

CHAPTER 4

4.0 ENVIRONMENTAL CONSEQUENCES

This chapter addresses direct, indirect, and cumulative effects of Alternatives A, B, and C on the identified resources. 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 space. A cumulative impact results from the incremental or collective impact by the action when combined with other past, present, and reasonably foreseeable future actions. Cumulative effects were examined within the French Broad River and Nolichucky River watersheds, in the context of gradually increasing population and land development in that area.

Analysis of environmental consequences was based upon the assumption that any activity allowed under a particular 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), it was assumed the entire 10 acres would be cleared of vegetation and developed to support an industrial facility. Activities on Zones 7 (Shoreline Access), 2 (Project Operations), and 6 (Developed Recreation) 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. Future projects, when planned in detail, will be evaluated to determine site-specific environmental impacts, and potential impacts to sensitive resources would be identified and avoided or minimized as appropriate consistent with applicable laws and regulations.

None of the three alternatives is expected to be controversial, involve unique or unknown risks, or violate federal, state, or local laws.

4.1. Land Use

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

Under Action Alternatives B and C, TVA would update the allocations originally designated for Douglas Reservoir in the 1965 Forecast System to reflect the land use zones defined in Table 2.3-2.

Alternative A – No Action

Under the No Action Alternative, TVA would continue to use the Forecast System designations established by TVA in 1965 to manage the lands surrounding Douglas Reservoir. Nolichucky Reservoir would remain unplanned and without forecast designations. The lands with existing TVA projects and existing land use agreements surrounding the two reservoirs would not be allocated to a land use zone; therefore, complete alignment with existing TVA policies would not occur. Requested land uses on

Douglas Reservoir that are consistent with the Forecast System designation, and all requested land uses on Nolichucky Reservoir, could either be approved or denied based on a review of potential environmental impacts, TVA's Land Policy, and other administrative considerations. Under Alternative A, there would be minor direct adverse effects and minor indirect effects due to the absence of comprehensive land plans.

Alternative B – Proposed Land Use Alternative

Under this alternative, TVA would create and implement individual RLMPs for the Douglas and Nolichucky reservoirs. The lands managed by TVA would be placed into one of the seven land use zones that best fits the existing land use (see Table 2.1-1). TVA would promote conservation of natural resources and developed recreation by allocating the land surrounding the two reservoirs as follows: 621 acres (19.5 percent) to Zone 3 (Sensitive Resource Management), 980 acres (30.7 percent) to Zone 4 (Natural Resource Conservation), and 496 acres (15.5 percent) to Zone 6 (Developed Recreation).

Under Alternative B as compared to Alternative A, 621 acres would be allocated to Zone 3 (Sensitive Resource Management). The amount of land allocated to Zones 4 (Natural Resource Conservation) and 6 (Developed Recreation) would correspondingly decrease 379 acres and 242 acres, respectively, under Alternative B as compared to Alternative A. Under this alternative, there would be no adverse direct or indirect effects to land use. However, there would be minor beneficial effects of long-term, comprehensive land plans.

Alternative C – Modified Land Use Alternative

Under this alternative, TVA would create and implement individual RLMPs for the Douglas and Nolichucky reservoirs. The lands managed by TVA would be placed into land use zones that best represent the existing land use, public comments, and other opportunities identified during scoping.

Selection of Alternative C, as compared to Alternative B, would result in changes in land use zones for 16 parcels of TVA-managed land. TVA would promote conservation of natural resources with an emphasis on the management of sensitive resources by allocating the land surrounding the two reservoirs as follows: 713 acres (22.3 percent) of the land surrounding the two reservoirs would be allocated to Zone 3 (Sensitive Resource Management), 971 acres (30.4 percent) to Zone 4 (Natural Resource Conservation), and 413 acres (13.0 percent) to Zone 6 (Developed Recreation).

Under Alternative C as compared to Alternative B, an additional 92 acres would be allocated to Zone 3 (Sensitive Resource Management), Zone 4 (Natural Resource Conservation) would decrease by 8 acres, and Zone 6 (Developed Recreation) would decrease by 83 acres.

Under Alternative C as compared to Alternative A, land allocated to Zone 3 (Sensitive Resource Management) would increase by 713 acres, Zone 4 (Natural Resource Conservation) would decrease by 388 acres, and Zone 6 (Developed Recreation) would decrease by 325 acres. Under this alternative, there would be no adverse direct or indirect effects to land use. However, there would be minor beneficial effects of long-term, comprehensive land plans.

4.2. 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 Zone 2 (Project Operations), Zone 3 (Sensitive Resource Management), and Zone 4 (Natural Resource Conservation), and on uncommitted (undeveloped) Zone 6 lands.

Under all three alternatives, developed recreation uses and opportunities would remain available in nearly the same proportions as currently established, even though land use designations (zones) may change. Similarly, the availability of lands offering dispersed recreation opportunities would remain relatively constant 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.

Among all three alternatives, no developed facilities currently used would be affected. In the context of the French Broad River and Nolichucky 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.

Under a former TVA license agreement with Greene County Board of Education, Cedar Creek Learning Center used and maintained facilities adjacent to Nolichucky Dam (Nolichucky Parcel 2) as an environmental education center. This center provided continuing education services to about 2,200 children per year. However, loss of funding resulted in the closure of the center in 2006. Since then the facilities have not been maintained. Greene County is currently considering options for its future use.

Alternative A – No Action Alternative

Under Alternative A, 738 acres (23.1 percent) of TVA-managed land on Douglas and Nolichucky reservoirs were originally forecast for public recreation or were unplanned and were placed in the equivalent land use zone as developed recreation for comparison with the other alternatives. Much of the remaining land would also support dispersed recreation, such as Zone 4 (Natural Resource Conservation) and Zone 3 (Sensitive Resource Management). Part of the land allocated to Zones 2 (Project Operations) and 6 (Developed Recreation) 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 under all the alternatives. Some lands categorized for developed recreation have been improved with facilities, while other parcels are not currently developed but may have potential for future development. 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. However, there are some recreation lands TVA would not likely develop. These parcels have limited potential for developed recreation development, but can readily support dispersed recreation. Therefore, the overall impacts to dispersed and developed recreation under Alternative A would be insignificant.

Alternative B – Proposed Land Use Alternative

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, Zone 3 (Sensitive Resource Management), or Zone 4 (Natural Resource Conservation), 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 242 acres, which is about 7.5 percent of the total TVA-managed land on the reservoirs. The reduction of land designated for Zone 6 is the result of further evaluation of the equivalency zoning under Alternative A. Evaluation has shown that some parcels are small, fragmented, and unsuitable for developed recreation. Additionally, some parcels would be allocated to other zones (see Table 2.3-1) to support protection of sensitive resources. About 496 acres (15.5 percent) of Douglas and Nolichucky reservoirs lands would be allocated to Zone 6.

The primary changes from Alternative A would be 621 acres allocated to Zone 3, and land allocated to Zone 4 (Natural Resource Conservation) would be decreased by 379 acres. None of the parcels allocated to a zone other than Developed Recreation currently have developed recreational facilities. Adoption of Alternative B would indirectly impact developed recreation by changing the amount and location of lands available for future development of recreational facilities. However, because there are recreation lands that are unsuited for developed recreation, the actual reduction in future development opportunities would be minor, and impacts under Alternative B would be insignificant.

Alternative C – Modified Land Use Alternative

Implementation of Alternative C, as compared to equivalent zoning under Alternative A, would result in a net reduction of land allocated to Zone 6 by 325 acres, which is about 10.1 percent of the total TVA-managed land on Douglas and Nolichucky reservoirs. About 413 acres (13.0 percent) of Douglas and Nolichucky reservoirs lands would be allocated to Zone 6.

The primary changes from Alternative B would be a net increase of 83 acres of land being allocated to Zone 3 or 4. Compared to Alternative B, Alternative C would result in different allocations for 16 parcels. Two of these parcels are on Douglas Reservoir and are considered better suited for dispersed recreation use, and one Douglas parcel was allocated to Zone 3 because it contains high quality wetlands. The remaining 10 parcels on Nolichucky Reservoir include two parcels being allocated to Zone 3 to protect sensitive resources, and eight parcels allocated to Zone 4 because they are isolated on the shores of the Nolichucky tailwater and better suited for dispersed recreation.

Under Alternative C as compared to Alternative A, the primary changes would be 713 acres allocated to Zone 3, land allocated to Zone 4 (Natural Resource Conservation) would be decreased by 388 acres, and Zone 6 (Developed Recreation) would decrease by 325 acres. None of the parcels allocated to a zone other than Developed Recreation currently have developed recreational facilities. Adoption of Alternative C would indirectly impact developed recreation by changing the amount and location of lands available for future development of recreational facilities. However, because there are recreation lands that

are unsuited for developed recreation, the actual reduction in future development opportunities would be minor, and impacts under Alternative C would be insignificant.

Under Alternative C, as with Alternative B, much of the land previously forecast for recreation is allocated to zones that allow for dispersed recreation. On this basis, selection of Alternative C would beneficially affect dispersed recreation. Further, opportunities for dispersed recreation may be slightly greater under Alternative C as compared to Alternative B. Again, because the overall number of acres is small, effects throughout the Douglas and Nolichucky reservoirs region are minor.

4.3. Prime Farmland

Effects to prime farmland 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 since those properties would be retained in a relatively natural state and not be converted to other land uses, preserving any occurring 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.

Major soil disturbance could occur on Zone 2 (Project Operations) when TVA or other public facilities are constructed. However, once these facilities are established, they often remain intact for long periods, and large tracts of land remain without adverse impacts to prime farmland. The greatest adverse impacts to prime farmland would occur with Zone 5 (Industrial), where major soil disturbances would be likely to occur. Major soil disturbances could occur on Zone 6 (Developed Recreation), in specific locations, if recreation facilities are constructed. Conversely, large areas could be left unaffected for more dispersed recreation management. In most situations, allocation to Zone 7 (Shoreline Access) would result in minor soil disturbances to narrow corridors providing access to private water use facilities or by construction of shoreline erosion-control structures.

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 for protection so that agricultural use can be preserved.

About 438 acres of prime farmland occur on 25 of the 102 parcels addressed in the DNTRLMP (see Table 4.3-1 and parcel descriptions in Volumes II and III). The potential for direct and indirect impacts to prime farmland under each of the alternatives is discussed below.

Table 4.3-1. Number of Acres of Prime Farmland Allocated to Each Zone Under Alternatives A, B, and C

Zone	Alternative A	Alternative B	Alternative C
2	188.5	188.8	188.8
3	0	155.8	155.8
4	217.4	65.0	66.1
5	0.2	0.2	0.2
6	31.4	27.7	26.6
7	0.9	0.9	0.9
Total	438.4	438.4	438.4

The total acreage of prime farmland associated with parcels addressed in the DNTRLMP is small (less than 0.25 percent) relative to the greater than 176,000 acres of prime farmland occurring in the five counties adjacent to Douglas and Nolichucky reservoirs. The majority of DNTRLMP parcels, including parcels containing prime farmland, are already committed to land uses other than agriculture. Regionally, the number of farms is declining in all of the five counties, although the average size of farms is increasing. However, because any future negative impacts on Douglas or Nolichucky reservoirs lands would occur on a relatively small proportion of existing prime farmland, none of the three alternatives would result in significant cumulative effects to prime farmland.

Alternative A – No Action Alternative

Under Alternative A, about 221 acres of prime farmland occur on parcels allocated to Zones 2, 5, 6, and 7, where disturbance of soils is likely. Approximately 43 percent of prime farmland around the two reservoirs occurs on Project Operations lands associated with dam reservations and tailwaters. Prime farmland also occurs on parcels designated for recreation use, such as community parks and boat ramps. In many instances, soil-disturbing impacts to parcels committed to Project Operations or those developed uses have already occurred, so allocation to these zones would not represent a future impact to prime farmland. Approximately 50 percent of prime farmland occurs on parcels allocated to Zone 4, where impacts are unlikely.

Adoption of Alternative A would have the greatest potential for adverse effects to prime farmland because the greatest proportions of these lands are allocated to Zones 2, 5, 6, and 7 (50 percent). As future requests for land uses on these parcels are submitted to TVA, project-specific environmental reviews are expected to minimize negative impacts to prime farmland. Some minor adverse impacts are expected as parcels are converted to uses incompatible with agriculture. However, because the proportion of prime farmland on these reservoirs is small in comparison to the region, implementing Alternative A would result in insignificant impacts.

Alternative B – Proposed Land Use Alternative

Under Alternative B, about 218 (50 percent) acres of prime farmland occur on parcels allocated to Zones 2, 5, 6, and 7, where impacts are likely. Approximately 221 acres (50 percent) of prime farmland would be allocated to Zones 3 and 4, where impacts are unlikely. Compared to the No Action Alternative, about 3 fewer acres of prime farmland would be subject to potential future development uses incompatible with agriculture.

As future requests for land uses are submitted to TVA, project-specific environmental reviews are expected to minimize negative impacts to prime farmland. However, minor adverse impacts are expected as parcels are converted to uses incompatible with agriculture. Because the proportion of prime farmland is small, changes in land use allocation would result in insignificant impacts.

Alternative C – Modified Land Use Alternative

Under Alternative C, 217 acres (49 percent) of prime farmland occur on parcels allocated to Zones 2, 5, 6, and 7, where impacts are likely. Approximately 222 acres (51 percent) of prime farmland would be allocated to Zones 3 and 4. Compared to the No Action Alternative, about 4 fewer acres of prime farmland would be subject to potential future development uses incompatible with agriculture. There are very small differences in the amount of prime farmland impacted between the alternatives, especially with Alternatives B and C, where only 1 acre would be allocated to zones with fewer potential impacts. Consequently, Alternative C would have slightly fewer impacts to prime farmland than Alternative B.

As future requests for land uses are submitted to TVA, project-specific environmental reviews are expected to minimize negative impacts to prime farmland. However, minor adverse impacts are expected as parcels are converted to uses incompatible with agriculture. Because the proportion of prime farmland is small, changes in land use allocation would result in insignificant impacts.

4.4. Terrestrial Ecology

This section addresses anticipated effects to terrestrial plant and wildlife communities. Effects to threatened and endangered plants and terrestrial and aquatic animals are addressed in the sections below.

4.4.1. Plant Communities

Alternative A – No Action Alternative

Under Alternative A, Douglas Reservoir would continue to be managed under the 1965 Forecast System, and Nolichucky Reservoir would remain unplanned and without forecast designations. Since the terrestrial plant communities on and around Douglas and Nolichucky reservoirs are common and representative of the region, there would be no significant impacts to the terrestrial ecology surrounding these reservoirs as a result of the adoption of Alternative A.

Under Alternative A, cumulative impacts could occur as commercial and residential development continues to increase in the region due to population growth. If terrestrial plant communities are not protected from deforestation due to development activities and population growth, a reduction in forested lands would result in reduced biodiversity of plants and animals due to habitat loss. In addition, increasing commercial and residential development would create landscape disturbances that would assist in the introduction and spread of invasive nonnative plant species along roadsides, in recreation areas, and in remaining forested lands.

Alternative B – Proposed Land Use Alternative

Under Alternative B, new allocations on Douglas Reservoir for 2,055 acres and on Nolichucky for 1,136 acres would reflect the existing land uses. Since the terrestrial plant communities surrounding both reservoirs are common and representative of the region,

there would be no significant impacts to these resources as a result of these new allocation proposals under Alternative B.

Under Alternative B, no significant impacts are expected to the terrestrial ecology of the region due to the spread of invasive species if conditions are met to revegetate disturbed areas with native or noninvasive nonnative plant species and to ensure that all equipment is clean and weed free prior to any work being done in or around the reservoirs.

Under Alternative B, no significant cumulative impacts are expected to the terrestrial plant communities of the Douglas and Nolichucky reservoirs. More lands would be allocated to zones protecting or conserving plants from commercial and residential development, keeping biodiversity reduction and habitat losses at a minimum, which would aid in preventing the introduction and spread of exotic invasive plant species.

Alternative C – Modified Land Use Alternative

Under Alternative C as compared to Alternative B, seven additional parcels would be placed in Zone 3 (Sensitive Resource Management) increasing that zone acreage from one to 65 on Douglas and from 620 to 648 on Nolichucky. In creating more protection of sensitive resources, the acreage allocated to Zone 4 (Natural Resource Conservation) on Douglas would have a net decreased of 41 acres. Conversely, Zone 4 would have a net gain of 32 acres on the Nolichucky Reservoir, and a net amount of 61 acres would be removed from Zone 6 (Developed Recreation). Since the terrestrial plant communities surrounding both reservoirs are common and representative of the region, there would be no significant impacts to these resources as a result of the allocation changes under Alternative C.

Under Alternative C, no significant impacts are expected to the terrestrial ecology of the region due to the spread of invasive species if conditions are met to revegetate disturbed areas with native or noninvasive nonnative plant species and to ensure that all equipment is clean and weed free prior to any work being done in or around the reservoirs.

Under Alternative C, no significant cumulative impacts are expected to the terrestrial plant communities of the Douglas and Nolichucky reservoirs. More lands would be allocated to zones protecting or conserving plants from commercial and residential development, keeping biodiversity and habitat losses at a minimum, which would aid in preventing the introduction and spread of exotic invasive plant species.

4.4.2. Invasive Plant Species

Under all alternatives, best management practices (BMPs) developed to prevent the spread and introduction of exotic invasive plant species would be followed. These practices would prevent a decrease in forest productivity, as well as protect native plant diversity and wildlife habitat.

Alternative A – No Action Alternative

Under Alternative A, invasive species in general would continue to proliferate, which would result in a decrease in forest productivity and forest use and management activities and would contribute to the degradation of plant diversity and wildlife habitat. Under Alternative A, negative impacts are anticipated to the terrestrial ecology of the region from the continued introduction and spread of nonnative invasive species.

Alternative B – Proposed Land Use Alternative

Under Alternative B, about 8 percent more lands than Alternative A would be allocated to zones protecting or conserving native vegetation from development, keeping biodiversity reduction and habitat losses at a minimum, which would aid in preventing the introduction and spread of exotic invasive plant species. This would result in beneficially insignificant impacts to the terrestrial ecology of the region from the spread of exotic invasive species.

Alternative C – Modified Land Use Alternative

Under Alternative C, about 10 percent more lands than Alternative A would be allocated to zones protecting or conserving native vegetation from development, keeping biodiversity and habitat losses at a minimum, which would aid in preventing the introduction and spread of exotic invasive plant species. This would result in slightly more (2 percent) beneficially insignificant impacts to the terrestrial ecology of the region from the spread of exotic invasive species than Alternative B.

4.4.3. Wildlife Communities

Analysis of the effects to terrestrial 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 wildlife communities. Indirect effects to wildlife communities include fragmentation and isolation of suitable habitat. Greater potential for site development correlates with a greater potential for adverse impacts to terrestrial wildlife. As such, Zones 3 and 4 are the most protective of terrestrial wildlife habitat. Zone 5 has the greatest potential to involve ground disturbance that may affect wildlife communities. The impacts to wildlife communities on Zones 2, 6, and 7 are dependent upon the existing condition of the parcel and on the proposed future uses. Lands allocated to these zones may involve substantive development (e.g., new substation, road, campground, marina, etc.) or 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. Therefore, for the purposes of this programmatic analysis, we assume the potential for impacts on Zones 2, 6, and 7 is 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 effects to wildlife communities.

Alternative A – No Action Alternative

Under Alternative A, 2,055 acres on Douglas Reservoir would be managed according to the 1965 forecast or existing land use. Approximately 1,136 acres on Nolichucky would remain unplanned, and current land uses would continue.

The largest percentages of lands would continue to be used for Developed Recreation (23.1 percent), Natural Resource Conservation (42.6 percent), and Project Operations (33.8 percent). Under Alternative A, no parcels would be placed in Sensitive Resource Management (the equivalent of Zone 3). Therefore, this alternative would provide less protection to sensitive resources than Alternatives B and C. Despite impacts from formal and informal recreation observed on certain parcels, given the amount of quality habitat observed on TVA and adjacent lands, direct, indirect, and cumulative impacts of Alternative A to terrestrial animal resources would be insignificant.

Alternative B – Proposed Land Use Alternative

Under Alternative B, 1,601 acres on Douglas and Nolichucky reservoirs would be allocated to Zones 3 and 4. These allocations would comprise 50 percent of allocated lands. Approximately 1,590 acres (50 percent) would be allocated to Zones 2, 5, 6, and 7.

As compared to Alternative A, allocation changes proposed under Alternative B include:

- Douglas Reservoir – 186.9 acres of recreation land going to either Zone 3 (Sensitive Resource Management) or Zone 4 (Natural Resource Conservation). Only 150 acres would remain in Zone 6 (Developed Recreation).
- Nolichucky Reservoir – 609.7 acres of equivalent natural resource conservation land and 10.4 acres of recreation land going to Zone 3 (Sensitive Resource Management).

Alternative B results in a net gain, compared to Alternative A, in the combined number of acres allocated to Zones 3 and 4, although this increase is less than under Alternative C. Changes in allocation of specific parcels would not result in significant adverse impacts. Therefore, 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 beneficially influence the cumulative impacts on migratory birds and other terrestrial wildlife communities in the Nolichucky and French Broad watersheds.

Alternative C – Modified Land Use Alternative

Under Alternative C, 1,684 acres on Douglas and Nolichucky reservoirs would be allocated to Zones 3 and 4. These allocations would comprise 53 percent of allocated lands. Approximately 1,507 acres (47 percent) would be allocated to Zones 2, 5, 6, and 7.

As compared to Alternative A, allocation changes proposed under this alternative include:

- Douglas Reservoir – 206.9 acres of recreation land going to Zone 4 (Natural Resource Conservation) or Zone 3 (Sensitive Resource Management). Only 127.5 acres would remain in Zone 6 (Developed Recreation).
- Nolichucky Reservoir – 612.5 acres of equivalent natural resource conservation land and 36 acres of recreation land going to Zone 3 (Sensitive Resource Management) primarily to protect wetlands.

Alternative C results in a greater level of protection of wildlife communities for Douglas and Nolichucky reservoirs. The habitats along the Nolichucky River provide a narrow yet long linear corridor of riparian zone habitat that is used by a diverse array of local and migratory wildlife species. 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 would benefit migratory birds and other terrestrial wildlife communities in the Nolichucky and French Broad watersheds.

4.5. Endangered and Threatened Species

Four federally listed as endangered, one federally listed as threatened, three candidates for federal listing, one federally protected, and five additional state-listed species are known to occur near Douglas and Nolichucky reservoirs (see Table 3.6-1).

4.5.1. Plants

No federally listed plant species or habitat suitable for supporting these species was identified on or within 5 miles of the parcels addressed in the Douglas and Nolichucky land plans. Therefore, there would be no effects to federally listed plant species as a result of adopting any of the alternatives identified by the land plans. The following discussion addresses potential impacts to state-listed plant species.

Under all alternatives, due to the increase of commercial and residential development in the region, cumulative impacts could occur to rare plant species known or yet to be discovered in the area. Increased habitat destruction due to development activities and population growth could result in the decrease of rare plant populations and their habitats, which could alter the genetic diversity of the affected species. However, the impacts of implementing the alternatives would be minor as the portion of land managed by TVA in the region is minor.

Alternative A – No Action Alternative

Under Alternative A, Douglas Reservoir would continue to be managed under the 1965 Forecast System. Since no state-listed species are reported on or within 5 miles of Douglas Reservoir, the No Action Alternative would have no impact to state-listed species.

Under Alternative A, Nolichucky Reservoir would remain unplanned and without forecast designations. Of the three state-listed plant species known to occur within 5 miles of the Nolichucky Reservoir, only one (Appalachian cliff fern) was found growing on rock walls on Parcel 12. Under the No Action Alternative, the population of Appalachian cliff fern could be impacted by habitat loss from future activities.

Alternative B – Proposed Land Use Alternative

Under Alternative B, new allocations on Douglas Reservoir for the 2,055 acres and on Nolichucky for 1,136 acres would reflect the existing land uses. Since no state-listed species are reported on or within 5 miles of Douglas Reservoir, there would be no impacts to state-listed species as a result of adopting Alternative B.

Of the three state-listed plant species known to occur within 5 miles of Nolichucky Reservoirs, only one (Appalachian cliff fern) was found growing on rock walls on Nolichucky Parcel 12. Under Alternative B, the parcel would be allocated as Zone 4 (Natural Resource Conservation), which would provide some protection for this species.

Alternative C – Modified Land Use Alternative

Under Alternative C, additional acreage would be set aside for Sensitive Resource Management. Since no state-listed species are reported on or within 5 miles of Douglas Reservoir, there would be no impacts to state-listed plant species as a result of adopting Alternative C.

Of the three state-listed plant species known to occur within 5 miles of the Nolichucky Reservoir, only one (Appalachian cliff fern) was found growing on rock walls on Parcel 12, which was subdivided into two parcels where Parcel 12a (2.76 acres) was designated as

Zone 3. Under Alternative C, no significant impacts are expected to this rare plant population due to the level of protection given to the species within the Zone 3 designation.

4.5.2. Terrestrial Animals

Under all three alternatives, land planning on Douglas and Nolichucky reservoirs would have no potential to affect any federally listed or state-listed terrestrial species, except for the gray bat, Indiana bat, bald eagle, and southern bog lemming. The spruce-fir moss spider and Carolina northern flying squirrel are restricted to higher elevations and are not found on TVA properties on either reservoir. Piping plovers are occasional migrants through the area and would not be impacted by proposed allocations. Potential impacts to the remaining species could occur through loss or conversion of habitat or by not protecting potential habitat for these species.

Alternative A – No Action Alternative

Under Alternative A, parcels would be managed to promote their current land uses. Populations of listed and protected species are known to occur near several TVA parcels. Current activities do not appear to be resulting in impacts to known populations. Because some parcels would remain uncommitted under Alternative A and future projects could alter habitat on these parcels, this alternative does have the potential to result in a reduction or modification of suitable habitat for listed species. However, known populations of species such as the gray bat and bald eagle are stable and increasing in the case of the bald eagle. Adoption of Alternative A might, but likely would not, adversely impact gray and Indiana bats and would result in no impacts to remaining species.

Alternative B – Proposed Land Use Alternative and Alternative C – Modified Land Use Alternative

Under Alternative B, many of the parcels with suitable habitat for listed and protected species would be placed in Zones 4 and 3, providing protection for these resources. Alternative C would provide further protection for suitable habitat for these species by allocating additional acreage to Zone 3. Protective buffer zones would be placed around and near gray bat caves in the area under these alternatives. Under both alternatives, TVA placed forested riparian zones that front gray bat caves at or near TVA boundaries in Zone 3. These forested corridors between caves and the river provide important travel corridors for gray bats as they move from their roosts to their foraging areas. The protection of the riparian corridor along the Nolichucky River would also protect suitable habitat for bald eagles and southern bog lemmings. With these beneficial measures, the adoption of Alternative B or C would not result in adverse impacts to listed or protected terrestrial animals.

4.5.3. 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 on a case-by-case basis and require appropriate site design and management practices using TVA's *General and Standard Conditions/Best Management Practices* (TVA 2005) 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 4.11 below, are directly related to the consequences to aquatic species.

Two federally listed as endangered, one federally listed as threatened, five candidates for federal listing, and seven state-listed aquatic animals are known to occur in Douglas and Nolichucky reservoirs (See Table 3.6-1). Under all of the alternatives, the potential impacts to listed aquatic species derive from pollution and siltation from erosion and ground disturbance activities.

Douglas Reservoir

The state-listed lake sturgeon, blue sucker, and tangerine darter and the federally listed threatened snail darter are known to occur in the French Broad River below Douglas Dam near Douglas Parcel 1. Because Douglas Parcel 1 would not change from Zone 2 (Project Operations), adoption of any of the alternatives would not impact known individuals or populations of these species. Nolichucky River Unit 6 DCH for the federally listed as endangered oyster mussel occurs 9 river miles up from the mouth of the Nolichucky River and not in the vicinity of the reservoir or TVA lands. Known occurrences of the federally listed as endangered oyster mussel, the state-listed highfin carpsucker, and the candidate for federal listing spectaclecase are within this DCH. However, the highfin carpsucker could potentially occur anywhere within Douglas Reservoir but prefers fast-moving water.

Nolichucky Reservoir

The federally listed as endangered Cumberland bean, pink mucket, Cumberlandian combshell, and rough rabbitsfoot are historical records (20 years or greater since last verified existence) and likely no longer occur within the area. The rayed bean and slabside pearlymussel, candidates for federal listing, and the state-listed Tennessee clubshell are also historical records and likely no longer occur within the project area. Within the Nolichucky River watershed, the Chucky madtom, candidate for federal listing, is known only from Little Chucky Creek, a tributary that flows into the Nolichucky River at NRM 23.5. This rare madtom is unlikely to occur in habitats that could be affected by the DNTRLMP.

The state-listed blue sucker and tangerine darter and the federally listed as threatened snail darter are known to occur in the Nolichucky River below Nolichucky Dam near TVA land Parcels 1 and 25-38. TVA transplanted 1,000 individuals of the federally listed as endangered birdwing pearlymussel into the Nolichucky River approximately 20 miles downstream from Nolichucky Dam in 1982 (Jenkinson 1983). In 1995, a juvenile birdwing pearlymussel was found at the transplant site, suggesting some reproduction. Although the birdwing pearlymussel was not found in a 2000 mussel survey, there is good reason to believe that this species still exists in the Nolichucky River below the dam (TVA 2006b).

Alternative A – No Action Alternative

Under the No Action Alternative, TVA would continue to use the Forecast System designations established by TVA in 1965 to manage the lands surrounding Douglas

Reservoir. Nolichucky Reservoir has never been forecasted or planned; TVA would continue to use existing land use agreements to manage the lands surrounding Nolichucky Reservoir under the No Action Alternative. Approximately 2,055 acres on Douglas Reservoir and 1,043 acres of committed land on Nolichucky Reservoir would be managed according to these agreements. On Nolichucky Reservoir, 93 acres of TVA land would remain unplanned and without forecast designations and would be managed according to current TVA policy.

The approximately 3,191 acres of public land managed by TVA on Douglas and Nolichucky reservoirs would continue to be managed similar to the proposed land use zones. Therefore, 42.6 percent of the land would continue to be managed for Natural Resource Conservation, 33.8 percent for Project Operations, no land for Sensitive Resource Management, 23.1 percent for Developed Recreation, and less than 1 percent for Shoreline Access and Industrial.

Under Alternative A, TVA land parcels would continue to be managed under the current Forecast System designations, existing land use agreements, or would remain unplanned; therefore, environmental conditions would likely remain the same. Furthermore, future land use proposals would comply with state and federal environmental regulations, and TVA's *General and Standard Conditions/Best Management Practices* (TVA 2005) would be required for projects on TVA lands. Further, there is only a small amount of TVA land surrounding the reservoirs in comparison to the overall land base in the reservoir watersheds. Therefore, selection of Alternative A would not likely adversely affect listed aquatic animals or their habitats directly, indirectly, or cumulatively.

Alternative B – Proposed Land Use Alternative

Adoption of this alternative would promote conservation of natural resources. Under this alternative, TVA would create and implement individual land plans for Douglas and Nolichucky reservoirs. The approximately 3,191 acres of public land managed by TVA on Douglas and Nolichucky reservoirs would be placed into one of the seven land use zones that best fits the existing land use. TVA would allocate 30.7 percent of the land surrounding the reservoirs to Zone 4 (Natural Resource Conservation), 33.8 percent to Zone 2 (Project Operations), 19.5 percent to Zone 3 (Sensitive Resource Management), 15.5 percent to Zone 6 (Developed Recreation) and less than 1 percent to Zone 7 (Shoreline Access) and Zone 5 (Industrial). Under this alternative, 242 acres currently being used for Zone 6 (Developed Recreation) would change to Zone 4 (Natural Resource Conservation) or Zone 3 (Sensitive Resource Management), which would improve the conservation of natural resources.

Nolichucky River Unit 6 DCH for the federally listed as endangered oyster mussel occurs 16 river miles downstream from Nolichucky Parcel 25. Known occurrences of the federally listed as endangered oyster mussel, spectaclecase (candidate for federal listing), and the state-listed highfin carpsucker, spiny riversnail, rosyface shiner, and fluted kidneyshell are within this DCH. The highfin carpsucker is also known to occur above the Nolichucky Dam and could occur anywhere within the Nolichucky Reservoir system.

Under Alternative B, Nolichucky Parcels 1 and 25-38 would remain in the same zone allocation as under Alternative A with the exception of Parcel 29 being allocated to Zone 3 (Sensitive Resource Management) and Parcel 30 being allocated to Zone 4 (Natural Resource Conservation). However, no TVA land parcels occur near enough to the Nolichucky River Unit 6 DCH to adversely impact the listed aquatic species or habitats

directly or indirectly. Therefore, adoption of Alternative B would not likely adversely affect listed aquatic animals or their habitats.

Implementation of the proposed alternative would not result in any negative cumulative effects from these proposed actions. Over the long-term, allocation of lands to Zones 3 (Sensitive Resource Management) and Zone 4 (Natural Resource Conservation), which limit ground disturbance, vegetation removal, and other development, is likely to benefit aquatic species. In fact, implementation of Alternative B could lead to a slightly improved riparian buffer and a small improvement to water quality and aquatic habitats downstream of the project areas, including areas where sensitive aquatic species are known to occur.

Alternative C – Modified Land Use Alternative

Adoption of this alternative would provide additional opportunities for the conservation of natural resources with an emphasis on the management of sensitive resources. Under this alternative, TVA would create and implement individual land plans for Douglas and Nolichucky reservoirs. The lands managed by TVA would be placed into land use zones that best represent the existing land use, public comments, and other opportunities identified during scoping. TVA would allocate approximately 30.4 percent of the land surrounding the reservoirs to Zone 4 (Natural Resource Conservation), 33.8 percent to Zone 2 (Project Operations), 22.3 percent to Zone 3 (Sensitive Resource Management), 12.9 percent to Zone 6 (Developed Recreation), and less than 1 percent to Zone 7 (Shoreline Access) and Zone 5 (Industrial).

As compared to Alternative B, implementation of Alternative C would result in more land being allocated to Zone 3 (Sensitive Resource Management). This increase in allocated protection would benefit sensitive aquatic species known to occur in Douglas Reservoir. Furthermore, for any proposed use of land, TVA would require the protection of water quality through either restricted development or the assurance to utilize BMPs, along with compliance with state and federal regulations that would eliminate any negative impacts to natural resources associated with the proposed action. As a result, no direct or indirect impacts to any sensitive aquatic species would occur from adoption of Alternative C.

As compared to Alternative B, implementation of Alternative C would allocate more land to Zones 3 and 4. Nolichucky Parcel 12a would be allocated to Zone 3 rather than the current allocation of Zone 4, and Nolichucky Parcels 25, 26, 27, and 31-38 would be allocated to either Zone 3 (Sensitive Resource Management) or Zone 4 (Natural Resource Conservation) rather than Zone 6 (Developed Recreation). This conservation and protection of land would benefit sensitive aquatic species known to occur in the reservoirs and their tailwater. Furthermore, future proposals for the use of land would require the use of BMPs that would minimize or eliminate any negative impacts to any natural resources associated with the proposed action. As a result, no direct or indirect impacts to any sensitive aquatic species would occur from adoption of Alternative C. Therefore, adoption of this alternative would not likely adversely affect listed aquatic animals or their habitats. In fact, some beneficial effects to these species may be recognized as a result of the increased proposed allocations to zones that conserve and protect natural resources.

Under Alternative C, zone allocations to Zones 3 and 4 would change for almost 83 acres as compared to Alternative B. Also under Alternative C, Douglas Parcel 28 (10 acres), Parcel 33 (17 acres), and Parcel 47 (36 acres) would change from Zone 4 (Natural Resource Conservation) to Zone 3 (Sensitive Resource Management). The proposed alternative would not result in any negative cumulative effects from these proposed actions.

In fact, they could lead to slightly improved riparian buffer zones and a small improvement to water quality and aquatic habitats downstream of the project areas, including areas where sensitive aquatic species are known to occur. Because this alternative allocates the largest amount of acreage to either Zone 3 (Sensitive Resource Management) or Zone 4 (Natural Resource Conservation), it would provide the greatest degree of protection to sensitive aquatic species within the reservoirs and their tailwaters.

4.6. Wetlands

Ground disturbance activities and vegetation removal would be the primary source of potential impacts to wetlands in wetland areas. The greater the ground disturbance from an activity on a wetland, the greater would be the potential for adverse impacts to wetlands and wetland functions.

Analysis of the environmental consequences for the three alternatives will focus on uncommitted parcels that contain wetlands. Of the 26 uncommitted parcels on Douglas and Nolichucky reservoirs, 13 parcels have wetlands present (Table 4.6-1). Under any of the alternatives, wetlands present on any parcels would be protected under EO 11990. Any impacts to wetlands associated with ongoing or future projects would be evaluated under future environmental reviews. Wetlands on the reservoirs are generally very small in size; thus, any impacts associated with future projects would have a negligible effect on overall wetland resources in the project area.

Table 4.6-1. Summary of Wetlands on Uncommitted Parcels for Douglas and Nolichucky Reservoirs

Parcel Number	Wetland Type	TVARAM Category	Zone Under Alternative A	Zone Under Alternative B	Zone Under Alternative C
Nolichucky Reservoir					
12a	emergent/scrub-shrub	2	4	4	3
26	emergent/scrub-shrub/forested	3	6	6	4
31	emergent/scrub-shrub/forested	3	6	6	4
33	emergent/scrub-shrub/forested	3	6	6	6
34	emergent/scrub-shrub/forested	3	6	6	4
Douglas Reservoir					
2	emergent/scrub-shrub	2	2	6	6
25	emergent/scrub-shrub	2	6	4	4
28	forested/scrub-shrub	3	4	4	3
37	emergent/scrub-shrub	2	4	4	4
45	emergent/scrub-shrub	2	4	4	4
47	forested/scrub-shrub	3	4	4	3
51	emergent/scrub-shrub	2	6	4	4
52	emergent/scrub-shrub	2	6	4	4

Alternative A – No Action Alternative

Under Alternative A, uncommitted parcels with wetlands would have one parcel as equivalent Zone 2 (Project Operations), seven parcels as equivalent to Zone 6 (Developed Recreation), and the remainder as equivalent to Zone 4 (Natural Resource Conservation). Ground disturbance activities and vegetation removal would be the primary source of potential impacts to wetlands in wetland areas, which would be expected to have the greatest occurrence on Zone 2 (Project Operations) and Zone 6 (Developed Recreation)

lands. The least ground disturbance would occur on Zone 4 (Natural Resource Conservation) where dispersed recreation and some minor and indirect impacts to wetlands could occur with this alternative.

Wetlands are generally very small in size; thus, any direct impacts associated with future projects would have a negligible effect on overall wetland resources in the project area. Although Alternative A has the greatest potential for impacts to wetlands, overall impacts associated with this alternative would still be considered 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 be likewise minor as the result of Alternative A. Informal recreation may result in very minor impacts to wetland vegetation, but these impacts would be expected to be very small and localized and would recover with no lasting effects. In addition, wetlands present on any parcels would be protected under EO 11990, and any future impacts to wetlands associated with ongoing or future projects would be evaluated under a site-specific environmental review.

Alternative B – Proposed Land Use Alternative

Under Alternative B, impacts to wetlands on Nolichucky Reservoir would be the same as under Alternative A, since the allocations of the parcels on Nolichucky with wetlands would not change. However, wetland impacts would be reduced on Douglas Reservoir where three uncommitted parcels containing wetlands would be allocated to zones with lesser impacts. Three would be allocated to Zone 4 (Natural Resource Conservation) and managed to protect and enhance habitat, rather than Zone 6 (Developed Recreation), which could have ground disturbances, and one would change from Zone 2 (Project Operations) to Zone 6, which could have slighter lesser impacts to wetlands. Therefore, Alternative B affords greater protection to wetlands than Alternative A.

Under Alternative B, direct impacts to wetlands are associated with Douglas Parcel 2 and Nolichucky Parcels 26, 31, 33, and 34, which would be allocated to Zone 6 (Developed Recreation).

Some minor and indirect impacts to wetlands could occur with this alternative. Dispersed recreation and camping activities could result in some minimal clearing of vegetation. Overall impacts associated with this alternative would still be considered 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 be likewise minor as the result of Alternative B. Informal recreation may result in very minor impacts to wetland vegetation, but these impacts would be expected to be very small and localized and would recover with no lasting effects. In addition, wetlands present on any parcels would be protected under EO 11990, and any future impacts to wetlands associated with ongoing or future projects would be evaluated under a site-specific environmental review.

Alternative C – Modified Land Use Alternative

Under Alternative C as compared to Alternative A, TVA would allocate six parcels containing wetlands to Zone 4 (Natural Resource Conservation) rather than Zone 6 (Developed Recreation), and one would be a Zone 6 rather than Zone 2. In addition, four parcels would be allocated to Zone 3 (Sensitive Resource Management) rather than Zone 4

under Alternative A. Specifically managed for protection and enhancement of sensitive resources, this allocation would afford a slightly greater level of protection to wetlands present on these parcels. The rest of the unplanned parcels would remain in Zone 4 or 6.

As compared to Alternative B, TVA would allocate three additional parcels containing wetlands to Zone 4 (Natural Resource Conservation) rather than Zone 6 (Developed Recreation), and four parcels would be allocated to Zone 3 (Sensitive Resource Management) rather than Zone 4.

Under Alternative C, direct impacts to wetlands would be associated only with Douglas Parcel 2 and Nolichucky Parcel 33, which would be allocated to Zone 6 (Developed Recreation). This alternative is expected to have the least amount of adverse effects to wetlands.

As described under Alternative B, there could be some very 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.

4.7. Floodplains

Alternative A – No Action Alternative

Under Alternative A, the development and/or management of properties would proceed under the 1965 Forecast System for Douglas Reservoir. For both Douglas and Nolichucky reservoirs, individual site-specific evaluations would be performed to ensure consistency with EO 11988. Potential development would generally consist of water use facilities and other repetitive actions in the floodplain that would result in minor floodplain impacts.

Alternative B – Proposed Land Use Alternative

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 for resource management and conservation activities.

Alternative C – Modified Land Use Alternative

The potential adverse impacts to natural and beneficial floodplain values under Alternative C would be less than those expected under Alternative A and the same as those under Alternative B because more parcels of the available land would be allocated for sensitive resource management and natural resource conservation. Although there is a potential for impacts to floodplains of varying degrees under all alternatives, potential impacts to floodplain values would be insignificant.

4.8. Cultural Resources

Under all the alternatives, the preservation and treatment of historic properties, which includes cultural resources, are addressed by the NHPA. Cultural resources include archaeological sites and historic sites/structures. In addition, archaeological resources located on federal lands are afforded protection under the ARPA. Similarly, the Native American Graves Protection and Repatriation Act (NAGPRA) provides protection to Native American artifacts and human remains.

A PA was executed in October 2005 between TVA, the Advisory Council on Historic Preservation, and the Tennessee SHPO regarding the implementation of TVA RLMPs for identification, evaluation, and treatment of historic properties that are eligible for inclusion in

the National Register of Historic Places (NRHP) (see Appendix E). This PA applies to all TVA land considered within the three alternatives. NRHP eligibility will be evaluated in consultation with the Tennessee SHPO according to stipulations of the PA. Furthermore, mitigation of adverse effects to any historic property will be conducted according to the stipulations in the PA.

4.8.1. Archaeological Resources

Under all alternatives, TVA will take necessary steps to ensure compliance with regulatory requirements of NHPA, NAGPRA, ARPA, and other federal legislation pertinent to archaeological resources. Under all alternatives, the cumulative impacts to significant archaeological sites would be minimized by avoidance of the site or by mitigation through data recovery excavation pursuant to 36 CFR Part 800.

Alternative A – No Action Alternative

Under Alternative A, 1,081 acres on Douglas and Nolichucky reservoirs would be forecast or planned to Project Operations and Industrial uses, which have the greatest potential for ground-disturbing activities. Additionally, 751 acres would be forecast or planned to 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 1,359 acres on Douglas and Nolichucky reservoirs would be managed for Natural Resource Conservation and none for Sensitive Resource Management. 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.

Site-specific activities proposed in the future would be analyzed to determine their effect on significant archaeological sites. In cases where archaeological resources would be affected, 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 of these resources as defined in the PA. Thus, under Alternative A, archaeological resources could be affected, but adverse effects would be mitigated. Under Alternative A, preservation or protection of archaeological resources would be achieved through compliance with NHPA and ARPA requirements. Because of the executed PA and because appropriate mitigation would be performed as necessary, potential effects to archaeological resources would be insignificant.

Compared to Alternatives B and C, Alternative A contains the greatest potential to affect archaeological sites due to the greater percentage of Zone 2 (34 percent) and Zone 6 (23 percent) parcels and the lower percentage of Zone 4 and Zone 3 (43 percent) parcels.

Alternative B – Proposed Land Use Alternative

Under Alternative B, 1,081 acres on Douglas and Nolichucky reservoirs would be allocated to Zones 2 and 5, while 509 acres would be allocated to Zones 6 and 7. Each of those land uses has moderate potential to indirectly impact archaeological sites.

Under Alternative B, 1,601 acres on the Douglas and Nolichucky reservoirs 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 archaeological sites that

may be present. The potential for indirect effects to archaeological sites also is low on land used for these purposes. Because less land is allocated to zones on which ground-disturbing activities are likely to occur, potential impacts to archaeological resources are less under Alternative B than under Alternative A. In any event, because appropriate mitigation would be implemented under the stipulations of the PA, potential effects would be insignificant.

Alternative C – Modified Land Use Alternative

At the programmatic scale, the potential for impacts to archaeological resources under Alternative C is nearly identical to potential impacts under Alternative B. Under Alternative C, 1,081 acres would be allocated to Zones 2 and 5, while 426 acres would be allocated to Zones 6 and 7. Moderate potential for indirect adverse impacts would occur on all four of those zones. Alternative C has slightly less potential to affect archaeological sites than Alternative B due to a slightly less allocation of land to Zone 6.

Under Alternative C, 1,684 acres on the Douglas and Nolichucky reservoirs 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. Therefore less land is allocated to zones on which ground-disturbing activities are likely to occur, potential impacts to archaeological resources are less under Alternative C than under Alternative A or B. Because any potential adverse effects to archaeological resources would require appropriate mitigation under the PA, any potential effects would be insignificant.

Compared to Alternative A, Alternative C has slightly less potential to affect archaeological sites than Alternative B due to the lesser percentage of Zone 6 (13 percent) parcels and greater percentage (53 percent combined) of Zones 3 and 4. The remaining parcel zone allocations under Alternatives B and C are the same.

4.8.2. Historic Structures

The historic structures data used for this study was derived mainly from planimetric map data and a windshield survey of the parcels that were deemed uncommitted during the scoping and preallocation process. For any proposal on a given parcel (regardless of zone allocation), a field check of the current status of these historical structures would be accomplished to determine the significance of the structure, and the parties would abide by the stipulations set forth in the PA. As noted above, under each alternative, review for applicability of the NHPA would take place for any proposed activity that has the potential to affect historical structures identified on or adjacent to TVA land. Nearly all 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, proposed site-specific activities would be subjected to the PA to determine what historic structures exist on TVA public land and on adjacent tracts within the APE. In addition, the significance of any historic structures would be determined under each of the alternatives.

Alternative A – No Action Alternative

Under this alternative, the Forecast System would continue to be administered on Douglas Reservoir, and Nolichucky Reservoir would remain unplanned. Under Alternative A, 1,359 acres would be allocated to equivalent Zone 4 (Natural Resource Conservation), and 1,832

acres would be allocated to zones allowing some form of development. Because they could change the visual character of the surrounding area, activities on equivalent Zone 6 (Developed Recreation) parcels, particularly those developed for commercial recreation, 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, management of historic structures and potential effects as a result of proposed development would continue to be evaluated on a case-by-case basis. 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 insignificant.

Alternative B – Proposed Land Use Alternative

Under Alternative B, the RMLPs would enhance conservation and protect historic structures. The plan would provide for preservation and would protect shoreline from development. Lands with distinctive visual character would be placed in Zone 3 or 4, Sensitive Resource Management and Natural Resource Conservation, respectively. About 621 acres would be allocated to Zone 3; 486 acres on the Nolichucky River corridor were judged to have unique scenic qualities. Another 980 acres would be allocated to Zone 4, which includes lands with attractive but less unique scenic qualities and little visible alteration. Activities that involve little visible change, 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 1,601 acres of publicly held reservoir acreage would be allocated to Zones 3 and 4, while 1,590 acres would be allocated to zones (2, 5, 6, and 7) that would allow some form of development. Implementation of this alternative would provide enhanced management and protection of historic structures as compared to Alternative A.

For any proposal on a given parcel (regardless of zone allocation), a field check of the current status of historic structures would be accomplished to determine the significance of the resource, and the stipulations set forth in the PA would be followed. Under each alternative, review for applicability of the NHPA would take place on a case-by-case basis for any proposed activity that has the potential to affect historic structures identified on or adjacent to TVA land. Since potential effects to historic structures would be identified and mitigated appropriately under the PA, these effects would not be significant.

Alternative C – Modified Land Use Alternative

Under this alternative, effects to historic structures would be similar to those described under Alternative B. Approximately 713 acres would be allocated to Zone 3 and approximately 971 to Zone 4, for a total of 1,684 acres; 1,507 acres would be allocated to zones (2, 5, 6, and 7) on which some development could occur. Like Alternative B, Alternative C provides for better protection of historic structures and preservation of natural areas around the reservoir than does Alternative A. Since potential effects to historic structures would be identified and mitigated appropriately under the PA, these effects would not be significant.

4.9. Managed Areas and Ecologically Significant Sites

Thirteen TVA natural areas occur on Douglas and Nolichucky reservoirs. Nine managed areas are on or immediately adjacent to Douglas Reservoir and include Trotter Bluff TVA

SWA, the Lower French Broad and Lower Holston River NEP area, the French Broad River (one segment NRI-listed and one segment designated a State Scenic River), Rankin Bottom State WMA, Henderson Island Refuge, Dandridge Municipal Park, and Sevier County Park.

Three managed areas are on or immediately adjacent to Nolichucky Reservoir and include Kinser Park, Davy Crockett Lake PNNL, and Nolichucky WMA. No TVA-managed areas are located on this reservoir, and no NRI streams or Wild and Scenic Rivers are in the vicinity of Nolichucky Reservoir.

Nolichucky Reservoir is situated near areas managed by other federal and state entities (e.g., USFS, TWRA, and UT) and contains ecologically significant areas. These include the Tobacco UT Agricultural Experiment Station, the Unicoi State Bear Reserve/Cherokee (North) WMA, and the Cherokee National Forest.

Alternative A – No Action Alternative

Under Alternative A, TVA would continue to use the Forecast System designations established by TVA in 1965 to manage the lands surrounding Douglas Reservoir. Nolichucky Reservoir would remain without a forecast and unplanned. While natural areas in the vicinity of the Douglas and Nolichucky reservoirs would not be adversely affected under this alternative, the Forecast System would not provide a systematic method of evaluating and identifying the most suitable uses of TVA public lands.

Alternative B – Proposed Land Use Alternative

Overall, the efficient management and protection of natural areas and ecologically significant sites have benefited from the development and implementation of TVA RLMPs. Under Alternative B, TVA would create and implement individual land plans for the two tributary reservoirs to guide future land use decisions. Allocations made under Alternative B would be beneficial to the protection of surrounding natural areas. TVA lands in Zone 2 are managed for informal recreation and, as is the case on Douglas Reservoir, may contain TVA-designated natural areas. TVA lands in Zone 3 (Sensitive Resource Management) and Zone 4 (Natural Resource Conservation) would increase to 50 percent of the total TVA-managed land on the reservoirs for Alternative B as compared to 43 percent for Alternative A. Because the implementation of the proposed Alternative B would not affect management objectives, recreational activities, or sensitive resources or result in visual changes to natural areas, no direct or indirect impacts to natural areas are anticipated. No cumulative impacts to natural areas are foreseeable as a result of the proposed action within the time and geographic bounds of this project.

Alternative C – Modified Land Use Alternative

Under Alternative C, TVA would create and implement individual land plans for the Douglas and Nolichucky reservoirs. The lands managed by TVA would be placed into land use zones that best represent the existing land use, public comments, and other opportunities identified during scoping. This alternative would provide additional opportunities for the conservation of natural resources with an emphasis on the management of sensitive resources. Allocations made under Alternative C would be beneficial to the protection of surrounding natural areas. TVA lands in Zone 3 (Sensitive Resource Management) and Zone 4 (Natural Resource Conservation) would increase to 53 percent of the total TVA-managed land on the reservoirs as compared to 43 percent for Alternative A. Because the implementation of the proposed Alternative C would not affect management objectives, recreational activities, or sensitive resources or result in visual changes to natural areas, no

direct or indirect impacts to natural areas are anticipated. No cumulative impacts to natural areas are foreseeable as a result of the proposed action within the time and geographic bounds of this project.

Douglas Reservoir Summary

Parcel 2 is located approximately 1.7 miles east of Trotter Bluff SWA, Lower French Broad and Lower Holston Rivers NEP, and the French Broad NRI stream. It is 2.0 miles northeast of Sevier County Park and over 3.0 miles from other natural areas in the vicinity of Douglas Reservoir. Because of the small size of Parcel 2 (0.01 acre), the increased activity associated with a developed recreation area would be minimal; therefore, the proposed allocation change from Zone 4 under Alternative A to Zone 6 under Alternatives B and C would not adversely affect managed areas, ecologically significant sites, or NRI streams.

Parcel 12 is located approximately 1.6 miles southwest of Henderson Island Refuge, 2.9 miles southwest of Dandridge Municipal Park, and over 3.0 miles from other natural areas in the vicinity of Douglas Reservoir. The proposed allocation change of Parcel 12 from Zone 6 under Alternative A to Zone 4 under Alternatives B and C would not adversely affect managed areas or ecologically significant sites.

Parcel 28 is located approximately 1.15 miles northwest of Rankin Bottoms WMA and over 3.0 miles from other natural areas in the vicinity of Douglas Reservoir. The allocation of Parcel 28 would be Zone 4 under Alternatives A and B and would change to Zone 3 under Alternative C. These allocations would not adversely affect managed areas or ecologically significant sites.

Parcel 33 is located within the southern corner of Rankin Bottoms WMA of Douglas Reservoir. The allocation of Parcel 33 would be Zone 4 under Alternatives A and B and would change to Zone 3 under Alternative C. These allocations would not adversely affect managed areas or ecologically significant sites.

Parcel 47 is located over 3.0 miles from any natural area in the vicinity of Douglas Reservoir. The allocation of Parcel 47 would be Zone 4 under Alternatives A and B and would change to Zone 3 under Alternative C. These allocations would not adversely affect managed areas or ecologically significant sites.

Parcel 53 is located over 3.0 miles from any natural area in the vicinity of Douglas Reservoir. The reallocation of Parcel 53 from Zone 4 under Alternative A to Zone 6 under Alternatives B and C would not adversely affect managed areas or ecologically significant sites.

Nolichucky Reservoir Summary

Parcel 5 is located north of and immediately adjacent to Kinser Park, 0.5 mile north of Davy Crockett Lake PNNL, within the boundaries of Nolichucky State WMA, and over 3.0 miles from other natural areas in the vicinity of Nolichucky Reservoir. The proposed allocation change of Parcel 5 from Zone 4 under Alternative A to Zone 3 under Alternatives B and C would not adversely affect managed areas or ecologically significant sites.

Parcel 6 is located east of and immediately adjacent to Kinser Park, immediately adjacent on the western shore of Davy Crockett Lake PNNL, within the boundaries of Nolichucky State WMA, and 3.0 miles from other natural areas in the vicinity of Nolichucky Reservoir. The proposed allocation change of Parcel 6 from Zone 4 under Alternative A to Zone 3

under Alternatives B and C would not adversely affect managed areas or ecologically significant sites.

Parcel 8 is located approximately 1.8 miles northeast of Kinser Park, immediately adjacent to the northeast of Davy Crockett Lake PNNL and Nolichucky WMA, and over 3.0 miles from other natural areas in the vicinity of Nolichucky Reservoir. The proposed allocation change of Parcel 8 from Zone 4 under Alternative A to Zone 3 under Alternatives B and C would not adversely affect managed areas or ecologically significant sites.

Parcel 9 is located approximately 2.4 miles northeast of Davy Crockett Lake PNNL and Nolichucky WMA and over 3.0 miles from other natural areas in the vicinity of Nolichucky Reservoir. The proposed allocation change of Parcel 9 from Zone 4 under Alternative A to Zone 3 under Alternatives B and C would not adversely affect managed areas or ecologically significant sites.

Parcel 12a is located over 3.0 miles from any natural area in the vicinity of Nolichucky Reservoir. Davy Crockett Birthplace State Park, the nearest natural area to Parcel 12a, is located approximately 3.4 miles northeast of Parcel 12a. The allocation of Parcel 12a would be Zone 4 under Alternatives A and B and would change to Zone 3 under Alternative C. These alternatives would not adversely affect managed areas or ecologically significant sites.

Parcel 18 is located approximately 2.7 miles northeast of Nolichucky WMA and Davy Crockett PNNL, and over 3.0 miles from other natural areas in the vicinity of Nolichucky Reservoir. The proposed allocation change of Parcel 18 from Zone 4 under Alternative A to Zone 3 under Alternatives B and C would not adversely affect managed areas or ecologically significant sites.

Parcel 19 is located approximately 1.3 miles northeast of Nolichucky WMA and Davy Crockett PNNL, 2.0 miles northeast of Kinser Park, and over 3.0 miles from other natural areas in the vicinity of Nolichucky Reservoir. The reallocation of Parcel 19 from Zone 4 under Alternative A to Zone 3 under Alternatives B and C would not adversely affect managed areas or ecologically significant sites.

Parcel 20 is located east and immediately adjacent to Nolichucky WMA and Davy Crockett PNNL, 1.2 miles northeast of Kinser Park, and over 3.0 miles from other natural areas in the vicinity of Nolichucky Reservoir. The proposed allocation change of Parcel 20 from Zone 4 under Alternative A to Zone 3 under Alternatives B and C would not adversely affect managed areas or ecologically significant sites.

Parcel 22 is located within the boundaries of Nolichucky WMA, immediately adjacent on the eastern shore of Davy Crockett PNNL, 0.5 mile south of Kinser Park, and over 3.0 miles from other natural areas in the vicinity of Nolichucky Reservoir. The proposed allocation change of Parcel 22 from Zone 4 under Alternative A to Zone 3 under Alternatives B and C would not adversely affect managed areas or ecologically significant sites.

Parcel 23 is located within the boundaries of Nolichucky WMA, immediately adjacent on the eastern shore of Davy Crockett PNNL, 0.5 mile south of Kinser Park, and over 3.0 miles from other natural areas in the vicinity of Nolichucky Reservoir. The proposed allocation change of Parcel 23 from Zone 4 under Alternative A to Zone 3 under Alternatives B and C would not adversely affect managed areas or ecologically significant sites.

Parcels 25-38 are located over 3.0 miles from any natural area in the vicinity of Nolichucky Reservoir. Changing the allocation of Parcels 25-38 from Zone 6 under Alternative A to either Zone 3 or 4 under Alternatives B and C would not adversely affect managed areas or ecologically significant sites.

4.10. 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 general public, their viewing distances, and visibility of proposed changes. In this assessment, scenic character is described using a variety of adjectives. Scenic integrity, which relates to degree of intactness or wholeness of the landscape character, is also an important factor. These measures help identify changes in visual character based on commonly held perceptions of landscape beauty and the aesthetic sense of place. Scenic value is determined by combining the levels of scenic attractiveness, scenic integrity, and scenic visibility. , scenic value, along with the foreground, middleground, and background viewing distances, was described previously in Section 3.11.

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 flowering shallow water areas were allocated to Zone 3 (Sensitive Resource Management). Land that provides valuable protective screening also was given this allocation. Parcels that possess attractive visual resources of less significance were allocated to Zone 4 (Natural Resource Conservation). 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 WMAs 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.

Under all the alternatives, the effect of land management on the Douglas and Nolichucky reservoirs would be beneficial for visual resources. Activities occurring during the management of TVA lands typically include road access, illegal dump clean up and prevention, construction and maintenance of access trails, wildlife and forest management, and the provision of parking areas within proximity of desired outdoor and recreational activities. These activities could provide greater visual opportunities for viewing natural scenery for pleasure from the water or land. For example, wildlife openings and agriculture leases could create positive visual contrast in the landscape. Controlled burns could enhance the aesthetic value of naturally appearing landscapes. Conducting timber

harvests in some areas of the reservoir could encourage successional forest cover that would enhance scenic integrity. The minor visual impacts following timber harvests and other types of vegetation management are temporary and would diminish as the site revegetates.

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

Lands having the greatest scenic qualities are often the most desirable for public preservation. Frequently, however, they are also the most sought after for commercial and residential development. Under all alternatives, TVA would continue to conduct site-specific environmental reviews for proposed actions on TVA land, 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 – No Action Alternative

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 could occur as development demands continue to increase. Actions of TVA and others would be evaluated to determine potential visual effects prior to land use approval. Where TVA has custody of the land, this process could prevent serious visual disruptions or loss of scenic resources. Approval of some activities may also require avoidance or mitigation measures that reduce visual impacts. Otherwise, under Alternative A with some 408 acres (13 percent) of public land being uncommitted and subject to various forms of potential development, sections of highly scenic shoreline as well as those of more common, less unique, visual quality would be at risk from approval of these uses.

Frequently, lands that are sought after for development are also those with the greatest scenic qualities and 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 Douglas and Nolichucky reservoirs, which would negatively impact the visual landscape character and aesthetic sense of place. In this event, the scenic integrity of the predominately rural reservoirs would slightly decrease.

Adoption of Alternative A could result in long-term negative cumulative impacts, which include gradual losses of visual resources, scenic attractiveness, and undeveloped natural 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 – Proposed Land Use Alternative

Under Alternative B, the land plans 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 and Natural Resource

Conservation, respectively. About 621 acres would be allocated to Zone 3, 486 acres on the Nolichucky River corridor were judged to have unique scenic qualities. Another 980 acres would be allocated to Zone 4, which includes lands with attractive but less unique scenic qualities and little visible alteration. Another 496 acres would be allocated to Developed Recreation (Zone 6), which could have moderate visual impacts. Activities that involve little visible change, such as recreational hiking, picnicking, bank fishing, and some selective forest management (e.g., pine beetle salvage), could take place in Zones 3 or 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 1,601 acres of publicly held reservoir 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 RLMPs 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 – Modified Land Use Alternative

Under this alternative, effects to visual resources would be similar to those described under Alternative B as the proportion of land allocated to zones favorable to visual resources is slightly increased. About 713 acres would be allocated to Zone 3, 486 acres on the Nolichucky River corridor were judged to have unique scenic qualities. Another 971 acres would be allocated to Zone 4, which includes lands with attractive but less unique scenic qualities and little visible alteration. Further land proposed to be allocated to Developed Recreation (Zone 6), which could have moderate visual impacts, would be decreased to 413 acres.

Adoption of Alternative C would likely have an increasingly beneficial impact over time. Consequently, implementation of this alternative would likely provide more enhanced protective management for visual resources than either Alternative A or B and would help preserve the scenic landscape character of the reservoirs for long-term public enjoyment.

4.11. Water Quality

Increased development and intensive land use has the potential to result in some degree of negative impact to the aquatic environment whether from point source pollution, such as 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 impacts to the aquatic environment and consequently aquatic life, are increased turbidity and sedimentation, increased levels of nutrients, which can lead to subsequent algal blooms and higher oxygen demands, and increased levels of chemicals and bacteria from impervious surfaces, disturbed lands, managed lawns, and improper operation or failure of wastewater treatment systems. As development of land around the

reservoirs increases, these cumulative impacts to water quality would continue regardless of the alternative selected by TVA,

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, would be expected to be higher from parcels designated for Project Operations, Industrial, Developed Recreation, or Shoreline Access use where more development and intensive land use might 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 *General and Standard Conditions/Best Management Practices* (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 – No Action Alternative

Under Alternative A, no land on Douglas or Nolichucky reservoirs would be allocated to Sensitive Resource Management, the land use designation that is most protective of water quality. About 43 percent of the reservoir lands (1,359 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 1,078 acres (34 percent) of the reservoir lands would be allocated to Zone 2 (Project Operations). Alternative A also includes a 3.4-acre parcel on Nolichucky Reservoir allocated to Industrial, which currently is a sand and gravel pit. No other TVA-managed lands on the reservoirs are allocated for industrial development. About 738 acres (23 percent) are allocated to Developed Recreation, and the remaining 13 acres (less than 1 percent) to 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 on any one site. However, the greatest potential for adverse impacts would come from the relatively large amount of Developed Recreation and Project Operation land, which could include disturbances from industrial facilities, recreation and sanitation facilities, roads and parking lots, or campgrounds. 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 result in minor direct, indirect, or cumulative impacts to water quality.

Alternative B – Proposed Land Use Alternative

Under Alternative B, a total of 1,601 acres (50 percent) of the reservoir lands would be allocated to Zone 3 (Sensitive Resource Management) and Zone 4 (Natural Resource Conservation). 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, a total of 1,078 acres (34 percent) of the reservoir lands would be allocated to Zone 2 (Project Operations). The only land allocated to Industrial (Zone 5) use would be the 3.4-acre parcel on Nolichucky Reservoir. Additionally, 509 acres (16 percent) would be allocated to Zone 6 (Developed Recreation) or Zone 7 (Shoreline Access). Under these four land use zones, development potentially affecting water quality could occur. However, the increase in land allocated to Zones 3 and 4 with lesser impacts to water quality would be beneficial. In addition, as under Alternative A, proposed land uses would be required to protect water quality in accordance with TVA guidelines, 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 – Modified Land Use Alternative

Allocations under Alternatives C are similar to Alternative B except that 83 additional acres would be allocated to Zone 3 (Sensitive Resource Management) and Zone 4 (Natural Resource Conservation). The same parcels are allocated to Zones 2, 5, and 7 under Alternatives B and C. The minor variations in allocations to Zones 3, 4, and 6 do not represent substantial changes, although they are beneficial to water quality. 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.

4.12. Aquatic Ecology

For aquatic species, the major source of potential adverse impacts to common aquatic species associated with activities on the uncommitted parcels of Douglas and Nolichucky reservoirs would be from land use changes and the potential for erosion. 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. It also provides a source of food for aquatic life. Insects associated with shoreline vegetation are fed upon by both carnivorous and insectivorous (insect eating) aquatic species. Tree root wads along the shoreline provide refuge from predation. Submerged trees that have fallen into the water from the shoreline also provide much needed structure in the reservoir environment. Riparian vegetation serves to stabilize soil along the shoreline as well, 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 (nonmoving) freshwater mussels that can be smothered by sedimentation. Under some circumstances, construction of docks and piers, while having short-term negative impacts, can increase fish habitat. Fixed docks, when combined with habitat improvements such as anchored brush, rock aggregations, log cribs, and/or other forms of cover, can actually enhance the shoreline aquatic habitat. Impacts to aquatic resources are directly related to changes in the existing natural shoreline conditions. Aquatic resources can be impacted by changes to shoreline (riparian) vegetation and land uses, including the presence of vegetation on back-lying lands. Similar to water quality (see Section 4.11) as development of land around the reservoirs increase, cumulative impacts to aquatic ecology from all sources would continue regardless of the alternative selected by TVA.

Alternative A – No Action Alternative

Under the No Action Alternative, TVA would continue to use the Forecast System designations established by TVA in 1965 to manage the lands surrounding Douglas Reservoir. Nolichucky Reservoir has never been forecasted or planned; TVA would continue to use existing land use agreements to manage the lands surrounding Nolichucky Reservoir under the No Action Alternative. Approximately 1,740 acres on Douglas Reservoir and 1,043 acres of committed land on Nolichucky Reservoir would be managed according to existing agreements. On Nolichucky Reservoir, 93 acres of TVA land would remain unplanned and uncommitted and would be managed according to current TVA policy.

The approximately 3,191 acres of public land managed by TVA on Douglas and Nolichucky reservoirs would continue to be managed in accordance with current land uses. Therefore, 43 percent of the land would continue to be managed for Natural Resource Conservation, 34 percent for Project Operations, no land for Sensitive Resource Management, 23 percent for Developed Recreation, and less than 1 percent for Shoreline Access and Industrial.

Under Alternative A, TVA land parcels would continue to be managed under the current Forecast System designations, existing land use agreements, or would remain unplanned; therefore, environmental conditions would likely remain the same. State and federal environmental regulations would apply, and TVA's *General and Standard Conditions/Best Management Practices* (TVA 2005) would be required for TVA-approved projects. Further, there is only a small amount of TVA land surrounding these reservoirs in comparison to the overall land base in the reservoir watersheds. Therefore, selection of Alternative A would have minor direct, indirect, or cumulative impacts on aquatic ecology.

Alternative B – Proposed Land Use Alternative

Adoption of this alternative would promote conservation of natural resources. Under this alternative, TVA would create and implement individual land plans for Douglas and Nolichucky reservoirs. The approximately 3,191 acres of public land managed by TVA on Douglas and Nolichucky reservoirs would be placed into one of the seven land use zones that best fits the existing land use.

Under Alternative B, about 186.9 acres allocated for Zone 6 (Developed Recreation) under Alternative A, would change to, Zone 4 (Natural Resource Conservation) or Zone 3 (Sensitive Resource Management) and only 150 acres would remain in Zone 6. TVA would emphasize conservation of natural resources and project operations by allocating 31 percent of the land surrounding the reservoirs to Zone 4, 34 percent to Zone 2, 19 percent to Zone 3, 16 percent to Zone 6 and less than 1 percent to Zone 7 (Shoreline Access) and Zone 5 (Industrial).

The major source of potential impacts to aquatic communities would be ground disturbance activities in riparian areas, which could affect water quality. That is, the greater the soil disturbance from an activity, the greater the potential for adverse impacts to water quality and listed aquatic species from runoff resulting sedimentation. Due to the increase in acreage dedicated to natural resources, the state and federal environmental regulations designed to protect aquatic species, and the use of TVA's *General and Standard Conditions/Best Management Practices* (TVA 2005), there would not be significant direct or indirect adverse impacts to aquatic communities under Alternative B.

The implementation of Alternative B would not result in negative cumulative effects from these proposed actions. Over the long-term, allocation of lands to Zone 3 (Sensitive Resource Management) and Zone 4 (Natural Resource Conservation), which limit ground disturbance, vegetation removal, and other development, would decrease pollution and erosion, which is likely to benefit aquatic ecology.

Alternative C – Modified Land Use Alternative

Adoption of this alternative would provide additional opportunities for the conservation of natural resources with an emphasis on the management of sensitive resources. Under this alternative, TVA would create and implement individual land plans for Douglas and Nolichucky Reservoirs. The lands managed by TVA would be placed into land use zones that best represent the existing land use, public comments, and other opportunities identified during scoping. TVA would allocate approximately 31 percent of the land surrounding the reservoirs to Zone 4 (Natural Resource Conservation), 34 percent to Zone 2 (Project Operations), 22 percent to Zone 3 (Sensitive Resource Management), 13 percent to Zone 6 (Developed Recreation), and less than 1 percent to Zone 7 (Shoreline Access) and Zone 5 (Industrial).

Under Alternative C, zone allocations would change for almost 83 acres as compared to Alternative B. As compared to Alternative B, implementation of Alternative C would allocate more land to Zone 3 (Sensitive Resource Management) and Zone 4 (Natural Resource Conservation). Nolichucky Parcel 12a would be allocated to Zone 3 rather than Zone 4, and Parcels 25, 26, 27, and 31-38 would be allocated to either Zone 3 or Zone 4 rather than Zone 6. Also under Alternative C, Douglas Parcel 28 (10 acres), Parcel 33 (17 acres), and Parcel 47 (36 acres) would change from Zone 4 to Zone 3.

This increase in land allocated to Zones 3 and 4, with their greater protection of natural resources, would benefit aquatic ecology on the reservoirs. Furthermore, future environmental reviews for any proposed use of land would require the use of BMPs, along with compliance with state and federal regulations that would reduce or eliminate negative impacts to natural resources associated with the proposed action. Therefore, development opportunities on TVA lands would not have direct or indirect, adverse impacts to aquatic communities under Alternative C. In fact, some beneficial effects to these species may be recognized as a result of proposed allocations with this alternative's promotion of conservation of natural resources.

Implementation of Alternative C would not result in any negative cumulative effects from these proposed actions. In fact, they could lead to slightly improved riparian buffer zones and a small improvement to water quality and aquatic habitats downstream of the project areas, thereby having a slightly beneficial effect on aquatic life.

4.13. Air Quality

With respect to the DNTRLMP, the greatest potential for effects to air quality is from the Industrial land use zone. Under all three alternatives, a single 3.4-acre parcel on the Nolichucky Reservoir (Parcel 21) is the only Zone 5 (Industrial) allocation. It is currently being used as a sand and gravel pit, which recovers material from the Nolichucky River with minimal impact to air quality.

The potential for impacts to air quality from actions on Zone 2 (Project Operations) lands depends upon the type of development proposed in the future. Because all alternatives include 1,078 acres of land allocated to Zone 2, the potential for impacts to air quality is the

same under all the alternatives. Under any of the alternatives, an appropriate level of site-specific environmental review would 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 (Sensitive Resource Management), 4 (Natural Resource Conservation), 6 (Developed Recreation), and 7 (Shoreline Access) are not likely to generate emissions that affect air quality. Therefore, adoption of any of the three alternatives would result in minor direct, indirect, or cumulative impacts to air quality.

4.14. Noise

The greatest potential for community noise impacts comes from industrial and commercial development, commercial transportation, and, to a lesser extent, commercial recreational development. The potential for impacts associated with noise depends upon the types of developments proposed for Zone 2 (Project Operations), Zone 5 (Industrial), and Zone 6 (Developed Recreation) lands. Under all three alternatives, future industrial development is limited to a single 3.4-acre parcel near Nolichucky Reservoir. The amount of land allocated to Developed Recreation (Zone 6) is greatest under Alternative A (738 acres), is about a third less under Alternative B (496 acres), and is lowest under Alternative C (413 acres). The amount of land allocated to Project Operations is the same under all the alternatives.

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

4.15. Socioeconomics

4.15.1. Population and Economy

There is very little TVA-managed public land suitable for industry on either Nolichucky or Douglas reservoirs. Although most of the shoreline is TVA-managed public land, except for a sand mining operation, the Nolichucky Reservoir currently has little industrial opportunity because of the sensitive resources, lack of supporting infrastructure, and lack of potential industrial sites. Although the majority of shoreline on Douglas Reservoir is privately owned, there are likewise few current industrial opportunities. It is conceivable that future industrial opportunities could occur on some of the privately owned shoreline; however, the relatively small amount of TVA-managed public land on Douglas Reservoir is better suited for other purposes or has been committed to other uses.

Alternative A – No Action Alternative

Under Alternative A, the TVA lands would continue to be managed as they are currently. TVA would continue to manage TVA land around Douglas Reservoir using the Forecast System, while TVA land around Nolichucky Reservoir would continue to be managed according to existing land use agreements, as discussed in Section 2.2.1. Continuation of current practices and policy would not, by itself, have socioeconomic impacts. However, specific future land use decisions could result in such impacts and would therefore be reviewed, as appropriate, at that time.

Alternative B – Proposed Land Use Alternative

Under Alternative B, the major differences as compared to Alternative A would include an increase of 621 acres for Sensitive Resource Management, better reflecting appropriate

uses for these lands and a 242-acre decrease of land allocated for Developed Recreation. These changes generally are to zones that are more representative of current land uses. There would be no changes in the allocation for Project Operations (1,078 acres), for Shoreline Access (13 acres), or for Industrial, which consists of one tract of land that is 3 acres. Adoption of Alternative B would have insignificant socioeconomic impacts. However, future site-specific proposed uses, specifically for industry, could potentially have significant impacts. Such proposals would be reviewed, as appropriate, at that time.

Alternative C – Modified Land Use Alternative

Under Alternative C, the proposed changes in allocation of TVA lands are very similar to those under Alternative B. Developed Recreation lands would constitute 83 fewer acres than under Alternative B; these 83 acres consist of several tracts, some of which would be allocated to Sensitive Resource Management and the rest to Natural Resource Conservation. Project Operations would consist of 1,078 acres, the same as in Alternative B. Most of the changes proposed under Alternative C are intended to reflect current usage or most appropriate uses. No changes are proposed to Industrial or Shoreline Access lands. Adoption of Alternative C would have insignificant socioeconomic impacts. However, future site-specific proposed uses, specifically for industry, could potentially have significant impacts. Such proposals would be reviewed, as appropriate, at that time.

4.15.2. Environmental Justice

Alternative A – No Action Alternative

As discussed in Section 3.16.2, minority populations in the area around Douglas and Nolichucky reservoirs constitute a relatively small share of the total population. Poverty levels, however, are somewhat higher, overall, than the state and national averages. Continuation of the current land use classifications under Alternative A would have no noticeable disproportionate impact on disadvantaged populations. Specific land use proposals, however, could have such impacts. Any such proposals would receive the appropriate level of review and analysis of impacts.

Alternative B – Proposed Land Use Alternative

The proposed land allocations under Alternative B are largely a reflection of current land uses. These proposed allocations would have no significant disproportionate impacts to disadvantaged populations. Specific land use proposals, however, could have such impacts. Any such proposals would receive the appropriate level of review and analysis of impacts.

Alternative C – Modified Land Use Alternative

The proposed land allocations under Alternative C are largely a reflection of current land uses, with public comments and other opportunities identified during scoping providing the basis for some allocations. Alternative C would have only small differences as compared to Alternative B. These proposed allocations would have no significant disproportionate impacts to disadvantaged populations. Specific land use proposals, however, could have such impacts. Any such proposals would receive the appropriate level of review and analysis of impacts.

4.16. Unavoidable Adverse Effects

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. 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. Implementation of any of the three alternatives is not expected to result in significant adverse cumulative effects to any resources.

4.17. 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 land management plans, 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’s 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 1 percent of Douglas and Nolichucky reservoirs lands. The percentage of lands allocated to Zone 2 (Project Operations) is approximately 34 percent under all alternatives. The percentage of lands allocated to Zone 6 (Developed Recreation) is about a third 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 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 Douglas and Nolichucky reservoirs lands allocated to Zones 3 and 4 is approximately 43 percent under Alternative A and approximately 50 to 52 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 Douglas and Nolichucky reservoirs 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.

4.18. Irreversible and Irretrievable Commitments of Resources

Irreversible commitments of resources generally occur through 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, 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 areas, or certain dispersed recreational activities for the foreseeable future. This is an irretrievable commitment of land that would occur under all alternatives. 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.

4.19. Energy Resources and Conservation Potential

Developing and implementing land management plans do 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 and various facilities on developed recreation lands.

Energy is also used by machines to maintain areas set aside for Zone 4 (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. However, the majority of lands in Zone 4 are not actively maintained. Implementation of Alternative C 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 Nolichucky parcel allocated to Zone 5 (Industrial), 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 land area 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.

4.20. 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 DNTRLMP, TVA would implement the following commitments and mitigation measures.

- TVA has executed a PA with the Tennessee SHPO for RLMPs for the identification, evaluation, and treatment of all cultural resources adversely affected by future proposed uses of TVA lands planned in RLMPs. All activities would be conducted in accordance with the stipulations defined in this PA.
- Prior to approving any proposal to use TVA land, TVA would conduct an appropriate level of site-specific environmental review 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 mitigation measures, including BMPs (e.g., TVA's *General and Standard Conditions/Best Management Practices*; TVA 2005), as a condition of approval for use of TVA land.
- Landscaping activities on developed properties would not include the use of plants listed as Rank 1 (Severe Threat), Rank 2 (Significant Threat), or Rank 3 (Lesser Threat) on the TN-EPPC (2001) List of Invasive Exotic Pest Plants in Tennessee (Appendix E, Tables E-6 through E-8).
- Revegetation and erosion-control work would utilize seed mixes comprised of native species or noninvasive nonnative species (Appendix E, Table E-9).