocky bluffs along US 64 along with invasive nonnative plants such as Japanese knotweed, princess tree, and tree-of-heaven.

Deciduous forest occurs mainly as oak-hickory forest (mesic to xeric) and mesic hardwood forest on slopes. Oak-hickory forests common on xeric ridges grade into more mesic slopes.

The globally rare (G2) community known as the Hiwassee/Ocoee River Boulder Scour Vegetation occurs in a 3.2-mile stretch of the Ocoee River between Ocoee 2 Powerhouse and Ocoee 2 Dam. This community is restricted in distribution, being limited to phyllite or graywacke boulders in unimpounded sections of rivers with a narrowed flow and a higher gradient regime. The habitat of this association has been affected and limited by the effects of impoundments and resulting changes in flooding regimes. It is threatened by recreational use, vegetational succession, and alterations in the flow regime. In this temporarily flooded river scour community, the herbaceous species are limited to the cracks and crevices of the boulders, with Ruth's golden aster dominating in many places. The scouring of the river controls the encroachment of woody vegetation, but small saplings of American sycamore, river birch, and Virginia pine can be found. Virginia willow, tag alder, and silky dogwood are shrubs found along the river.

Invasive plants occur on most of the planned TVA parcels around the Ocoee reservoirs. The species present include Chinese lespedeza, Chinese privet, Japanese honeysuckle, Japanese knotweed, Japanese stilt grass, Johnson grass, kudzu, mimosa, multiflora rose, princess tree, and tree-of-heaven.

3.6.3.1.2 Environmental Consequences

Alternative A

Under Alternative A, the impacts to the Hiwassee/Ocoee River Boulder Scour Vegetation G2 community would be as previously described in the ROS EIS (TVA 2005a). The portion of the river containing the globally rare (G2) plant community is presently being managed by the USFS. To minimize impacts, the USFS, in cooperation with TVA, is displaying signs on the rocks to warn rafters not to disturb the area of the rare plant community. With the exception of the Hiwassee/Ocoee River Boulder Scour Vegetation G2 community, most plant communities encountered on the Ocoee reservoirs are common and representative of the Blue Ridge Mountains. No additional impacts are expected to the terrestrial ecology of the Ocoee reservoirs.

Alternatives B and C

Under Alternatives B and C, the impacts on plant communities would be the same as under Alternative A.

3.6.3.2 **Wildlife Communities**

3.6.3.2.1 Affected Environment

TVA parcels around the Ocoee reservoirs are allocated for Project Operations. Properties on the Ocoee reservoirs contain evergreen, evergreen-deciduous, deciduous, southern Appalachian cove forests, and limited early successional habitats. Much of the landscape is extremely rugged with steep hillsides, dry ridge tops, and deeply incised stream corridors. Most of the terrestrial animal species observed here are typical of the region.

Bat surveys performed in the vicinity indicate that red, big brown, and silver-haired bats as well as northern *Myotis* and eastern pipistrelle are common in the area. Belted kingfisher, great blue heron, green heron, gray squirrel, white-tailed deer, and wild turkey are common wildlife frequently observed in the area. American crow, broad-winged hawk, and green frog were also observed in the area.

3.6.3.2.2 Environmental Consequences

Alternative A

Under Alternative A, all planned parcels on the Ocoee reservoirs are allocated for Project Operations. Several properties on Ocoee 1 Reservoir are unplanned; these areas front recreation areas and USFS lands. The existing uses of all these parcels would continue and would not result in adverse impacts to wildlife.

Alternatives B and C

Under Alternatives B and C, allocated uses for Ocoee 2 and 3 reservoirs will remain the same as under Alternative A. The new allocations to Zone 4 (Natural Resource Conservation) and Zone 6 (Developed Recreation) on narrow strip parcels on Ocoee reservoirs would be based on their current use. Adoption of Alternative B or C is not expected to result in adverse impacts to wildlife.

3.6.4 Endangered and Threatened Species

A regional overview of endangered and threatened species is provided in Section 3.1.4.

3.6.4.1 Affected Environment

One federally listed plant, Ruth's golden aster, and 21 state-listed plants are known from within 5 miles of the Ocoee reservoirs (Table 3-67). In addition, monkey-face orchid, a federal candidate for listing, is known from Polk County. Other than horsesugar found on Parcels 1 and 2 on Ocoee 3 Dam Reservation, no other listed plants were found on 375.3 planned acres for the Ocoee reservoirs

Table 3-67. Federally and State-Listed as Endangered, Threatened, and Other Species of Conservation Concern Known From the Vicinity of the Ocoee Reservoirs in Polk County, Tennessee

Common Name	Scientific Name	Federal Status	State Rank	State Status
Plants				
American ginseng	<i>Panax quinquefolius</i>	--	S3S4	S-CE
Ash-leaf bush-pea*	<i>Thermopsis fraxinifolia</i>	--	S3	THR
Broad-leaved tickseed	<i>Coreopsis latifolia</i>	--	S1S2	END
Chalk maple	<i>Acer saccharum ssp. leucoderme</i>	--	S3	SPCO
Cow parsnip	<i>Heracleum maximum</i>	--	S2	SPCO
Eastern turkeybeard	<i>Xerophyllum asphodeloides</i>	--	S3	THR
Fraser's loosestrife*	<i>Lysimachia fraseri</i>	--	S2	END
Giant hyssop	<i>Agastache scrophulariifolia</i>	--	S1S2	THR
Horsesugar*	<i>Symplocos tinctoria</i>	--	S2	SPCO
Large cranberry	<i>Vaccinium macrocarpon</i>	--	S2	THR
Monkey face orchid	<i>Platanthera integrilabia</i>	CAN	S2S3	END
Mountain bush-honeysuckle	<i>Diervilla rivularis</i>	--	S2	THR
Mountain honeysuckle	<i>Lonicera dioica</i>	--	S2	SPCO
Naked-fruited rush	<i>Juncus gymnocarpus</i>	--	S3	SPCO
Nestronia	<i>Nestronia umbellula</i>	--	S1	END
Nevius' stonecrop*	<i>Sedum nevii</i>	--	S1	END
Northern bush-honeysuckle	<i>Diervilla lonicera</i>	--	S2	THR
Pink lady's slipper	<i>Cypripedium acaule</i>	--	S4	E-CE
Ruth's golden aster*	<i>Pityopsis ruthii</i>	END	S1	END
Sedge	<i>Carex purpurifera</i>	--	S2	THR
Southern lobelia	<i>Lobelia amoena</i>	--	S1S2	THR
Sweet pinesap	<i>Monotropsis odorata</i>	--	S2	THR
Tawny cotton-grass	<i>Eriophorum virginicum</i>	--	S1S2	THR
Fish				
Tennessee dace*	<i>Phoxinus tennesseensis</i>	--	S3	NMGT
Amphibian				
Seepage salamander*	<i>Desmognathus aeneus</i>	--	S1	NMGT
Birds				
Bald eagle	<i>Haliaeetus leucocephalus</i>	--	S3	NMGT
Red-cockaded woodpecker	<i>Picoides borealis</i>	END	SH	EXTI
Swainson's warbler*	<i>Limnothlypis swainsonii</i>	--	S3	NMGT

Common Name	Scientific Name	Federal Status	State Rank	State Status
Mammals				
Masked shrew*	<i>Sorex cinereus</i>	--	S4	NMGT
Smoky shrew*	<i>Sorex fumeus</i>	--	S4	NMGT
Woodland jumping mouse*	<i>Napaeozapus insignis</i>	--	S4	NMGT
Reptile				
Northern pine snake*	<i>Pituophis melanoleucus melanoleucus</i>	--	S2	THR
Snails				
Blue-gray glyph*	<i>Glyphyalinia ocoae</i>	--	S2	NOST
Ocoee covert*	<i>Fulmonelix archeri</i>	--	S1	NOST

-- = Not applicable

*Species descriptions in the text

Rank abbreviations: S1 = Critically imperiled, S2 = Imperiled, S4 = Widespread, abundant, and apparently secure

Status abbreviations: NMGT = In need of management, NOST = No state status, THR = Threatened

Ash-leaf bush pea is a southern Appalachian endemic that occurs from North Carolina and Tennessee, into northern portions of Georgia and South Carolina. Habitat includes openings in dry woodlands and ridges (Weakley 2006). There are currently eight known sites for this species in Polk County with one known from the Gee Creek wilderness area. No suitable habitat was found on the TVA lands.

Fraser's loosestrife occurs in eastern Tennessee, the Carolinas, Alabama, and Georgia with disjunct populations in southern Illinois and northwestern Tennessee. Fraser's loosestrife is generally found in wet areas such as alluvial meadows, moist stream and riverbanks, flats along streams, moist pastures, and roadside ditches, yet it is also known from rocky upland and hardwood forests (ibid). There are currently 10 populations reported from Polk County with two considered historic records. Habitat for Fraser's loosestrife occurs along the bluffs above US 64, which runs parallel to the Ocoee River. Plants are known to occur on USFS land on the bluffs adjacent to Parcel 1 of Ocoee 2.

The range of **horsesugar**, a common subcanopy woody species on the coastal plain, extends into the southeastern Tennessee and western Carolina mountains (ibid). Eight populations of horsesugar have been reported from areas surrounding the Ocoee reservoirs. During field reviews on Parcels 1 and 2 at Ocoee 3 Dam, plants were found growing in the understory of evergreen-deciduous forests. Common trees found in the canopy were hickory, oak, and pine species. Other common trees observed were tulip poplar and sweetgum. In addition to the horsesugar, other associated understory species were American holly, buffalo nut, Carolina allspice, flowering dogwood, serviceberry, and sourwood and vine hydrangea.

Nevius' stonecrop is a succulent herb that is endemic to Polk and Marion counties in Tennessee, north central and east central Alabama, and west central Georgia. It occurs on gneiss rock outcrops on river bluffs (ibid). There are currently nine records known in the Cherokee National Forest, all restricted to the Ocoee River Gorge growing on rocky outcrops above US 64, which runs parallel to the Ocoee River. Plants are known to occur on the bluffs near Parcel 3 of Ocoee 2.

Ruth's golden aster (see Section 3.1.4) is known from a 3.2-mile reach of the Ocoee River, between Ocoee 2 Dam and Ocoee 2 Powerhouse. Approximately 600 plants occur in this area (TVA 2005b). Since 1987, there has been a gradual increase in numbers of

Ruth's golden aster on the Ocoee River. However, in 2007, five out of the six populations of Ruth's golden aster declined in numbers, possibly related to widespread drought conditions. Presently, the USFS in cooperation with TVA is displaying signs on the rocks where the rare plant populations occur to warn rafters not to disturb the plants. River flows are managed as described in the ROS EIS (TVA 2005a).

The **Tennessee dace**, a state-listed species, occurs in tributaries to Ocoee 1 Reservoir. It inhabits low-gradient woodland tributaries of the Tennessee River and prefers shallow pools with associated debris and undercut banks (Etnier and Starnes 1993).

Seepage salamanders frequent seepages with moist leaf litter but are occasionally found beneath logs, moss mats, and other surface objects (Petranka 1998). This species is expected to occur scattered throughout the Ocoee Reservoir project area. They are known from Parcel 16.

Bald eagles nest on Parcel 20 along the Caney Creek embayment of Ocoee 1 Reservoir. Eagles have successfully raised young at this location annually since 2005.

As previously described in Section 3.1.4, the **red-cockaded woodpecker** is extirpated from the mountain reservoirs area. Other listed animals previously reported in the area and likely or known to occur on the Ocoee reservoirs lands are described below.

Swainson's warblers nest in wooded bottomlands and ravines with a thick, shrubby understory. Habitat for this species exists along most of the tributaries to the Ocoee River in the vicinity of the Ocoee reservoirs.

Masked shrews are found in a variety of habitats but are most commonly found living among rocks and logs in moist woods as well as in marshy meadows and sphagnum bogs (Linzey 1998). This species likely occurs along stream corridors in the area.

Smoky shrews inhabit cool, damp hemlock and spruce forests as well as deciduous forests (ibid). They have been collected in swamps and bogs. This species is reported from several localities in the Cherokee National Forest. Suitable habitat for smoky shrews exists within the Ocoee Reservoir land parcels.

Woodland jumping mice inhabit areas of dense herbaceous growth in moist or mesic habitats (ibid). This species has been found inhabiting bogs and swamps. This species is reported from several localities in the Cherokee National Forest. Suitable habitat for woodland jumping mice exists on the Ocoee reservoirs land.

Although **Indiana bats** have not been reported from areas surrounding the Ocoee reservoirs, forested habitats were assessed for their suitability for this endangered species. Forested areas on TVA lands ranked low in their suitability as summer roost habitat for Indiana bats because of the lack of suitable roosting trees, young age of most stands, and the presence of thick midstory layers. Mist net surveys for bats were performed at four sites near the Ocoee 2 Powerhouse during the late 1990s. No Indiana bats were captured during these surveys. No parcels were found that warrant a Zone 3 (Sensitive Resource Management) allocation to protect other federally listed species.

Northern pine snakes inhabit well-drained sandy or loamy soils with dense vegetation. They have been found in pine barrens, mixed scrub pine and oak woods, dry rocky

mountain ridges, sand hills, and old fields (Ernst and Ernst 2003). This species is reported from several localities in the Cherokee National Forest. Suitable habitat for northern pine snake exists on ridge tops on the Ocoee reservoirs land.

Blue-gray glyph and **Ocoee covert** are both terrestrial snails found in deciduous forests. Both species are known from tributaries of the Ocoee River in Polk County, Tennessee. A population of Ocoee coverts exists on Parcel 4 off the road behind the powerhouse. A population of blue-gray glyphs exists approximately a mile from Parcel 3.

3.6.4.2 Environmental Consequences

Alternative A

Plants

Under Alternative A, the impacts to Ruth's golden aster would be as previously described in the ROS EIS (TVA 2005a). The region where the plants occur is managed by the USFS and would not be affected by the proposed MRLMP. To minimize impacts, the USFS, in cooperation with TVA, is displaying signs on the rocks to warn rafters not to disturb the areas where the rare plants grow. Since horsesugar occurs on parcels designated for dam operations, no adverse impacts are expected to this species.

Terrestrial Animals

No federally listed terrestrial animals are known to occur on TVA parcels on the Ocoee reservoirs although the formerly listed bald eagle nests on Parcel 20 on Ocoee 1 Reservoir. TVA has established a protective buffer zone around this locality as recommended by the *National Bald Eagle Management Guidelines* (USFWS 2007). The parcel borders USFS lands.

Forested areas on TVA lands ranked low in their suitability as summer roost habitat for Indiana bats because of the lack of suitable roosting trees, young age of most stands, and the presence of thick midstory layers. Mist net surveys for bats were performed at four sites near the Ocoee 2 Powerhouse during the late 1990s. No Indiana bats were captured during these surveys. No parcels were found that warrant a Zone 3 (Sensitive Resource Management) allocation to protect other federally listed species.

Under Alternative A, all previously planned parcels are allocated for Project Operations and several narrow TVA parcels on Ocoee 1 Reservoir have not been planned. These narrow strips front USFS recreation areas and lands. Under Alternative A, continued committed use of the narrow strip lands fronting USFS lands and the planned allocations utilized on the three Ocoee reservoirs are not expected to result in impacts to protected terrestrial animal resources.

Aquatic Animals

Under Alternative A, occurrences of the Tennessee dace are known from tributaries near the vicinity of unplanned Parcels 17, 18, and 22 on Ocoee 1 Reservoir, which front USFS lands. Parcel 17 fronts the USFS Parksville Lake Campground. Any future proposed activities on Parcel 17 would be subject to environmental review to assess impacts on aquatic species, and therefore, the Tennessee dace would not be affected. No known listed aquatic species occur in Ocoee 2 or 3 reservoirs, and therefore, any activities anticipated on these reservoirs would have no impacts to sensitive species.

Alternatives B and C

Plants

Under Alternatives B and C, impacts would be the same as under Alternative A.

Terrestrial Animals

Under Alternatives B and C, allocations for parcels under Alternative A for the Ocoee reservoirs will remain the same. The new allocations of Zone 4 (Natural Resource Conservation) and Zone 6 (Developed Recreation) for the narrow strip parcels on Ocoee 1 Reservoir are not expected to result in impacts to protected terrestrial animal resources or their habitats. As with Alternative A, the bald eagle nest would be protected by guidelines established by the *National Bald Eagle Management Guidelines* (USFWS 2007).

Aquatic Animals

Under Alternatives B and C, Parcel 17 would be allocated to Zone 6 (Developed Recreation) and Parcels 18 and 22 would be allocated as Zone 4 (Natural Resource Conservation), which represent their existing uses, and therefore would be no change from Alternative A. No known listed aquatic species occur in Ocoee 2 or 3 reservoirs, and therefore, there would be no impacts to sensitive aquatic species.

3.6.5 Wetlands

A regional overview of the wetlands resource for the mountain reservoirs is provided in Section 3.1.5.

3.6.5.1 Affected Environment

Wetland areas on the Ocoee reservoirs are primarily scrub-shrub and emergent wetlands associated with the river channels and islands. NWI data (Table 3-68) support this, showing 115 acres of emergent wetlands and 103 acres of scrub-shrub wetlands present on the three Ocoee reservoirs. Typical plant species associated with these habitats include river birch, sycamore, tag alder, and silky dogwood. No wetlands were present on any of the TVA parcels associated with Ocoee 1 Reservoir. Parcels 1, 2, 4, and 5 on Ocoee 2 Reservoir contain scrub-shrub wetlands immediately downstream of the dam and also downstream of the powerhouse. Parcels 1 and 4 on Ocoee 3 Reservoir also have scrub-shrub wetlands associated with the riverine portions of the parcel.

Table 3-68. Wetland Acreage - Ocoees Reservoirs

Combined Aquatic Beds and Flats (acres)	Emergent (acres)	Forested (acres)	Scrub-Shrub (acres)	All Types (acres)
20	115	6	103	244

Source: National Wetlands Inventory

3.6.5.2 Environmental Consequences

The impacts of the various alternatives on wetlands would be similar, and none would be adverse. Under all alternatives, parcels containing wetlands would generally continue to be managed as they have been in the past, and actions with the potential to affect wetlands would be assessed under NEPA prior to their implementation.

3.6.6 Floodplains

An overview of floodplains in the mountain reservoirs area is provided in Section 3.1.6.

3.6.6.1 Affected Environment

Ocoee 1 Reservoir

The affected area extends from the lower limit of the Ocoee Dam Reservation at about ORM 11.5 upstream to about ORM 17.0 in Ocoee 1 Reservoir. The 100-year flood elevations for the Ocoee River downstream of the dam vary from 739.4-feet msl at ORM 11.5 to 742.0-feet msl at ORM 11.9 (downstream of Ocoee 1 Dam). The 500-year flood elevations for the Ocoee River downstream of the dam vary from 744.2-feet msl at ORM 11.5 to 747.9-feet msl at ORM 11.9. Tabulations of the 100- and 500-year flood elevations are included in Appendix H.

The main watercourse in Ocoee 1 Reservoir is the Ocoee River. The 100-year flood elevation for the Ocoee River is 839.5-feet msl from Ocoee 1 Dam (ORM 11.9) to the upper end of Ocoee 1 Reservoir at about ORM 17.0. The 500-year flood elevation for the Ocoee River is 843.4-feet msl from the dam to the upper end of the reservoir.

Ocoee 2 Reservoir

The affected area extends from the Ocoee 2 Powerhouse at about ORM 19.8 upstream to about ORM 24.5 in Ocoee 2 Reservoir. The 100- and 500-year flood elevations for the Ocoee River at the powerhouse and downstream of the dam have not been determined.

The main watercourse in Ocoee 2 Reservoir is the Ocoee River. The approximate 100-year flood elevation for the Ocoee River is estimated to be 1,123.0-feet msl from Ocoee 2 Dam (ORM 24.2) to the upper end of TVA's landrights at about ORM 24.5. The approximate 500-year flood elevation for the Ocoee River is estimated to be 1,124.5-feet msl from the dam to ORM 24.5.

Ocoee 3 Reservoir

The affected area extends from the Ocoee 3 Powerhouse at about ORM 25.1 upstream to about ORM 35.5 in Ocoee 3 Reservoir. The 100- and 500-year flood elevations for the Ocoee River at the powerhouse and downstream of the dam have not been determined.

The main watercourse in Ocoee 3 Reservoir is the Ocoee River. The 100-year flood elevations for the Ocoee River vary from 1,438.1-feet msl at Ocoee 3 Dam (ORM 29.2) to elevation 1,455.6-feet msl at the upper end of TVA's landrights at about ORM 35.5. The 500-year flood elevations for the Ocoee River vary from elevation 1,439.7-feet msl at the dam to elevation 1,458.8-feet msl at the upper end of TVA's landrights. Tabulations of the 100- and 500-year flood elevations are included in Appendix H.

3.6.6.2 Environmental Consequences

The environmental consequences of each alternative are discussed in Section 3.1.6. None of the alternatives would have adverse effects on the Ocoee reservoirs floodplains.

3.6.7 Cultural Resources

An overview of cultural resources in the mountain reservoirs area is provided in Section 3.1.7.

3.6.7.1 Archaeological Resources

3.6.7.1.1 Affected Environment

Ocoee 1 Reservoir was subject to a shoreline survey in January and February of 2002 during the winter drawdown period (Ahlman 2002b). Approximately 54.7 miles of shoreline were investigated, and 20 archaeological sites either identified or revisited. Of these, 10 sites are considered potentially eligible for listing in the NRHP. Below the Ocoee 1 Reservoir Dam, a site was investigated for potential impacts resulting from the construction of the 1996 Olympic whitewater venues model site (Dicks 2002).

Archaeological surveys have not been conducted along the shorelines of Ocoee 2 and 3 reservoirs. However, archaeological sites occur near Ocoee 2 Dam, Ocoee 3 Powerhouse, and Ocoee 3 Dam. These were recorded by the USFS transmission line surveys and Tennessee Department of Transportation during studies of the US 64 corridor. The three archaeological sites on TVA Ocoee 2 Reservoir lands and the four sites on TVA Ocoee 3 Reservoir lands are all on lands used for project operations.

3.6.7.1.2 Environmental Consequences

Because none of the alternatives would change existing land uses, the adoption of any alternative would not directly affect archaeological resources. As described in Section 3.1.7.1.2, TVA anticipates executing a PA in Tennessee for the identification, evaluation, and treatment of all historic properties in the Ocoee reservoirs area. Until the PA is executed, TVA will incorporate the phased identification, evaluation, and treatment procedure to effectively preserve historic properties as required by Section 106 of the NHPA. TVA would adhere to the terms of this PA under all alternatives, and no adverse impacts on archaeological resources are expected.

3.6.7.2 Historic Structures

3.6.7.2.1 Affected Environment

Ocoee 1 (Parksville) Reservoir

Henry Crumbliss, an employee of the Chattanooga Railway and Light Company, is credited with the idea of locating a hydro plant at this location. He was a professional engineer and supposedly riding through the area on horseback when he conceived the idea of the project. Crumbliss later became chief engineer of TEPCO.

Some idea of the magnitude of the undertaking may be gathered from the fact that 1,500 men were employed and to ensure the welfare of these workers and their families, a town was built having practically all of the features of a city, including labor camps, boarding houses, waterworks, stores, an ice plant, a hospital, and fire and police protection.

The first hydroelectric power supplied to Chattanooga came from this plant located at Parksville, Tennessee, on the Ocoee River. This dam may hold the distinction of being the first to supply hydroelectric power in the TVA territory.

Ocoee 1 Dam and Powerhouse are listed in the NRHP.

Ocoee 2 Reservoir

The Ocoee 2 Powerhouse is located on the Ocoee River at its junction with Caney Creek, just above the headwaters of Ocoee 1 Reservoir. Construction of the project was started in 1911, and the plant was placed in operation October 24, 1913. Because of the manner in

which the hydraulic head was obtained, many people considered Ocoee 2 to be an engineering marvel of the time. In its natural bed, the river drops about 270 feet in a distance of 5 miles. A diversion dam was built 5 miles upstream from the powerhouse location to divert water into a wooden flume that was set upon a shelf carved along the side of the mountain. The drop in the flume for its entire length was 17 feet, 6 inches, providing an operating head for the plant of some 250 feet.

The Diversion Dam

The diversion dam is a rock-filled crib structure, 385 feet long at its crest. At the maximum section, it is 27.5 feet high and 40 feet wide at the base. The dam rests throughout on a rock foundation. The crib was constructed of 10-inch-square sawed pine timbers, fastened at the intersections with drift bolts.

The Flume

The flume on the mountainside is a wooden structure designed for a waterway 14 feet and 2 inches wide by 9 feet and 9 inches deep when carrying the maximum required capacity of 1,200 second-feet. The flume is 24,800 feet long, and the drop in the flume for its entire length is 17 feet and 6 inches. Almost 9 million board feet of Georgia pine lumber was used in its construction.

At certain points, trestles support the flume. These vary in height from 70 to 150 feet and in length from 200 to 500 feet. Construction of the taller trestles used steel; the other trestles used wood. Concrete structures replaced the wooden trestles at a later date.

A narrow gauge railway was constructed on top of the flume. The railway was used to patrol the flume and to carry construction and maintenance materials. A handcar was initially used. This was superseded by a battery-operated car, and it, in turn, was superseded by a car powered with a gasoline motor.

The village of Caney Creek was built in 1918 by TEPCO to house employees at the plant and their families. Located across the river, it was home to 15 families. Both *Life* magazine and Ripley's *Believe It or Not* featured Caney Creek as one of the few "carless" towns in America. TVA removed the village in 1941.

Ocoee 2 Dam, Powerhouse, and Flume are listed in the NRHP.

Ocoee 3 Reservoir

Ocoee 3 Reservoir is named for the river it sits on and for its position among the three dams on the lower Ocoee. Ocoee 3 Dam, like Apalachia Dam, is a straight gravity-type diversion structure. Construction began on the dam on July 17, 1941, the day the dam was authorized by the TVA Board of Directors. The dam closed in August 1942, and its single hydropower-generating unit went into service on April 30, 1943. The Ocoee 3 Powerhouse is located more than 2 miles downstream from the dam. At the dam, water from the river is diverted into a tunnel and carried to the powerhouse downstream.

Both the Ocoee 3 Dam and Powerhouse are considered to be historic properties.

3.6.7.2.2 Environmental Consequences

Under all alternatives, there would be no changes to existing land uses and no associated impact to historic structures. As described in Section 3.1.7.1.2, TVA proposes to execute a

PA in Tennessee for the identification, evaluation, and treatment of all historic properties in the Ocoee reservoirs area. Until the PA is executed, TVA will incorporate the phased identification, evaluation, and treatment procedure to effectively preserve historic properties as required by Section 106 of the NHPA.

3.6.8 Managed Areas and Ecologically Significant Sites

Managed areas, ecologically significant sites, and NRI streams are defined in Section 3.1.8.

3.6.8.1 Affected Environment

Table 3-69 lists managed areas and ecologically significant sites within 3 miles of the Ocoee reservoirs. The areas are grouped by closest distance to the reservoir; areas abutting or less than 0.1 mile from reservoir lands and NRI streams underlying reservoir waters are listed as “adjacent.”

Table 3-69. Managed Areas, Ecologically Significant Sites, and Nationwide Rivers Inventory Streams Within 3 Miles of Ocoee Reservoirs

Name	Type of Area	Authority	County, State	Closest Distance to Reservoir
Ocoee River	NRI	Federal	Polk, Tenn.	Adjacent
Ocoee River Ruth’s Golden Aster Sites	Ecologically significant site (ESS)	None for sites; federal for species protection	Polk, Tenn.	Adjacent
Cherokee National Forest	Managed area (MA)	Federal	Polk, Tenn.	Adjacent
Cherokee (South) State Wildlife Management Area	MA	State	Polk, Tenn.	Adjacent
Goforth Creek Gorge Site	ESS	None	Polk, Tenn.	Adjacent
Ocoee State Bear Reserve	MA	Federal	Polk, Tenn.	Adjacent
Little Frog Mountain Wilderness Study Area	MA	Federal	Polk, Tenn.	Adjacent
Sugarloaf Mountain Park	MA	State	Polk, Tenn.	0.2 mile west
Little Frog Mountain Roadless Area	MA	Federal	Polk, Tenn.	0.3 mile east
Walkertown Branch Bog	ESS	None	Polk, Tenn.	0.3 mile northeast
Big Frog Wilderness Area	MA	Federal	Polk, Tenn.	0.6 mile west
William Davenport Refuge Designated State Natural Area	MA	State	Polk, Tenn.	2.0 miles northeast

3.6.8.2 Environmental Consequences

Under all alternatives, there would be no change in existing land uses, and none of the alternatives would affect managed areas and ecologically significant sites.

3.6.9 Visual Resources

The general visual environment of the mountain reservoirs is described in Section 3.1.9.

3.6.9.1 Affected Environment

The Ocoee River Gorge, surrounded by wooded peaks of the Cherokee National Forest, provides visitors with vistas of scenic mountain beauty. US 64 borders the river’s course

throughout most of the area. Ocoee 1 creates a scenic reservoir offering a variety of water-based recreation opportunities.

Ocoee 1 Reservoir shoreline is the most developed of the three Ocoees. This development is mainly through the efforts of the USFS and supports recreation on the Ocoees. This development includes cabins, camping sites, a beach, and a recreation area. Much of the reservoir remains relatively pristine, as development is sparsely located along the shoreline with some development located in coves off the main water body.

The water surface of Ocoee 1 Reservoir contrasts greatly with the rugged mountains of the surrounding Cherokee National Forest. The highest peaks are hundreds of feet higher than the lake and provide dramatic views in the middleground and background distances from the water. Scenic integrity is distinctive. Scenic integrity is high.

Ocoee 2 Dam lies just downstream from the confluence of the Ocoee River and Gassaway Creek. Ocoee 2 Dam functions doubly as a put-in location for Ocoee River whitewater rafting. Views of the river below from this location vary distinctively, from those of shallow trickling pools to a river that runs into Class IV rapids, which diversifies the viewing constituency, operation, and management of the area.

TVA land at Ocoee 3 Reservoir includes only the dam reservation land at the dam. Land along the headwaters of the reservoir is managed by the USFS.

3.6.9.2 Environmental Consequences

Under all alternatives, the existing land uses would continue, with the majority of TVA lands continuing to be used for project operations. Under Alternatives B and C, narrow strips of lands fronting USFS lands would be allocated to either Zone 4 (Natural Resource Conservation) or Zone 6 (Developed Recreation). None of the alternatives would adversely affect visual resources.

3.6.10 Water Quality and Aquatic Ecology

An overview of water quality and aquatic ecology for the mountain reservoirs area is provided in Section 3.1.10.

3.6.10.1 Affected Environment

The Ocoee reservoirs are located in the Blue Ridge Physiographic Province. Due to the geologic characteristics of the region, streams in the watershed have naturally low concentrations of nutrients and dissolved minerals. Consequently, these reservoirs are expected to have low productivity (low chlorophyll concentrations). The copper industry that once existed in the Copper Basin has resulted in extremely degraded water quality and aquatic habitat in the Ocoee River. The Ocoee reservoirs are located downstream from the Copper Basin, and decades of erosion have caused significant filling of the reservoirs. Ocoee 1 Reservoir has lost about 25 percent of its original volume.

Ocoee 1 Reservoir has an average annual discharge of about 1,426 cfs and a theoretical reservoir retention time of approximately 30 days. Retention is much shorter for Ocoee 1 Reservoir than for most tributary reservoirs. However, because of the shallow depth of the turbine intakes, water in the lower third of the water column can reside in the reservoir much longer. Both Ocoee 1 and Ocoee 3 reservoirs are “run-of-river” reservoirs operated

on an inflow-equals-outflow basis. Because of this, they do not have the same water quality problems associated with stratification as other mountain reservoirs.

Ocoee 2 Reservoir is formed by Ocoee 2 Dam at ORM 24.2 and has no storage capacity. Ocoee 3 Reservoir is formed by Ocoee 3 Dam, about 5 river miles upstream from Ocoee 2 Dam. Between its closure in 1942 and a sediment survey in 1976, Ocoee 3 Reservoir had lost approximately 80 percent of its storage volume due to heavy siltation from the upstream Copper Basin area. The copper industry that once existed in the basin has resulted in extremely degraded water quality and aquatic habitat in the Ocoee River.

There is no development around Ocoee 3 Reservoir. During recreation season, Ocoee 2 and 3 reservoirs are operated to accommodate an extensive whitewater rafting industry downstream of the Ocoee 2 Diversion Dam and the Ocoee 3 Powerhouse. To a lesser extent, Ocoee 3 releases are modified to provide whitewater recreation opportunities between the dam and the powerhouse, which requires water to be spilled at the dam rather than being diverted to the powerhouse.

Reservoir Ecological Health

TVA does not routinely sample the reservoir ecological health of Ocoee 2 or Ocoee 3 reservoirs. Figure 3-6 shows the reservoir ecological health scores for Ocoee 1 Reservoir from 1994 through 2006. Areas sampled on Ocoee 1 Reservoir included the forebay at ORM 12.5 (area of the reservoir nearest the dam). The overall ecological health condition for Ocoee 1 Reservoir rated “good” for the first time in 2006. Ocoee 1 Reservoir rated in the “fair” category all past years except in 1999 when it rated “poor”; the score was just below the breakpoint between “fair” and “poor.” Bottom life exhibited a noticeable change between the 1994-2003 and 2005-2006 time periods. Although the variety of organisms remained low, there was a substantial increase in the number of individuals collected in 2005 and 2006. This led to highest score for benthic community in 2006 and contributed to the higher overall reservoir score. The lower reservoir score in 1999 was due to concurrent low scores for benthos and fish as the fish assemblage received its lowest score, primarily due to the collection of only a few fish.

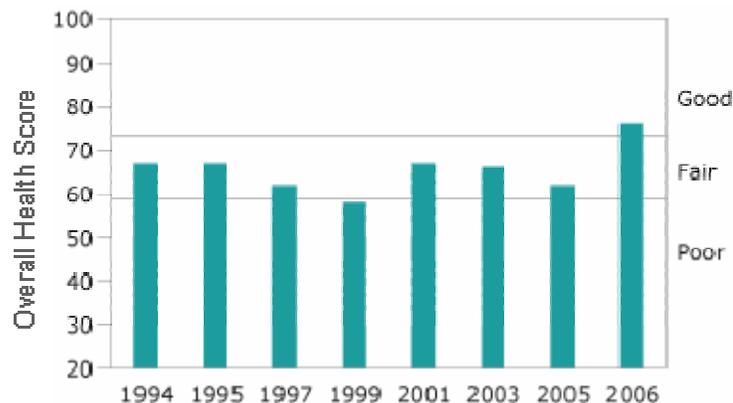


Figure 3-6. Ocoee 1 Reservoir Ecological Health Ratings, 1994-2006

Dissolved Oxygen

Prior to 2005, Ocoee 1 Reservoir had consistently rated “good” for DO. In 2005 and 2006, DO rated “high fair.” DO rated lower those years because a small area of water with low DO was present near the reservoir bottom in late autumn that was not present in previous years.

Chlorophyll

Although chlorophyll has continued to rate “good” each year, summer average concentrations have been slightly higher the past four years than in previous years.

Sediment Quality

Sediment quality remains the most notable issue on Ocoee 1 Reservoir. Past mining practices in the Copper Basin left a legacy of very high concentrations of several metals: arsenic, copper, iron, lead, and zinc. In addition, elevated amounts of PCBs have been found historically in the sediment. PCBs, arsenic, and lead concentrations indicate a decreasing trend, although concentrations remain above normal levels.

Table 3-70. Ocoee 1 Reservoir Water Quality and Sediment Ratings, Reservoir Vital Signs Monitoring Data 1991-2006

	Monitoring Years										
	1991	1992	1993	1994	1995	1997	1999	2001	2003	2005	2006
Ocoee 1 Forebay											
Dissolved Oxygen	Good	Good	Good	Good	Good	Good	Good	Good	Good	Fair	Fair
Chlorophyll	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good
Sediment	NS	NS	Poor								

NS = Not sampled

Benthic Monitoring

At Ocoee 1 Reservoir, only the forebay at ORM 12.5 has been sampled beginning in 1994. The forebay scored “poor” all years with the exception of 1997, 2005, and 2006 when it scored “fair” (Table 3-71).

Table 3-71. Recent (1994-2006) Benthic Community Ratings for Ocoee 1 Reservoir

Station	River Mile	1994	1995	1997	1999	2001	2003	2005	2006
Forebay	12.5	Poor	Poor	Fair	Poor	Poor	Poor	Fair	Fair

Fisheries Monitoring

The RVSMP included annual fish sampling on Ocoee 1 Reservoir in 1994. A list of fish species commonly found in Ocoee 1 Reservoir can be found in Appendix I. The fish community in Ocoee 1 Reservoir rated “fair” six of the eight years sampled, “poor” in 1999, and “good” in 2001 (Table 3-72).

Table 3-72. Recent (1999-2006) Reservoir Fish Assemblage Index Ratings for Ocoee 1 Reservoir

Station	1994	1995	1997	1999	2001	2003	2005	2006
Forebay	Fair	Fair	Fair	Poor	Good	Fair	Fair	Fair

In 2006, Ocoee 1 Reservoir SFI rated above the Valleywide average for black bass and spotted bass, and below for largemouth bass (Table 3-73). No SFI surveys have been conducted on Ocoee 3 Reservoir.

Table 3-73. Sport Fishing Index Scores for Selected Sport Fish Species in Ocoee 1 Reservoir, 2006

Fish Species	2006 Score	2006 Valleywide Average
Black Basses	38	36
Largemouth Bass	30	33
Spotted Bass	36	31

Swimming Advisories

There are no state advisories against swimming in Ocoee 1 Reservoir or the Ocoee River. TVA performed *E. coli* bacteria monitoring at five locations in 2007: Ocoee River at Ocoee 2 Powerhouse bridge, Greasy Creek Campground beach, Floatway take-out site at ORM 19.7, Floatway take-out site at Caney Creek, and Floatway access site below Ocoee 2 Dam at ORM 24.2.

Fish Consumption Advisories

There are no fish consumption advisories for the Ocoee reservoirs. TVA collected channel catfish and largemouth bass from Ocoee 1 Reservoir for tissue analysis in autumn 2005. The results, which were similar to those of previous years, were provided to state agencies in Tennessee. TVA will analyze fish from the reservoir again in autumn 2009.

State(s) Impaired Waters

The Tennessee Department of Environment and Conservation (TDEC) assigned use support ratings to waters in the Ocoee River basin based on available biological, chemical, and/or physical data. As shown in Table 3-74, a total of 46.5 miles of monitored stream and 2,254 reservoir surface acres are listed as impaired (TDEC 2006).

Table 3-74. Summary of Impaired Waters in the Watershed of Ocoee River Basin in Tennessee

Stream/River Name	State	Miles/Acres	Description	Water Quality Stressor/Source
Ocoee River	Tenn.	26.6/ 2,254	Ocoee Reservoir No. 1 through Ocoee Reservoir No. 3	Iron, copper, zinc, pH, Loss of biological integrity due to siltation, habitat loss due to streamflow alteration / past mining activities, Copper Basin area
North Potato Creek	Tenn.	6.3		Copper, iron, zinc, pH, physical substrate habitat alterations, loss of biological integrity due to siltation / past mining activities, Copper Basin area
Burra Burra Creek	Tenn.	2.2		Copper, iron, zinc, pH, loss of biological integrity due to siltation
Ellis Branch	Tenn.	2.8		Copper, zinc, iron
Davis Creek	Tenn.	3.8		Copper, iron, zinc, pH, loss of biological integrity due to siltation
Fourmile Creek	Tenn.	4.8		<i>E. coli</i>

Water Supply

No municipal water suppliers currently withdraw water from Ocoee 1, Ocoee 2, or Ocoee 3 reservoirs. Copper Basin Utility District and the towns of McCaysville, Georgia, and Blue Ridge, Georgia, currently have intakes in Ocoee 3 Reservoir's supporting watershed. The 2005 average daily water demand for these intakes were 0.25 MGD (Copper Basin Utility District), 0.76 MGD (McCaysville), and 0.84 MGD (Blue Ridge), a total daily average demand of 1.85 MGD.

3.6.10.2 Environmental Consequences

No change in the existing land use would occur on the Ocoee reservoirs because all parcels are committed to their existing uses, which would continue under all alternatives.

Any proposed actions on TVA land would be assessed for compliance with TVA's Land Policy, SMP, and Section 26a regulations. Individual environmental reviews would identify potential adverse impacts and mitigation to protect the aquatic environment; TVA would then take appropriate measures to address these impacts. Therefore, no significant impacts to water quality and aquatic life are expected in association with these alternatives.

3.6.11 Air Quality and Noise

An overview of the air quality of the mountain reservoirs area is provided in Section 3.1.11. Under all of the alternatives, the existing uses of Ocoee Reservoir lands would not change, and there would be no adverse impacts to air quality. Noise has previously been discussed in Section 3.1.11.2.

3.6.12 Socioeconomics

The socioeconomic conditions of the mountain reservoirs area are described in Section 3.1.12.

3.6.12.1 Affected Environment

3.6.12.1.1 Population and Economy

Population: Tables 3-75 and 3-76 contain data regarding the population of the area. Polk County, Tennessee, had a population of 16,050 in 2000, an increase of 18.0 percent since 1980. This was a lower rate than in either the state or the nation. The rate of growth in the county, state, and nation was greater, much greater for the county from 1990 to 2000 than from 1980 to 1990. Estimates for 2006 indicate that the population of Polk County has declined 0.7 percent since 2000 compared to growth of more than 6 percent in both the state and nation during that time. Projections through 2020 indicate that the county will rebound to have faster population growth than the state and nation over that time. The rates for the county and state are projected to be greater than for 1980-2000, but the rate for the nation is projected to be lower.

Table 3-75. Population – Polk County, Tennessee

Area	1980	1990	2000	2006 (Estimate)	2020 (Projection)	Density (persons per square mile) 2000
Polk County	13,602	13,643	16,050	15,939	22,086	36.9
Tennessee	4,591,023	4,877,185	5,689,283	6,038,803	7,195,375	138.0
United States	226,545,805	248,709,873	281,421,906	299,398,484	335,804,546	79.6

Source: U.S. Census Bureau (undated a-e) and Tennessee Advisory Council on Intergovernmental Relations and University of Tennessee Center for Business and Economic Development (2003)

Table 3-76. Recent and Projected Population Changes – Polk County, Tennessee (Percentage Growth)

Area	1980-1990	1990-2000	1980-2000	2000-2006	2000-2020	1980-2020
Polk County	0.3	17.6	18.0	-0.7	37.6	62.4
Tennessee	6.2	16.7	23.9	6.1	26.5	56.7
United States	9.8	13.2	24.2	6.4	19.3	48.2

Source: Calculated from data in Table 3-75

Polk County is decidedly rural in distribution of population. As noted in Table 3-75, the population density of the county is substantially lower than the state and much lower than the nation. The largest town in Polk County is Benton with 1,138 residents in 2000. About 87 percent of the population in Polk County is outside incorporated towns.

Economy: Table 3-77 contains the most recent annual data regarding the amounts and types of employment, amounts of unemployment, and incomes in the area. In 2005, Polk County had 4,404 people employed on average. The county had a much higher percentage of farmers and government employees than the state or nation, a lower percentage of manufacturing employees, and a lower percentage of employees in the general “other” category than the state or nation. The average unemployment rate for 2006 in the county was higher than the state or nation. Per capita personal income in 2005 was much lower in the county than in the state or nation.

Table 3-77. Employment, Unemployment, and Income – Polk County, Tennessee

Area	Employment, 2005	Employment (percent of total)					Unemployment Rate, 2006	Per Capita Personal Income 2005
		Farm	Manufacturing	Retail Trade	Government	Other		
Polk County	4,404	7.9	7.2	12.6	20.9	51.4	5.6	24,245
Tennessee	3,630,959	2.7	11.7	11.4	12.1	62.2	5.2	30,969
United States	174,249,600	1.7	8.5	10.9	13.7	65.2	4.6	34,471

Source: U.S. Bureau of Economic Analysis (undated) and Tennessee Department of Labor (undated)

3.6.12.1.2 Environmental Justice

The minority population in the Ocoee reservoirs area is small (Table 3-78). In Polk County, 3.1 percent of the total population was estimated to be minorities in 2006, which was far below the state average of 22.5 percent and the national average of 33.6 percent. The estimated poverty rate in the county in 2004 was 15.1 percent, slightly higher than the state rate of 15.0 percent and higher than the national rate of 12.7 percent.

Table 3-78. Minority Population, 2006, and Poverty, 2004 – Polk County, Tennessee

Area	Population, 2006				Percent Below Poverty Level, 2004
	Total	Nonwhite	White Hispanic	Percent Minority	
Polk County	15,939	325	164	3.1	15.1
Tennessee	6,038,803	1,182,866	174,747	22.5	15.0
United States	299,398,484	59,652,230	41,001,760	33.6	12.7

Source: U.S. Census Bureau (undated d and 2004)

3.6.12.2 **Environmental Consequences**

The current land uses at the Ocoee reservoirs would continue under all of the alternatives. Other than the possible expansion of existing recreation facilities, there would be little development that would affect socioeconomic conditions. None of the alternatives would result in disproportionate impacts on minority or disadvantaged populations.

3.7 Apalachia Reservoir

3.7.1 Land Use

An overview of land use for the mountain reservoirs is provided in Section 3.1.1.

3.7.1.1 Affected Environment

On Apalachia Reservoir, TVA initially purchased 7,506 acres of land (see Table 1-1). TVA transferred 6,661 acres (89 percent) to the USFS and sold 2 acres. Because the pipeline and tunnel system carries water from the reservoir 8.3 miles downriver to the powerhouse to generate electricity, much of TVA's retained land is actually downstream of the dam and not adjacent to the reservoir.

TVA retained 843 acres of land divided into seven parcels on Apalachia Reservoir. All of the parcels are committed to existing land uses. Dam reservation, powerhouse reservation, and other land supporting TVA Project Operations account for 90 percent of the calculated acreage. As previously mentioned, the acreage of the narrow strip of TVA-retained land fronting the land TVA transferred to the USFS has not been calculated; therefore, the committed uses associated with those parcels are not represented in the committed acreage total. However, there are two parcels that are committed through the transfer agreement with the USFS. This land is used for natural resource conservation and dispersed recreation and is managed by the USFS. The remaining 10 percent of the committed acreage is Parcel 7, which is under a term easement for Public Recreation to the State of Tennessee. For a complete list of the committed uses for Apalachia Reservoir parcels, reference Appendix E.

TVA owns 100 percent of the approximately 32 miles of shoreline on Apalachia Reservoir (Table 1-2). This shoreline either fronts land TVA retained for Project Operations or fronts the land TVA retained fronting the land transferred to the USFS. With the exception of TVA dam reservation land, the USFS manages the land along the reservoir, and there is no shoreline along the reservoir available for residential access.

Cherokee County, North Carolina, and Polk County, Tennessee, are predominantly rural. There are no towns near the reservoir. About a third of the land in Cherokee County is in the Nantahala National Forest (USFS 2007b, Quickfacts 2007) and a similar amount of Polk County lies in the Cherokee National Forest (Southeast Tennessee Development District 2007). In recent years, development has increased on the privately owned land in these counties, particularly in Cherokee County. Within the past several years, development has been initiated on several large private tracts behind the USFS lands on Apalachia Reservoir. According to Cherokee County Manager David Badger (personal communication, November 7, 2007), there are about 37,500 parcels of property in the county, and nearly half of these parcels are owned by nonresidents. According to Mr. Badger, about 4,000 acres of Cherokee County are Cherokee Indian tribal lands.

Two TVA parcels on Apalachia Reservoir contain prime farmland (Table 3-79).

Table 3-79. Acres of Prime Farmland in Selected Parcel – Apalachia Reservoir

Parcel Number	Total Parcel Acres	Acres of Prime Farmland	Zone Allocation	Description
1	139.1	30.7	2	Dam Reservation
7	82.8	76.6	6	Gee Creek Campground

3.7.1.2 Environmental Consequences

Alternative A

As shown in Table 2-3, under Alternative A the allocated land uses for the 843 acres that are planned are wholly represented by two allocations. The dam and powerhouse reservations representing 760 acres (90 percent) are allocated to Project Operations. The remaining 83 acres (10 percent) are allocated to Recreation. The five planned parcels are committed to the existing land use.

Under Alternative A, TVA would not designate land use allocations for two parcels of TVA land on Apalachia that front USFS land (Table 2-4). The acreage for these unplanned parcels has not been calculated. Both unplanned parcels are committed to the existing land use (Table 2-2) through the transfer agreement with the USFS.

There would be no potential for change in land use under Alternative A because all of the parcels on Apalachia Reservoir are committed to their existing use as shown in Table 2-2.

Alternatives B and C

Under Alternatives B and C, almost all the TVA lands would continue to be managed for Zone 2 (Project Operations) and Zone 6 (Developed Recreation). The very small amount of previously unplanned narrow strip land (less than 0.1 percent) surrounding most of Apalachia Reservoir would be allocated to Zone 4 (Natural Resource Conservation) based on the commitments of the transfer agreement between TVA and the USFS. Neither Alternative B nor C would affect prime farmlands.

3.7.2 Recreation

An overview of the recreation resource for the mountain reservoirs is provided in Section 3.1.2.

3.7.2.1 Affected Environment

Apalachia Reservoir, the associated river reaches, and Gee Creek Campground have a number of recreation facilities that provide recreation opportunities. There are two TVA parcels on Apalachia Reservoir lands that support developed recreation facilities. These areas are described below and summarized in Table 3-80.

There is one campground on Apalachia Reservoir lands. TDEC operates the Gee Creek Campground (Parcel 7) recreation area as a component of the Tennessee State Park System (Hiwassee/Ocoee Scenic River State Park) under a public recreation term easement agreement with TVA. Facilities at Gee Creek include campsites, picnic areas, an amphitheatre, a stream access site, play courts, and walking trails. TDEC administrative offices and maintenance bases supporting the state park are also located on this parcel.

There is one formal boat ramp on Apalachia Reservoir. The North Carolina Wildlife Resources Commission manages the boat ramp on the Hiwassee Reservoir Dam Reservation (Hiwassee Parcel 3).

Table 3-80. Recreation Facilities on Apalachia Reservoir

Area Name	County, State	Sector	Operator	Land Ownership	Parcel Number	Campground	Marina	Picnic Tables	Boat Ramp	Stream Access	Paved Trails	Fishing Piers	Other
Powerhouse Put-In*	Polk, Tenn.	Public	USFS	USFS	N/A					X			
Gee Creek*	Polk, Tenn.	Public	State of Tenn.	TVA	7	X		X		X	X		X
N.C. Wildlife Resources Commission Ramp	Cherokee, N.C.	Public	State of N.C.	TVA	3**				X				

* = Stream access site

** = Hiwassee Reservoir Parcel 3

Dispersed Recreation

Dispersed recreation has historically been an important use of Apalachia Reservoir lands but primarily takes place on USFS property. TVA does not have an inventory of heavily used dispersed recreation areas.

3.7.2.2 Environmental Consequences

Under all alternatives for Apalachia Reservoir lands, one parcel is allocated to Developed Recreation. Parcel 7 (91.9 acres) is committed to use as a component of the Tennessee State Park System by an operating agreement with TDEC.

TVA would not allocate any additional parcels for Developed Recreation under any alternative. Therefore, any future demand for developed recreational needs accommodated on TVA lands would have to be met by expansion of the state park by TDEC. Potential environmental impacts would be insignificant since parcels utilized for developed recreation would not change. The potential for impacts from any new facilities would be subject to review and potential mitigation under NEPA.

None of the alternatives propose changing land use of any parcels; therefore, potential impacts to dispersed recreation would be restricted to expansions within existing committed parcels (e.g., campground expansion). Potential impacts to dispersed recreation of this nature are expected to be insignificant.

3.7.3 Terrestrial Ecology

An overview of terrestrial ecology (plant and wildlife communities) is provided in Section 3.1.3.

3.7.3.1 Plant Communities

3.7.3.1.1 Affected Environment

The physiognomic vegetative classes commonly found on and near Apalachia Reservoir lands are evergreen forest, evergreen-deciduous forest, deciduous forest, shrublands, and herbaceous vegetation.

The small percentages of the forests considered to be evergreen forest consist of small stands of Virginia pine and small stands of white pine. The most common forest type is evergreen-deciduous forest. Rocky bluffs found along the railroad right-of-way adjacent to the powerhouse had several species of xeric ferns (hairy lip fern and cliffbrake fern) and princess tree, along with poison ivy and Virginia creeper. Deciduous forest occurs mainly as oak-hickory forest (mesic to xeric) and mesic hardwood forest on slopes. Oak-hickory forests common on xeric ridges grade into more mesic slopes.

Scrub-shrub wetlands (shrublands) are associated with the rocky cobble areas of the river near the Apalachia Powerhouse and have a high percentage of rare plants. The portion of the river between the powerhouse and the dam is a globally rare (G2) community known as the Hiwassee/Ocoee River Boulder Scour Vegetation, as described in Section 3.6.3.1. The encroachment of trees and woody vines is a threat to this area, which is managed by the USFS and not included in the MRLMP parcels.

Herbaceous vegetation is commonly found along transmission line and railway and roadway rights-of-way as well as grassy areas within the dam reservations and commercial recreation areas. Purple sprangletop, bahia grass, and tall fescue were common grasses observed during field surveys, as were a number of invasive species.

Invasive plants occur on most of the TVA parcels around Apalachia Reservoir. The species present include autumn olive, Chinese lespedeza, Chinese privet, Japanese honeysuckle, Japanese knotweed, Japanese stiltgrass, kudzu, marsh dayflower, mimosa, multiflora rose, princess tree, shrubby lespedeza, and tree-of-heaven. These invasive plants are most prevalent along the railroad right-of-way that runs adjacent to the Hiwassee River between the powerhouse and the dam.

3.7.3.1.2 Environmental Consequences

Alternative A

Under Alternative A, no significant impacts are expected to the plant communities of Apalachia Reservoir since there would be no changes under the current Forecast System plan. The globally rare (G2) plant community, the Hiwassee/Ocoee River Boulder Scour Vegetation that occurs within the Apalachia Bypass reach is presently being managed by the USFS and would not be affected by Alternative A.

Alternatives B and C

The impacts of Alternatives B and C would be the same as those of Alternative A.

3.7.3.2 Wildlife Communities

3.7.3.2.1 Affected Environment

The Apalachia Reservoir properties contain primarily evergreen, evergreen-deciduous, and deciduous forest habitats, and smaller areas of early successional habitats, similar to those observed on the other mountain reservoirs. Apalachia Reservoir lands adjoin USFS lands

and contribute to large contiguous tracts of forest supporting a variety of area-sensitive species. A wetland was identified on Parcel 3, near USFS lands. A cave is known from the project area, approximately 0.5 mile from Parcel 7. No uncommon animals are known from the cave. Wildlife communities on Apalachia Reservoir are typical for the region.

3.7.3.2.2 Environmental Consequences

Under all alternatives, there would be no change in current land uses, and therefore, no impacts to wildlife and wildlife habitats would result.

3.7.4 Endangered and Threatened Species

A regional overview of endangered and threatened species is provided in Section 3.1.4.

3.7.4.1 Affected Environment

Federally and state-listed as endangered, threatened, and other species of conservation concern, reported from the vicinity of Apalachia Reservoir, are listed in Table 3-81.

Table 3-81. Federally and State-Listed as Endangered, Threatened, and Other Species of Conservation Concern Known From the Vicinity of Apalachia Reservoir in Polk County, Tennessee, and Cherokee County, North Carolina

Common Name	Scientific Name	Status		
		Federal	N.C. State Status (Rank)	Tenn. State Status (Rank)
Plants				
American ginseng	<i>Panax quinquefolius</i>	--	--	S-CE (S3S4)
Ash-leaf bush pea*	<i>Thermopsis fraxinifolia</i>	--	--	THR (S3)
Bitter cress	<i>Cardamine flagellifera</i>	--	--	THR (S2)
Branching whitlow-wort*	<i>Draba ramosissima</i>	--	--	SPCO (S2)
Butternut	<i>Juglans cinerea</i>	--	--	THR (S3)
Creekgrass	<i>Potamogeton epihydrus</i>	--	--	SPCO (S1S2)
Dwarf filmy-fern	<i>Trichomanes petersii</i>	--	--	THR (S2)
Gibbose panic grass*	<i>Sacciolepis striata</i>	--	--	SPCO (S1)
Hairy umbrella-sedge*	<i>Fuirena squarrosa</i>	--	--	SPCO (S1)
Horsesugar*	<i>Symplocos tinctoria</i>	--	--	SPCO (S2)
Obovate marshallia	<i>Marshallia obovata</i>	--	--	THR (S1)
Pink lady's slipper	<i>Cypripedium acaule</i>	--	--	E-CE (S4)
Ruth's golden aster*	<i>Pityopsis ruthii</i>	END	--	END (S1)
Small purple fringe orchid	<i>Platanthera psycodes</i>	--	--	SPCO (S2)

Common Name	Scientific Name	Status		
		Federal	N.C. State Status (Rank)	Tenn. State Status (Rank)
Small whorled pogonia	<i>Isotria medioloides</i>	THR	END (S1)	--
Southern lobelia	<i>Lobelia amoena</i>	--	--	THR (S1S2)
Sweet pinesap	<i>Monotropsis odorata</i>	--	--	THR (S2)
Tennessee pondweed*	<i>Potamogeton tennesseensis</i>	--	--	THR (S2)
Hiwassee quillwort*	<i>Isoetes tennesseensis</i>	--	--	SPCO (S1)
Toothed sedge	<i>Cyperus dentatus</i>	--	--	SPCO (S1)
Yellow jessamine	<i>Gelsemium sempervirens</i>	--	--	SPCO (S1S2)
Amphibians				
Eastern hellbender*	<i>Cryptobranchus alleganiensis alleganiensis</i>	--	SPCO (S3)	NMGT (S3)
Seepage salamander*	<i>Desmognathus aeneus</i>	--	RARE (S3)	NMGT (S1)
Birds				
Bald eagle*	<i>Haliaeetus leucocephalus</i>	--	THR (S3)	NMGT (S3)
Red-cockaded woodpecker	<i>Picoides borealis</i>	END	END (S2)	EXTI (SX)
Swainson's warbler*	<i>Limnothlypis swainsonii</i>	--		NMGT (S3)
Mammal				
Smoky shrew*	<i>Sorex fumeus</i>	--	--	NMGT (S4)
Reptiles				
Bog turtle*	<i>Glyptemys muhlenbergii</i>	THR	THR (S2)	--
Northern pine snake*	<i>Pituophis melanoleucus melanoleucus</i>	--	SPCO (S3)	THR (S3)
Stripeneck musk turtle*	<i>Sternotherus minor</i>	--	SPCO (S1)	--
Fish				
Blotchside logperch*	<i>Percina burtoni</i>	--	END (S1)	NMGT (S2)
Tangerine darter*	<i>Percina aurantiaca</i>	--	--	NMGT (S3)
Tennessee dace*	<i>Phoxinus tennesseensis</i>	--	--	NMGT (S3)
Snails				
Cohutta slitmouth*	<i>Stenotrema cohuttense</i>	--	--	NOST (S2)
A freshwater snail*	<i>Elimia christyi</i>	--	END (S1)	--
A freshwater snail	<i>Somatogyryus sp. 2</i>	--	--	NOST (S1)
Smooth mudalia*	<i>Leptoxis virgata</i>	--	NOST (SU)	NOST (S1)
Mussels				
Spike*	<i>Elliptio dilatata</i>	--	SPCO (S1)	--
Tan riffleshell*	<i>Epioblasma florentina walkeri</i>	END	--	END (S1)
Slabside pearlymussel*	<i>Lexingtonia dolabelloides</i>	CAND	--	NOST (S2)
Tennessee clubshell*	<i>Pleurobema oviforme</i>	--	END (S1?)	NOST (S2S3)
Rainbow*	<i>Villosa iris</i>	--	SPCO (S1)	--
Cumberland bean*	<i>Villosa trabalis</i>	END	NOST (S1)	END (S1)

-- = Not applicable

*Species descriptions in the text

Rank abbreviations: S1 = Critically imperiled, S2 = Imperiled, S3 = Rare or uncommon, S4 = Widespread, abundant, and apparently secure, SX = Presumed extirpated, ? = Inexact or uncertain

Status abbreviations: CAND = Candidate for listing; END = Endangered, E-CE = Endangered commercially exploited, EXTI = Extirpated, NMGT = In need of management, NOST = No state status, RARE = Rare, S-CE = Special concern-commercially exploited, SPCO = Special concern, THR = Threatened

Ash-leaf bush pea (see Section 3.6.4) is known from eight sites in Polk County with one known from the Gee Creek wilderness area near Parcel 7.

Branching whitlow-wort grows in crevices and rock outcrops or on dry talus slopes on a variety of rock types (Weakley 2006). It is known from two populations on rocky bluffs overlooking the Ocoee River above Parcels 5 and 6.

Gibbose panic grass inhabits freshwater marshes along streams and on shores of ponds and lakes, as well as swamps, ditches, and drainage canals (Godfrey and Wooten 1979). It is commonly found on the coastal plain and known on the periphery of its range in Tennessee with less than 10 reported populations. Two current and one extirpated populations are known to occur within 5 miles of the river. Gibbose panic grass was found growing on cobble bars in the Apalachia Bypass reach near the powerhouse on Parcel 5.

Hairy umbrella-sedge inhabits moist, open, and often sandy soils of marshes, ditches, and savannas. This is a coastal plain species with disjunct populations in the Hiwassee River area. One current and one extirpated population are known from the region, and plants were found growing on cobble bars in the Apalachia Bypass reach near the powerhouse on Parcel 5.

Horsesugar (see Section 3.6.4) was found growing in forested areas on Parcels 4, 5, and 6.

A large population of over 10,000 individuals of **Ruth's golden aster** occurs within a three-mile stretch of the Hiwassee River between Apalachia Powerhouse and Dam (TVA 2005b). None of this population occurs on lands subject to the MRLMP. Since 1987, there has been a gradual decrease in the size of this population. The decrease could be due to the encroachment of competing woody vegetation. The USFS is considering more active management of this population, including the removal of woody vegetation.

Tennessee pondweed inhabits slow to fast moving streams and rivers (Haynes and Hellquist 2000). It is known from two populations in the Hiwassee River watershed and was found growing in the water of the Apalachia Bypass reach near the powerhouse Parcel 5.

Hiwassee quillwort is known only to occur in the Hiwassee River between Quinn Springs and the Apalachia Powerhouse. Before its rediscovery at Reliance, Tennessee, in 2000, this population was thought to be a different species, lake quillwort, and extirpated from the Little Tennessee River in Monroe County and the Hiwassee River in Polk County (Luebke and Budke 2003). Hiwassee quillwort occurs in the river at Parcel 6.

Eastern hellbenders are known from the Hiwassee River and its tributaries and should be expected throughout the project area.

Seepage salamanders (see Section 3.3.4) have been found on Parcel 1 north of Apalachia Dam and less than 0.5 mile from Parcel 7. Habitat exists throughout the undisturbed forests within the project area.

No active **bald eagle** nests are reported from Apalachia Reservoir, and bald eagles were not observed during field surveys. Forested parcels around the reservoir are suitable nesting habitat.

Suitable habitat for **Swainson's warblers** (see Section 3.6.4) exists on Parcels 1, 3, 4, and 7, and this species has been reported from the vicinity of Quinn Springs.

Smoky shrews (see Section 3.6.4) have been collected in swamps and bogs in the region. A section of rich cove forest on Parcel 1 contains suitable habitat for this species.

The two known population of **bog turtles** in the area are both over 6 miles from Apalachia Reservoir. Three bog-like areas occur on Zone 1 lands. All three have been altered considerably by grazing, fire, cultivation, and drainage efforts. None of these sites are known to contain bog turtles and only represent marginal habitat for the species.

Suitable habitat for **northern pine snakes** (see Section 3.6.4) occurs in dry, forested habitats near the Apalachia Dam Reservation.

Stripeneck musk turtles inhabit rivers, creeks, spring runs, lakes and lake margins, ponds, and swamps, especially those with mud bottoms (Ernst et al. 1994). This species has been recorded from the Hiwassee River just below Apalachia Dam, and likely occurs near Parcels 1 and 4.

Blotchside logperch prefers large creeks to small or medium rivers with low turbidity over areas of large gravel and small cobble in medium current. Spawning occurs in April and May (Etnier and Starnes 1993). The blotchside logperch has been collected in the Hiwassee River between the Apalachia Powerhouse and the confluence with Gee Creek.

Tangerine darter occurs in deep riffles and runs with a mixture of boulders, large rubble, and bedrock substrate. It utilizes deep pool habitat during the winter and spawns in gravel riffles from May to June (ibid). The tangerine darter has been collected in the Hiwassee River at various locations between the Apalachia Dam and its confluence with Gee Creek.

Tennessee dace inhabits low-gradient woodland tributaries of the Tennessee River. The Tennessee dace prefers shallow pools with associated debris and undercut banks (ibid). The Tennessee dace has been collected in the Hiwassee River between the Apalachia Powerhouse and its confluence with Gee Creek.

Cohutta slitmouths are terrestrial snails found only in the Hiwassee River watershed. A population of this species is known from the woodland next to Gee Creek within 3 miles of Parcel 7.

The snail *Elimia christyi* has only recently been differentiated from the knotty elimia (*Elimia interrupta*) and is only known from the Hiwassee River, Shuler Creek, and Valley River; Cherokee County in North Carolina; and Coker Creek and Hiwassee River (half dozen sites) in Polk County, Tennessee (Minton et al. 2004). It has been reported by Johnson et al. (2005) as well from the Hiwassee River inside and adjacent to Cherokee National Forest. *Elimia christyi* has a Global Rank of G2 (very rare and imperiled within the world).

Somatogyrus sp. 2 has been observed in one location on the Hiwassee River in East Tennessee (NatureServe 2007). This snail is tracked by the TVA Heritage Program because it has a Global Rank of G1 (extremely rare and critically imperiled in the world). It has been collected in the Hiwassee River upstream of the Apalachia Powerhouse.

Smooth mudalia is endemic to the Tennessee River drainage with most of its original habitat being polluted or inundated by reservoirs (NatureServe 2007). This snail is tracked

by the TVA Heritage Program because it has a Global Rank of G2 (very rare and imperiled within the world). It has been collected in the Hiwassee River upstream of the Apalachia Powerhouse.

Spike mussel can be found living on firm substrate of coarse sand and gravel in moderate to strong current (Parmalee and Bogan 1998). This species has been collected in the Hiwassee River below Apalachia Dam.

Tan riffleshell (see Section 3.1.4) has been collected in the Hiwassee River between Apalachia Dam and Apalachia Powerhouse. Only a few surviving populations of this species exist.

Slabside pearl mussel (see Section 3.1.4) inhabits substrate of sand, fine gravel, and cobble in strong currents (ibid). It has been collected at various locations in the Hiwassee River between Apalachia Dam and its confluence with Gee Creek.

Tennessee clubshell prefers substrate of coarse gravel and sand in small shallow creeks and rivers with good current (ibid). This mussel has been collected in the Hiwassee River between the Apalachia Dam and the Apalachia Powerhouse.

Rainbow mussel can be found living in the edge of emerging vegetation in riffles with sand and gravel substrate and a moderate current (ibid). The rainbow mussel has been collected in the Hiwassee River downstream of the Apalachia Dam.

One of the few remaining viable populations of the **Cumberland bean** (see Section 3.1.4) is in the Hiwassee River in Polk County. The Cumberland bean has been collected in the Hiwassee River, between the Apalachia Dam and its confluence with Gee Creek.

3.7.4.2 Environmental Consequences

Plants

Under all alternatives, there will be no changes to the current land uses of Apalachia Reservoir lands and no resulting adverse impacts on listed plants. The federally listed plant Ruth's golden aster, which occurs in the Apalachia Bypass reach, is presently being managed by the USFS and would not be affected by the proposed alternatives. Any proposed activities on the TVA lands would be carefully evaluated for their potential to affect the several state-listed plants present on or near these lands.

Terrestrial Animals

No federally listed terrestrial animals are known from TVA parcels on Apalachia Reservoir. Therefore, adoption of any of the alternatives would not result in impacts to any federally listed terrestrial animals or their habitats. Forested areas on TVA lands ranked low in their suitability as summer roost habitat for Indiana bats because of the lack of suitable roosting trees. Suitable habitat for state-listed species and species tracked by Natural Heritage Programs occurs on numerous parcels but would not be affected by the continuation of the existing land uses under all of the alternatives.

Aquatic Animals

All of the listed aquatic species are known to occur in the Apalachia tailwater downstream of Apalachia Dam. Future actions taken on these parcels under any of the alternatives would be subject to further environmental review to assess impacts of a specific action, and therefore, no significant impacts to listed species are anticipated. These species are more

directly affected by the operation of Apalachia Dam, which would not change under any of the alternatives.

3.7.5 Wetlands

A regional overview of the wetlands resource for the mountain reservoirs is provided in Section 3.1.5.

3.7.5.1 Affected Environment

Wetlands are very rare on Apalachia Reservoir; NWI data indicates a total of 6 acres of forested and scrub-shrub wetlands. Although NWI data did not report any emergent wetlands, very small areas of emergent and scrub-shrub wetlands were found during field surveys of the river channel downstream of the powerhouse (Parcel 3). Small areas were also found in the flats upstream of the dam (Parcel 1). Species associated with wetlands on Apalachia Reservoir include swamp milkweed, jewelweed, smartweed, bulrush, St. John's wort, cattail, cardinal flower, soft rush, river birch, black willow, red maple, tag alder, buttonbush, and sycamore.

Table 3-82. Wetland Acreage - Apalachia Reservoir

Combined Aquatic Beds and Flats (acres)	Emergent (acres)	Forested (acres)	Scrub-Shrub (acres)	All Types (acres)
0	0	2	4	6

Source: National Wetlands Inventory

3.7.5.2 Environmental Consequences

The impacts of the various alternatives on wetlands would be similar, and none would be adverse. Under all alternatives, parcels containing wetlands would generally continue to be managed as they have been in the past, and any actions with the potential to affect wetlands would be assessed prior to their implementation.

3.7.6 Floodplains

An overview of floodplains in the mountain reservoirs area is provided in Section 3.1.6.

3.7.6.1 Affected Environment

The affected area extends from the land at the powerhouse at about HRM 53.3 upstream to about HRM 75.8 in Apalachia Reservoir at the tailwater of Hiwassee Dam. There is also one small tract of land occupied by the Gee Creek Campground located between HRM 43.2 and 43.8 that is managed by TDEC. The 100-year flood elevations for the Hiwassee River downstream of the dam vary from 848.1-feet msl at the powerhouse (HRM 53.3) to 1,182.3-feet msl at HRM 66.0 (downstream of Apalachia Dam). The 500-year flood elevations for the Hiwassee River downstream of the dam vary from elevation 853.1-feet msl at HRM 53.3 to 1,187.8-feet msl at HRM 66.0. At the Gee Creek Campground the 100-year flood elevations vary from 732.7-feet above msl at HRM 43.2 to 734.5-feet msl at HRM 43.8. The 500-year flood elevations vary from 738.7-feet msl at HRM 43.2 to 740.0-feet msl at HRM 43.8. Tabulations of the 100- and 500-year flood elevations are included in Appendix H.

The main watercourse in Apalachia Reservoir is the Hiwassee River. The 100-year flood elevation for the Hiwassee River is 1,282.0-feet msl from Apalachia Dam (HRM 66.0) to the upper end of the reservoir at HRM 75.8 (tailwater of Hiwassee Dam). The 500-year flood elevation for the Hiwassee River is 1,283.0-feet msl from the dam to the upper end of the reservoir.

3.7.6.2 Environmental Consequences

The environmental consequences of each alternative are discussed in Section 3.1.6. None of the alternatives would have adverse effects on Apalachia Reservoir floodplains.

3.7.7 Cultural Resources

An overview of cultural resources in the mountain reservoirs area is provided in Section 3.1.7.

3.7.7.1 Archaeological Resources

3.7.7.1.1 Affected Environment

Apalachia Reservoir was the subject of a single archaeological survey conducted in 1995, when the reservoir was lowered to 1,254-feet msl for maintenance, exposing about 200 acres (Riggs et al. 1996). A total of 16 archaeological sites were identified. Five of the 16 sites are considered potentially eligible for listing in the NRHP. A number of archaeological resources in the area are considered potentially eligible for listing in the NRHP.

3.7.7.1.2 Environmental Consequences

Under all alternatives, the existing uses of Apalachia Reservoir lands would not change and archaeological resources would not be directly affected. Any activities on these lands with the potential to affect archaeological resources would be reviewed according to the terms of the PA with the Tennessee SHPO for the portion of Apalachia Reservoir in Tennessee (Appendix G). TVA anticipates executing a similar PA in North Carolina for the identification, evaluation, and treatment of all historic properties in the mountain reservoirs area. Until this PA is executed, TVA will incorporate the phased identification, evaluation, and treatment procedure to effectively preserve historic properties as required by Section 106 of the NHPA. TVA would adhere to the terms of this PA under all alternatives, and no adverse impacts on archaeological resources are expected.

3.7.7.2 Historic Structures

3.7.7.2.1 Affected Environment

TVA chose the name "Apalachia" after a nearby crossroads settlement, Old Apalachia, north of the river in North Carolina and from a flag stop, Apalachia, on the L&N Railroad on the south bank in Tennessee.

Apalachia Dam and Powerhouse are considered to be historic properties, as they are potentially eligible for listing in the NRHP. Therefore, prior to any undertaking that could affect the dam and powerhouse, TVA would evaluate the effects of the action in accordance with Section 106 of the NHPA.

3.7.7.2.2 Environmental Consequences

Under all alternatives, the existing uses of Apalachia Reservoir lands would not change, and historic structures would not be directly affected. Any activities on these lands with the

potential to affect the dam, powerhouse, or other historic structures would be reviewed according to the terms of the existing PA with the Tennessee SHPO for the portion of Apalachia Reservoir in Tennessee, and the PA to be developed in North Carolina, as described in Section 3.1.7.1.2.

3.7.8 *Managed Areas and Ecologically Significant Sites*

Managed areas, ecologically significant sites, and NRI streams are defined in Section 3.1.8.

3.7.8.1 *Affected Environment*

The tailwaters of Apalachia Reservoir-Hiwassee River from Apalachia Dam to Gee Creek Campground are included in the study area. Gee Creek Campground, managed by TDEC, is an outlying Apalachia Reservoir parcel, and the Apalachia Bypass Tunnel, which runs west from Apalachia Dam to the Apalachia Powerhouse, is approximately parallel to the Hiwassee River for some distance.

Managed areas, ecologically significant sites, and NRI streams within 3 miles of Apalachia Reservoir and its tailwaters (Hiwassee River) are listed in Table 3-83. The areas are grouped by closest distance to the reservoir and/or the Hiwassee River; areas on the Hiwassee River and those abutting or less than 0.1 mile from the reservoir and tailwaters are listed as “adjacent.”

Table 3-83. Managed Areas, Ecologically Significant Sites, and Nationwide Rivers Inventory Streams Within 3 Miles of Apalachia Reservoir and its Tailwaters (Hiwassee River) to Gee Creek Campground

Name	Type of Area	Authority	Location County, State	Closest Distance to Reservoir and/or Tailwaters
Hiwassee River	NRI	Federal	Polk Tenn.	Adjacent
Hiwassee State Scenic River	Managed area (MA)	State	Polk Tenn.	Adjacent
Hiwassee River State Mussel Sanctuary	MA	State	Polk Tenn.	Adjacent
Hiwassee River Ruth's Golden Aster Sites	Ecologically significant site	None for sites; federal for species protection	Polk Tenn.	Adjacent
Nantahala National Forest	MA	Federal	Cherokee N.C.	Adjacent
Nantahala State Game Land	MA	State	Cherokee N.C.	Adjacent
John Muir National Recreation Trail/John Muir State Scenic Trail	MA	Federal/State	Polk Tenn.	Adjacent
Cherokee National Forest	MA	Federal	Polk Tenn.	Adjacent
Cherokee (South) State Wildlife Management Area	MA	State	Polk Tenn.	Adjacent
Coker Creek Scenic Area	MA	Federal	Polk Tenn.	0.2 mile north

3.7.8.2 *Environmental Consequences*

None of the alternatives for Apalachia Reservoir would change existing land uses, and therefore, no impacts to managed areas or ecologically significant sites are anticipated.

3.7.9 Visual Resources

The general visual environment of the mountain reservoirs is described in Section 3.1.9.

3.7.9.1 Affected Environment

Apalachia Reservoir has a narrow pool characterized by steep, wooded ridgelines adjacent to the shoreline. Some parcels are within the Hiwassee River Scenic River Corridor. There are several distinct coves that offer quiet, scenic destinations for fishermen and recreation boaters. There is little development along the shoreline, resulting in a naturally appearing expanse of reservoir unaltered by human development.

Most shoreline adjacent to Apalachia Reservoir has been preserved, resulting in pristine views from the reservoir of old-growth forest. The only parcels actively managed by TVA are the reservation land for the dam and powerhouse. Gee Creek Campground, located several miles below the powerhouse, is managed by TDEC as a component of the state park system.

3.7.9.2 Environmental Consequences

Under all alternatives, TVA would continue to manage its lands on Apalachia Reservoir according to the existing uses. Visual resources would not be impacted, and the high scenic integrity of the area would be maintained.

3.7.10 Water Quality and Aquatic Ecology

An overview of water quality and aquatic ecology for the mountain reservoirs area is provided in Section 3.1.10.

3.7.10.1 Affected Environment

Apalachia Reservoir is located in the Blue Ridge Physiographic Province; the streams in the watershed have naturally low concentrations of nutrients and dissolved minerals. Land use in the watershed remains largely forested with the Nantahala National Forest making up a large percent of the forested lands (NCDENR 2007a). Most of the water entering Apalachia Reservoir comes from Hiwassee Dam with little local inflow, so water quality in Apalachia is strongly affected by waters outside its own immediate drainage area. Long-term (1990-2005) flows from Apalachia Dam average about 2,164 cfs, which results in an average retention time of about 14 days.

Deep tributary reservoirs such as Apalachia Reservoir often stratify into distinct temperature layers in the summer. As a result, water discharged from the base of the dam into the tailwater can be very cold and have low DO, impairing water quality in the tailwater. TVA mitigates potential downstream impacts by introducing oxygen into the water leaving the turbine, resulting in better water quality.

There are three minor NPDES discharges located in the upper reach of the reservoir: Bear Paw WWTP, Hiwassee Dam School, and Hiwassee Hydro Plant.

Reservoir Ecological Health

Apalachia Reservoir is monitored at a forebay site at HRM 67.0. Apalachia Reservoir received a "good" ecological health rating in 2006 with the highest score (82) to date (Figure 3-7). This was the result of three indicators (chlorophyll, benthic macroinvertebrates, and sediment) concurrently scoring at the upper end of their historical range rather than of a substantial change in any indicator. The reservoir's score has

fluctuated between “fair” and “good” since monitoring began, but the higher reservoir scores since 2000 are largely the result of improvements in the benthic community, which rated in the “poor” to “low fair” range until 2000 when the community received a “good” rating. The benthic community has continued to rate “good” in subsequent years.

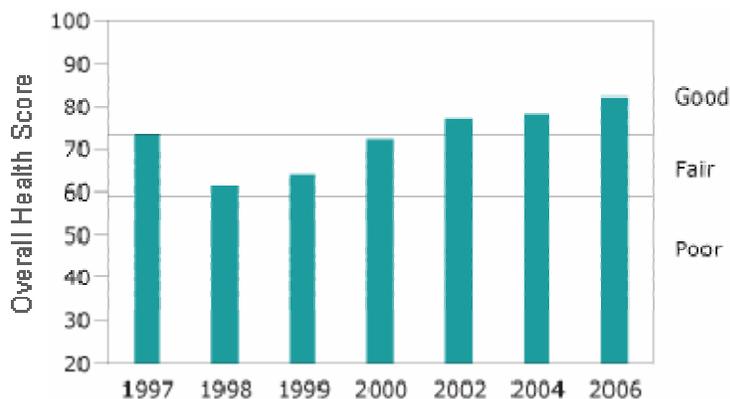


Figure 3-7. Apalachia Reservoir Ecological Health Ratings, 1997-2006

Dissolved Oxygen

According to Table 3-84, DO has rated “fair” each year due to a small zone of low DO water along the bottom of the reservoir in late summer. Although low DO (<2 mg/L) water has encompassed only a small percentage of the water column each year, a large percentage of the reservoir bottom is often exposed to low concentrations.

Chlorophyll

Chlorophyll ratings have fluctuated between “poor,” “fair,” and “good,” with no specific trend through time.

Sediment Quality

Sediment quality rated “good” most years because no PCBs or pesticides were detected and no metals had elevated concentrations. Sediment quality rated “fair” in 2000 due to slightly elevated concentrations of copper—probably related to the area’s geology— and “fair” in 1998 because low levels of chlordane were detected. Chlordane was a pesticide previously used to control termites and crop pests.

Table 3-84. Apalachia Reservoir Water Quality and Sediment Ratings, Reservoir Vital Signs Monitoring Data 1997-2006

	Monitoring Years						
	1997	1998	1999	2000	2002	2004	2006
Apalachia Forebay							
Dissolved Oxygen	Fair	Fair	Fair	Fair	Fair	Fair	Fair
Chlorophyll	Good	Good	Fair	Poor	Poor	Poor	Good
Sediment	Good	Fair	Good	Fair	Good	Good	Good

Benthic Community

The benthic community rated in the “poor” to “low fair” range until 2000 when the community received a “good” rating. The improvement resulted primarily from an increase in the number of *Corbicula*, fingernail clams, and more notably the number of chironomids collected. The benthic community has continued to rate “good” in subsequent years.

Benthic Monitoring

Areas sampled on Apalachia Reservoir included the forebay at HRM 67.0 (area of the reservoir nearest the dam). All benthic community scores rated “fair” to “good” for the eight years during which benthic samples were taken with the exception of 1998 which scored “poor” (Table 3-85).

Table 3-85. Recent (1996-2006) Benthic Community Ratings for Apalachia Reservoir

Station	River Mile	1996	1997	1998	1999	2000	2002	2004	2006
Forebay	67.0	Fair	Fair	Poor	Fair	Good	Good	Good	Good

Fisheries Monitoring

The RVSMP began including annual fish sampling on Apalachia Reservoir in 1996. A list of fish species commonly found in Apalachia Reservoir can be found in Appendix I. The fish community in Apalachia Reservoir has consistently rated “fair” at the forebay sampling stations.

Apalachia Reservoir provides some opportunities for sport anglers, particularly those interested in black bass. Because of its isolation, relatively few anglers use the reservoir when compared to other regional reservoirs. In 2006, Apalachia Reservoir SFI rated below the average for black bass, largemouth bass, smallmouth bass, and spotted bass (Table 3-86).

Table 3-86. Sport Fishing Index Scores for Selected Sport Fish Species in Apalachia Reservoir, 2006

Fish Species	2006 Score	2006 Valleywide Average
Black Basses	30	36
Largemouth Bass	30	33
Smallmouth Bass	26	30
Spotted Bass	22	31

Swimming Advisories

There are no state advisories against swimming in Apalachia Reservoir. TVA performed *E. coli* bacteria monitoring at one location in 2007: Hiwassee Dam tailwater boat ramp.

Fish Consumption Advisories

The State of North Carolina has issued a statewide fish consumption advisory for largemouth bass because of mercury concentrations. TVA collected channel catfish and largemouth bass from the reservoir for tissue analysis in autumn 2006. The results, which were similar to those of previous years, were provided to state agencies in North Carolina. TVA will analyze fish from Apalachia Reservoir again in autumn 2008.

State(s) Impaired Waters

The North Carolina Division of Water Quality assigned use support ratings to waters in the Hiwassee River basin based on biological, chemical, and physical data collected between September 1999 and August 2004 (NCDENR 2007a). All waters evaluated in the immediate watershed of Apalachia Reservoir are “supporting” in the aquatic life, recreation, and water supply categories. TDEC has listed 11.4 miles of the Hiwassee River below Apalachia Dam as impaired due to habitat loss from flow alteration (TDEC 2006). Since 2004, TVA has provided minimum flows in this reach of the Hiwassee River between Apalachia Dam and Apalachia Powerhouse from June 1 through November 1 to enhance the diversity of aquatic species in that water body (TVA 2005a).

Water Supply

No municipal water suppliers currently withdraw water from Apalachia Reservoir or its supporting watershed.

3.7.10.2 Environmental Consequences

Under all alternatives, no changes in the existing land uses would occur on Apalachia Reservoir. Any proposed actions on TVA land would be assessed for compliance with TVA’s Land Policy, SMP, and Section 26a regulations. Individual environmental reviews would identify potential adverse impacts and mitigation to protect the aquatic environment; TVA would then take appropriate measures to address these impacts. Therefore, no significant impacts to water quality and aquatic life are expected in association with these alternatives.

3.7.11 Air Quality and Noise

An overview of the air quality of the mountain reservoirs area is provided in Section 3.1.11. Under all of the alternatives, the existing uses of Apalachia Reservoir lands would not change, and there would be no adverse impacts to air quality. Noise has previously been discussed in Section 3.1.11.2.

3.7.12 Socioeconomics

The socioeconomic conditions of the mountain reservoirs area are described in Section 3.1.12.

3.7.12.1 Affected Environment

3.7.12.1.1 Population and Economy

Population: Cherokee County, North Carolina, had a population of 24,298 in 2000, an increase of 28.3 percent since 1980 (Tables 3-87 and 3-88). This was a lower rate than was in the state but higher than was in the nation. The rate of growth in the county, state, and nation was higher from 1990 to 2000 than from 1980 to 1990. Estimates for 2006 indicate that the population of Cherokee County has grown an additional 8.3 percent since 2000. This remains a faster rate than the nation but is not quite as fast as in the state as a whole. Projections through 2020 indicate that the county will continue to have faster population growth than the nation over that time, but not as fast as population growth in the state. The rate for the county is projected to be greater than for 1980-2000, but the rates for the state and nation are projected to be lower than for 1980-2000.

Polk County, Tennessee, had a population of 16,050 in 2000, an increase of 18.0 percent since 1980 (Table 3-87 and 3-88). This was a lower rate than in either the state or the

nation. The rate of growth in the county, state, and nation was much greater for the county from 1990 to 2000 than from 1980 to 1990. Estimates for 2006 indicate that the population of Polk County has declined 0.7 percent since 2000. This compares to growth of more than 6 percent in both the state and nation during that time. Projections through 2020 indicate that the county will rebound to have faster population growth than the state and nation over that time. The rates for the county and state are projected to be greater than for 1980-2000, but the rate for the nation is projected to be lower.

Table 3-87. Population – Cherokee County, North Carolina, and Polk County, Tennessee

Area	1980	1990	2000	2006 (Estimate)	2020 (Projection)	Density (persons per square mile) 2000
Cherokee County, N.C.	18,933	20,170	24,298	26,309	31,702	53.4
Polk County, Tenn.	13,602	13,643	16,050	15,939	22,086	36.9
North Carolina	5,880,095	6,628,637	8,049,313	8,856,505	10,885,758	165.2
Tennessee	4,591,023	4,877,185	5,689,283	6,038,803	7,195,375	138.0
United States	226,545,805	248,709,873	281,421,906	299,398,484	335,804,546	79.6

Source: U.S. Census Bureau (undated a-e), North Carolina Office of State Budget and Management (2007), and Tennessee Advisory Council on Intergovernmental Relations and University of Tennessee Center for Business and Economic Development (2003)

Table 3-88. Recent and Projected Population Changes – Cherokee County, North Carolina, and Polk County, Tennessee (Percentage Growth)

Area	1980-1990	1990-2000	1980-2000	2000-2006	2000-2020	1980-2020
Cherokee County	6.5	20.5	28.3	8.3	30.5	67.4
Polk County	0.3	17.6	18.0	-0.7	37.6	62.4
North Carolina	12.7	21.4	36.9	10.0	35.2	85.1
Tennessee	6.2	16.7	23.9	6.1	26.5	56.7
United States	9.8	13.2	24.2	6.4	19.3	48.2

Source: Calculated from data in Table 3-87

The counties are decidedly rural in distribution of population. As noted in Table 3-87, the population densities of both counties, particularly Polk County, are substantially lower than their states and much lower than the nation. The largest town in Cherokee County is Andrews, with 1,602 residents in 2000. The largest town in Polk County is Benton, with 1,138 residents in 2000. About 87 percent of the population in both counties is outside incorporated towns.

Economy: Table 3-89 contains the most recent annual data regarding the amounts and types of employment, amounts of unemployment, and incomes in the area. In 2005, Cherokee County had 13,422 people employed on average. The county had a higher percentage of farmers, manufacturing employees, and retail employees than either the state or the nation. The county had a lower percentage of government employees and employees in the general “other” category than the state or nation. The average unemployment rate for 2006 in the county was higher than either the state or the nation. Per capita personal income in 2005 was much lower in the county than in the state or nation.

In 2005, Polk County had 7,020 people employed on average. The county had a much higher percentage of farmers and government employees than the state or nation, a lower percentage of manufacturing employees, and a lower percentage of employees in the general “other” category than the state or nation. The average unemployment rate for 2006 in the county was higher than the state or nation. Per capita personal income in 2005 was much lower in the county than in the state or nation.

Table 3-89. Employment, Unemployment, and Income – Cherokee County, North Carolina, and Polk County, Tennessee

Area	Employment 2005	Employment (percent of total)					Unemployment Rate 2006	Per Capita Personal Income 2005
		Farm	Manufacturing	Retail Trade	Government	Other		
Cherokee County, N.C.	13,422	2.2	12.2	17.9	12.1	55.5	5.4	21,814
Polk County, Tenn.	7,020	7.9	7.2	12.6	20.9	51.4	5.6	24,245
North Carolina	5,119,512	1.4	11.5	10.8	15.7	60.5	4.8	31,041
Tennessee	3,630,959	2.7	11.7	11.4	12.1	62.2	5.2	30,969
United States	174,249,600	1.7	8.5	10.9	13.7	65.2	4.6	34,471

Source: U.S. Bureau of Economic Analysis (undated), North Carolina Employment Security Commission (undated), and Tennessee Department of Labor (undated)

Cherokee County is geographically in the center of a bowl defined by the surrounding counties. Therefore, it has historically been a regional trade center with a more balanced economy than the surrounding counties. As with all the counties in the region, the increasing land values due to the demand for vacation homes is making it more difficult for local residents to find affordable housing Ginny Faust, North Carolina Department of Community Affairs, personal communication, November 13, 2007; Melody Adams, Graham County, November 9, 2007).

3.7.12.1.2 Environmental Justice

The minority population in the Apalachia Reservoir area is small (Table 3-90). In Cherokee County, 6.4 percent of the total population was estimated to be minorities in 2006, which was far below the state average of 32.1 percent and the national average of 33.6 percent. The estimated poverty rate in the county in 2004 was 15.1 percent, higher than the state rate of 13.8 percent and the national rate of 12.7 percent.

In Polk County, 3.1 percent of the total population was estimated to be minorities in 2006, which was far below the state average of 22.5 percent and the national average of 33.6 percent (Table 3-90). The estimated poverty rate in the county in 2004 was 15.1 percent, slightly higher than the state rate of 15.0 percent and higher than the national rate of 12.7 percent.

Table 3-90. Minority Population, 2006, and Poverty, 2004 – Cherokee County, North Carolina, and Polk County, Tennessee

Area	Population, 2006				Percent Below Poverty Level, 2004
	Total	Nonwhite	White Hispanic	Percent Minority	
Cherokee County, N.C.	26309	1310	366	6.4	15.1
Polk County, Tenn.	15,939	325	164	3.1	15.1
North Carolina	8,856,505	2,298,351	543,059	32.1	13.8
Tennessee	6,038,803	1,182,866	174,747	22.5	15.0
United States	299,398,484	59,652,230	41,001,760	33.6	12.7

Source: U.S. Census Bureau (undated d and 2004)

3.7.12.2 Environmental Consequences

The current uses of Apalachia Reservoir lands would continue under all of the alternatives. Other than the possible expansion of existing recreation facilities, there would be little development that would affect socioeconomic conditions. None of the alternatives would result in disproportionate impacts on minority or disadvantaged populations.

3.8 Fontana Reservoir

3.8.1 Land Use

An overview of land use for the mountain reservoirs region is provided in Section 3.1.1.

3.8.1.1 Affected Environment

TVA initially purchased 57,312 acres of land for Fontana Reservoir (Table 1-1). TVA transferred 55,153 acres (96 percent) to other agencies for public use. Approximately 44,000 acres were transferred to the USFS and 10,400 acres were transferred to the NPS for inclusion in the GSMNP. Of the originally purchased acreage, TVA sold about 1,228 acres (2 percent). Several hundred acres along the reservoir were involved in a USFS land exchange, which provided land for residential development. This area is known as Fontana Lake Estates.

TVA retained 931 acres of land divided into 46 parcels on Fontana Reservoir. All of the parcels are committed to existing land uses. The dam reservation accounts for 43 percent (403 acres) of the calculated acreage. As previously mentioned, the acreage of the narrow strip of TVA-retained land fronting the land TVA transferred to the USFS has not been calculated; therefore, the committed uses associated with those parcels are not represented in the committed acreage total. However, there are 23 such parcels that are committed through the transfer agreement with the USFS. Most of this land is used for natural resource conservation and dispersed recreation, and some of the land is managed for developed recreation where it fronts recreational facilities such as where marinas are present. Additionally, there are several parcels committed to recreational use through land use agreements, the largest of which include Fontana Village Resort near the dam (351.7 acres) and the Old SR 288 boat ramp and day use area near Bryson City (70.3 acres). Finally, there are two parcels committed to residential access by deeded rights or prior policy. For a complete list of the committed uses on Fontana Reservoir parcels, reference Appendix E.

TVA owns 92 percent of the approximately 238 miles of shoreline on Fontana Reservoir (Table 1-2). This shoreline either fronts land TVA retained for project operations or fronts the land TVA retained fronting the land transferred to the USFS. Nineteen percent of the shoreline was never owned by TVA. TVA only purchased flowage easements along this private shoreline. Approximately 11 percent of the shoreline, all privately owned, is available for residential development (Table 3-2). TVA estimates that about 64 percent of the shoreline available for residential development is currently developed.

Graham and Swain Counties, North Carolina, are predominantly rural. Bryson City in Swain County is the town nearest to the reservoir. About 60 percent of the land in Graham County is in the Nantahala National Forest (USFS 2007b, Quickfacts 2007). About 7 percent of Swain County is in the National Forest (ibid). According to Swain County Economic Development Director Ken Mills (personal communication, November 14, 2007), when the acreage in the Great Smoky Mountains National Park and the Cherokee Indian Reservation is added, total federal and tribal ownership is 88 percent of the county. Mr. Mills noted that development has increased on the privately owned land in the county in recent years. Graham County Economic Development Director Melody Adams (personal communication, November 9, 2007), said this was also occurring in Graham County.

No prime farmlands occur on the TVA-managed lands on Fontana Reservoir.

3.8.1.2 Environmental Consequences

Alternative A

As shown in Table 2-4, TVA did not utilize the Forecast System designations to plan Fontana Reservoir and has no other formal plan for the management of its Fontana Reservoir lands. Under Alternative A, TVA would continue to manage this land for its current uses with no parcel allocations or RLMP. There would be no potential for change in land use under Alternative A because all of the parcels on Fontana Reservoir are committed to their existing use as shown in Table 2-2.

Under Alternative A, there would be no impacts to prime farmlands.

Alternatives B and C

Under Alternatives B and C on Fontana Reservoir, TVA would allocate the previously unplanned 931 acres to four of the seven current land use planning zones. The largest amount of land, comprising 16 parcels and approximately 435 acres (46.7 percent), would be allocated to Zone 6 (Developed Recreation). Almost as large an amount, 3 parcels totaling 405 acres (43.5 percent) would be allocated to Zone 2 (Project Operations). Twenty-five parcels comprising about 50 acres (5.4 percent) would be allocated to Zone 4 (Natural Resource Conservation). However, the previously unplanned acreage for the TVA-retained land fronting USFS land is unknown and therefore is not included in the Zones 4 and 6 acreage totals. Zone 7 (Shoreline Access) would have 41 acres (4.4 percent) allocated to it. No land would be allocated to Zone 3 (Sensitive Resource Management) or Zone 5 (Industrial).

No significant changes to land use are expected to occur on Fontana Reservoir under either alternative because the allocations are consistent with existing committed land use on all parcels.

Under Alternatives B and C, there would be no impacts to prime farmlands.

3.8.2 Recreation

An overview of the recreation resource for the mountain reservoirs is provided in Section 3.1.2.

3.8.2.1 Affected Environment

There are 19 TVA parcels on Fontana Reservoir that support developed recreation facilities. TVA actively manages a few of these parcels; most, however, are managed by the USFS and state and county agencies, either through TVA land transfer agreements or landrights provided by licenses, leases, or easements. In addition to the TVA and other public land that provides recreational opportunities, the private sector also provides needed amenities such as marinas. These developed recreation areas are summarized in Table 3-91.

There are four campgrounds on Fontana Reservoir. There are two commercial campgrounds located on TVA land and on USFS land. Cable Cove Recreation Area (Parcel 7) is operated by the USFS and the State of North Carolina and also includes a boat ramp. Tsali Recreation Area (Parcel 15) is operated by the USFS and the State of North Carolina and also includes picnic tables and a boat ramp.

There are 11 recreation areas that contain at least one boat ramp, six of which are privately operated. Five of the ramps are operated by public entities.

There are five commercial marinas operating on Fontana Reservoir, all of which are privately operated: Prince Boat Dock (Parcel 11), Peppertree Fontana Village (Parcel 4), Alarka Dock (Parcel 16), Greasy Branch Boat Dock (Parcel 35), and Almond Boat and RV Park (Parcel 25).

The single public fishing pier on Fontana Reservoir is at the SR 288 Recreation Park (Parcel 44) and managed by Swain County.

There are six stream access sites located near Fontana Reservoir. All of these are located on TVA land and managed by other public agencies. Cullowhee Dam (Parcel TSGA-3) is managed by Western Carolina University; East LaPorte (Parcel TSGA-4) is managed by Jackson County; Phillips Bridge (Parcel LTRA-3) and Prentiss Bridge (Parcel LTRA-4) are managed by Macon County; Bryson City Park (Parcel 42) is managed by Bryson City; and Ela (Parcel TSGA-1) is managed by Swain County.

Table 3-91. Recreation Facilities on Fontana Reservoir

Area Name	County, State	Sector	Operator	Land Ownership	Parcel Number	Campground	Marina	Picnic Tables	Boat Ramp	Stream Access	Paved Trails	Fishing Piers	Other
Crisp Boat Dock	Graham, N.C.	Private	Commercial	Private***	13				X				
Prince Boat Dock	Graham, N.C.	Private	Commercial	Private***	11		X		X				
Peppertree Fontana Village	Graham, N.C.	Private	Commercial	TVA	4	X	X		X				X
Fontana Dam Reservation	Graham, N.C.	Public	TVA	TVA	2, 3, 4			X					X
Cable Cove Recreation Area	Graham, N.C.	Public	USFS/State of N.C.	USFS**	7	X			X				
Tsali Recreation Area	Graham/Swain, N.C.	Public	USFS/State of N.C.	USFS**	15	X		X	X				
Cullowhee Dam*	Jackson, N.C.	Public	West Carolina University	TVA	TSGA-3					X			
East LaPorte*	Jackson, N.C.	Public	Jackson County	TVA	TSGA-4			X		X			
Phillips Bridge*	Macon, N.C.	Public	Macon County	TVA	LTRA-3					X			
Prentiss Bridge*	Macon, N.C.	Public	Macon County	TVA	LTRA-4					X			
Alarka Dock	Swain, N.C.	Private	Commercial	Private***	16		X		X				
Greasy Branch Boat Dock	Swain, N.C.	Private	Commercial	Private***	35		X		X				X
Almond Boat and RV Park	Swain, N.C.	Private	Commercial	USFS**	25	X	X		X				X
Bryson City Park	Swain, N.C.	Public	Bryson City	TVA	42					X			X
Ela*	Swain, N.C.	Public	Swain County	TVA	TSGA-1			X		X			X
SR 288 Recreation Park	Swain, N.C.	Public	Swain County	TVA	44			X	X			X	

Area Name	County, State	Sector	Operator	Land Ownership	Parcel Number	Campground	Marina	Picnic Tables	Boat Ramp	Stream Access	Paved Trails	Fishing Piers	Other
Lemmon's Branch Ramp	Graham, N.C.	Public	USFS/State of N.C.	USFS**	19				X				
Wilderness Boat Ramp	Swain, N.C.	Public	State of N.C.	USFS**	38				X				

* = Stream access site

** = TVA retained below MSC

*** = Marina below USFS and TVA Land below the 1,710-foot msl

Dispersed Recreation

Dispersed recreation has historically been an important use of Fontana Reservoir. The following table is a summary of parcels utilized for dispersed recreation areas that have been identified to date on Fontana Reservoir.

Table 3-92. Dispersed Recreation Areas on Fontana

Recreation Area	Parcel Number	Number of Sites
Fontana Lake Estates	28	1
National Park Service 1	45	3
National Park Service 2	46	3

3.8.2.2 Environmental Consequences

Alternative A

Under Alternative A on Fontana Reservoir, no land is allocated for developed recreation. However, under Alternative A, 16 unplanned parcels currently support developed recreation. The unplanned parcels are all committed to a developed recreation use through transfer agreement covenants and TVA license, leases, and easements.

Under Alternative A, TVA would not allocate any parcels for Public or Commercial Recreation use on Fontana Reservoir. The unplanned parcels that are committed to developed recreation would continue to be used for that purpose. Therefore, any future demand for recreational needs would have to be met by expansion of recreation facilities in these existing areas. Under Alternative A, potential environmental impacts would be insignificant since parcels utilized for developed recreation would not change. The potential for impacts from any new facilities would be subject to review and potential mitigation under NEPA.

Under Alternative A, there are no proposed changes in land use of any parcels, and therefore, potential impacts to dispersed recreation would be restricted to expansions within existing committed parcels (e.g., campground expansion). Potential impacts to dispersed recreation of this nature are expected to be insignificant.

Alternatives B and C

Under Alternatives B and C, 16 parcels would be allocated to Zone 6 (Developed Recreation) on Fontana Reservoir. All of these parcels are committed to a developed recreation use, and all of the parcels currently support recreational use with existing facilities. The parcels allocated to Zone 6 under Alternatives B and C include those unplanned parcels under Alternative A that are committed to a developed recreation use.

Under Alternatives B and C, any future demand for recreational needs accommodated on TVA land would have to be met by expansion of recreation facilities in these existing areas allocated to Zone 6. These areas are the same under Alternative B as under Alternative A, and since there would be no new parcels allocated for Developed Recreation, the potential environmental impacts would be the same. The potential for impacts from any new facilities within existing areas would be subject to review and potential mitigation under NEPA.

Under Alternatives B and C, there are no proposed changes in land use of any parcels, and therefore, potential impacts to dispersed recreation would be restricted to expansions within existing committed parcels. Potential impacts to dispersed recreation of this nature are expected to be insignificant.

3.8.3 Terrestrial Ecology

An overview of terrestrial ecology (plant and wildlife communities) is provided in Section 3.1.3.

3.8.3.1 Plant Communities

3.8.3.1.1 Affected Environment

The physiognomic vegetative classes commonly found on Fontana Reservoir lands are evergreen forest, evergreen-deciduous forest, deciduous forest, shrublands, and herbaceous vegetation. Evergreen forests make up a small percentage of the forests and consist of large stands of Virginia pine and small stands of white pine. Evergreen-deciduous forests, the most common forest type, are dominated by stands of mixed pine-hardwood trees. On dry xeric ridges, pitch, short-leaf, and Virginia pines and oaks are found in the canopy with the understory dominated by blueberry/huckleberry species along with stump sprouts of American chestnut. Horsesugar, a small tree thought to be extirpated from the Great Smoky Mountains National Park, was found growing within an evergreen-deciduous forest on Parcel 46 (an island adjacent to park service lands). More mesic sites were also dominated by oaks interspersed with pines, often including white pine.

Deciduous forests occur mainly as oak-hickory forests (mesic to xeric) and mesic hardwood forests on slopes. Oak-hickory forests common on xeric ridges grade into more mesic slopes. Cove hardwood forests are dominated by tulip poplar with American beech, Fraser's magnolia, striped maple, sweet birch, white oak, and yellow buckeye. The cove hardwood forest on Parcel 23 is unusually diverse flora with American basswood, northern red oak, tulip poplar, and white oak in the canopy and American plum, buffalo nut, dog hobble, flowering dogwood, highbush blueberry, mountain laurel, red maple, rosebay, sweet birch, sweetshrub, and wild hydrangea in the subcanopy. Numerous ferns were present, which included Christmas fern, cinnamon fern, marginal shield fern, New York fern, rock cap fern, southern lady fern, and royal fern. Other herbaceous species found were American alumroot, bellwort, flowering spurge, New England aster, Solomon's seal, thimbleberry, and touch-me-not.

Forested wetlands were found in bottom areas along the backs of coves along the reservoirs and grade into scrub-shrub wetlands (shrublands). A seepage area associated with a rocky bluff was observed on Parcel 28 opposite of Parcel 27 on the Little Tennessee River. Woolly lip fern and rock cap fern grow on the rocky bluff.

Herbaceous vegetation is commonly found along transmission line and railway and roadway rights-of-way as well as grassy areas within the dam reservations and commercial recreation areas. Kudzu and oriental bittersweet were commonly encountered along boneset, bracken fern, common ragweed, small-headed sunflower, and several grass species such as broomsedge, Johnson grass, love grass, and sugar cane plume grass. Tall fescue and bahia grass were common grasses seen on the dam reservation.

A number of invasive species were observed during field surveys, especially on the dam reservation and along the railroad and road rights-of-way. The species present include oriental bittersweet, autumn olive, Chinese lespedeza, Chinese privet, Japanese honeysuckle, Japanese stiltgrass, kudzu, mimosa, multiflora rose, princess tree, and tree-of-heaven. Large stands of kudzu occur along the railroad right-of-way on Fontana Lake Estates and near the US 19 bridge at Parcel 27. TVA, along with the NPS, has attempted to control oriental bittersweet on the dam reservation and other areas near Fontana Reservoir for several years by physically pulling the plants where they occur.

3.8.3.1.2 Environmental Consequences

Under all alternatives, there would be no changes to existing land uses and thus no associated impacts on plant communities. TVA's ability to manage invasive species would not change from the present situation. TVA currently prioritizes invasive species management efforts based on several factors including the availability of resources, potential for partnerships, and threat to sensitive resources.

3.8.3.2 **Wildlife Communities**

3.8.3.2.1 Affected Environment

The TVA lands on Fontana Reservoir contain a mixture of deciduous, evergreen, evergreen-deciduous, and early successional habitats. Wildlife communities are considered common in the region. A variety of salamanders, including dusky and slimy salamanders, was noted near streams along Parcels 31 and 28. Additionally, a series of ponds with associated emergent wetlands on Parcels 31 and 28 provide habitat for various amphibians, wading birds, ducks, and songbirds such as yellow warbler, common yellowthroat, and other species typically associated with wetlands. River otters are observed regularly on Fontana Reservoir and tailwater. Few mud flats habitat exists on Fontana Reservoir.

3.8.3.2.2 Environmental Consequences

Under all alternatives, there would be no changes to existing land uses and thus no associated impacts to wildlife communities.

3.8.4 **Endangered and Threatened Species**

A regional overview of endangered and threatened species is provided in Section 3.1.4.

3.8.4.1 Affected Environment

Five state-listed plant species are known from within 5 miles of Fontana Reservoir (Table 3-93). In addition, the federally listed Virginia spiraea occurs in Graham County. No threatened or endangered plants or terrestrial animals were found during field surveys conducted as part of this planning process. As described below, suitable habitat for some listed animals does occur on Fontana Reservoir lands.

Table 3-93. Federally and State-Listed as Endangered, Threatened, and Other Species of Conservation Concern Reported From the Vicinity of Fontana Reservoir

Common Name	Scientific Name	Federal Status	State Rank	State Status
Plants				
Dwarf filmy-fern	<i>Trichomanes petersii</i>	--	S2	THR
Glade spurge	<i>Euphorbia purpurea</i>	--	S2	SR-T
Liverwort	<i>Aneura sharpii</i>	--	S1	SR-T
Rock gnome lichen	<i>Gymnoderma linear</i>	END	S2	THR
Saxifrage	<i>Saxifraga caroliniana</i>	--	S3	SR-T
Sedge	<i>Carex purpurifera</i>	--	S1	SR-P
Virginia spirea	<i>Spirea virginiana</i>	END	S2	END
Amphibian				
Eastern hellbender*	<i>Cryptobranchus alleghaniensis alleghaniensis</i>	--	S2	RARE
Birds				
Bald eagle*	<i>Haliaeetus leucocephalus</i>	--	S3	THR
Blue-winged warbler*	<i>Vermivora pinus</i>	--	S2	RARE
Cerulean warbler*	<i>Dendroica cerulea</i>	--	S2	RARE
Mammals				
Northern flying squirrel	<i>Glaucomys sabrinus coloratus</i>	END	S2	END
Eastern cougar	<i>Puma concolor cougar</i>	END	SH	S2
Indiana bat*	<i>Myotis sodalis</i>	END	S1?	END
Rafinesque's big-eared bat*	<i>Corynorhinus rafinesquii rafinesquii</i>	--	S2	THR
Southeastern fox squirrel*	<i>Sciurus niger niger</i>	--	S3	NOST
Southern Appalachian woodrat*	<i>Neotoma floridana haematoreia</i>	--	S3	SPCO
Reptiles				
Bog turtle*	<i>Glyptemys muhlenbergii muhlenbergii</i>	THR	S2	THR
Northern pine snake	<i>Pituophis melanoleucus melanoleucus</i>	--	S3	SPCO
Fish				
Spotfin chub*	<i>Erimonax monachus</i>	THR	S1	THR
Smokey dace*	<i>Clinostomus funduloides ssp. 1</i>	--	S2	SPCO
Sicklefin redbhorse*	<i>Moxostoma sp .2</i>	CAND	S?	NOST
Wounded darter*	<i>Etheostoma vulneratum</i>	--	S2	SPCO
Olive darter*	<i>Percina squamata</i>	--	S2	SPCO

Common Name	Scientific Name	Federal Status	State Rank	State Status
Insects				
Appalachian crescent*	<i>Phycoides batesii maconensis</i>	--	S2	RARE
Dusky azure*	<i>Celastrina eberina</i>	--	S2?	RARE
Snails				
Noonday globe*	<i>Patera clarki nantahala</i>	THR	S1	THR
Open supercoil*	<i>Paravitrea umbilicaris</i>	--	S2	SPCO
Mussels				
Slippershell mussel*	<i>Alasmidonta viridis</i>	--	S1	END
Little-wing pearlymussel*	<i>Pegias fabula</i>	END	S1	END

-- = Not applicable

*Species descriptions in the text

Rank abbreviations: S1 = critically imperiled, S2 = imperiled, S3 = rare or uncommon, SH = State historical, ? = inexact or uncertain

Status abbreviations: CAND = Candidate for listing, END = Endangered, NOST = no state status, RARE = rare, SPCO = Special Concern, SR-P = Significantly Rare-Peripheral; SR-T = Significantly rare-throughout, THR = Threatened

Eastern hellbenders are known from the Tuckasegee River and its tributaries. They are expected to occur in the numerous streams flowing into Fontana Reservoir.

Bald eagles (see Section 3.1.4) nest near the mouth of the Tuckasegee River, adjacent to Parcel 37. Recent bald eagle sightings suggest that additional nests may exist in the vicinity of Eagle Creek. Adult bald eagles were observed on Fontana Reservoir during field investigations in 2006.

Blue-winged warblers live within early to midsuccessional habitats typically containing a mixture of woody shrubs, herbaceous vegetation, and trees. A blue-winged warbler was observed within a transmission line corridor near Fontana Village in 1964. Habitat for this species still exists in the area but is relatively uncommon throughout the Fontana Reservoir project area.

Cerulean warblers occur largely in mature deciduous forests. Numerous records of this species exist within the Fontana Reservoir area, including on the dam reservation, and suitable habitat occurs on many of the parcels surrounding Fontana Reservoir.

A total of 20 points were sampled on Fontana Reservoir lands to determine their quality as **Indiana bat** summer roost habitat. Overall, most forested habitat ranked as unsuitable for Indiana bats; sample points indicated low-quality habitat due to lack of suitable roost trees and thick midstory. Due to the abundance of habitat in the area and presence of Indiana bats in the region, Indiana bat surveys would be performed during future projects in the vicinity of Fontana Reservoir that have the potential to affect summer roost habitat.

Rafinesque's big-eared bats often roost in caves, mines, and hollow trees, under loose bark of trees, and in abandoned buildings and other man-made structures especially in or near wooded areas. They forage in mature forests in both uplands and lowlands. One site within the boundaries of the GSMNP houses a population of Rafinesque's big-eared bats during winter months. This site is approximately 2.5 miles from the Fontana Dam Reservation. Foraging habitat for this species exists on several TVA parcels.

Southeastern fox squirrels often occur in evergreen-deciduous forests and long-leaf pine forests, but can be found in disturbed areas, hedgerows, and city parks. A historic record of southeastern fox squirrel was reported near Parcel 38.

Southern Appalachian woodrats occupy woodland and brushy habitats. They are usually associated with rocky outcrops but also occur in areas with dense vegetation. A single record is known for this species within 3 miles of the project area. This species likely occurs on TVA parcels dominated by forested habitat.

The only known **bog turtle** population in Graham or Swain counties is over 6 miles from the Fontana Reservoir project area. No bog turtle habitat exists in the project area.

Spotfin chub (see Section 3.1.4) has been collected in the Tuckasegee River and Little Tennessee River forks of Fontana Reservoir.

Smokey dace populations are spotty and uncommon in the Tennessee side of the Little Tennessee River but common in the North Carolina side (NatureServe 2007). This fish has been collected in the Tuckasegee River fork of Fontana Reservoir.

Sicklefin redhorse (see Section 3.1.4) has been recognized as a distinct species by the USFWS and has been designated as a Candidate for federal listing. This species has not yet been assigned a formal scientific name; however, it is currently in the process of being formally described as a species by the scientific community. It has been collected in the Tuckasegee River fork of Fontana Reservoir near NPS parcels of land, as well near Parcels 11 and 12 on the Little Tennessee River fork of Fontana Reservoir.

Wounded darter can be found in moderate to large rivers and prefers depths of 0.5 meter or more in gentle to moderate current with boulder to coarse rubble substrate. Spawning occurs in late May to late July with water temperatures of 16-20 degrees Celsius (Etnier and Starnes 1993). This fish has been collected in the Little Tennessee River fork of Fontana Reservoir upstream of Parcel 11.

Olive darter is an inhabitant of higher gradient upland rivers in boulder and bedrock chutes with moderate to torrential current (ibid). This fish has been collected on the upper end of Fontana Reservoir in the vicinity of Parcels 16 to 19.

Appalachian crescent habitat includes damp meadows to dry ridges. The host plants include many species of aster. All records of this butterfly are south of the Fontana Reservoir project area; however, habitat exists around Fontana Reservoir.

Dusky azure butterflies inhabit moist, rich deciduous forests. The host plant of the larvae is goatsbeard (*Aruncus dioicus*), which is relatively common throughout the Fontana Reservoir project area.

Suitable habitat for **noonday globes** (see Section 3.1.4) occurs on Parcels 22, 23, and 24 within the Nantahala Gorge. No intensive surveys have been performed at these sites. A population is known from approximately 2.3 miles south of Parcel 24.

Open supercoils are known from cove forests with rocky slopes. Parcel 1 cove forest may contain this species.

Slippershell mussel is found in small creeks and shallow streams. It prefers substrate of sand and fine gravel but can thrive in mud and sand bottoms among vegetation roots in stretches of continuous current (Parmalee and Bogan 1998). This mussel has been collected in the Little Tennessee River fork of Fontana Reservoir, upstream of assessed Parcel 11.

Little-Wing pearl mussel (see Section 3.1.4) has been collected in the Little Tennessee River fork of Fontana Reservoir, upstream of Parcel 11.

3.8.4.2 Environmental Consequences

Plants

No known populations of endangered or threatened plants are known to occur on the 931 acres of TVA land on Fontana Reservoir, and therefore, no impacts to listed plants are expected under any alternatives.

Terrestrial Animals

No federally listed as endangered or threatened terrestrial animals are known to occur on TVA Fontana Reservoir lands. These lands also ranked low in their suitability as Indiana bat habitat due to the lack of suitable roosting trees and the presence of thick midstory layers on the forested parcels. A few state-listed species, including the bald eagle, which was formerly federally listed, occur on or are likely to occur on Fontana Reservoir lands. Under all alternatives, TVA would incorporate protective buffers as suggested by the Bald and Golden Eagle Protection Act around all known bald eagle nests in the project area. TVA would also review any proposed activities on Fontana Reservoir lands for their potential to affect listed terrestrial animals. Under all alternatives, there would be no impacts to federally listed terrestrial animals and no adverse impacts to state-listed terrestrial animals.

Aquatic Animals

Under all alternatives, there would be no changes to existing land uses. Future actions on Fontana Reservoir parcels would be subject to further environmental review to assess their impacts, and with implementation of proper BMPs, there would be no effect on any listed aquatic species.

Under Alternatives B and C, Parcel 41 would be allocated to Zone 2 (Project Operations) for an existing wastewater treatment plant, and Parcel 42 would be allocated to Zone 6 (Developed Recreation) for Bryson City Park. The olive darter occurs in this reach, and activities on Parcels 41 and 42 could potentially impact the species; however, with the implementation of appropriate environmental controls, no impacts would occur to this species. Parcel 43 is a riverine island that would be allocated to Zone 4 (Natural Resource Conservation) and thereby provides habitat protection for the olive darter.

Occurrences of the sicklefin redhorse are known within the vicinity of all TVA land parcels on Fontana Reservoir. Activities on any of these land parcels, which are primarily utilized for Zone 4 (Natural Resource Conservation) or Zone 6 (Developed Recreation) and front an existing boat ramp and boat docks, have the potential for negative water quality impacts to the reservoir. However, as long as proper controls are implemented during any future development, no impacts would occur to this candidate species.

Occurrences of the smokey dace and spotfin chub are known within the vicinity of Parcel 39. Under Alternatives B and C, Parcel 39 fronts USFS lands, which would be allocated to Zone 4 (Natural Resource Conservation); therefore, these species would not be affected.

Parcels 18, 19, 20, 21, 25, 26, 27, 28, and 29 are adjacent to designated critical habitat for the spotfin chub. Under Alternatives B and C, Parcels 18, 20, 26, and 28 front undeveloped USFS lands that would be allocated to Zone 4 (Natural Resource Conservation), which would have beneficial effects to spotfin chub habitat through maintaining the riparian habitat. Parcels 19 and 25 are an existing boat ramp and boat dock area and would be allocated to Zone 6 (Developed Recreation). Although recreational activities can have the potential to affect water quality, proper operation of recreational facilities should reduce possible impacts to the spotfin chub to insignificant levels. Parcel 21 would be allocated to Zone 2 (Project Operations) to support the existing land use adjacent to the Great Smoky Mountain Railway, and activities thereon should not impact aquatic life.

Parcels 27 and 29 would be allocated to Zone 7 (Shoreline Access) to support the existing use by the Fontana Lake Estates Subdivision and other areas with water access. Zone 7 allocated lands have the potential for additional nutrient enrichment that can occur as a result of the loss of the riparian buffer on residential shoreline along the reservoir. TVA requires BMPs to minimize impacts to natural resources associated with any new proposed development fronting residential access areas. With the implementation of TVA Standards and Conditions and BMPs, these proposed allocations would not affect spotfin chub critical habitat.

Occurrences of the wounded darter and little-wing pearl mussel are also known to occur within the vicinity of Parcels 27 and 28. The presence of critical habitat in this reach would be evaluated and taken into consideration for any future permit requests on these parcels. The Zone 4 (Natural Resource Conservation) allocation for Parcel 28 would have beneficial effects for the wounded darter.

3.8.5 Wetlands

A regional overview of the wetlands resource for the mountain reservoirs is provided in Section 3.1.5.

3.8.5.1 Affected Environment

Wetlands are a relatively uncommon habitat type on Fontana Reservoir (Table 3-94). As discussed in Section 3.1.5, wetlands comprise less than 0.1 percent of the total land cover types in the Little Tennessee River watershed.

Table 3-94. Wetland Acreage - Fontana Reservoir

Combined Aquatic Beds and Flats (acres)	Emergent (acres)	Forested (acres)	Scrub-Shrub (acres)	All Types (acres)
6	4	39	8	57

Source: National Wetlands Inventory

Wetland resources on Fontana Reservoir are primarily associated with the reservoir shoreline in very narrow fringes. Common species include persimmon, cutgrass, jewelweed, buttonbush, river birch, sycamore, alder, red maple, sedges, and soft rush. The

majority of TVA parcels contain steeply sloped shorelines; thus, wetlands are only associated with a few parcels. These areas are typically linear and small (<0.1 acre) in size. Parcels 3, 11, 14, and 20 contain small areas of scrub-shrub and emergent wetlands. A series of ponds with associated emergent wetlands on Parcels 31 and 28 provide valuable habitat for amphibians, wading birds, ducks, and songbirds. There are also small seeps within Parcels 23 and 24 that are relatively uncommon habitat types.

3.8.5.2 Environmental Consequences

The impacts of the various alternatives on wetlands would be similar, and none would be adverse. Under all alternatives, parcels containing wetlands would generally continue to be managed as they have been in the past, and actions with the potential to affect wetlands would be assessed prior to their implementation.

3.8.6 Floodplains

An overview of floodplains in the mountain reservoirs area is provided in Section 3.1.6.

3.8.6.1 Affected Environment

The affected area extends from the lower limit of the dam reservation at about Little Tennessee River Mile (LTRM) 59.1 upstream to about LTRM 87.0 in Fontana Reservoir. The approximate 100-year flood elevations for the Little Tennessee River downstream of the dam vary from 1,280.0-feet msl at LTRM 59.1 to 1,286.0-feet msl at LTRM 61.0 (downstream of Fontana Dam). The approximate 500-year flood elevations for the Little Tennessee River downstream of the dam vary from 1,283.5-feet msl at LTRM 59.1 to 1,291.0-feet msl at LTRM 61.0. Tabulations of the 100- and 500-year flood elevations are included in Appendix H.

There are two main watercourses in Fontana Reservoir: the Little Tennessee River and the Tuckasegee River. The 100-year flood elevation for the Little Tennessee River is 1,710.0-feet msl from Fontana Dam (LTRM 61.0) to the upper end of the reservoir at about LTRM 87.0. The 500-year flood elevation is also 1,710.0-feet msl from the dam to the upper end of the reservoir. The 500-year flood elevation is used to control flood damageable development for TVA projects and on TVA lands.

The 100-year flood elevations for the Tuckasegee River vary from 1,710.0-feet msl at the mouth (LTRM 76.15) to elevation 1,735.4-feet msl at the upper end of TVA's landrights at about LTRM 12.7. The 500-year flood elevations for the Tuckasegee River vary from elevation 1,710.0-feet msl at the mouth to elevation 1,739.5-feet msl at the upper end of TVA's landrights.

3.8.6.2 Environmental Consequences

The environmental consequences of each alternative are discussed in Section 3.1.6. None of the alternatives would have adverse effects on Fontana Reservoir floodplains.

3.8.7 Cultural Resources

An overview of cultural resources in the mountain reservoirs area is provided in Section 3.1.7.

3.8.7.1 Archaeological Resources

3.8.7.1.1 Affected Environment

Fontana Reservoir was the subject of archaeological surveys of the proposed North Shore Road corridor in 2004 (Webb 2004) and of large tracts of shoreline in late fall 1995 (Shumate et al. 1996), the winter of 2005-2006 (Gage and Herrmann 2006), and the winter of 2006-2007 (Gage and Herrmann 2007). The 1995 survey focused on the area from LTRM 82.5 of the Little Tennessee River upstream to approximately LTRM 90.1 and portions of Alarka Creek. Eight of the 21 sites recorded during the 1995 survey were considered potentially eligible for listing in the NRHP. The 2005-2006 and 2006-2007 surveys were conducted as part of the ROS project. Twenty-three sites, 14 of which were considered eligible, were identified during the first season, while 88 sites, 37 of which were considered eligible, were identified during the second.

During the survey of the proposed USFS Lemmons Branch Boat Ramp, a historic farmstead was identified (Shumate and Shumate 2000). Modifications to the proposed ramp resulted in a joint USFS-TVA project that involved the mitigation of the mid-19th century farmstead (Riggs and Shumate 2002).

3.8.7.1.2 Environmental Consequences

Because no changes to existing land uses are proposed under any of the alternatives for Fontana Reservoir, the potential for impacts to archaeological resources is low. As described in Section 3.1.7, TVA proposes to implement a PA in North Carolina for the identification, evaluation, and treatment of all historic properties potentially affected by this lands planning effort. Until the PA is executed, TVA will incorporate the phased identification, evaluation, and treatment procedure to effectively preserve historic properties, including archaeological resources, as required by Section 106 of the NHPA. TVA would adhere to the terms of this PA under all alternatives, and no adverse impacts on archaeological resources are expected.

3.8.7.2 Historic Structures

3.8.7.2.1 Affected Environment

Fontana Dam, named for the nearby town, is a straight gravity concrete structure with a maximum height above foundation rock of 480 feet, making it, at the time of construction, the highest dam east of the Rocky Mountains and the fourth highest in the world. Alcoa (formerly known as the Aluminum Company of America) started developing the Little Tennessee River as early as 1917. At the time of the formation of TVA in 1933, Alcoa had constructed three hydroelectric projects on the Little Tennessee and its tributaries—Cheoah, Calderwood, and Santeetlah—and had also explored the Fontana Dam site. Its early plans contemplated developing the reach between Bryson City, North Carolina, and Fontana with two dams, each about 225 feet high, as a 450-foot dam was at that time beyond all precedent. Later, its plans called for the one dam located at the Fontana site and of a height approximately the same as that of the structure built by TVA.

TVA started negotiations with Alcoa over the construction of a multipurpose dam at the Fontana site in 1935. The problems involved in attempting to arrive at an agreement in the matter were not simple, as the method of operations of the Fontana plant would necessarily control the operation of Alcoa's downstream Calderwood Dam. Finally, in 1941, an agreement was reached whereby the storage and release of water at Alcoa's hydroelectric plants would be directed by TVA and Alcoa would receive certain allotments of power from

the TVA system. In the meantime, two additional projects, Nantahala and Glenville, had been built upstream from Fontana, so a total of five plants were involved in the agreement.

As a result of the influx of construction workers, a new town, Fontana Village, housing some 5,000 people who worked around the clock in three shifts, sprang up in the forest. What was once the construction village is now a resort, offering recreational activities such as boating, horseback riding, and making crafts. The village retains a number of the community facilities and houses built by the TVA in the early 1940s (Bisher et al. 1999). These structures are important in the history of manufactured housing and include a variety of “temporary,” “demountable,” and trailer houses. The village also includes the Gunter house, a two-room log house of half-dovetailed construction.

Historic properties on Fontana Reservoir include the dam and powerhouse as well as the structures remaining from the original construction village. There are two segments of the Appalachian National Scenic Trail near Fontana Dam, an approximate 6-mile section extending 3.25 miles north and 2.75 miles south of the dam. Most of the trail dates to 1946 or later. There are no potentially significant Appalachian National Scenic Trail shelters along these sections of trail (NPS 2007).

3.8.7.2.2 Environmental Consequences

Because no changes to existing land uses are proposed under any of the alternatives for Fontana Reservoir, the potential for impacts to historic structures is low. Under all alternatives, TVA would implement the PA described above in Section 3.1.7.1.2. This PA would include historic structures, and with its implementation, no adverse effects on historic structures are anticipated. Until the PA is implemented, TVA would individually evaluate actions with the potential to affect historic structures as required by Section 106 of the NHPA.

3.8.8 ***Managed Areas and Ecologically Significant Sites***

Managed areas, ecologically significant sites, and NRI streams are defined in Section 3.1.8.

3.8.8.1 **Affected Environment**

Table 3-95 lists managed areas and NRI streams within 3 miles of Fontana Reservoir. The areas are grouped by closest distance to the reservoir; areas on TVA lands but managed by other entities through a letter of agreement or land use agreement with TVA are listed as “on reservoir.” Those areas abutting or less than 0.1 mile from reservoir lands and NRI streams underlying reservoir waters are listed as “adjacent.”

Table 3-95. Managed Areas, Ecologically Significant Sites, and Nationwide Rivers Inventory Streams Within 3 Miles of Fontana Reservoir

Name	Type of Area	Authority	Location County, State	Closest Distance to Reservoir
Little Tennessee River	NRI	Federal	Swain, N.C.	Adjacent
Nantahala River	NRI	Federal	Swain, N.C.	Adjacent
Tuckasegee River	NRI	Federal	Swain, N.C.	Adjacent
Appalachian National Scenic Trail	Managed area (MA)	Nonprofit organization (TVA land use agreement)	Swain, N.C.	On reservoir (crosses Fontana Dam)

Name	Type of Area	Authority	Location County, State	Closest Distance to Reservoir
Bryson City Park	MA	Local (TVA land use agreement)	Swain, N.C.	On reservoir
Nantahala National Forest	MA	Federal	Swain, N.C.	Adjacent
Nantahala State Game Land	MA	State	Swain, N.C.	Adjacent
Great Smoky Mountains National Park/Registered State Natural Area	MA	Federal/State	Swain, N.C.	Adjacent
Needmore Tract	MA	State	Swain, N.C.	Adjacent
Swain County Park	MA	Local	Swain, N.C.	Adjacent
Cherokee Indian Reservation (3,200- acre tract)	MA	Federal	Swain, N.C.	1.7 miles southeast

No ecologically significant sites are located within 3 miles of Fontana Reservoir.

3.8.8.2 Environmental Consequences

None of the alternatives for Nottely Reservoir would change existing land uses, and therefore, no impacts to managed areas or ecologically significant sites are anticipated.

3.8.9 Visual Resources

The general visual environment of the mountain reservoirs is described in Section 3.1.9.

3.8.9.1 Affected Environment

The landscape character of Fontana Reservoir is mainly naturally appearing between the dam and Bryson City, North Carolina. At the dam, views are of an intact reservoir surrounded by rugged mountains. With the exception of the dam and roadway, the landscape is unaltered by human development. There are large contiguous land holdings to the north (NPS) and to the south (USFS) that help preserve substantial stretches of shoreline. Scenic attractiveness is distinctive. Scenic integrity is high.

From the dam to approximately Sawyer Creek, there are numerous undeveloped coves. These coves have natural settings available to boaters and fisherman. Steep slopes along the shoreline provide a dramatic contrast to the reservoir, particularly when viewed from background distances. There are few islands along this section of the reservoir that would obscure views from the water, providing visitors on the reservoir dramatic panoramas of natural landscapes. Scenic value is excellent.

Farther upstream, east of Chambers Creek, there is a variety of development along the reservoir. These include numerous residential developments, boat docks, marinas, a city park, and a municipal wastewater treatment plant. Much of this development lies along Panther Creek and north of the confluence of the Little Tennessee River and Nantahala River. Concentrations of dwellings and related water use facilities are dominant along some sections of this portion of Fontana Reservoir, where they create a strong adverse contrast with the natural landscape character. Scenic value is fair, and scenic integrity is low.

3.8.9.2 Environmental Consequences

Under all alternatives, the existing land uses of TVA Fontana Reservoir lands would not change. With the exception of the dam itself and associated operational support area for the dam, as well as the existing developed recreation areas, the remainder of TVA lands would remain undisturbed. The dam provides visual contrast to the reservoir along the headwaters and to the riverine setting downstream. Any future actions on TVA lands would be assessed for their potential to affect the scenic value and scenic integrity of the Fontana Reservoir area.

3.8.10 Water Quality and Aquatic Ecology

An overview of water quality and aquatic ecology for the mountain reservoirs area is provided in Section 3.1.10.

3.8.10.1 Affected Environment

Fontana Reservoir is the deepest reservoir in the TVA Tennessee River system. Average annual discharge is 3,950 cfs, which provides an average hydraulic retention time in the reservoir of 181 days. Water entering the reservoir is low in nutrients and dissolved minerals. Water in Fontana Reservoir is quite clear due to limited photosynthetic activity and a mostly forested watershed.

Reservoir Ecological Health

TVA samples Fontana Reservoir at the forebay at LTRM 62.0 (area of the reservoir nearest the dam) and two midreservoir sites (LTRM 81.5 and Tuckasegee River Mile 3.0). Figure 3-8 shows the reservoir ecological health scores for Fontana Reservoir from 1994 through 2006.

Fontana Reservoir rated “fair” in 2006, a similar rating to previous years in which the full complement of indicators was measured. In 1994, 1995, and 2000, the overall health score was slightly higher. This was partly because bottom life was not sampled at all locations in these years due to the extensive reservoir drawdown for the scheduled five-year safety check and maintenance at Fontana Dam. This indicator, which usually rates in the “fair-poor” category, probably would have reduced the overall score by several points.

Dissolved Oxygen

DO rated “good” or “fair” at the forebay and Little Tennessee River locations and “fair” or “poor” at the Tuckasegee site. However, the area of low DO was substantially smaller at the Tuckasegee site in 2004 than in previous years, resulting in the first “good” rating for DO at this location.

Often deep tributary reservoirs such as Fontana Reservoir stratify into temperature distinct layers in the summer. As a result, water discharged from the base of the dam into the tailwater can be very cold and have low DO, impairing water quality in the tailwater. TVA mitigates this on Fontana by introducing oxygen into the water leaving the turbine, resulting in better water quality. As part of the LIP, turbine venting is used to improve the DO content of the releases.

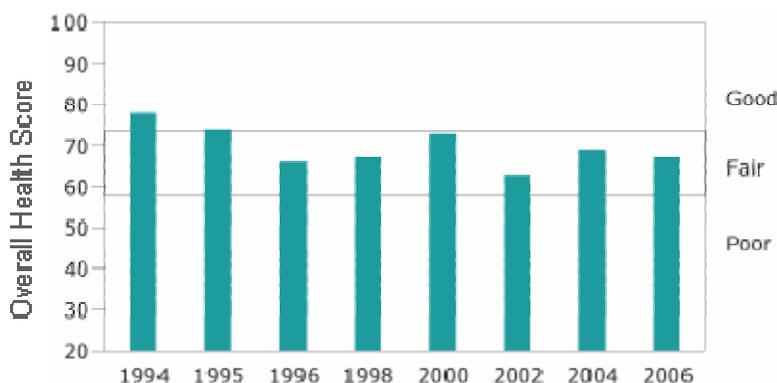


Figure 3-8. Fontana Reservoir Ecological Health Ratings, 1994-2006

Chlorophyll

Chlorophyll has rated “good” at the forebay all years monitored. A slight increase in chlorophyll levels at the two midreservoir monitoring locations has been observed in Fontana Reservoir for several years. These increases have caused chlorophyll ratings to drop from “good” at the midreservoir locations in the early 1990s to “fair or poor” in recent years.

Sediment Quality

Sediment quality ratings have fluctuated between “good” and “fair” dependent on whether chlordane was detected. Chlordane was last detected in the reservoir sediments in 2002 and only at the Tuckasegee midreservoir site. Chlordane has not been detected at the forebay or Little Tennessee midreservoir site since 1998.

Table 3-96. Fontana Reservoir Water Quality and Sediment Ratings, Reservoir Vital Signs Monitoring Data 1993-2006

	Monitoring Years								
	1993	1994	1995	1996	1998	2000	2002	2004	2006
Fontana Forebay									
Dissolved Oxygen	Fair	Good	Good	Fair	Fair	Fair	Fair	Fair	Fair
Chlorophyll	Good	Good	Good	Good	Good	Good	Good	Good	Good
Sediment	Fair	Fair	Good	Good	Fair	Good	Good	Good	Good
Fontana Midreservoir Little Tennessee River									
Dissolved Oxygen	Good	Good	Fair	Good	Fair	Good	Fair	Good	Fair
Chlorophyll	Good	Good	Fair	Good	Good	Poor	Poor	Poor	Fair
Sediment	Good	Fair	Fair	Fair	Fair	Good	Good	Good	Good
Fontana Midreservoir Tuckasegee River									
Dissolved Oxygen	Poor	Fair	Fair	Fair	Poor	Fair	Poor	Good	Fair
Chlorophyll	Good	Good	Fair	Fair	Fair	Fair	Poor	Fair	Fair
Sediment	Fair	Fair	Good	Fair	Fair	Fair	Fair	Good	Good

Benthic Monitoring

Areas sampled on Fontana Reservoir included the forebay at LTRM 62.0 and midreservoir at LTRM 81.5. All of the benthic community scores rated “poor” for the seven years during which benthic samples were taken, with the exception of the midreservoir in 1994 (Table 3-97).

Table 3-97. Recent (1994-2006) Benthic Community Ratings for Fontana Reservoir

Station	1994	1996	1998	2000	2002	2004	2006
Forebay	Poor						
Midreservoir	Fair	Poor	Poor	Poor	Poor	Poor	Poor

Fish Monitoring

The RVSMP included fish sampling on Fontana Reservoir in 1994. A list of fish species commonly found in Fontana Reservoir can be found in Appendix I. The fish community in Fontana Reservoir has consistently rated in the “fair” to “good” range at both the forebay and at both midreservoir sites (Table 3-98).

Table 3-98. Recent (1994-2006) Reservoir Fish Assemblage Index Ratings for Fontana Reservoir

Station	1994	1995	1996	1998	2000	2002	2004	2006
Forebay	Good	NS	Fair	Fair	Fair	Fair	Fair	Good
Midreservoir-Little Tennessee	Good	Fair	Good	Good	Good	Good	Fair	Fair
Midreservoir-Tuckasegee	Fair	Fair	Fair	NS	Fair	Good	Fair	Good

NS = Not sampled

Fontana Reservoir provides opportunities for sport anglers, particularly those interested in bass and walleye. In 2006, Fontana Reservoir SFI rated above average for black bass, smallmouth bass, and walleye (Table 3-99).

Table 3-99. Sport Fishing Index Scores for Selected Sport Fish Species in Fontana Reservoir, 2006

Fish Species	2006 Score	2006 Valleywide Average
Black Basses	40	36
Largemouth Bass	30	33
Smallmouth Bass	42	30
Walleye	36	33

Swimming Advisories

There are no state advisories against swimming in Fontana Reservoir. TVA performed *E. coli* bacteria monitoring at two location in 2007: the Tsali Campground boat ramp and Nantahala River canoe access site at Nantahala River Mile 0.8 on an unnamed tributary.

Fish Consumption Advisories

The State of North Carolina has issued a statewide fish consumption advisory because of mercury concentrations. TVA collected channel catfish and largemouth bass from Fontana Reservoir for tissue analysis in autumn 2006. The results, which were similar to those of previous years, were provided to state agencies in North Carolina. TVA will analyze fish from Fontana again in autumn 2008.

State(s) Impaired Waters

The North Carolina Division of Water Quality assigned use support ratings to waters in the Little Tennessee River basin based on biological, chemical, and physical monitoring data collected between September 1999 and August 2004 (NCDENR 2007b). A total of 30.8 miles of stream and 170.6 reservoir acres are impaired in the immediate watershed of Fontana Reservoir (ibid)(Table 3-100).

Table 3-100. Summary of Impaired Waters in the Immediate Watershed of Fontana Reservoir

Stream/River Name	State	Miles or Acres	Description	Water Quality Stressor/Source
Savannah Creek	N.C.	13.4 miles	Headwaters to Tuckasegee River	Fecal coliform, turbidity and habitat degradation/unknown and associated with agriculture
Scott Creek	N.C.	15.3 miles	Headwaters to Tuckasegee River	Fecal coliform, turbidity and habitat degradation/multiple sources
Tuckasegee River	N.C.	1.4 miles	Savannah Creek to Unnamed Tributary 0.3 mile upstream of Yellow Creek	Fecal coliform/unknown
Tuckasegee River	N.C.	0.7 miles	Dillsboro Dam to Mack Town Branch	Fecal coliform/unknown
Tuckasegee River arm of Fontana Lake	N.C.	170.6 acres	Lemmons Creek to Peachtree Creek	Fecal coliform and sediment

Water Supply

No municipal water suppliers currently withdraw water from Fontana Reservoir. Western Carolina University, Nantahala Village, and Tuckasegee Water and Sewer, as well as the towns of Bryson City, Franklin, Sky Valley, and Cherokee currently have intakes in Fontana Reservoir's supporting watershed. The 2005 average daily water demand for these intakes

were 0.375 MGD (Western Carolina University), 0.002 MGD (Nantahala Village), 0.914 MGD (Tuckasegee Water and Sewer), 0.7 MGD (Bryson City), 1.12 MGD (Franklin), 0.03 MGD (Sky Valley), and 1.2 MGD (Cherokee). The total average daily municipal water demand from Fontana Reservoir and its supporting watershed was 4.341 MGD.

3.8.10.2 Environmental Consequences

Under all alternatives, TVA would continue to manage its Fontana Reservoir lands according to their current uses. All of the parcels on Fontana Reservoir are committed to their existing uses, which would not change. Any proposed actions would be assessed for their potential to affect water quality and aquatic life, as well as compliance with TVA's Land Policy, SMP, and Section 26a regulations. Individual environmental reviews would identify potential adverse impacts and mitigation to protect the aquatic environment; TVA would then take appropriate measures to address these impacts. Therefore, none of the alternatives would significantly impact water quality or aquatic life.

3.8.11 Air Quality and Noise

An overview of the air quality of the mountain reservoirs area is provided in Section 3.1.11. Under all of the alternatives, the existing uses of Fontana Reservoir lands would not change, and there would be no adverse impacts to air quality. Noise has previously been discussed in Section 3.1.11.2.

3.8.12 Socioeconomics

The socioeconomic conditions of the mountain reservoirs area are described in Section 3.1.12.

3.8.12.1 Affected Environment

3.8.12.1.1 Population and Economy

Population: Graham County, North Carolina, had a population of 7,993 in 2000, an increase of 10.8 percent since 1980 (Tables 3-101 and 3-102). This was a lower rate than in the state and the nation. The rate of growth in the county, state, and nation was higher from 1990 to 2000 than from 1980 to 1990. The population of Graham County has declined during the years from 1980 to 1990. Estimates for 2006 indicate that the population of Graham County has remained approximately the same since 2000, as compared to growth in both the state and nation. Projections through 2020 indicate that the county will continue to have a much lower rate of population growth than the state or nation over that time. The rate for the county is projected to be greater than for 1980-2000.

Swain County, North Carolina, had a population of 12,968 in 2000, an increase of 26.1 percent since 1980 (Tables 3-101 and 3-102). This was a lower rate than was in the state but higher than was in the nation. The rate of growth in the county, state, and nation was higher from 1990 to 2000 than from 1980 to 1990. Estimates for 2006 indicate that the growth rate of population in Swain County has dropped substantially and was much less than growth in both the state and nation. Projections through 2020 indicate that the county will continue to have a lower rate of population growth than the state but greater than the nation over that time. The rate for the county is projected to be slightly greater than for 1980-2000.

Table 3-101. Population – Graham and Swain Counties, North Carolina

Area	1980	1990	2000	2006 (Estimate)	2020 (Projection)	Density (persons per square mile) 2000
Graham County	7,217	7,196	7,993	7,996	8,538	27.4
Swain County	10,283	11,268	12,968	13,445	16,411	24.6
North Carolina	5,880,095	6,628,637	8,049,313	8,856,505	10,885,758	165.2
United States	226,545,805	248,709,873	281,421,906	299,398,484	335,804,546	79.6

Source: U.S. Census Bureau (undated a-e) and North Carolina Office of State Budget and Management (2007)

Table 3-102. Recent and Projected Population Changes – Graham and Swain Counties, North Carolina (Percentage Growth)

Area	1980-1990	1990-2000	1980-2000	2000-2006	2000-2020	1980-2020
Graham County	-0.3	11.1	10.8	0.0	6.8	18.3
Swain County	9.6	15.1	26.1	3.7	26.5	59.6
North Carolina	12.7	21.4	36.9	10.0	35.2	85.1
United States	9.8	13.2	24.2	6.4	19.3	48.2

Source: Calculated from data in Table 3-101

The counties are decidedly rural in distribution of population. As noted in Table 3-101, the population densities of the counties are substantially lower than the state and much lower than the nation. The largest town in Graham County is Robbinsville, with 747 residents in 2000. About 91 percent of the population in the county is outside incorporated towns. The largest town in Swain County is Bryson City, with 1,411 residents in 2000. About 89 percent of the population in the county is outside incorporated towns. This enumeration does not include the population in the town of Cherokee because it is part of the Cherokee tribal lands.

Economy: Table 3-103 contains the most recent annual data regarding the amounts and types of employment, amounts of unemployment, and incomes in the area. In 2005, Graham County had 4,031 people employed on average. The county had a higher percentage of farmers and manufacturing employees than either the state or the nation. According to Graham County's Director of Planning and Economic Development, the county's largest manufacturer recently laid off a large number of employees, so the current manufacturing employment would probably be a much lower percentage (Melody Adams, Graham County economic development director, personal communications, November 9, 2007). The percentage of employees in retail and government was lower than either the state or the nation. The average unemployment rate for 2006 in the county was higher than either the state or the nation. Per capita personal income in 2005 was much lower in the county than in the state or nation.

In 2005, Swain County had 7,446 people employed on average. The county had a lower percentage of farmers, manufacturing employees, and retail employees than either the state or the nation. The percentage of employees in government was much higher than either the state or the nation. (This may be due to a different way of reporting the Cherokee Tribe in the county, or possibly staff of the GSMNP.) The average unemployment rate for 2006 in the county was higher than either the state or the nation. Per capita personal income in 2005 was much lower in the county than in the state or nation.

Table 3-103. Employment, Unemployment, and Income – Graham and Swain Counties, North Carolina

Area	Employment, 2005	Employment (percent of total)					Unemployment Rate, 2006	Per Capita Personal Income 2005
		Farm	Manufacturing	Retail Trade	Government	Other		
Graham County	4,031	2.9	17.4	7.6	12.9	59.3	6.4	23,763
Swain County	7,446	1.2	6.3	10.3	32.2	49.9	5.8	22,594
North Carolina	5,119,512	1.4	11.5	10.8	15.7	60.5	4.8	31,041
United States	174,249.6	1.7	8.5	10.9	13.7	65.2	4.6	34,471

Source: U.S. Bureau of Economic Analysis (undated) and North Carolina Employment Security Commission (undated)

3.8.12.1.2 Environmental Justice

Information on the minority and low-income population in the Fontana Reservoir area is shown in Table 3-104. In Graham County, 10.6 percent of the total population was estimated to be minorities in 2006, which was far below the state average of 32.1 percent and the national average of 33.6 percent. The estimated poverty rate in the county in 2004 was 16.7 percent, higher than the state rate of 13.8 percent and the national rate of 12.7 percent.

In Swain County, 32.8 percent of the total population was estimated to be minorities in 2006, which was slightly above the state average of 32.1 percent and slightly below the national average of 33.6 percent. This is due to the presence of the Cherokee Indian Tribe. The estimated poverty rate in the county in 2004 was 15.4 percent, higher than the state and national rates.

Table 3-104. Minority Population, 2006, and Poverty, 2004 – Graham and Swain Counties, North Carolina

Area	Population, 2006				Percent Below Poverty Level, 2004
	Total	Nonwhite	White Hispanic	Percent Minority	
Graham County	7,995	783	64	10.6	16.7
Swain County	13,445	4,280	163	32.8	15.4
North Carolina	8,856,505	2,298,351	543,059	32.1	13.8
United States	299,398,484	59,652,230	41,001,760	33.6	12.7

Source: U.S. Census Bureau (undated d and 2004)

3.8.12.2 Environmental Consequences

The current land uses at Fontana Reservoir would continue under all of the alternatives. Other than the possible expansion of existing recreation facilities and construction of private water use facilities by adjacent residential landowners, there would be little development that would affect socioeconomic conditions.

Under all alternatives, the Cherokee tribal lands are some distance from Fontana Reservoir, and the tribal jobs, incomes, and revenues are largely involved with the gaming and tourism activity in the vicinity of the town of Cherokee, North Carolina. The Cherokee housing situation on the tribal lands is also disconnected from market forces affecting nontribal land on the reservoir. Therefore, management of TVA lands is not expected to have disproportional impacts on the Cherokee tribe.

3.9 Unavoidable Adverse Effects

The land uses of the majority of the mountain reservoirs lands would not change under any of the alternatives, and there would be no unavoidable adverse effects associated with planning these lands. The increased industrial development under Alternatives A and C and recreational developments under Alternative C on the five Chatuge Reservoir and Hiwassee Reservoir parcels do have a potential for unavoidable adverse effects. However, TVA would carefully review the potential impacts of any proposed developments on these parcels and implement practicable measures to minimize the adverse effects. However, regional development trends and future residential shoreline development in existing areas would continue to result in losses of aquatic and terrestrial habitat regardless of which alternative is selected.

3.10 Relationship Between Short-Term Uses and Long-Term Productivity

Commitments of the shoreline to industrial and some types of recreational development are essentially long-term decisions that would decrease the productivity of land for agricultural, forest, wildlife, and other natural resources management. Long-term productivity decreases would be somewhat greater under Alternatives A and C than under Alternative B. As described in earlier sections, the types of changes that occur with development would result in a decline in the habitat quality for some terrestrial species and increase the habitat for others. Many of the water-related impacts of the development could be minimized by the use of appropriate controls on erosion.

In addition to the shoreline development, increased regional development would likely occur independent of any of the alternatives and result in population increase and an increase in the number of people recreating on the reservoirs and adjacent public lands. New jobs and income would be generated by their spending activities leading to enhanced long-term socioeconomic productivity.

3.11 Irreversible and Irretrievable Commitments of Resources

Irretrievable use of nonrenewable resources (i.e., fuel, energy, and some construction materials) could occur under all of the alternatives due to future residential shoreline development in existing areas as well as potential industrial and recreational development under Alternatives A and C. The trend in development around the mountain reservoirs and the surrounding area is primarily dependent on the regional and national economy, and therefore, use of most (if not all) of these resources could occur somewhere else in the region to provide the same development services regardless of the alternative chosen.

3.12 Energy Resources and Conservation Potential

Energy is used by machines for fuel to maintain grassy areas on the TVA Project Operations lands such as the dam reservation and for operation of the TVA dams. There are no additional short-term energy uses required for these TVA project lands under all alternatives, as they are already established.

Energy is also used by machines to maintain areas set aside for Natural Resource Conservation. Although these activities also are not likely to have much influence on regional energy use demands, there would be some short-term energy use of fuel to

conduct prescribed natural resource conservation activities, such as mowing, timber management, access road maintenance, etc. Alternative B would have a slightly greater requirement for this type of energy use since it contains the greater amount of acreage allocated to Natural Resource Conservation.

TVA is encouraging campers who utilize developed recreation areas to reduce energy consumption and conserve water resources and has posted resource conservation tips at many campgrounds located on TVA land as part of its campground conservation program. These practices could potentially reduce energy usage under all alternatives.

Alternative C allocates additional land for developed recreation areas, some of which may include infrastructure such as bathhouses, pavilions, and lighting that may increase energy consumption. TVA would encourage energy conservation measures to be utilized at recreation areas that may be developed in the future.

Greater energy usage would occur if industrial facilities are developed on Hiwassee or Chatuge reservoirs (under Alternatives A and C, respectively) TVA actively promotes public education and outreach to encourage energy efficiency and green-energy offerings and promotes the integration of energy efficiency and water conservation into community planning and building construction. TVA would work with potential users of TVA lands to achieve the greatest energy savings and conservation practices.