

## CHAPTER 4

### 4.0 ENVIRONMENTAL CONSEQUENCES

This chapter addresses the potential direct, indirect, and cumulative effects of adopting and implementing Alternatives A, B, and C. A direct impact is an effect caused by the action and occurring at the same time and place. An indirect impact is an effect caused by the action but removed in time or distance. A cumulative impact results from the incremental or collective effect of the action when combined with other past, present, and reasonably foreseeable future actions. Cumulative effects were examined within the South Fork Holston River and Watauga River watersheds, in the context of gradually increasing population and land development in that area.

#### 4.1. Introduction

Analysis of environmental consequences was based upon the assumption that any activity allowed under a particular land use zone would occur at the greatest allowable intensity on the entire extent of the parcel. For example, on a 10-acre parcel allocated to Zone 5 (Industrial), we assumed the entire 10 acres would be cleared of vegetation and developed to support an industrial facility. Activities on Zones 7, 2, and 6 may include development, construction, and landscaping but some areas of a parcel may be left in a relatively natural state. Therefore, the analysis was based upon the assumption that the potential for altering the existing conditions of a parcel are greatest under Zone 5; moderate under Zones 7, 2, and 6; slight under Zone 4; and least under Zone 3. Actual projects, when planned and proposed in detail in the future, will be evaluated to determine site-specific environmental impacts. Potential impacts to sensitive resources would be identified and avoided or minimized as appropriate consistent with applicable regulations.

#### 4.2. Land Use

Under all three alternatives, allocations of parcels having existing land use agreements (i.e., committed parcels) were not changed. Because only 5 percent of NTR lands are uncommitted, land uses change very little among alternatives. In many instances, the primary change has been the application of a new zone definition (Table 1-2 and Appendix E). Effects to land use are based upon changes in the amount of land allocated to each zone.

Most categories of land uses under the action alternatives would remain available in approximately the same proportions as are currently established under the No Action Alternative. Under all three alternatives, a single 125-acre parcel near South Holston Reservoir is allocated to Zone 5 (Industrial). The same 15 parcels on Boone, Fort Patrick Henry, South Holston, and Watauga reservoirs are allocated to Zone 7 (Shoreline Access) under all three alternatives. The overall percentage of lands, across all seven reservoirs, allocated to Zone 3 (Sensitive Resource Management) and Zone 6 (Developed Recreation) changes very little among alternatives.

In terms of land use, the primary differences between the No Action Alternative and the action alternatives (B and C) are the reduction of lands allocated to Zone 2 (Project Operations) and the increase in lands allocated to Zone 4 (Natural Resource Conservation) (Table 2-6).

Regionally, the trend of increasing residential development in areas of the reservoirs currently available for development is 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 land rights for residential use or the disposal of reservoir lands for residential use. All three alternatives are consistent with this policy.

Land cover in the Watauga River and South Fork Holston River watersheds is predominantly deciduous, evergreen, and mixed forest (Table 4-1). Less than 5 percent of the land in these watersheds is urban, commercial, or residential. Relative to the region within these two watersheds, the consequences of allocating NTR lands as planned under each of the three alternatives would result in only minor cumulative effects to land use in the region.

**Table 4-1. Land Cover/Use in the Watauga River and South Fork Holston River Watersheds**

Land Cover/Use	Percent of Total Area
Deciduous Forest	55
Evergreen Forest	6
Mixed Forest	7
Pasture/Grasses	22
Cropland	2
Open Water	3
Urban/Residential/Commercial	5

Source: TDEC 2000; 2006a

**Alternative A**

Using equivalent land use zones, 90 percent of NTR lands are allocated to Zones 2, 4, and 6 (Table 2-6). Changes to current land use would be minor. Land designated for Industrial (125 acres) and uncommitted parcels designated for Developed Recreation (111 acres) or Project Operations (85 acres) are currently undeveloped but could be developed in the future. Because these parcels are already designated for these uses, direct impacts to land use would be minor.

The primary impact of Alternative A is the absence of a comprehensive plan to guide consideration of land use requests. Under this alternative, the lands surrounding the seven NTRs would not be allocated to a land use zone; therefore, complete alignment with current TVA policies would not occur. Requested land uses that are consistent with the forecast designation or Boone Reservoir Land Management Plan (TVA 1999) would either be approved or denied based on a review of potential environmental impacts, TVA’s Land Policy, and other administrative considerations. Among the six NTRs without a previous RLMP, a total of 154 parcels were unplanned under the Forecast System, and 12 of those parcels (totaling 37 acres) are also uncommitted. Land use requests submitted for those parcels would be evaluated individually based upon TVA policies. Over the long term, absence of comprehensive reservoir-wide land plans may result in land uses that do not fully optimize the goals of multiple use and stewardship to which TVA strives. However, because only about 5 percent of the land around the NTRs is uncommitted, any impacts to land use under the No Action Alternative would be negligible.

**Action Alternatives B and C**

Implementation of Alternative B, as compared to equivalent zoning under Alternative A, would result in changes of zone allocations on 36 parcels (Table 2-5). Under Alternative B, 90 percent of NTR lands would be allocated to Zones 4, 2, and 6 (Table 2-6). The number of acres allocated to Zone 4 (Natural Resource Conservation) would increase on Boone, Fort Patrick Henry, South Holston, and Watauga reservoirs, resulting in an additional 662 acres allocated to Zone 4 under Alternative B. An additional 171 acres on three reservoirs would be allocated to Zone 3 (Sensitive Resource Management) to protect sensitive resources. Field surveys indicated no sensitive resources exist on two Boone parcels allocated to Sensitive Resource Management under the No Action Alternative. Those parcels, totaling about 221 acres, would be allocated to Zone 4 under both action alternatives, resulting in a net decrease of about 51 acres allocated to Zone 3 under the action alternatives. The area allocated to Zone 2 (Project Operations) would decrease by a total of 527 acres across all seven reservoirs. Although the number of acres allocated to Zone 6 would slightly increase on South Holston Reservoir, there would be a net decrease of 85 acres on the NTRs due to decreases in Zone 6 lands on Fort Patrick Henry, Watauga, and Wilbur reservoirs.

Selection of Alternative C, as compared to equivalent zoning under Alternative A, would result in changes in land use zones for 47 parcels (Table 2-5). Ninety percent of NTR lands would be allocated to Zones 4, 2, and 6 (Table 2-6). Under Alternative C, an additional 635 acres would be allocated to Zone 4 (Natural Resource Conservation). The area allocated to Zones 2 and 3 would have a net decrease of 527 acres and 57 acres, respectively. Although the number of acres allocated to Zone 6 would slightly increase on South Holston Reservoir, there would be a net decrease of 51 acres across all seven reservoirs.

Under Alternatives B and C, as compared to Alternative A, land use allocations would not change for Beaver Creek or Clear Creek reservoirs. On Wilbur Reservoir, the only difference among alternatives is allocating Parcel 1 (6 acres) to Zone 4 under Alternatives B and C, as compared to Zone 6 under Alternative A. The effect of changes in the amount of Zone 2 lands is discussed in detail below. Changes in the amount land allocated to Zones 3, 4, and 6 are discussed in detail in sections addressing sensitive resources and recreation.

In comparison to Alternative A, the amount of land allocated to Zone 2 under Alternatives B and C would be reduced on Boone, Fort Patrick Henry, South Holston, and Watauga reservoirs (Tables 4-2 and 4-3). Reduction of the amount of land in Zone 2 would not adversely affect TVA's ongoing project operations or public works. Currently, of the parcels forecast/planned for Project Operations that would be allocated to other uses under Alternatives B and C, none contains operations or public works facilities. The parcels identified with the equivalent land use Zone 2 were broadly categorized under the Forecast System, and are more appropriately classified as natural resources management areas. For example, the majority of parcels changed from equivalent Zone 2 to other uses were forecast for Reservoir Operations, which applied to islands used for dispersed recreation and natural resources management, and to narrow shoreline bands managed for flood control (Appendix E). The actual land use on those parcels is more consistent with the definition of Zone 4 or 3 rather than Zone 2 (Table 1-2).

Differences in land use between Alternatives B and C are slight (Table 4-4). The amount of land allocated to Zone 2 does not change between the two action alternatives. Allocations for Beaver Creek, Clear Creek, Boone, and Wilbur are identical between the two action

**Table 4-2. Acres Allocated to Land Use Zones Under Alternative B Compared to Equivalent Allocations Under Alternative A**

Zone	Beaver Creek	Clear Creek	Boone	Fort Patrick Henry	South Holston	Watauga	Wilbur	Total
2	--	--	-36	-91	-258	-143	--	-527
3	--	--	-186	19	98	19	--	-51
4	--	--	222	115	156	163	6	662
5	--	--	--	--	--	--	--	0
6	--	--	--	-43	3	-39	-6	-85
7	--	--	--	--	--	--	--	0

-- = No change

**Table 4-3. Acres Allocated to Land Use Zones Under Alternative C Compared to Equivalent Allocations Under Alternative A**

Zone	Beaver Creek	Clear Creek	Boone	Fort Patrick Henry	South Holston	Watauga	Wilbur	Total
2	--	--	-36	-91	-258	-143	--	-527
3	--	--	-186	21	5	102	--	-57
4	--	--	222	113	247	48	6	635
5	--	--	--	--	--	--	--	0
6	--	--	--	-43	5	-7	-6	-51
7	--	--	--	--	--	--	--	0

-- = No change

**Table 4-4. Acres Allocated to Land Use Zones Under Alternative C Compared to Alternative B**

Zone	Beaver Creek	Clear Creek	Boone	Fort Patrick Henry	South Holston	Watauga	Wilbur	Total
2	--	--	--	--	--	--	--	0
3	--	--	--	3	-93	83	--	-6
4	--	--	--	-3	91	-116	--	-27
5	--	--	--	--	--	--	--	0
6	--	--	--	--	2	32	--	34
7	--	--	--	--	--	--	--	0

-- = No change

alternatives. Allocations on Fort Patrick Henry Reservoir are nearly identical except for a single 3-acre parcel that is allocated to Zone 3 under Alternative C, but to Zone 4 under Alternative B. The primary differences between Alternatives B and C are the number of acres allocated to Zones 3, 4, and 6 on South Holston and Watauga reservoirs. Under Alternative C, as compared to Alternative B, there are about 34 more acres allocated to Zone 6, about 27 fewer acres allocated to Zone 4, and about 6 fewer acres allocated to Zone 3.

Under Alternatives B and C, changes in land use allocations would not result in substantive direct or indirect impacts to land use. The presence of comprehensive long-term land use

plans would beneficially affect land use by providing clear guidance designed to optimize multiple uses and land stewardship throughout the NTRs.

### **4.3. Recreation**

Developed recreation occurs on committed parcels allocated to Zone 6 (or the equivalent under Alternative A). These parcels typically have an existing land use agreement for a park, campground, marina, or other recreation purposes. Dispersed recreation opportunities occur primarily on parcels allocated as Zones 2, 3, and 4, and on uncommitted (undeveloped) Zone 6 lands. Under all three alternatives, the net percentage of NTR lands available for developed recreation uses (Zone 6 allocations) would be nearly the same (from 17 to 19 percent). Similarly, the percentage of Zones 2, 3, and 4 lands offering dispersed recreation opportunities would remain relatively constant, at 78 to 79 percent of the land, among all three alternatives. The alternatives differ in the allocation of individual parcels to developed recreation. As discussed below, Alternatives B and C differ in the allocations of certain parcels based upon suitability for recreational activities and requests for future recreational uses.

The zone allocations (or the equivalent under Alternative A) on Beaver Creek and Clear Creek reservoirs are the same under all three alternatives. Existing recreational opportunities on those reservoirs are preserved under all three alternatives. Therefore, there would be no adverse consequences to recreational opportunities under any of the alternatives. On Boone Reservoir, 11 parcels totaling 75 acres are allocated to Zone 6 under all three alternatives. Therefore, opportunities for developed recreation on Boone Reservoir would not be adversely affected under any alternative. Furthermore, on Boone Reservoir, differences among the alternatives are based upon changes in allocations among Zones 2, 3, and 4 (Table 2-5), which does not affect the availability of dispersed recreation opportunities. Based upon these conclusions, Beaver Creek, Clear Creek, and Boone reservoirs were dismissed from the more detailed discussion of potential impacts to recreation under each alternative found below.

Among all three alternatives, the variation in the amount of land available for developed and dispersed recreation opportunities is small. No developed facilities currently used would be affected under any alternative. In the context of the South Fork Holston River and Watauga River watersheds, federal land available to the public for developed and dispersed recreation is abundant. TVA-managed recreational facilities provide river and reservoir access that is unique but abundant in the region. Given the abundant and diverse opportunities, none of the three alternatives involve impacts that would result in significant cumulative effects to developed or dispersed recreation in the region.

#### **Alternative A**

Under Alternative A, 939 acres (19 percent) of TVA shoreland on NTRs are forecast for developed recreation. Unless otherwise posted, 1,744 acres (35 percent) of parcels allocated to Sensitive Resource Management and Natural Resource Conservation would support dispersed recreation, and the remaining 2,125 acres allocated to Project Operations and Shoreline Access could be available for dispersed recreation unless occupied by development or otherwise posted.

Alternative A includes the greatest number of acres of land designated for developed recreation. Some lands categorized for developed recreation have been improved with facilities, while other parcels are not currently developed but have potential for future development. Implementation of this alternative would beneficially affect developed

recreation by providing a diversity of existing sites as well as future opportunities for new facilities.

Alternative A includes the least amount of land available for dispersed recreation. Continuation of the Forecast System would negatively affect dispersed recreation. However, because there are substantial amounts of Zone 4 and undeveloped Zone 2 lands under this alternative, the impacts would be minor.

### **Alternative B**

Under the action alternatives, lands managed by TVA that provide recreation opportunities associated with developed public and/or commercial facilities would be placed into Zone 6 (Developed Recreation), or Zone 2 (Project Operations) when the facilities occur on TVA dam reservations. Lands managed by TVA that provide dispersed recreation opportunities would be placed into Zone 2, 3, or 4, depending upon other compatible uses occurring on the parcel. Dispersed recreation could occur on any TVA parcels that are not otherwise posted or developed.

Implementation of Alternative B, as compared to equivalent zoning under Alternative A, would result in a net reduction of land allocated to Zone 6 by 85 acres. The reduction is less than 2 percent of the total TVA-managed land on the NTRs. About 854 acres (17 percent) of NTR lands would be allocated to Zone 6. Parcels 19 and 46 on South Holston Reservoir, totaling 37 acres and forecast as Natural Resource Conservation, would be allocated to Zone 6, which would allow opportunities for developed recreation that are consistent with adjacent USFS lands. Conversely, 13 parcels, totaling 122 acres, forecast for Developed Recreation on Fort Patrick Henry, South Holston, Watauga, and Wilbur reservoirs would be allocated to other zones (Table 2-5). None of these 13 parcels allocated to a zone other than Developed Recreation currently have developed recreational facilities. Although no Zone 6 lands would remain on Wilbur Reservoir, about 54 acres of Zone 6 lands would be available on the nearby Watauga Reservoir. Adoption of Alternative B would impact recreation by changing the amount and location of lands available for future development of recreational facilities. Under Alternative B, the acreage of Zone 6 land on South Holston Reservoir would slightly increase, but would be reduced on Fort Patrick Henry, Watauga, and Wilbur reservoirs. However, because the number of acres removed from Zone 6 is small, impacts would be minor.

Furthermore, each of the parcels previously forecast for Developed Recreation is allocated to zones that allow for dispersed recreation. The 2,357 acres (48 percent of NTR properties) allocated to Zones 3 and 4 would support opportunities for dispersed recreation, and an additional 1,598 acres allocated to Zones 2 and 7 could be available for dispersed recreation unless occupied by development or otherwise posted. On this basis, selection of Alternative B would beneficially affect recreation. Again, because the number of acres is small, effects throughout the NTRs region are minor.

### **Alternative C**

Selection of Alternative C, compared to Alternative A, would reduce the total acreage allocated to Zone 6 by 51 acres, or 1 percent of the total TVA-managed land on the NTRs. Approximately 888 acres (18 percent) of NTR lands would remain allocated to Zone 6. Five parcels on Watauga and South Holston reservoirs, totaling about 69 acres and currently forecast as Natural Resource Conservation (Zone 4), would be allocated to Zone 6, which would increase opportunities for developed recreation on those reservoirs. Conversely, 11 parcels totaling 120 acres of land forecast for Developed Recreation on Fort Patrick Henry,

South Holston, Watauga, and Wilbur reservoirs would be allocated to other zones (Table 2-5). None of these 11 parcels previously forecast for Zone 6 currently has developed recreational facilities. While no land on Wilbur Reservoir would be allocated to Zone 6, 86 acres of Zone 6 lands would be available on the nearby Watauga Reservoir. Adoption of Alternative C would indirectly impact recreation by changing the amount and location of lands available for future development of recreational facilities. Under Alternative C, the acreage of Zone 6 land on South Holston Reservoir would slightly increase, but would be reduced on Fort Patrick Henry, Watauga, and Wilbur reservoirs. However, because the number of acres removed from Zone 6 is small, impacts would be minor.

Compared to Alternative B, Alternative C would result in different allocations for four South Holston Reservoir parcels, resulting in the net increase of about 2 acres allocated to Zone 6. Similarly, three additional Watauga Reservoir parcels, totaling about 32 acres, would be allocated to Zone 6 under Alternative C. Opportunities for developed recreation would be greater on South Holston and Watauga reservoirs under Alternative C as compared to B.

Under Alternative C, as with Alternative B, each of the parcels previously forecast for developed recreation is allocated to zones that likely allow for dispersed recreation. About 2,322 acres (47 percent) of NTRs properties would be allocated to Zones 3 and 4 and would support dispersed recreation uses, and another 1,598 acres allocated to Zones 2 and 7 could be available for dispersed recreation unless occupied by development or otherwise posted. On this basis, selection of Alternative C would beneficially affect recreation. However, opportunities for dispersed recreation may be slightly reduced under Alternative C as compared to Alternative B. Again, because the number of acres is small, effects throughout the NTRs region are minor.

#### **4.4. Prime Farmland**

Effects to prime farmlands can occur when actual or designated land uses are changed to other uses or designations, such as industrial or recreational development, which preclude the property being used for agricultural purposes. Generally, prime farmland on properties located in Zone 3 (Sensitive Resource Management) and Zone 4 (Natural Resource Conservation) are not subject to adverse impacts because those properties would be retained in a relatively “natural” state and not be converted to other land uses, preserving any prime farmland. However, prime farmland on parcels allocated to Zone 2, 5, 6, or 7 is subject to potential adverse effects because land in these zones could be devoted to nonagricultural uses, such as industrial development, developed recreation, and water access.

Under any of the alternatives, proposed actions involving the transfer of land for development that contains any acreage of soil with prime farmland could require completion of Form AD 1006, *Farmland Conversion Impact Rating*. This impact rating is based on soil characteristics as well as site assessment criteria, such as agriculture and urban infrastructure, support services, farm size, compatibility factors, on-farm investments, and potential farm production loss to the local community and county. Site assessment scores tend to be higher for the more rural locations. Sites receiving scores greater than 160 points (out of a possible 260) are given greater consideration of protection so that agricultural use can be preserved.

About 431 acres of prime farmland occur on 24 of the 231 parcels addressed in the NTRLMP (Table 4-5 and Appendix G, Table G-1). About 167 acres of farmland of statewide importance occur on 12 parcels located in Virginia. The potential for direct and

indirect impacts to prime farmland and farmland of statewide importance under each of the alternatives is discussed below.

**Table 4-5. Approximate Number of Acres of Prime Farmland and Land of Statewide Importance Allocated to Each Zone Under Alternatives A, B, and C**

Zone	Alternative A		Alternative B		Alternative C	
	Prime Farmland	Land of Statewide Importance	Prime Farmland	Land of Statewide Importance	Prime Farmland	Land of Statewide Importance
2	356	11	201	4	201	4
3	18	0	75	0	34	0
4	12	0	109	16	154	11
5	7	0	7	0	7	0
6	30	155	30	147	27	153
7	8	1	8	1	8	1

The total acreage of prime farmland associated with parcels addressed in the NTRLMP is small (about 0.5 percent) relative to more than 79,830 acres of prime farmland occurring in the five counties adjacent to the NTRs. The majority of NTRLMP parcels, including parcels containing prime farmland, are already committed to land uses other than agriculture. Regionally, the number of farms and the acres of land in farms are declining in nearly all of the five counties, although the average size of farms is increasing except in Sullivan County, Tennessee (Table 3-7). However, because any future negative impacts on NTR lands would occur on a relatively small proportion of existing prime farmland in the region and project-specific reviews would identify and minimize adverse impacts, implementation of any of the three alternatives would not result in substantial cumulative effects to prime farmland.

**Alternative A**

Under Alternative A, approximately 401 acres of prime farmland and 167 acres of farmland of statewide importance occur on parcels allocated to Zones 2, 5, 6, and 7, where disturbance of soils is likely. Approximately 60 percent of prime farmland around the seven reservoirs occurs on Project Operations lands associated with dam reservations and tailwaters. Nearly 53 percent of prime farmland is located on South Holston Parcels 2, 3, and 73, which comprise the tailwater shoreline and dam reservation, and are forecast for Project Operations. Prime farmland also occurs on parcels developed for use as community parks, informal boat ramps, and a water treatment plant. In many instances, soil-disturbing impacts to parcels committed to Project Operations or those developed uses have already occurred; therefore, allocation to these zones would not represent a future impact to prime farmland. Conversely, about 4 percent of prime farmland occurs on parcels fronting subdivisions, riparian strips, and an undeveloped industrial parcel on which future impacts could occur. Approximately 30 acres of prime farmland occur on parcels allocated to Zones 3 and 4, where impacts to prime farmland are unlikely.

About 86 percent of the farmland of statewide importance occurs on parcels currently allocated to Zone 6. About 119 acres (71 percent) occur on Sugar Hollow Park (Beaver Creek Parcels 1 and 3), which is already developed and landscaped. Similarly, another 24

acres of farmland of statewide importance is located on South Holston Parcels 24 and 33, which are Zone 6 parcels committed to the Washington County Park and the Area 6 Ramp, respectively. The remainder of farmland of statewide importance occurs on parcels used for Project Operations, access areas, formal and informal boat ramps, and a fire department building (Appendix G, Table G-1). None of the farmland of statewide importance occurs on parcels allocated to Zone 3 or 4.

Adoption of Alternative A would have the greatest potential to adversely affect prime farmland and farmland of statewide importance because the greatest proportion of parcels would be allocated to Zones 2, 5, 6, and 7. As future requests for land uses on these parcels are submitted to TVA, project-specific environmental reviews are expected to identify and reduce negative impacts to prime farmland and farmland of statewide importance. Minor adverse impacts are expected as parcels are converted to uses incompatible with agriculture. However, because the proportion of prime farmland and farmland of statewide importance is small, changes in land use would not result in significant impacts.

### **Alternative B**

Under Alternative B, 246 acres of prime farmland and 152 acres of farmland of statewide importance would occur on parcels allocated to Zones 2, 5, 6 and 7 where impacts are likely. Approximately 184 acres of prime farmland and about 16 acres of farmland of statewide importance would be allocated to Zones 3 and 4. Compared to the No Action Alternative, 155 fewer acres of prime farmland and 15 fewer acres of farmland of statewide importance would be subject to potential future development uses incompatible with agriculture.

As described under Alternative A above, future requests for land uses would be subject to project-specific environmental reviews. Minor adverse impacts to prime farmland are expected. However, for the reasons stated above, changes in land use under Alternative B would not result in significant impacts.

### **Alternative C**

Under Alternative C, 243 acres of prime farmland and 158 acres of farmland of statewide importance would occur on parcels allocated to Zones 2, 5, 6, and 7 where impacts are likely. Approximately 188 acres of prime farmland and 11 acres of farmland of statewide importance would be allocated to Zones 3 and 4.

Compared to the No Action Alternative, about 158 fewer acres of prime farmland and about 9 fewer acres of farmland of statewide importance would be subject to potential future development uses incompatible with agriculture.

Compared to Alternative B, about 3 fewer acres of prime farmland would be subject to potential future development uses incompatible with agriculture. However, about 6 more acres of farmland of statewide importance could be developed under Alternative C as compared to Alternative B.

As described under Alternative A above, future requests for land uses would be subject to project-specific environmental reviews. Minor adverse impacts to prime farmland are expected. However, for the reasons stated above, changes in land use under Alternative C would not result in significant impacts.

#### **4.5. Terrestrial Ecology**

This section addresses anticipated effects to terrestrial plant and wildlife communities. Potential effects to threatened and endangered plants and animals are addressed in Section 4.6 below.

Analysis of the effects to terrestrial plant and wildlife communities is based upon the potential for proposed activities to result in clearing vegetation or ground disturbance (e.g., grading), which would be the primary sources of direct impacts to plant and wildlife communities. Indirect effects to plant and wildlife communities include fragmentation and isolation of suitable habitat and spread of invasive, nonnative species that compete with native species. Greater potential for site development correlates with a greater potential for adverse impacts to terrestrial plants and wildlife. As such, Zones 3 and 4 are the most protective of terrestrial habitat. Zone 5 has the greatest potential to involve ground disturbance that may affect terrestrial communities. The potential impacts to plants and wildlife on Zones 2, 6, and 7 are dependent upon the existing condition of the parcel and on the proposed future uses. Future actions on lands allocated to these zones may involve substantive development (e.g., new roads, campgrounds, marinas, etc.), or they may be left relatively natural. Furthermore, many wildlife species may become accustomed to facilities developed on these lands, such that long-term effects to common species of wildlife are minor. For the purposes of this programmatic analysis, we assume the potential for impacts to plants and wildlife on Zones 2, 6, and 7 would be moderate.

Under any of the alternatives, site-specific environmental reviews would be conducted when development projects are proposed in the future. Such reviews would evaluate the potential for project-specific effects to plant and wildlife communities. Additionally, to minimize the potential for introduction of invasive plant species on TVA-owned properties, any proposed development project would implement the following requirements:

- Landscaping activities would not include the use of invasive plants listed as Rank 1 (Severe Threat), Rank 2 (Significant Threat), or Rank 3 (Lesser Threat) on the TN-EPPC list of Invasive Exotic Pest Plants in Tennessee (Appendix G, Tables G-9 through G-11).
- Revegetation and erosion-control work would utilize seed mixes comprised of native species or noninvasive, nonnative species (Appendix G, Table G-12).

##### **4.5.1. Plant Communities**

In the South Fork Holston River and Watauga River watersheds, as the human population and associated commercial and residential development continues to increase, a related trend of increasing removal and fragmentation of natural vegetation is expected. Loss of native vegetation communities may lead to diminished biodiversity and alteration of habitat suitability. Common deciduous and evergreen forests and woodlands are extensive in the NTRs region. Under all three alternatives, the proposed NTRLMP identifies lands for natural resources conservation and implements measures to minimize impacts when projects are planned. Therefore, none of the three alternatives would result in significant cumulative impacts to common terrestrial vegetation.

Rare plant communities are limited in distribution in the region. The Carolina Hemlock (Eastern Hemlock)/Great Laurel Forest is a globally critically imperiled terrestrial plant community. Within the SBRE, this plant community is a key component supporting other

floral species and fauna because the hemlock provides shade, food, and shelter for those species. The Carolina Hemlock (Eastern Hemlock)/Great Laurel Forest is susceptible to infestation of the hemlock wooly adelgid, an exotic insect pest. Regionally, cumulative effects of increasing population and development and the spread of the wooly adelgid are expected to result in the continued decline of this rare community. The USFS is implementing biological and chemical measures to control wooly adelgid in the federal lands adjacent to Watauga Reservoir. Because TVA-managed parcels containing the Carolina Hemlock (Eastern Hemlock)/Great Laurel Forest would be managed to conserve natural resources, activities proposed under each of the three alternatives would not result in adverse cumulative effects to that plant community. Similarly, continued allocation of Watauga Reservoir Parcel 24 to Project Operations (Zone 2) under all three alternatives is expected to maintain intact the Northern White Cedar Limestone Seepage Woodland habitat and would not result in adverse cumulative effects to that plant community.

### **Alternative A**

Under Alternative A, 1,409 acres on four of the seven reservoirs (Fort Patrick Henry, South Holston, Watauga, and Wilbur) would be forecast or planned for Natural Resource Conservation (equivalent to Zone 4). An additional 335 acres on Boone Reservoir would be planned for Sensitive Resource Management (equivalent to Zone 3). The potential for impacts to plant communities in these two zones is minor. Approximately 3,064 acres on the NTRs would be designated Project Operations, Developed Recreation, or Shoreline Access, where moderate effects to plant communities may occur. The greatest potential for impacts to plant communities would be limited to 125 acres near South Holston Reservoir. Given the substantial amount of common vegetation types around those reservoirs, selection of Alternative A would not result in major direct or indirect effects to common terrestrial plant communities.

No uncommon terrestrial plant communities are known from the lands surrounding Beaver Creek, Clear Creek, Boone, South Holston, Fort Patrick Henry, or Wilbur reservoirs. Project-specific surveys would be conducted prior to clearing vegetation to evaluate the presence of, and potential impacts to uncommon or rare plant communities. Therefore, activities around those six reservoirs are not expected to affect rare terrestrial plant communities.

The Carolina Hemlock (Eastern Hemlock)/Great Laurel Forest occurs along the north shore of Watauga Reservoir (Parcels 2, 3, 4, 5, and 6), on parcels forecast for Natural Resource Conservation. Currently, Parcels 2, 3, 4, and 6 are under a permanent easement for the use and benefit of the USFS. No easement has been granted for Parcel 5. These parcels are remote and are surrounded by USFS lands. The public can access these parcels from the reservoir or the Appalachian Trail, which runs through Parcel 3. Activities conducted on Natural Resource Conservation parcels include forest management and dispersed recreation. There is some potential for clearing, the removal of hazard trees, and other timber management that would directly affect the Carolina Hemlock (Eastern Hemlock)/Great Laurel Forest on these parcels. However, because such activities likely would be conducted to promote forest health, no substantial adverse effects are expected. Additionally, there is potential for indirect impacts to this community from dispersed recreation activities (e.g., cutting firewood). However, given the remoteness and steep slopes of the parcels, the potential for frequent and intense visitation is low. Therefore, no significant indirect impacts to this rare plant community are anticipated.

The northern white cedar limestone seepage woodland, a globally rare community, occurs in Parcel 24 on Watauga Reservoir, which is a utility easement corridor, surrounded on both sides by land allocated to Natural Resource Conservation. Maintenance of the easement sustains the conditions that allow this community to thrive. Therefore, no adverse direct or indirect effects to this plant community are expected from the continued management of this easement.

### **Alternative B**

Under Alternative B, 2,357 acres on five of seven NTRs (Boone, Fort Patrick Henry, South Holston, Watauga, and Wilbur) would be allocated to Zones 3 and 4, in which impacts to terrestrial vegetation are expected to be minor. Approximately 2,452 acres would be allocated to Zones 2, 6, and 7, where the potential for direct and indirect impacts is greater. The extent of NTR lands allocated to Zone 5 (Industrial) under Alternative B is the same as under Alternative A. Because the amount of land eligible for potential development is smaller, the potential to promote the spread of invasive exotic plants is lower under Alternative B than under Alternative A. Furthermore, requirements to use noninvasive species for planting or seeding would reduce the potential for spreading invasive species of plants. Allocations proposed under Alternative B would be more protective compared to the existing condition, and would result in minor direct or indirect impacts to common terrestrial plant communities.

No uncommon terrestrial plant communities are known from the lands surrounding Beaver Creek, Clear Creek, Boone, South Holston, Fort Patrick Henry, or Wilbur reservoirs. Project-specific surveys would be conducted prior to clearing vegetation to evaluate the presence of, and potential impacts to, listed plant species. Therefore, activities around those six reservoirs are not expected to affect rare terrestrial plant communities.

Under this alternative, Watauga Reservoir Parcels 2, 3, 4, 5, and 6, on which Carolina Hemlock (Eastern Hemlock)/ Great Laurel Forest (globally critically imperiled terrestrial community) occurs, would remain allocated as Zone 4 (Natural Resource Conservation). Similarly, the globally rare northern white cedar limestone seepage woodland community on Watauga Parcel 24 would remain allocated to Zone 2 (Project Operations) and managed as a utility corridor. For the same reasons described above under Alternative A, no significant direct or indirect adverse impacts are expected to occur to either rare plant community under Alternative B.

### **Alternative C**

Under Alternative C, 2,322 acres on five of seven NTRs (Boone, Fort Patrick Henry, South Holston, Watauga, and Wilbur) would be allocated to Zones 3 and 4, in which impacts to terrestrial vegetation are expected to be minor. Approximately 2,486 acres would be allocated to Zones 2, 6, and 7, where the potential for impacts is greater. The extent of NTR lands allocated to Zone 5 (Industrial) under Alternative C is the same as under Alternative A. Because the amount of land eligible for potential development is smaller, the potential to promote the spread of invasive exotic plants is lower than under Alternative A. Furthermore, requirements to use noninvasive species for planting or seeding would reduce the potential for spreading invasive species of plants. Allocations proposed under Alternative C would be more protective compared to the existing condition and would not result in major direct or indirect impacts to common terrestrial plant communities.

No uncommon terrestrial plant communities are known from the lands surrounding Beaver Creek, Clear Creek, Boone, South Holston, Fort Patrick Henry, or Wilbur reservoirs.

Project-specific surveys would be conducted prior to clearing vegetation to evaluate the presence of, and potential impacts to uncommon or rare plant species. Therefore, future activities around those six reservoirs are not expected to affect rare terrestrial plant communities.

Under Alternative C, Watauga Reservoir Parcels 2, 3, 4, 5, and 6, would be allocated to Zone 3 (Sensitive Resource Management) as compared to their Zone 4 (Natural Resource Conservation) allocation under Alternative B. Those parcels contain the globally critically imperiled terrestrial community, Carolina Hemlock (Eastern Hemlock)/Great Laurel Forest. Because no forest management activities would occur on Zone 3 parcels, the potential for direct impacts to this plant community is lower under Alternative C than under Alternative A or B. Therefore, although Alternative C would result in slightly fewer acres allocated to Zone 3 as compared to Alternative B, parcels containing known sensitive species would be somewhat more protected under Alternative C. Because dispersed recreation could occur on Zone 3 parcels, there is potential for indirect impacts. However, as described above under Alternative A, the likelihood of substantial recreational activities is low, and no major indirect impacts to this community are anticipated under Alternative C.

In addition, no adverse direct or indirect impacts to the globally rare northern white cedar limestone seepage woodland community are anticipated because allocation changes are not proposed for Parcel 24 on Watauga Reservoir.

#### **4.5.2. Wildlife Communities**

##### **Alternative A**

Under Alternative A, 1,409 acres on four of the seven reservoirs (Fort Patrick Henry, South Holston, Watauga, and Wilbur) would be forecast or planned for Natural Resource Conservation (equivalent to Zone 4). An additional 335 acres on Boone Reservoir are planned for Sensitive Resource Management (Zone 3). Approximately 3,064 acres on the NTRs would be designated Project Operations, Developed Recreation, or Shoreline Access, where moderate effects to terrestrial wildlife may occur. Industrial use would be limited to 125 acres near South Holston Reservoir.

Under this Alternative, Beaver Creek and Clear Creek reservoirs would remain unplanned, and current land uses would continue. No effects to existing terrestrial wildlife habitat on TVA-managed land around Beaver Creek and Clear Creek reservoirs are anticipated.

Boone Reservoir would continue to be managed as it is under the 1999 RLMP (TVA 1999) and the Boone Management Unit Resource Management Plan (TVA 2002). Sensitive areas, including a cave, on Parcel 6, are currently allocated to Sensitive Resource Management. Due to the protected status of the parcel, no impacts to sensitive terrestrial animal resources are anticipated. No other impacts to terrestrial wildlife habitat on Boone Reservoir are anticipated under Alternative A.

On Fort Patrick Henry, South Holston, Watauga, and Wilbur reservoirs, TVA shoreland would remain under current allocations under the Forecast System established for those reservoirs in 1965. The mature forest and intact shorelines around South Holston and Watauga reservoirs provide good quality habitat for wildlife. Formal and informal recreation occurring on several parcels (South Holston Parcels 25, 34, 35, 36, and 37, and Watauga Parcel 50) is resulting in removal of vegetation and soil compaction, which degrades habitat suitability for wildlife. Further degradation of wildlife habitat would occur with the current land use designations under Alternative A.

Under Alternative A, the existing uses of TVA parcels would likely remain unchanged. Despite impacts from formal and informal recreation observed on certain TVA-managed parcels, given the amount of quality habitat observed on TVA and adjacent lands, direct, indirect, and cumulative impacts of actions under Alternative A to terrestrial animal resources would be minor.

### **Alternative B**

Under Alternative B, 2,357 acres on five of seven reservoirs (Boone, Fort Patrick Henry, South Holston, Watauga, and Wilbur) would be allocated to Zones 3 and 4. Zone 3 allocations would comprise 6 percent of NTR lands and would occur on Boone, Fort Patrick Henry, South Holston, and Watauga reservoirs. Approximately 2,452 acres on the NTRs would be allocated to Zones 2, 6, and 7. Industrial use would be limited to the same 125-acre parcel discussed under Alternative A.

Allocation changes (compared to Alternative A) proposed under this alternative include:

- Two Boone Reservoir parcels (26 and 27), totaling 221.5 acres and designated for Sensitive Resource Management under Alternative A, would be allocated to Zone 4. In the 1999 Boone RLMP, those parcels were allocated to Zone 3 based upon presence of habitat potentially suitable for sensitive species. Because current data indicate no sensitive species are present, these parcels would not meet criteria warranting management for sensitive resources. The allocation to Zone 4 would promote conservation of natural resources, including existing habitat. These parcels are within the Boone Management Unit, for which the Boone Management Unit Resource Management Plan (TVA 2002) would continue to be implemented.
- Two South Holston parcels (19 and 46), totaling 36.6 acres and forecast for Natural Resource Conservation, would be allocated to Zone 6, which would allow for dispersed recreation as well as the potential for developed recreation.
- Five parcels, totaling 170.7 acres, would be allocated to Zone 3, rather than Zone 2 or 4 under Alternative A, to protect sensitive resources identified on those parcels.
- Twenty-two parcels, totaling 465.7 acres, would be allocated to Zone 4, rather than Zone 2 or 6 under Alternative A. There is decreased potential for negative impacts to terrestrial wildlife communities on land allocated to Zone 4 as compared to Zones 2 and 6.
- Parcel 50 on Watauga Reservoir, and Parcels 25, 35, 36, and 37 on South Holston Reservoir would remain or would change to Zone 4. While this allocation is likely to limit development, it does not limit dispersed recreation. Therefore, the ongoing degradation of vegetation and soil quality is expected to continue. Degradation of terrestrial wildlife habitat is expected to continue on these parcels under Alternative B. However, given the substantial amount of similar habitat around those reservoirs, these impacts would not significantly affect terrestrial wildlife communities.

Implementation of Alternative B would result in a net gain, compared to the existing condition, in the number of acres allocated to Zones 3 and 4. The proposed allocations under Alternative B increase the total acreage allocated to Zones 3 and 4 on five of the seven reservoirs as compared to Alternative A. Changes in allocation of specific parcels

would not result in significant adverse impacts. Therefore, adoption of Alternative B is not expected to result in negative direct, indirect, or cumulative impacts to terrestrial wildlife communities. Over the long term, allocation of lands to Zones 3 and 4, which limits ground disturbance, vegetation removal, and other development, is likely to benefit terrestrial wildlife communities in the South Fork Holston River and Watauga River watersheds.

### **Alternative C**

Under Alternative C, approximately the same number of acres of NTR land would be allocated to Sensitive Resource Management (Zone 3) and Natural Resource Conservation (Zone 4), as was proposed in Alternative B. About 34 more acres would be allocated to Zone 6 under Alternative C than under Alternative B. Allocations to the other zones would be the same as under Alternative B.

Allocation changes (relative to Alternative A) proposed under Alternative C include:

- Two Boone Reservoir parcels (26 and 27), totaling 221.5 acres and designated for Sensitive Resource Management under Alternative A, would be allocated to Zone 4 because no sensitive resources warranting protection were identified on those parcels (see additional discussion of these parcels above).
- Fifteen parcels, totaling 164.4 acres, would be allocated to Zone 3 rather than Zone 2 or 4 under Alternative A to protect sensitive resources identified on those parcels.
- Eight parcels (322.6 acres) forecast or planned for Zone 2 under Alternative A would be allocated to Zone 4.
- Five parcels (South Holston 19 and 46 and Watauga 17a, 50, and 59), totaling 69 acres and forecast for Natural Resource Conservation under Alternative A, would be allocated to Zone 6. Additionally, Parcels 34, 35, and 36 on South Holston Reservoir would remain allocated to Zone 6, which would allow for dispersed recreation as well as the potential for developed recreation. The ongoing degradation of vegetation and soil quality is expected to continue, and future development of recreational facilities has the potential to permanently remove or alter habitat. However, given the substantial amount of similar habitat around those reservoirs, these impacts would not significantly affect terrestrial wildlife communities.

Implementation of Alternative C would result in a net gain, compared to the existing condition, in the number of acres allocated to Zones 3 and 4. The proposed allocation under Alternative C would increase the total acreage allocated to Zones 3 and 4 on five of the seven reservoirs as compared to Alternative A.

On the other hand, Alternative C would result in about 6 fewer acres allocated to Zone 3 and about 27 fewer acres allocated to Zone 4 than under Alternative B. Variation in the net amount of Zone 3 land is based upon results of field surveys that indicated presence, or absence (in the case of South Holston Parcel 1), of sensitive resources. Variation in the net amount of Zone 4 land is based upon targeting recreational opportunities to parcels most suitable for that use. Changes in allocation of specific parcels would not result in significant adverse impacts. Therefore, Alternative C is not expected to result in negative direct, indirect, or cumulative impacts to terrestrial wildlife communities. Over the long term, allocation of lands to Zones 3 and 4 is likely to beneficially affect terrestrial wildlife

communities in the South Fork Holston River and Watauga River watersheds in a cumulative context.

#### **4.6. Endangered and Threatened Species**

Analysis of potential effects to endangered and threatened species was based upon the potential for proposed land use allocations to result in development of currently undeveloped parcels. Greater potential for site development correlates with greater potential for adverse impacts to listed species. However, under any of the alternatives, site-specific environmental reviews would be conducted on projects proposed in the future. Those site-specific reviews would assess the presence of, and potential project-related impacts to, listed species of plants and animals.

##### **4.6.1. Plants**

No plants or habitat suitable for plants that are federally listed were identified on or within 5 miles of the parcels addressed in the NTRLMP. Therefore, federally listed plants would not be affected under any of the alternatives. The following discussion addresses potential impacts to state-listed plant species. The potential environmental effects of future projects would be evaluated and impacts to state-listed plants would be avoided or minimized to the extent possible. Therefore, the scope and extent of potential impacts resulting from the NTRLMP is minimal, and adoption of any of the three alternatives would not result in significant cumulative effects to state-listed species.

##### **Alternative A**

Under Alternative A, 3,189 acres would be allocated to Project Operations, Industrial, Developed Recreation, and Shoreline Access land uses, on which the potential for impacts to state-listed plants is greatest. About 1,744 acres would be managed for Natural Resource Conservation or Sensitive Resource Management, on which the potential to impact listed plants is lowest.

Ongoing operations and management would continue on the nine parcels containing known populations of state-listed plants. Under Alternative A, Fort Patrick Henry Parcel 10a would continue to be part of Parcel 10, and it would be allocated to Project Operations. Parcels 2, 3, 4, 5, 6, and 50 on Watauga Reservoir would be forecast for Natural Resource Management and, except for Parcel 5, would continue to be included in the USFS easement. State-listed plants on these parcels could be subject to direct impacts associated with project operations and forest management. However, project-specific surveys would be conducted prior to clearing vegetation to evaluate the presence of, and potential impacts to, listed plants. Therefore, no major direct impacts would occur on these parcels or where state-listed plants occur throughout the NTRs.

There is potential for indirect impacts associated with dispersed recreation and spread of invasive plant species. On the Watauga parcels, given the remoteness and steep slopes of the parcels, the potential for frequent and intense visitation is low, and therefore, no substantive indirect impacts to state-listed plants are anticipated. The state-listed branching whitlow-wort found on Fort Patrick Henry Parcel 10a also is located on a steep bluff where foot traffic is unlikely, and the occurrence of exotic invasive plants is minor. No major indirect impacts to this species are expected under Alternative A.

### **Alternative B**

Under Alternative B, 28 parcels on five of seven NTRs that were forecast or planned to Zone 2 or 6 under Alternative A would be allocated to Zone 3 or 4. This would result in a lower potential for impacts to state-listed plants that may be present on those parcels. The potential for impacts to state-listed plants would be low on the 2,357 acres allocated to Zones 3 and 4 and greater on the remaining 2,576 acres allocated to other zones. However, project-specific surveys would be conducted prior to clearing vegetation to evaluate the presence of, and potential impacts to, listed plants. Therefore, no substantive impacts are anticipated under Alternative B.

Under Alternative B, Fort Patrick Henry Parcel 10a would be created and allocated to Zone 4, which would be more protective of the state-listed as endangered plant present on that parcel. Similarly, state-listed plants identified on Watauga Reservoir parcels would remain allocated as Zone 4. The potential for site development is diminished on these parcels, and no direct impacts to state-listed plants would occur. Direct impacts associated with forest management and indirect impacts associated with dispersed recreation and invasive species may still occur on Zone 4 parcels, but impacts would be minor for the reasons described above under Alternative A.

### **Alternative C**

Under Alternative C, 26 parcels on five of seven reservoirs that were forecast or planned to Zones 2 and 6 would be allocated to Zone 3 or 4. This would result in a decreased potential for impacts to state-listed species that may be present on those parcels. The potential for impacts to state-listed plants would be low on the 2,322 acres allocated to Zones 3 and 4 and greater on the remaining 2,611 acres allocated to other zones. However, project-specific surveys would be conducted prior to clearing vegetation to evaluate the presence of, and potential impacts to, listed plants. Therefore, no major impacts are anticipated under Alternative C.

Compared to Alternatives A and B, land use allocations proposed under Alternative C are the most protective of known populations of state-listed plants around Fort Patrick Henry and Watauga reservoirs. Six of the seven parcels would be allocated to Zone 3 (Sensitive Resource Management) (Table 2-5). Parcel 50 on Watauga Reservoir would be allocated to Zone 6 (Developed Recreation), consistent with the current management by USFS as a primitive camping area. Future plans for developed recreation facilities on this parcel would include protection of sensitive plant resources occurring within this parcel. There is potential for indirect impacts to state-listed plants from dispersed recreation and invasive species. However, as described above under Alternative A, any indirect impacts would be minor.

#### **4.6.2. Terrestrial Animals**

Under all three alternatives, land planning on the NTRs has no potential to affect any federally listed or state-listed terrestrial species, except for the southern bog lemming, which has been observed on South Holston Reservoir Parcel 2. As stated in Section 3.6.2 above, no other state-listed or federally listed species have been observed on NTRs parcels. NTRs parcels do not contain habitat suitable for most federally listed or state-listed species recorded within 3 miles of the NTRs.

### **Alternative A**

Under Alternative A, South Holston Reservoir Parcel 2 is designated TVA Project Operations. The parcel is a portion of the tailwater below the South Holston Dam, and

includes several easements for utilities and a highway. Activities currently occurring on this parcel do not adversely affect the southern bog lemming. If additional development were proposed in the future, a site-specific assessment would be conducted to evaluate impacts to listed species. Therefore, no adverse direct, indirect, or cumulative impacts to this species are anticipated under Alternative A.

### **Alternatives B and C**

Under Alternatives B and C, South Holston Reservoir Parcel 2 would be allocated to Zone 4 (Natural Resource Conservation). This would change the management focus of this parcel to enhance the natural resources on the land and provide for human use and appreciation. Future development is less likely, but still possible. Because the variety of habitat this species prefers is common throughout the region, these new management focuses are not expected to impact the southern bog lemming.

#### **4.6.3. Aquatic Animals**

The primary source of potential impacts to listed aquatic species is ground disturbance and construction in riparian areas, which could directly affect aquatic species by introducing structures, riprap, or other materials into the water. Such activities may also indirectly affect aquatic species by degrading water quality through inputs of pollutants, sediment, or excess nutrients. Soil disturbance is associated with potential for runoff and sedimentation, which may impact water quality and listed aquatic species. Therefore, activities in Zones 2, 5, 6, and 7 have the greatest potential to affect aquatic species, with Zone 5 activities having the greatest likelihood of adverse effects due to clearing and grading, development of impervious surfaces, and the potential for point source discharges to the reservoir. Actions in Zones 3 and 4 have the lowest potential to affect aquatic species.

Prior to specific actions taken on any parcels in the future, TVA would conduct additional site-specific environmental reviews and require appropriate site design and management practices using TVA's Section 26a General and Standard Conditions, including best management practices (BMPs), to minimize negative environmental impacts and help ensure that 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. Potential impacts to water quality, discussed in Section 4.12 below, are directly related to the consequences to aquatic species.

Analysis of the effects to aquatic species under the three alternatives focused on species located near uncommitted (plannable) parcels. The potential environmental consequences of ongoing projects and activities associated with committed land uses have been reviewed previously; therefore, we assume that no adverse effects to aquatic species would occur from ongoing activities on committed parcels. To examine potential effects to aquatic species, TVA aquatic biologists evaluated records for each species' location within each of the reservoir watersheds, determined the species' location relative to the NTRs parcels, and considered barriers to passage such as dams and, for certain species, impounded habitat. While 26 federally listed and state-listed aquatic species are known from one or more of the seven reservoirs or associated tributaries or tailwaters (see individual RLMPs), not all of those species are located near plannable parcels. None of the parcel allocations in the NTRLMP have potential to affect federally listed aquatic species. TVA identified 10 state-listed species potentially affected by NTR lands planning (Table 4-6). Based on these criteria and as shown in the table, Boone, South Holston, and Watauga were the only NTRs

with proposed parcel allocations potentially associated with records of state-listed species. Therefore, planning of the 4,288 acres of TVA-managed land surrounding those three reservoirs was reviewed in detail to evaluate potential effects to listed aquatic species. Results of the detailed analysis are described below.

**Table 4-6. State-Listed Aquatic Animals That Occur Near Plannable Parcels**

Common Name	Scientific Name	State Status (Rank)	Reservoir
Longhead darter	<i>Percina macrocephela</i>	THR (S2)	Boone
Tennessee dace	<i>Phoxinus tennesseensis</i>	NMGT (S3)	Boone
Black sculpin	<i>Cottus baileyi</i>	TRKD (S2)	South Holston
Fatlips minnow	<i>Phenacobius crassilabrum</i>	SPCO (S2)	South Holston
River redhorse	<i>Moxostoma carinatum</i>	SPCO (S2S3)	South Holston
Sharphead darter	<i>Etheostoma acuticeps</i>	END (S1)	South Holston
Greenfin darter	<i>Etheostoma chlorbranchium</i>	THR (S1)	South Holston
Banded sculpin	<i>Cottus carolinae</i>	THR (S1)	Watauga
Tangerine darter	<i>Percina aurantiaca</i>	NMGT (S3)	Watauga
Tennessee dace	<i>Phoxinus tennesseensis</i>	NMGT (S3)	Watauga

Note: No federally listed aquatic species occur near plannable parcels.

**State Status abbreviations:** END = Endangered; NMGT = In need of management; SPCO = Species of concern; THR = Threatened; TRKD = Tracked

**State Rank abbreviations:** S1 = Critically imperiled, often with 5 or fewer occurrences; S2 = Imperiled, often with <20 occurrences; S3 = Rare or uncommon, often with <80 occurrences; S#S# = Occurrence numbers are uncertain

### Alternative A

Under Alternative A, a total of 1,744 acres would be managed either for Sensitive Resource Management or Natural Resource Conservation. Boone Reservoir is the only reservoir with land allocated to Sensitive Resource Management. These two land use designations afford the most protection to aquatic life.

Under Alternative A, a total of 2,425 acres on the three reservoirs are currently allocated to Project Operations, Shoreline Access, and Developed Recreation. A single 125-acre parcel near South Holston Reservoir is allocated to Industrial use. Activities associated with these four land use designations have potential to indirectly affect aquatic life. However, as described above, the extent of impacts associated with these designations would depend upon the specifics of future development. Projects proposed in the future would be individually evaluated and subject to federal, state, and TVA regulations and permits. Therefore, no major direct, indirect, or cumulative impacts to listed aquatic species are anticipated.

### Alternative B

Under Alternative B, TVA would allocate about half of the TVA-managed land around Boone, South Holston, and Watauga reservoirs (approximately 2,209 acres) to Zones 3 and 4. All three reservoirs would have some parcels allocated to Zones 3 and 4. Approximately 1,954 acres would be allocated to Zones 2, 6, and 7. Just as under Alternative A, the only land allocated to Zone 5 (Industrial) is the 125-acre parcel near South Holston Reservoir.

On Boone Reservoir, the longhead darter and Tennessee dace records are associated with parcels allocated to Zone 3. However, the Tennessee dace could potentially be found on any Boone Reservoir parcel with small streams. Listed aquatic species records identified on South Holston Reservoir are associated with parcels allocated to Zone 4. Listed aquatic

species identified on Watauga Reservoir are associated with uncommitted parcels allocated either to Zone 3 or 4. As on Boone, the Tennessee dace could be found on any TVA parcels on Watauga Reservoir with small streams.

Under Alternative B, on all three reservoirs containing state-listed aquatic species, the acreage allocated to Zones 3 and 4 would increase, and acreage allocated to Zones 2, 6, and 7 would decrease. Future developments on parcels around these reservoirs have the potential to adversely impact state-listed aquatic species. However, because over half the shoreland is allocated to zones on which development is unlikely and future development projects would be required to minimize impacts to water quality, selection of Alternative B would not result in adverse direct, indirect, or cumulative impacts to state-listed aquatic species. Over the long term, allocation of lands to Zones 3 and 4, which limits ground disturbance, vegetation removal, and other development, is likely to benefit aquatic species in the South Fork Holston River and Watauga River watersheds.

### **Alternative C**

Under Alternative C, TVA would allocate greater than 51 percent of the TVA-managed land around Boone, South Holston, and Watauga reservoirs (approximately 2,175 acres) to Zones 3 and 4. All three reservoirs would have some parcels allocated to Zones 3 and 4. Approximately 1,987 acres would be allocated to Zones 2, 6, and 7. Just as under Alternatives A and B, the only land allocated to Zone 5 (Industrial) is the 125-acre parcel near South Holston Reservoir.

Compared to existing conditions (Alternative A), implementation of Alternative C would result in greater acreage allocated to Zones 3 and 4 and less acreage allocated to Zones 2, 6, and 7 on all three reservoirs containing state-listed aquatic species. Compared to Alternative B, implementation of Alternative C would result in 34 fewer acres on Boone, South Holston, and Watauga allocated to Zones 3 and 4.

Future developments on parcels around these reservoirs have potential to adversely impact state-listed aquatic species. However, because over half the shoreland is allocated to zones on which development is unlikely, and future development projects would be required to minimize impacts to water quality, selection of Alternative C would not result in adverse direct, indirect, or cumulative impacts to state-listed aquatic species. Over the long term, allocation of lands to Zones 3 and 4 is likely to beneficially affect aquatic species in the South Fork Holston River and Watauga River watersheds.

## **4.7. Wetlands**

Analysis of the effects anticipated under the three alternatives focused on wetlands located on uncommitted (plannable) parcels. The potential environmental consequences of ongoing projects and activities associated with committed land uses previously have been reviewed. Therefore, we assumed that parcels with existing committed land uses either contain no wetlands, or the ongoing land use does not adversely affect on-site wetlands. Of the 34 uncommitted parcels for the seven reservoirs, wetlands are present on nine parcels on Fort Patrick Henry, South Holston, and Watauga (Table 4-7). Four of the wetlands are Category 3 (highest quality), and five are Category 2 (moderate quality).

**Table 4-7. Summary of Wetlands on Uncommitted Parcels on Northeastern Tributary Reservoirs**

Reservoir	Parcel No.	Wetland Type	TVARAM Category	Zone Allocation by Alternative		
				A	B	C
Fort Patrick Henry	10a	emergent	2	2	4	3
	21	forested	2	6	4	4
	23	forested	2	4	4	4
South Holston	19	scrub-shrub	2	4	6	6
	25a	emergent/scrub-shrub/forested	3	6	4	3
Watauga	11	scrub-shrub	2	6	4	4
	26	emergent/scrub-shrub	3	4	4	3
	31	forested/scrub-shrub	3	4	4	3
	32	forested/scrub-shrub	3	4	4	3

Ground-disturbing activities and vegetation removal would be the primary source of potential impacts to wetlands. Greater ground disturbance correlates with a greater potential for adverse impacts to wetlands and wetland functions. The potential for ground-disturbing activities would be greatest in Zones 5, 6, and 7 and least in Zones 3 and 4. There is moderate potential for ground disturbance in Zone 2, as some Project Operations lands would be maintained undeveloped, and many Zone 2 parcels have already undergone development. Under any of the alternatives, wetlands present on any parcels would be subject to EO 11990. Any impacts to wetlands associated with ongoing or future project operations would be evaluated under NEPA and minimized to the extent practicable.

#### **Alternative A**

No major direct impacts to wetlands are expected to occur under Alternative A. As shown in Table 4-7, one of the nine parcels would be designated as Project Operations (Zone 2); three parcels as Developed Recreation (Zone 6), and the remainder as Natural Resource Conservation (Zone 4). The likelihood of future development is greater on parcels allocated to Zones 2 and 6 than Zones 3 and 4. However, any projects proposed for these parcels would be reviewed to assess potential effects to wetlands; impacts would be avoided or mitigated. Furthermore, these wetlands are generally very small in size. Consequently, any potential impacts associated with future project operations or developed recreation would have a negligible effect on wetlands.

There could be some minor and indirect impacts to wetlands associated with dispersed recreation and camping activities where minimal clearing of vegetation occurs on the shoreline and around tent and picnic areas. Overall, impacts associated with this alternative would be minor, as any localized trimming or clearing of wetland vegetation would have a negligible effect on wetland resources within the overall project area.

Because the total area of emergent, forested, and scrub-shrub wetlands addressed in this NTRLMP is very small (186 acres), proposed activities under Alternative A would have no measurable cumulative impacts to wetlands in the region.

#### **Alternative B**

No significant direct impacts to wetlands are expected to occur under Alternative B. Eight out of the nine parcels containing wetlands would be Zone 4 (i.e., managed to protect and enhance habitat), which would afford protection to wetlands. This alternative would afford

greater protection to wetlands on Fort Patrick Henry Parcel 21, where unauthorized mowing is occurring. Similar protection for wetlands is anticipated on South Holston Parcel 25a, where unauthorized all-terrain vehicle use is impacting the site.

Some minor and indirect impacts to wetlands could occur under this alternative. Informal recreation and camping activities could result in some minimal clearing of vegetation. Overall, impacts associated with this alternative would be minor, as any localized trimming or clearing of wetland vegetation would have a negligible effect on wetland resources within the overall project area.

Cumulative impacts to wetlands would likewise be minor under Alternative B. Informal recreation may result in very minor impacts to wetland vegetation, but these impacts are expected to be very small and localized, and wetlands would recover with no lasting effects.

### **Alternative C**

Implementation of this Alternative is expected to have the least amount of adverse effects to wetlands. Under Alternative C, TVA would allocate five parcels containing wetlands to Zone 3 (Sensitive Resource Management) as compared to their allocation to either Zone 2 (Project Operations) or Zone 4 (Natural Resource Conservation) under Alternative A. Because Zone 3 parcels are specifically managed for protection and enhancement of sensitive resources, this allocation change would afford a slightly greater level of protection to wetlands on the parcels than is provided under Alternative A or B.

As described under Alternative B, adoption of Alternative C would reduce ongoing damage to wetlands on Fort Patrick Henry Parcel 21 and South Holston Parcel 25a. Additionally, as described above under Alternatives A and B, there could be some negligible impacts to wetlands associated with informal recreation, but these impacts are expected to be very minor. As with both previous alternatives, cumulative impacts to wetlands would be negligible.

## **4.8. Floodplains**

Under any of the three alternatives considered, projects proposed on TVA-managed parcels would be reviewed to ensure consistency with EO 11988.

Minor potential impacts to the floodplain are expected under any of the three alternatives. The degree of impacts under each alternative is described below. However, because the maximum potential extent of floodplain impacts is small and the requirements of EO 11988 will be applied to individual projects, effects to the floodplain are expected to be minimal under all three alternatives.

### **Alternative A**

Under Alternative A, the development and/or management of properties would proceed under the 1965 Forecast System, the 1999 Boone Reservoir Land Management Plan, and current policies, and floodplain impacts would be evaluated when future projects are planned in detail. 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, 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 to Zones 3 and 4, in which construction of facilities or structures within the floodplain is not anticipated.

### **Alternative C**

The potential adverse impacts to natural and beneficial floodplain values under Alternative C would virtually be the same as those expected under Alternative B because the same percentage of acres would be allocated to Zones 3 and 4, in which construction within the floodplain is not anticipated.

## **4.9. Cultural Resources**

Under all three alternatives, TVA would comply with the requirements of the NHPA regarding the preservation and treatment of historic properties. In Tennessee, the PA stipulates procedures for evaluating eligibility for the NRHP and mitigating adverse effects to historic properties. In Virginia, TVA would implement procedures required under Section 106 of the NHPA (see Section 3.9 above) until a similar PA is executed. In addition, archaeological resources located on federal lands (including all TVA NTR lands) are afforded protection under ARPA, NAGPRA, and other federal legislation pertinent to archaeological resources.

### **4.9.1. Archaeological Resources**

Analysis of the potential effects anticipated under the three alternatives focused on uncommitted parcels. The majority of archaeological survey coverage on NTRs does not fall within the uncommitted (plannable) parcels addressed in this NTRLMP. Therefore, this analysis evaluates the potential for proposed activities to result in ground disturbance (e.g., clearing and grading), which would be the primary source of potential direct impacts to archaeological sites. Greater ground disturbance correlates with a greater potential for adverse impacts to archaeological resources. Indirect effects to archaeological resources include looting resulting from the presence of the public. Looting can have significant negative effects on individual sites. On the other hand, the presence of the public may also indirectly benefit archaeological resources due to increased monitoring by conservation-minded groups.

For the purpose of comparing potential direct and indirect effects to archaeological sites at a programmatic scale, the land use zones were rated based on the potential ground disturbance required for their associated activities. Zones 3 and 4 are relatively equal in their low potential for effects to archaeological sites due to the minimal ground disturbance associated with those zones. The potential to indirectly affect archaeological sites is also low on shorelands in Zones 3 and 4 because increased monitoring may counteract looting or abuse of archaeological sites.

Zones 6 and 7 are relatively equal in their moderate potential to affect archaeological sites as they typically involve more ground disturbance than activities characteristic of Zones 3 and 4. The potential for indirect effects to archaeological sites is also moderate in Zones 6 and 7 because the increased foot traffic associated with Shoreline Access and Developed Recreation may lead to looting of archaeological sites.

The greatest potential to affect archaeological sites occurs on parcels allocated to Zones 2 and 5 due to the greater amount of ground disturbance normally associated with navigation, power, and dam projects in Zone 2 and industrial facilities in Zone 5. The potential for indirect effects to archaeological sites is moderate in Zones 2 and 5 because the increased

foot traffic associated with Project Operations and Industrial use could lead to looting of archaeological sites.

Under any of the alternatives, results of archaeological testing will be reviewed prior to undertaking site-specific ground-disturbing activities on any of the NTRs. In Tennessee, TVA would use the phased identification and evaluation procedure set forth in the PA. TVA is coordinating with the Virginia SHPO to develop a similar PA that would apply to TVA lands planned in that state. Until such a PA is executed, TVA would incorporate the phased identification and evaluation procedures to effectively mitigate adverse effects to archaeological sites in Virginia pursuant to Section 106 of the NHPA. For all activities, TVA would comply with other pertinent laws and regulations, including ARPA, NAGPRA, and other federal legislation pertinent to archaeological resources.

Site-specific activities proposed in the future would be approved or denied according to the significance of any archaeological resources present. Archaeological sites within the NTRs properties will be avoided whenever possible. If avoidance is not possible, mitigation may be required. Such mitigation typically calls for additional archaeological investigation and may require data recovery of potentially impacted archaeological resources in the form of removal, cataloging, and archiving, as defined in the Tennessee PA, as to be developed in the Virginia PA, and/or as provided under Section 106. Although mitigation documents the site and preserves certain artifacts, under the revised NHPA regulations, excavation and removal of artifacts are considered adverse impacts to an archaeological site.

Within the South Fork Holston River and Watauga River watersheds, trends of increasing population and land development are likely to increase disturbance of archaeological resources. Under each of the three alternatives proposed for the NTRLMP, impacts to significant archaeological sites would be minimized by avoidance of the site or by mitigation through data recovery pursuant to 36 CFR Part 800. Furthermore, designation of lands to uses that minimize ground disturbance is protective of archaeological resources. Therefore, implementation of the NTRLMP would not contribute to cumulative adverse effects that may occur in the region.

Proposed parcel allocations for the committed parcels surrounding Beaver Creek and Clear Creek reservoirs are identical under all three alternatives. Therefore, no direct or indirect impacts to archaeological sites are expected at those locations under any of the three alternatives.

#### **Alternative A**

Under Alternative A, 2,202 acres on the seven reservoirs would be forecast or planned for Project Operations and Industrial uses, which have the greatest potential for ground-disturbing activities. Additionally, 987 acres would be forecast or planned for Developed Recreation and Shoreline Access uses, which have moderate potential for ground-disturbing activities. Each of those land uses has moderate potential to indirectly impact archaeological sites.

Approximately 1,744 acres on the seven NTRs would be managed for Natural Resource Conservation or Sensitive Resource Management under this alternative. These land uses have the lowest potential for ground-disturbing activities, and consequently the lowest potential to affect archaeological sites that may be present. The potential for indirect effects to archaeological sites also is low on land used for these purposes.

Because of the executed PA in Tennessee and adherence to NHPA requirements in Virginia, and because appropriate mitigation would be performed as necessary, potential effects to cultural resources would be minor. Any adverse indirect effects to archaeological sites under Alternative A are expected to be minor.

### **Alternative B**

Under Alternative B, 1,675 acres would be allocated to Zones 2 and 5, on which there is high potential for ground disturbance. Another 902 acres would be allocated to Zones 6 and 7, where there is moderate potential for ground disturbance. As future requests for land uses on these parcels are submitted to TVA, project-specific environmental reviews are expected to avoid or mitigate negative direct impacts to archaeological sites as described in the PA (in Tennessee) or under Section 106 of the NHPA (in Virginia). Therefore, potential effects to archaeological resources would be minor. However, each of those land uses has moderate potential to indirectly affect archaeological sites.

Under Alternative B, the greatest amount of land (2,357 acres) on the seven NTRs would be allocated to Zones 3 and 4. These land uses have the lowest potential for ground-disturbing activities and consequently the lowest potential to affect any archaeological sites that may be present. The potential for indirect effects to archaeological sites also is low on land used for these purposes.

### **Alternative C**

At the programmatic scale, the potential for impacts to archaeological resources under Alternative C would be nearly identical to the potential impacts described under Alternative B. Under Alternative C, 1,675 acres would be allocated to Zones 2 and 5, while 936 acres would be allocated to Zones 6 and 7. Using the same approach described above, adverse impacts to archaeological resources would be avoided or mitigated on a project-specific basis. Because of the executed PA in Tennessee and adherence to NHPA requirements in Virginia, and because appropriate mitigation would be performed as necessary, potential effects to cultural resources would be minor. Moderate potential for indirect adverse impacts would occur on all four of those zones.

Under Alternative C, 2,322 acres on the seven NTRs would be allocated to Zones 3 and 4. These land uses have the lowest potential for ground-disturbing activities and low potential for indirect effects to archaeological sites.

#### **4.9.2. Historic Structures**

Information on historic structures used for this study was derived mainly from planimetric map data and a windshield survey of uncommitted parcels. For any proposal on a given parcel (regardless of zone allocation), a field check of the current status of these historic structures would be accomplished to determine the significance of the resource, and the stipulations set forth in the Tennessee PA, any applicable Virginia PA, and/or under Section 106 of the NHPA would be followed. Under each alternative, review for applicability of the NHPA would take place for any proposed activity that has the potential to affect historic structures identified on or adjacent to TVA land. Nearly all of these historical structures are located on property adjacent to TVA land, not on TVA tracts. Historic structures located off site would be considered because they may be subject to indirect effects such as changes in the visual character or setting from actions on TVA property.

Regardless of the alternative adopted, proposed site-specific activities would be subjected to the requirements of the PA (in Tennessee) or Section 106 of the NHPA (in Virginia) to

determine what historic features exist on TVA public land and on adjacent tracts within the APE. TVA would determine the significance of any historic structures identified, and impacts to such structures would be avoided or mitigated in accordance with the PA and/or the NHPA.

### **Alternative A**

Under this alternative, management of historic structures and potential effects as a result of proposed development would continue to be evaluated on a case-by-case basis. Under Alternative A, because they could change the visual character of the surrounding area, activities on Zone 6 (Developed Recreation), particularly commercial recreation activities, Zone 5 (Industrial), and Zone 7 (Shoreline Access) have the 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, and because TVA would reserve the option to refuse land use requests that would have unavoidable adverse effects, potential effects to historic structures would be minor. Selection of this alternative would not result in cumulative effects to historic structures in the region.

### **Alternative B**

Under Alternative B, the NTRLMP would enhance conservation and protect historic structures. The plan would provide for preservation and would protect additional shoreline from development. Lands with distinctive visual character, such as heavily contrasting land forms or unique water bodies, would be placed in Zone 3 (Sensitive Resource Management) or Zone 4 (Natural Resource Conservation). About 284 acres would be allocated to Zone 3, where presence of sensitive resources, including significant scenic areas, was a principal consideration. Another 2,073 acres would be allocated to Zone 4, which includes lands with attractive but less unique scenic qualities and little visible alteration. Activities that involve minor visible changes, such as recreational hiking, picnicking, bank fishing, and some selective forest management (e.g., pine beetle salvage), could take place in both Zones 3 and 4. Some development with more visible modifications could take place in Zone 4 areas, as long as the location and appearance remained subordinate to the desired visual characteristics. A total of 2,357 acres (48 percent) of publicly held reservoir acreage on the NTRs would be allocated to Zones 3 and 4, as compared to 1,744 acres (35 percent) under Alternative A. Therefore, implementation of this alternative would provide enhanced management of historic structures.

Under Alternative B, development could occur, particularly on the 42 percent of land allocated to Zones 2, 5, 6, and 7. However, because review for applicability of the NHPA would take place on a case-by-case basis for any proposed activity, potential effects to historic structures would be identified and mitigated appropriately under the PA (in Tennessee) or under Section 106 of the NHPA (in Virginia). Therefore, no substantial direct or indirect effects to historic structures would occur. Selection of this alternative would not result in cumulative effects to historic structures in the region.

### **Alternative C**

Under this alternative, the potential for effects to historic structures would be similar to those described under Alternative B. Approximately 278 acres would be allocated to Zone 3 and approximately 2,044 to Zone 4, a combined total of about 47 percent of all NTRs reservoir lands. Compared to the No Action Alternative, Alternative C would afford better protection of historic structures and preservation of natural areas around the reservoir. Compared to Alternative B, Alternative C would allocate about 34 fewer acres to Zones 3

and 4, and would therefore afford slightly less protection to any historic structures in the area.

Under this alternative, development could occur, particularly on 43 percent of land allocated to Zones 2, 5, 6, and 7. However, because potential effects to historic structures would be identified and mitigated appropriately under the PA (in Tennessee) or under Section 106 of the NHPA (in Virginia), these effects would not be significant. Selection of Alternative C would not result in cumulative effects to historical structures in the region.

#### **4.10. Managed Areas and Ecologically Significant Sites**

Natural areas on TVA NTR lands are on committed parcels and are allocated according to their prescribed land use to one of four zones: Zone 2 (Project Operations), Zone 3 (Sensitive Resource Management), Zone 4 (Natural Resource Conservation), or Zone 6 (Developed Recreation). Additionally, committed parcels fronting natural areas situated on back-lying public lands are zoned according to the agency's land use of the back-lying land (e.g., USFS land), and are within one of the zones listed above. Under all three alternatives, between 35 and 48 percent of acres on the TVA NTRs is allocated to Sensitive Resource Management or Natural Resource Conservation. Therefore, between one-third and one-half of the NTR lands have management objectives that support and enhance the character of natural areas on, adjacent, or near TVA NTR lands.

With a single exception, zone allocations of parcels containing natural areas are the same under all three alternatives. Parcel 59 on Watauga Reservoir, which includes a portion of the Appalachian Trail, is allocated to Zone 4 (Natural Resource Conservation) under Alternatives A and B, but is allocated to Zone 6 (Developed Recreation) under Alternative C. Parcel 59 is approximately 20 acres and includes a narrow strip fronting land transferred to the USFS and an island accessible only by water. Allocation to Zone 6 under Alternative C reflects current management by the USFS and use of the parcel for dispersed recreation (i.e., in accordance with the definition of Zone 6, which includes "TVA public land fronting land owned by other agencies for recreational purposes."). Therefore, changing the allocation of Parcel 59 from Zone 4 to Zone 6 would not result in adverse impacts to the natural area.

All other natural areas are located on parcels that remain allocated to the current use. No changes to the size, location, or character of natural areas are expected to result from selection of Alternative A, B, or C. Therefore, no adverse direct or indirect impacts to natural areas are expected under any of the alternatives.

Although trends of increasing population growth and land development are occurring within the South Fork Holston River and Watauga River watersheds, there are no reasonably foreseeable future actions that would negatively affect natural areas or ecologically significant sites on non-TVA land in that region. Under all three alternatives considered in this document, preservation of natural areas and ecologically sensitive sites on TVA-managed lands would beneficially contribute to the cumulative regional efforts to conserve natural habitats for the long term.

#### **4.11. Visual Resources**

Potential visual consequences were examined in terms of the likely visual changes between the existing landscape and the landscape as it might be altered by the proposed actions. The assessment of visual change considered the sensitivity of viewing points available to

the 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.

Comparative scenic values of TVA public land were assessed during the development of Alternatives B and C in order to identify areas for scenic protection and visual resource conservation. Those parcels having distinctive visual characteristics such as islands, rock bluffs, steep, wooded ridges, wetlands, and flowing shallow water areas were allocated to Sensitive Resource Management (Zone 3) under the action alternatives. Land that provides valuable protective screening also was allocated to Zone 3. Parcels that possess attractive visual resources of less significance were allocated to Natural Resource Conservation (Zone 4). This zone also includes land that provides important scenic buffers. 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 development 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.

The scenic character of major wildlife management areas and wetlands would be preserved under all the alternatives. Many islands around the reservoirs would be protected from alteration under all alternatives. This would preserve the scenic accent, attractive contrast, and visual richness they contribute to reservoir vistas. Several areas of the reservoirs would benefit under the action alternatives. Major sections of the riverine upper reservoirs would be protected or screened from further development. This would preserve the variety of wooded, river, ridge landforms; linear channel islands with low trees; broad areas of shallow water; flowering plants; and steep, forest-covered mountainside along the banks. The combined contributions of these attractive features would help sustain the scenic landscape character and aesthetically pleasing sense of place.

Lands having the greatest scenic qualities are often the most desirable for public preservation. Frequently, however, they are also the most sought-after for commercial and residential 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 the No Action Alternative, there would continue to be no established provision to allocate selected lands based upon visual resource conservation concerns. A slow but noticeable decline in scenic resources, aesthetic quality, and visual landscape character would occur as development demands continue to increase. Where TVA has custody of the land, actions of TVA and others would be evaluated to determine potential visual effects prior to land use approval, thereby preventing serious visual disruptions or loss of scenic resources. Approval of some activities may also require avoidance or mitigation measures that reduce visual impacts.

However, under the Forecast System, about 254 acres of uncommitted lands (5 percent of all NTR lands) could be subject to various forms of development. Sections of highly scenic shoreline as well as those of more common, less unique visual quality would be continually at risk from approval of these uses. Frequently, lands sought for development are also those with the greatest scenic qualities and that are the most desirable for public conservation. Alteration of lands with the least capacity to absorb change could occur. Under Alternative A, the cumulative effect of additional development could reduce the overall scenic attractiveness of the NTRs, which would negatively affect the visual landscape character and aesthetic sense of place. In this event, the scenic integrity of the predominately rural reservoirs would decrease slightly.

Adoption of Alternative A would likely result in some long-term negative impacts, which include gradual losses of visual resources, scenic attractiveness, and undeveloped areas, as well as negative changes in the aesthetic sense of place. Scenic integrity would probably decrease as patchy development spreads within views from the reservoirs.

### **Alternative B**

Under Alternative B, the NTRLMP would enhance conservation and protection of scenic resources. The plan would provide for preservation of the most scenic areas, and would protect additional shoreline from development. Lands with distinctive visual character would be placed in Zone 3 or 4 (Sensitive Resource Management or Natural Resource Conservation, respectively). About 284 acres would be allocated to Zone 3, where visual qualities and scenic value were principal considerations for most parcels. Another 2,073 acres would be allocated to Zone 4, which includes lands with attractive but less unique scenic qualities and little visible alteration. Activities that involve minor visible changes, such as recreational hiking, picnicking, bank fishing, and some selective forest management (e.g., pine beetle salvage), could take place in both Zones 3 and 4. Some development with more visible modifications could take place in Zone 4 areas, as long as the location and appearance remained subordinate to the desired visual characteristics. A total of 2,357 acres (48 percent) of TVA-managed NTRs acreage would be allocated to Zones 3 and 4. Management and protection of the scenic landscape character would provide direction for any land use decisions affecting these parcels. Visual impacts would also be considered in decisions affecting the use of parcels in other zones.

Adoption of Alternative B would likely have an increasingly beneficial impact over time. The land management plan would provide for protection of scenic resources and preservation of natural areas, as development grows around the reservoirs. Scenic integrity would remain moderate or higher in selected areas. Consequently, implementation of Alternative B would provide important protective management of visual resources, which would help preserve the aesthetic sense of place and scenic landscape character of the reservoirs.

### **Alternative C**

Under this alternative, potential effects to visual resources would be similar to those described under Alternative B. Approximately 278 acres would be allocated to Zone 3 and approximately 2,044 to Zone 4, for a total about 47 percent of all reservoir lands in those two categories. Alternative C provides for better protection of scenic resources and preservation of natural areas around the reservoir than does Alternative A. Consequently, implementation of this alternative would provide enhanced protective management for visual resources and would help preserve the scenic landscape character of the reservoirs for long-term public enjoyment. On the other hand, about 34 fewer acres are allocated to

Zones 3 and 4 under Alternative C as compared to B, which would result in slightly less preservation of scenic resources under Alternative C.

#### **4.12. Water Quality**

Increased development and intensive land use has the potential to result in some degree of negative impact to the aquatic environment from point source pollution such as municipal or industrial discharges, or nonpoint source pollution, which comes from many sources (typically defined as sources that are not required to have an 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 potential impacts to the aquatic environment and consequently aquatic life, are:

- Increased turbidity and sedimentation.
- Increased levels of nutrients that can lead to subsequent algal blooms and higher oxygen demands.
- Increased levels of chemicals and bacteria from impervious surfaces, disturbed lands, managed lawns, and improper operation or failure of wastewater treatment systems.

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. Potential water quality impacts, such as erosion and nutrient runoff, likely would be greater from parcels designated for Project Operations, Industrial, Developed Recreation, or Shoreline Access use where more development and intensive land use could occur. 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 Section 26a General and Standard Conditions/BMPs (TVA 2005) 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**

Under Alternative A, only Boone Reservoir has parcels (335 acres) allocated to Sensitive Resource Management, the land use designation that is most protective of water quality. Parcels on five of the seven reservoirs (excluding Beaver Creek and Clear Creek reservoirs), totaling 28 percent of NTR lands (1,409 acres), would be dedicated to Natural Resource Conservation, which affords some protection to water quality through restriction on development and protection of riparian vegetation.

Under Alternative A, a total of 2,077 acres (42 percent) of the NTR lands are currently allocated to Zone 2 (Project Operations). Alternative A also includes a 125-acre parcel near South Holston Reservoir allocated to Industrial, which currently is undeveloped. The Industrial parcel is located approximately 1 mile from the reservoir, so future clearing,

grading, or other site development would likely have limited effects on reservoir water quality. No other TVA-managed land on the NTRs is allocated for industrial development. An additional 987 acres are allocated to Developed Recreation and Shoreline Access. Activities associated with these four land use zones have some potential to adversely impact water quality, with the Industrial classification having the greatest potential for adverse impacts. Industrial development could involve extensive clearing and grading, increase impervious surfaces, and result in possible point source pollution to the adjoining reservoir. However, the extent of impacts associated with any of these land uses would be dependent on the specifics of future development. New facilities with permitted discharges would be required to meet permit limits specifically designed to prevent degradation of applicable water quality criteria. Further, any proposed land use would be required to protect water quality through either restricted development or the commitment to use BMPs to minimize impacts. Therefore, selection of Alternative A would not cause substantial direct, indirect, or cumulative impacts to water quality.

### **Alternative B**

Under Alternative B, a total of 2,357 acres (48 percent) would be allocated to Sensitive Resource Management (Zone 3) and Natural Resource Conservation (Zone 4). Zone 3 allocations would occur on four reservoirs, and Zone 4 allocations would occur on five of the seven reservoirs (Table 2-3). Zone 3 and Zone 4 allocations afford the most protection to water quality because of the more stringent restrictions on land use and enhanced protection of riparian vegetation.

Under Alternative B, only two parcels (totaling about 37 acres) that were designated for an undeveloped land use under Alternative A would be allocated to a potentially developed use under Alternative B (Table 2-5). South Holston Parcels 19 and 46, forecast to Zone 4 under Alternative A, would be allocated to Zone 6 (Developed Recreation). A total of 1,550 acres (31 percent) would be allocated to Zone 2 under Alternative B. The only land allocated to Industrial use would be the 125-acre parcel near South Holston Reservoir. Additionally, 902 acres are allocated to Developed Recreation and Shoreline Access. Under these four land use zones, development potentially affecting water quality could occur. However, as described above under Alternative A, proposed land uses would be required to protect water quality in accordance with TVA guidance, federal regulations, and state permits. Consequently, direct, indirect, and cumulative impacts to water quality associated with Alternative B are expected to be minor.

### **Alternative C**

Allocations under Alternatives B and C are identical on Boone, Wilbur, Clear Creek, and Beaver Creek reservoirs. Alternative C, as compared to Alternative B, involves changes in land use allocations for 19 parcels of TVA-managed land. Under Alternative C, an additional 34 acres are allocated to Zone 6, with an equivalent reduction in allocations to Zone 3 (6 acres) and 4 (29 acres). The same parcels are allocated to Zones 2, 5, and 7 under Alternatives B and C. The minor variations in allocations to Zones 6, 4, and 3 do not represent substantial changes. Therefore, the potential for adverse impacts to water quality under Alternative C are the same as described under Alternative B above. Similarly, the requirements for project design, permitting, and monitoring to minimize impacts to water quality would be the same as described under Alternative B. Therefore, potential direct, indirect, and cumulative effects to water quality would be minor under Alternative C.

#### **4.13. Aquatic Ecology**

As with listed aquatic species, the major source of potential adverse impacts to common aquatic species in the NTRs would be land use changes and associated erosion, clearing of shoreline vegetation, and runoff. Shoreline riparian vegetation provides several benefits to aquatic life. Shoreline vegetation can provide shade to help control water temperature, especially in cove areas where the water is usually shallow with little flow. Terrestrial vegetation also provides habitat for insects that are fed upon by carnivorous and insectivorous aquatic species. Tree root wads along the shoreline provide refuge from predation. Submerged trees that have fallen into the water also provide structure in the reservoir. Riparian vegetation also serves to stabilize shoreline soil, thereby reducing the potential for erosion. Sedimentation associated with erosion can clog voids between rocks in the substrate of streams and reservoirs. These voids are important for fish spawning and habitat for aquatic insects. Clean rocky substrates are also the home of sessile freshwater mussels that can be smothered by sedimentation. Potential impacts to aquatic ecology likely would be greater from parcels designated for Project Operations, Industrial, Developed Recreation, or Shoreline Access use where more development and intensive land use could occur. However, as described in Section 4.12 above, individual actions would be subject to site-specific environmental review, as well as applicable state and TVA guidelines for minimizing impacts to aquatic habitat. In some instances, construction of docks and associated pilings and structures such as rock aggregation, while having potential short-term negative impacts during construction, can enhance shoreline habitat when constructed by providing shade and cover for some fish and aquatic invertebrates.

Land uses around Clear Creek and Beaver Creek reservoirs parcels would not change under any of the three alternatives. Therefore, the condition of aquatic communities (fish and benthic organisms) in those reservoirs would most likely remain in poor to fair condition under any of the alternatives.

No change to land use designations are proposed under Alternative A. Alternatives B and C both involve a significant portion of TVA-managed land being allocated to Sensitive Resource Management and Natural Resource Conservation. Therefore, none of the proposed allocation changes under any of the alternatives would negatively affect the trout fisheries in the TVA reservoirs and tailwaters considered in this analysis.

##### **Alternative A**

Under Alternative A, approximately 3,189 acres are designated for Project Operations, Industrial, Developed Recreation, and Shoreline Access uses with high potential for ground-disturbing activities that may affect aquatic ecology. The only land allocated to Industrial is a parcel approximately 1 mile from South Holston Reservoir. About 1,409 acres on the NTRs would be managed for Natural Resource Conservation. An additional 335 acres on Boone Reservoir is designated for Sensitive Resource Management. No Sensitive Resource Management parcels are located on the other six reservoirs. Zones 3 and 4 designations have the lowest potential to affect aquatic ecology.

Future land use requests consistent with the Forecast System designation or existing land plan can either be approved or denied based on a review of potential environmental impacts, compliance with TVA's Land Policy, and other administrative considerations. Future developments could negatively affect aquatic ecology. However, due to the required project-specific environmental review and application of TVA Section 26a General and Standard Conditions/BMPs (TVA 2005), negative impacts would be minor. Additionally, the TVA-managed land addressed in the NTRLMP constitutes a small proportion of the total

watersheds draining to the NTRs. Therefore, selection of Alternative A is not expected to result in direct, indirect, or cumulative impacts to common aquatic species or their habitats.

### **Alternative B**

Under Alternative B, a total of 2,357 acres (48 percent) would be allocated to Sensitive Resource Management (Zone 3) and Natural Resource Conservation (Zone 4), resulting in a pronounced increase in acreage in these two allocations as compared to Alternative A. Zone 3 would occur on four of the seven reservoirs, and Zone 4 would occur on five, with the largest increases on Watauga and South Holston reservoirs. The increase in number of acres allocated to these zones, as well as the expanded distribution of those zones on more reservoirs, is expected to benefit the aquatic environment indirectly by maintaining natural shoreline vegetation.

Under Alternative B, only two parcels (totaling about 37 acres) that were designated for an undeveloped land use under Alternative A would be allocated to a potentially developed use under Alternative B (Table 2-5). South Holston Parcels 19 and 46, forecast to Zone 4 under Alternative A, would be allocated to Zone 6 (Developed Recreation) under Alternative B. A total of 2,577 acres (52 percent) would be allocated to Zones 2, 5, 6, and 7. Under these four land use zones, development potentially affecting water quality could occur. The only land allocated to Industrial use would be the 125-acre parcel near South Holston Reservoir. However, as described above under Alternative A, proposed land uses would be required to protect the aquatic environment in accordance with TVA guidance, federal regulations, and state permits. Consequently, direct, indirect, and cumulative impacts to aquatic ecology associated with Alternative B are expected to be negligible.

### **Alternative C**

Compared to Alternative B, approximately 34 additional acres would be allocated to zones likely to impact aquatic ecology under Alternative C. As under Alternative B, the number of acres allocated to Zones 3 and 4 are substantially greater than the existing conditions. Allocations proposed under Alternative C also result in distribution of Zones 3 and 4 lands over a greater number of reservoirs than existing conditions. Therefore, because the differences between Alternatives B and C are minor, the effects to aquatic ecology under Alternative C are virtually the same as those described under Alternative B.

## **4.14. Air Quality**

With respect to the NTRLMP, the greatest potential for effects to air quality is from the Industrial land use zone. Under all three alternatives, a single 125-acre parcel near South Holston Reservoir (Parcel 6) is currently undeveloped but has the appropriate land use designation to be developed for industrial use in the future. TVA previously concluded that conversion of the site to light industrial would not have an adverse impact on air quality in the area (TVA 1995). Development of this parcel for activity not categorized as "light industrial" (i.e., not causing obnoxious odors, noise, toxic waste, excessive airborne particulates, fire hazards, etc.) would require project-specific assessment of effects to environmental resources including air quality. Furthermore, in the event that a land use request on another NTRs parcel involves industrial development, a site-specific environmental review will include assessing and documenting the extent of expected air quality impacts. Should the requested parcel be located in or potentially affect a nonattainment area for ozone or PM<sub>2.5</sub> (where particulate matter has a diameter less than or equal to 2.5 micrometers), TVA shall 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.

The potential for impacts to air quality from actions on Project Operations (Zone 2) lands depends upon the type of development proposed in the future. The No Action Alternative includes the greatest amount of land forecast or planned for Project Operations (2,077 acres). Because both action alternatives include 1,550 acres of land allocated to Zone 2, the potential for impacts to air quality is lower under Alternatives B and C than under the existing condition. Under any of the alternatives, an appropriate level of environmental review would be required to document the extent of expected air quality impacts from projects proposed in the future. Future projects would be subject to federal, state, and local air quality regulations.

Activities associated with Zones 3, 4, 6, and 7 are not likely to generate emissions that affect air quality. Therefore, adoption of any of the three NTRLMP alternatives would result in no significant impacts to air quality.

#### **4.15. Noise**

The greatest potential for community noise impacts comes from industrial and commercial development, commercial transportation, and, to a lesser extent, commercial recreational development. Under all three alternatives, future industrial development is limited to a single 125-acre parcel near South Holston Reservoir. The amount of land allocated to Developed Recreation (Zone 6) is greatest under Alternative A (939 acres), is less under Alternative C (888 acres), and is lowest under Alternative B (854 acres). The amount of land allocated to Project Operations is also greatest under Alternative A (2,077 acres) and less under Alternatives B and C (1,550 acres each). The potential for impacts associated with noise depends upon the types of developments proposed for Zones 2 and 6 lands.

Overall, based on the proportion of TVA public land available for development relative to the entire shoreline of the NTRs, there would be an minor increase in the potential for impacts associated with noise under all three alternatives, with the lowest potential for noise expected under Alternative B.

#### **4.16. Socioeconomics**

Potential socioeconomic impacts of the NTRLMP would be associated with direct effects of jobs created by development accommodated by the allocation of TVA-managed lands to use zones (e.g., development of industrial facilities, campgrounds, marinas, etc.). Because the proportion of land allocated to Industrial or Developed Recreation uses is small, the potential for new job creation is negligible. Additionally, there could be indirect effects associated with population growth in response to new development. Effects to socioeconomics could occur because of changes in developed and dispersed recreation opportunities, as well as changes in the overall attractiveness of the area as a place to live or visit.

The TVA Land Policy clarifies the availability of TVA-managed lands for industrial, residential, and recreational uses, which in turn determines the potential for development. However, future industrial, commercial, and residential development is likely to occur in the NTRs region on private land, regardless of the uses and availability of TVA public lands.

Regionally, the implementation of the NTRLMP is not expected to significantly contribute to cumulative human population growth or the economy via creation of jobs, residential developments, or commercial opportunities. However, TVA public lands in the NTRLMP provide public recreation opportunities and undeveloped shoreline that enhance the

attractiveness of the area, both of which may indirectly promote some population growth and certain economic sectors.

#### **4.16.1. Population and Economy**

Under all three alternatives, land use allocations would be very similar. Zone 5 (Industrial) would be allocated the same (one 125-acre tract) in all cases. As stated above, variation among alternatives was small because commitments that exist on 95 percent of NTR parcels were honored during the allocation process (Table 2-2). Additionally, no demand for industrial lands on TVA-owned property around the NTRs was identified during the allocation process or public involvement in this EIS. Opportunities for economic development exist on parcels allocated to developed recreation uses. Zone 6 (Developed Recreation) allocations would be very similar, ranging from 939 acres under Alternative A to 854 acres under Alternative B. Under each alternative, there are currently undeveloped parcels allocated to Zone 6, which provides an opportunity for future development. Additionally, the Watershed Team will evaluate on a project-specific basis other opportunities to support economic development near NTR parcels, such as road and utility easements. The location and extent of residential developments would not be changed by any of the alternatives.

#### **Alternative A**

Under this alternative, TVA would continue to use the current designations where they exist. Land use requests would be approved or denied based on their consistency with the current designations and on a review of potential environmental impacts, the TVA Land Policy, and other relevant considerations. Adoption of the No Action Alternative would not affect the local or regional population and economy.

#### **Alternative B**

Under this Alternative, as compared to Alternative A, there would be no change in the land designated for industrial use or shoreline access, but there would be a decrease of 85 acres (about 10 percent) in the land designated for Developed Recreation. Most of the differences between Alternatives A and B would designate land now considered to be for Project Operations to Natural Resource Conservation, which would more appropriately reflect current uses. As discussed in Section 4.3, the changes would have no substantive impact on the attractiveness of the area for dispersed recreation. Therefore, none of the changes would be likely to have any noticeable impact on the local economy or on economic development opportunities in the area.

#### **Alternative C**

Under Alternative C, as compared to Alternative A, there would be no change in the land designated for Industrial use or Shoreline Access, but there would be a decrease of 51 acres (about 1 percent) in the land designated for Developed Recreation. Compared to Alternative B, implementing Alternative C would result in about 34 more acres allocated for Developed Recreation, but about 35 fewer acres allocated to Zones 3 and 4. Other allocations under Alternative C would be very similar to those under Alternative B with regard to their overall potential impact. Therefore, none of the changes would be likely to have any noticeable effect on the local economy or on economic development opportunities in the area.

#### **4.16.2. Environmental Justice**

As discussed in Section 3.16.2, the minority population in the vicinity of the NTRs is small compared to the state and national levels. However, poverty levels are higher in some

counties where these reservoirs are located. The changes that would occur under Alternatives B and C are minor and would have at most only small impacts on the region's economy, recreation opportunities in the area, scenic values, and other resource areas. Therefore, no disproportionate impacts to disadvantaged populations are expected to occur under any of the alternatives.

#### **4.17. Unavoidable Adverse Effects**

Because of the requirement that project-specific environmental reviews be conducted prior to implementation, few, if any, unavoidable potential environmental effects would result under any of the three alternatives. Implementation of any of the three alternatives would result in no effects or minor effects to all of the resources examined (Table 2-7).

Implementation of any of the three alternatives is not expected to result in substantive adverse cumulative effects to any resources. Continuing regional development trends, such as residential development on non-TVA lands, would likely continue to result in degradation of aquatic and terrestrial habitat regardless of the alternative selected.

#### **4.18. Relationship Between Short-Term Uses and Long-Term Productivity**

NEPA requires consideration of the "relationship between short-term uses of man's environment and the maintenance and enhancement of long-term productivity" (40 CFR § 1502.16). For RLMPs, short-term uses generally are those that occur within a 10-year period, and long term refers to later decades. Productivity is the capability of the land to provide market and amenity outputs and values for future generations. The capability of the land to maintain productivity is one factor that influences the quality of life for future generations.

Generally, the land planning process results in few actions that adversely affect long-term productivity. Where practicable, TVA manages public lands for multiple uses, including recreation, natural resources, and protection of sensitive resources, for the goal of protecting these values for the public.

Commitments of the land for developed uses (e.g., industrial facilities, certain project operations facilities, some types of recreational development) have potential to decrease the productivity of land for agriculture, forestry, wildlife, certain recreational activities, and other natural resources management. Under all three alternatives, industrial and shoreline access uses are allocated to the same parcels, totaling about 4 percent of NTR lands (Table 2-6). The percentage of lands allocated to Zone 2 (Project Operations) is approximately 42 percent under Alternative A and 31 percent under Alternatives B and C. The percentage of lands allocated to Zone 6 (Developed Recreation) is also smaller under Alternatives B and C compared to Alternative A. Therefore, the extent of land allocated to zones having a potential to adversely affect long-term productivity is greatest under Alternative A. The potential to convert prime farmland or farmland of statewide importance (Virginia) to nonagricultural uses is greatest under Alternative A and lowest under Alternative C.

Conversely, allocation to Zones 3 (Sensitive Resource Management) and 4 (Natural Resource Conservation) increases the likelihood of long-term productivity of those lands. The percentage of NTR lands allocated to Zones 3 and 4 is approximately 35 percent under Alternative A and approximately 48 percent under Alternatives B and C. Therefore, long-term productivity of the land is expected to be greater under Alternatives B and C.

The scenic and recreational values of the NTRs are key factors in attracting new residents and visitors to the region. The current regional trends of increasing population and residential and commercial development are expected to continue. New jobs and income would be generated by spending activities of new residents and visitors, which may lead to enhanced long-term socioeconomic productivity. Allocation of lands to zones that enhance scenic and dispersed recreational values (i.e., Zones 3 and 4) is greatest under Alternatives B and C, while allocation to developed recreational uses is greatest under Alternative A. Therefore, adoption and implementation of any of the three alternatives is expected to promote public enjoyment of the reservoirs and, thereby, support regional trends of socioeconomic growth.

#### **4.19. Irreversible and Irretrievable Commitments of Resources**

Irreversible commitments of resources generally occur from the use of nonrenewable resources that have few or no alternative uses at the termination of the proposed action. Irretrievable commitments of resources result in the lost production or elimination of renewable resources such as timber, agricultural land, or wildlife habitat.

Construction of residences and project operations, industrial, and recreational facilities/structures would involve irreversible commitment of fuel, energy, and building material resources. Use of these resources would occur under all three alternatives as site-specific proposals are reviewed and approved, but would be greatest under Alternative A due to the greater total number of acres allocated to Zones 2, 5, 6, and 7, as compared to the total acres in those zones under Alternatives B and C.

As shoreline is converted to residential, commercial, industrial, and some types of recreational use, the land is essentially permanently changed and no longer available for agriculture, forestry, wildlife habitat, natural area, or certain dispersed recreational activities for the foreseeable future. This is an irretrievable commitment of land, which would occur under all alternatives if and when specific projects are approved and implemented. Over the long term, this type of irretrievable commitment would be greatest under Alternative A, due to the greater total number of acres allocated to Zones 2, 5, 6, and 7, as compared to the total acres in those zones under Alternatives B and C.

#### **4.20. Energy Resources and Conservation Potential**

Developing and implementing RLMPs does not involve substantive use of energy resources, but the activities allowed under land use zone definitions could use energy resources. Energy is used to fuel machines needed to maintain grassy areas on the TVA Project Operations lands such as dam reservations. Alternative A includes the greatest number of acres allocated to Zone 2 lands, and therefore would likely require the greatest amount of energy to maintain Project Operations lands.

Energy is also used by machines to maintain areas set aside for Natural Resource Conservation. Under any of the three alternatives, fuel would be required to conduct natural resource management activities such as mowing, timber management, access road maintenance, etc., should those activities be prescribed for certain parcels. The majority of lands in Zone 4 are not actively maintained. Implementation of Alternative B would result in a slightly greater requirement for this type of energy use because it involves the greatest acreage allocated to Zone 4 (Natural Resource Conservation).

Energy may be consumed by campers, boaters, and other users on Zone 6 (Developed Recreation) lands. TVA is encouraging campers who utilize developed recreation areas to reduce energy consumption and to conserve water resources. TVA has posted resource conservation tips at many campgrounds located on TVA land as part of its campground conservation program. TVA would encourage energy conservation measures to be utilized at recreation areas that may be developed in the future. These practices could potentially reduce energy usage under all alternatives. Alternative A involves the greatest number of acres allocated to Zone 6; therefore, energy use associated with developed recreation would be greatest under that alternative.

Finally, because each alternative contains the same South Holston parcel allocated to Zone 5, potential energy use associated with Industrial activities would be the same under each of the three alternatives. 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 energy savings and to implement conservation practices.

Under all three alternatives, energy use associated with land planning would be minor because nearly half the acres would likely be maintained in a natural condition. The small amount of energy used while implementing the RLMPs is not likely to have much influence on regional energy use demands.

#### **4.21. Summary of TVA Commitments and Proposed Mitigation Measures**

Mitigation measures are actions that could be taken to avoid, minimize, rectify, offset, reduce, or compensate for adverse impacts to the environment. In considering requests for use of TVA lands allocated under the NTRLMP, TVA will implement the following commitments and mitigation measures.

- TVA has executed a PA with the Tennessee SHPO for RLMPs and will seek to execute a separate PA with the Virginia SHPO for the identification, evaluation, and treatment of all cultural resources adversely affected by future proposed uses of TVA lands planned in RLMPs. All activities will be conducted in accordance with the stipulations defined in these PAs. Until the Virginia PA is executed, the TVA will incorporate the identification, evaluation, and treatment procedures established under Section 106 of the NHPA to effectively mitigate adverse effects to historic properties.
- Prior to approving any proposal to use NTR land, an appropriate level of site-specific environmental review will be conducted to determine the potential environmental effects of the proposed use.
- As necessary, based on the findings of any site-specific environmental review, TVA may require the implementation of appropriate mitigative measures, including TVA's BMPs (e.g., Section 26a General and Standard Conditions/best management practices [TVA 2005]), as a condition of approval for land use on the TVA-managed properties on the NTRs.
- In the event that a land use request involves industrial development, the site-specific environmental review will determine and document the extent of expected air quality impacts. Should the requested parcel be located in or potentially affect a

nonattainment area for ozone or  $PM_{2.5}$  (where particulate matter has a diameter less than or equal to 2.5 micrometers), TVA shall 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.

- Invasive plants listed as Rank 1 (Severe Threat), Rank 2 (Significant Threat), or Rank 3 (Lesser Threat) on the TN-EPPC list of Invasive Exotic Pest Plants in Tennessee (Appendix G, Tables G-9 through G-11) will not be used in landscaping activities on NTR lands.
- Revegetation and erosion-control measures will utilize seed mixes comprised of native species or noninvasive nonnative species (Appendix G, Table G-12).

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