

## CHAPTER 4

### 4. ENVIRONMENTAL CONSEQUENCES

#### 4.1. Introduction

This chapter describes the environmental consequences of the three alternatives for managing TVA public land around Watts Bar Reservoir. Under all three alternatives, previously unplanned land includes strips of retained land fronting TVA sale tracts (marginal strip). These retained strips of TVA public land that are encumbered with water access rights are proposed for allocation to Zone 7 (Shoreline Access) under Modified Alternatives B and C, in accordance with the SMI decision of 1999. Approximately 14 percent (2,303 acres) of TVA public land, which comprises 340 shoreline miles, on Watts Bar Reservoir is proposed for allocation to Zone 7 under Modified Alternatives B and C. As explained in Section 1.3, land in Zone 7 would be categorized as shoreline protection, residential mitigation, or managed residential under the TVA SMP. Review of private water use facility requests in Zone 7 would include consideration of the site's shoreline categorization status to minimize environmental impacts. Protective measures presently in place under TVA's land use approval process and SMI EIS would reduce or minimize impacts of residential development of private property.

Under the No Action Alternative, the land use allocation categories assigned to each parcel in the 1988 Plan would remain in effect. Under the Action Alternatives B and C, TVA would update the allocations originally designated for each parcel in the 1988 Plan to reflect the land use zones defined in Table 2.1-1 of this Land Plan. Modified Action Alternatives B and C incorporate alternative land use zone allocations listed in Table 2.1-2.

#### 4.2. Terrestrial Ecology (Plant and Animal Communities)

The terrestrial ecology on Watts Bar Reservoir lands could be impacted by management scenarios dictated by land use allocations. Each of the land use zone designations allow for specific uses (see Chapter 2, Table 2.1-2), which would have individual and specific impacts on terrestrial ecology.

In most cases, the least environmental impacts to terrestrial animals and vegetation on a reservoir-wide basis would occur on lands allocated to Zone 3 (Sensitive Resource Management) and Zone 4 (Natural Resource Conservation), where land is managed for the protection of sensitive resources, maintenance of wildlife habitat, and dispersed recreation uses. Conversely, the greatest potential for negative effects on general terrestrial ecology would occur on lands allocated to Zone 5 (Industrial), and on some lands allocated to Zone 2 (Project Operations). While a range of impacts from minimal to extensive could occur on lands allocated to Zone 6 (Developed Recreation), the effects on the terrestrial ecology resources would depend on the type and extent of any recreation development.

The majority of parcels that would be allocated to Zones 5 and 6 and developed under Alternative A and Modified Alternative B are currently forested. Loss of these forests would accompany land clearing for development, resulting in permanent conversion to nonforest conditions with a substantive loss of biodiversity. In situations where some forested areas

were left intact, they would essentially be small islands of “habitat” that would have much less value to area wildlife.

Development entails land cover changes that often foster the establishment of invasive terrestrial animals and other species, such as brown-headed cowbirds, European starlings, house sparrows, and rock pigeons that are symptomatic of disturbance. Large-scale developments can also lead to increased wildlife “nuisance” problems where animals such as white-tailed deer, raccoons, striped skunks, opossums, and beaver may cause garden crop or ornamental shrub damage when their natural habitats are encroached upon.

Additionally, under any development scenario, an increased representation by invasive plant species that typically inhabit edge habitats would be expected. In order to minimize the potential for the introduction of invasive plant species on TVA-owned or transferred properties, any development scenario would include the following conditions and requirements:

- Landscaping activities on developed properties would not include the use of plants listed as Rank 1, “Severe Threat,” Rank 2, “Significant Threat,” and Rank 3, “Lesser Threat,” on the Tennessee Exotic Pest Plant Council’s list of Invasive Exotic Pest Plants in Tennessee (Appendix D, Table D-7).
- Revegetation and erosion control work would utilize seed mixes comprised of native species or noninvasive nonnative species (Appendix D, Table D-8).

Only 3.7 percent of the land base in the state of Tennessee is in public ownership (State of Tennessee 2003). Alternatives that develop TVA land would reduce this percentage and reduce land available for wildlife habitat and dispersed recreation public use. This has been an expressed concern of many stakeholders. Cumulative impacts to terrestrial ecological resources are ongoing and likely to continue in the Watts Bar Reservoir area, regardless of any action taken by TVA or the alternative selected. This is due to the amount of private land that borders TVA-owned properties. These private lands are developing at an increasingly rapid pace, particularly for residential housing purposes throughout the Watts Bar Reservoir area. Currently, there are over 17,000 acres of platted residential property adjacent to Watts Bar Reservoir. This acreage is greater than the total amount of TVA public land being planned on the reservoir. TVA constantly receives inquiries about new potential development areas. It is estimated that approximately 60 percent of the platted area has already been converted to residential housing with complete conversion of most of these areas anticipated. Varieties of terrestrial habitats are being impacted through conversion to residential housing including forests of various ages and open land in multiple successional stages. While some types of wildlife and vegetation can adapt to this alteration of the habitat, many species cannot and will no longer be found in these areas.

**Alternative A – No Action:** Under the 1988 Plan, several large parcels of land are allocated for developed uses that would fall under land allocation categories equivalent to Zone 5 (Industrial) and Zone 6 (Developed Recreation). The former CRBR site (1,109 acres - Parcels 142, 143, 145, 147, and 148) is allocated for industrial use. Since 1988, several timber harvests have been conducted by TVA on these parcels, and a short-term revocable land use permit was granted to the TWRA allowing the use of these parcels as part of the Oak Ridge Reservation WMA. These parcels provide substantial high-quality habitat for a variety of terrestrial animal and plant species including high-density populations of white-

tailed deer and eastern wild turkey, which are an important part of the TWRA-managed hunts on the Oak Ridge Reservation WMA.

Another area allocated for developed uses is the Lowe Branch site, which includes Parcels 297 and 298 (279 acres). Following the 1988 Plan, these parcels have been managed in the interim for forestry and wildlife habitat development and have received extensive use for a variety of dispersed recreation activities by the general public, especially for white-tailed deer hunting. In the late 1990s, TVA identified significant abuse to portions of this property including trash dumping, disposal of dead livestock, and severe off-road vehicle impacts. In an effort to control these abuses and better manage the area, TVA incorporated this area into its resource management plan and EA for the LWBU (TVA 2000). This process and implementation plan led to the gating and control of land use abuses and the development of stakeholder partnerships (Quail Unlimited) to help better manage the site for wildlife resources.

Adoption of this alternative could potentially impact over 1,300 acres of high-quality terrestrial habitat primarily at the former CRBR site and the Lowe Branch site. The parcels are allocated for Industrial Development in the 1988 Plan and would be developed in the future, resulting in the loss of interim uses for dispersed recreation such as the TWRA land use permit. There is also an additional 2,000 acres of TVA property scattered across the reservoir that, under the 1988 Plan, might be developed for commercial recreation. Therefore, under this alternative, there are about 3,300 acres, or approximately 20 percent, of the TVA land base on Watts Bar Reservoir where terrestrial ecological resources would be adversely impacted.

**Action Alternative B – Modified Development and Recreation:** Under this alternative, TVA would allocate approximately 357 acres (2.2 percent) of the TVA public land base on Watts Bar Reservoir to Zone 5 (Industrial). An additional 760 acres of the former CRBR site (Parcels 142, 143, 145, 148) would be allocated for Zone 2 (Project Operations). Zone 2 and Zone 5 could have similar impacts to terrestrial ecology, although the retention of TVA ownership with Zone 2 allows a greater degree of control that could be exercised to mitigate adverse impacts on terrestrial ecology. Should these areas be developed in the future, the dispersed recreation opportunities supported by terrestrial habitats in these areas would eventually be lost. Under this alternative, an additional buffer along the Clinch River is proposed by adding 110 acres to Parcel 144 as Zone 3. The establishment of a riverside buffer would reduce the potential impacts to wildlife and vegetation that would result from any type of industrial development at the former CRBR Site.

The total amount of land (1,072 acres) proposed for allocation to Zone 5 and the additional land proposed for allocation to Zone 2 is about a third less than the 1,545 acres allocated for Industrial and Commercial Development in the 1988 Plan (Alternative A). In addition, the allocation of Parcel 240 as Zone 4 would be beneficial to terrestrial ecology.

Therefore, potential impacts to terrestrial ecological resources would be less under this alternative than for Alternative A. Where habitat alteration occurs under this alternative, the impacts would be similar to Alternative A, and they would include the loss of some interior forest bird habitat, more habitat fragmentation and loss of biodiversity, and a concurrent increase in invasive plants and animals. More specifically, this alternative would affect some habitat for several listed Birds of Conservation Concern (USFWS 2002) including chuck-will's widow, whip-poor-will, Acadian flycatcher, wood thrush, prairie warbler, prothonotary warbler, worm-eating warbler and Kentucky warbler. The Louisiana waterthrush also occurs in this

region, but suitable habitat for this species is very limited on TVA lands under consideration; therefore, TVA's actions would have little effect on it.

From a dispersed recreation user perspective, this alternative would lessen opportunities for recreation pursuits such as hiking, camping, hunting, and wildlife observation. Specifically, selection of this alternative would eliminate future stakeholder partnership opportunities and activities on Parcels 297 and 298 at Lowe Branch as well as eliminate from consideration a request from TWRA for the transfer of Parcels 295, 297, 298, and 299 from TVA for inclusion in its WMA program as a contiguous tract of land. Additionally, this alternative would eliminate, over time, the WMA hunting regulation agreement with TWRA for the former CRBR Site area (which includes Parcels 142, 143, 144, 145, and 146).

Under Modified Alternative B, direct, indirect, and cumulative impacts on terrestrial ecological resources would occur on a site-specific basis, particularly on portions of the Lowe Branch area and the former CRBR Site, over time as industrial development progresses. Recreation area development under this alternative would also impact terrestrial resources on site- and action-specific bases. The eventual development of the proposed Zone 2, 5, and 6 parcels could potentially impact up to 1,072 acres of currently undeveloped, mostly forested habitat. While some of these impacts would be significant on a localized basis, loss of terrestrial ecological biodiversity and associated dispersed recreation opportunities under this alternative is expected to be insignificant on a reservoir-wide basis over the 10-year plan horizon.

**Action Alternative C – Modified Conservation and Recreation:** Under this action alternative, TVA would allocate approximately 31 percent (5,098 acres) of the current public land base on Watts Bar Reservoir to Zone 4 (Natural Resource Conservation). This is about 1,800 acres more than the No Action Alternative and 1,200 acres more than Modified Alternative B. Impacts to terrestrial ecological resources under this alternative would be less than under Alternative A or Modified Alternative B. Selection of this alternative would protect more interior forest bird habitat and terrestrial biodiversity, reduce habitat fragmentation potential, and lessen the occurrence of invasive exotic plant and invasive animal species on a reservoir-wide basis. This alternative would also be considered beneficial to most of the Birds of Conservation Concern species as described under Modified Alternative B.

From a recreation user's perspective, this alternative would expand opportunities for informal pursuits, such as wildlife and nature observation and hunting. Specifically, selection of this alternative would maintain current stakeholder partnership opportunities and activities on Parcels 297 and 299 at Lowe Branch and keep open consideration of TWRA's request for the transfer of Parcels 295, 297, 298, and 299 for inclusion in its WMA program. Additionally, this alternative would change the allocation of the former CRBR site (Parcels 142, 143, 145, and 148) from Zone 2 or 5 to Zone 4. This reallocation would maintain the area's current ecological state and allow TWRA to continue its interim management agreement.

Specifically, this alternative would allow for continued management of natural resources on Parcels 295, 297, 298, and 299 with the possibility of designating a portion of this area as an Important Bird Area in conjunction with TWRA and the incorporation of prescribed burning regimes to better manage groups of wildlife species in conjunction with the Tennessee Division of Forestry. The eventual development of the proposed Zone 5 and 6 parcels could potentially impact up to 54 acres of currently undeveloped, mostly forested habitat.

Selection of Modified Alternative C would have the greatest benefit for terrestrial ecological resources on both a site-specific and reservoir-wide basis for the proposed 10-year plan horizon.

### **4.3. Sensitive (Endangered and Threatened) Species**

Sensitive species include any plant or animals listed under the ESA or similar state laws or regulations, as well as any species or community of species considered to be rare, uncommon, in need of management, or of special concern. The sensitive species in this section are those that are found in the area of Watts Bar Reservoir. The discussion of sensitive species is presented in three sections, plants, terrestrial animals, and aquatic animals.

Overall, TVA has determined that under all of the Alternatives there would be no effect on the two federally listed plants present in the project area; Virginia spirea and Cumberland rosemary, four of the five federally listed mussels; fanshell, rough pigtoe, shiny pigtoe, and orangefoot pimpleback, the two federally listed fish; snail darter and spotfin chub, and one mammal; gray bat. Also, these alternatives would not result in adverse modification of designated critical habitat for the federally listed spotfin chub in the Obed or Emory Rivers, and potential impacts for state-listed species would be insignificant.

Further, TVA has determined that adoption of Alternative A or Modified B is not likely to adversely affect the federally listed mussel, pink mucket, but adoption of the Modified Alternative C would have no effect on the mussel.

TVA consulted with the USFWS (see Appendix H) and received concurrence that the preferred alternative (Modified Alternative B) is not likely to adversely affect federally listed species.

#### **4.3.1. Plants**

Most of the potential for adverse effects to rare plant species, including threatened and endangered species, is dependent on how land is used and impacted from changes in the allocated land use. For example, land allocated to Zone 3 (Sensitive Resource Management) or Zone 4 (Natural Resource Conservation), which has little or no activities like soil disturbances, would be beneficial to a protected plant species. However, a change of allocation of a parcel to Zone 5 (Industrial) or Zone 6 (Developed Recreation), which allows soil disturbance, could result in a loss of protected species on that parcel. Such changes would facilitate changes in land use and land cover. Potential direct effects include ground disturbance that could result in the physical destruction and loss of sensitive plant species. Also, changes in land use could indirectly affect some sensitive plants by subtly affecting the habitats of some sensitive plants. Examples of such potential indirect effects include changes in the amount of light, soil moisture, and drainage patterns.

No populations of federally listed plants are known to occur on Watts Bar Reservoir lands. Thirty-seven species of state-listed as threatened and endangered plants are reported from within a 5-mile radius of Watts Bar Reservoir with 13 species occupying areas directly on or adjacent to reservoir lands. The remaining sensitive species are found within 5 miles of Watts Bar Reservoir and would not be impacted by any of the alternatives.

Seven HPAs on Watts Bar Reservoir have been designated for protection of state-listed plant species, and one new HPA is proposed under the modified action alternatives. These are on land parcels allocated to Zone 3 and contain habitat for six of the 13 state-listed as threatened and endangered plant species. Spreading false-foxglove, a state-listed as threatened species, is protected at Grassy Creek, Marble Bluff, Polecat Creek Slopes, Rayburn Bridge, Sugar Grove, and Stowe Bluff; Appalachian bug bane, a state-listed as

threatened species, is protected at Grassy Creek and Stowe Bluff; northern bush-honeysuckle, a state-listed as threatened species, occurs within Marney Bluff and Stowe Bluff; mountain honeysuckle, a species of special concern, is protected at Sugar Grove; Bay starvine, a state-listed as threatened species, occurs on the proposed Whites Creek Alluvial Deposit Forest (see Section 3.4.3); and shining ladies'-tresses, a state-listed as threatened orchid, is protected at Grassy Creek. The remaining seven listed plant species occur in Zone 1 (Non-TVA Shoreline), Zone 4, Zone 6, and Zone 7 (Shoreline Access), see Table 4.3-1.

A majority of the rare plant species occur under all the alternatives within Zone 1, Zone 3 (Parcels 65, 91, 94, 146, 152, 194, and 196), Zone 4 (Parcels 70 and 126), Zone 6 (Parcel 121), and Zone 7 (Parcels 61, 81, 128, and 248), see Section 3.3.1. The rare plant communities occurring in flowage areas of Zone 1 could incur minor impacts by the changing water levels resulting from normal river and reservoir operations. Since the HPA boundaries and the amount of land designated to Zone 3 would remain constant (Alternative A) or increase (Modified Alternatives B or C) impacts to the rare plant communities found on parcels within Zone 3 are not likely. Although the amount of land varies with the alternative, rare plants occurring on Zone 4 would likewise incur the benefits of protection from adverse activities. There could be impacts to any rare plant species occurring on Zones 2, 5, 6, and 7 primarily from the construction of infrastructure to support their purpose; however, these and any other populations of listed species that might be discovered in the future would be subjected to TVA environmental review should individual projects or changes in land use be proposed. Accordingly, appropriate protective or mitigative measures would be implemented as required to protect these sensitive plant resources.

**Table 4.3-1. Rare Plant Species Occurring on Watts Bar Reservoir Land for All Alternatives, Listed by Zone**

Zone*	Parcel # or River Mile	Rare Plants Present	Habitat Protection Area
1 (2)	CRM 3	Fetter-bush ( <i>Leucothoe racemosa</i> )	
1	TRM 593	American barberry ( <i>Berberis canadensis</i> ), Mountain honeysuckle ( <i>Lonicera dioica</i> )	
1	CRM 10.5, 12.5	Spreading false-foxglove ( <i>Aureolaria patula</i> )	
1	CRM 19.5	Canada lily ( <i>Lilium canadense</i> ), Spreading false-foxglove ( <i>Aureolaria patula</i> )	
1	CRM 12.5	Large-flowered barbara's-buttons ( <i>Marshallia grandiflora</i> ), Pursh's wild-petunia ( <i>Ruellia purshiana</i> )	
1	CRM 11.4	Northern white cedar ( <i>Thuja occidentalis</i> )	
3	Parcel 196	Spreading false-foxglove ( <i>Aureolaria patula</i> ), Appalachian bugbane ( <i>Cimicifuga rubifolia</i> ), Northern bush-honeysuckle ( <i>Diervilla lonicera</i> )	Stowe Bluff
3	Parcel 65	Northern bush-honeysuckle ( <i>Diervilla lonicera</i> )	Marney Bluff
3 & 4	Parcel 91	Spreading false-foxglove ( <i>Aureolaria patula</i> )	Marble Bluff
3 & 4	Parcel 94	Spreading false-foxglove ( <i>Aureolaria patula</i> )	Polecat Creek Slopes
3	Parcel 194	Spreading false-foxglove ( <i>Aureolaria patula</i> )	Rayburn Bridge
3	Parcel 152	Spreading false-foxglove ( <i>Aureolaria patula</i> ), Mountain honeysuckle ( <i>Lonicera dioica</i> )	Sugar Grove

Zone*	Parcel # or River Mile	Rare Plants Present	Habitat Protection Area
3	Parcel 146	Spreading false-foxglove ( <i>Aureolaria patula</i> ), Appalachian bugbane ( <i>Cimicifuga rubifolia</i> ), Shining ladies'-tresses ( <i>Spiranthes lucida</i> )	Grassy Creek
3	Parcel 233	Bay starvine ( <i>Schisandra glabra</i> )	Whites Creek Alluvial Deposit Forest
2 & 4	Parcel 70	Spreading false-foxglove ( <i>Aureolaria patula</i> )	
4	Parcel 126	Spreading false-foxglove ( <i>Aureolaria patula</i> ), Northern bush-honeysuckle ( <i>Diervilla lonicera</i> )	
4 & 6	Parcel 121	Mountain bush-honeysuckle ( <i>Diervilla rivularis</i> )	
7	Parcel 248	Spreading false-foxglove ( <i>Aureolaria patula</i> )	
7	Parcel 61	Spreading false-foxglove ( <i>Aureolaria patula</i> )	
7	Parcel 81	Spreading false-foxglove ( <i>Aureolaria patula</i> )	
7	Parcel 128	Appalachian bugbane ( <i>Cimicifuga rubifolia</i> )	

\* Zone 1: Non-TVA Land (Flowage), Zone 2: Project Operations, Zone 3: Sensitive Resource Management, Zone 4: Natural Resource Conservation, Zone 6: Developed Recreation, Zone 7: Shoreline Access. Under Modified Alternatives B and C, some parcel acreages would increase from or would be added to another parcel.

**Alternative A – No Action:** As described above, there are no known populations of federally listed plants on Watts Bar Reservoir lands; therefore, no impacts to federally listed plants are expected under this alternative. Known populations of other rare plants would continue to be protected by their inclusion in Zones 3 (Sensitive Resource Management) and 4 (Natural Resource Conservation) or through the environmental review of any development proposals. Therefore, insignificant direct or indirect adverse impacts to state-listed or other rare plants are expected under Alternative A.

Under the No Action Alternative about 58 percent (9,400 acres) of the total TVA-owned land area would be allocated to categories equivalent to Zones 2 (Project Operations), 5 (Industrial), or 6 (Developed Recreation), or would remain as unplanned marginal strips where impacts to rare plants would be most likely to occur. However, about 42 percent (6,800 acres) of the total TVA-owned land area would be allocated to categories equivalent to Zones 3 and 4 for resource conservation (see Table 2.2-2) where rare plants would be protected. Adoption of the No Action Alternative would result in insignificant cumulative impacts to the rare, sensitive, and state-listed plants on Watts Bar Reservoir.

**Action Alternative B – Modified Development and Recreation:** As described above, there are no known populations of federally listed plants on Watts Bar Reservoir lands; therefore, no impacts to federally listed plants are expected under this alternative. Known populations of rare plants would continue to be protected by their inclusion in Zones 3 (Sensitive Resource Management) and 4 (Natural Resource Conservation) or through the environmental review of any development proposals. Therefore, insignificant direct or indirect adverse impacts to state-listed or other rare plants are expected under Modified Alternative B.

Under Modified Alternative B, about 53 percent (8,600 acres) of the total TVA-owned land area would be allocated to Zones 2 (Project Operations), 5 (Industrial), 6 (Developed Recreation), and 7 (Shoreline Access) where impacts to rare plants would be most likely to occur. However, about 47 percent (7,600 acres) of the total TVA-owned land area would be

allocated to Zones 3 and 4 for resource conservation (see Table 2.2-2) where rare plants would be protected. Impacts would be slightly less than the No Action Alternative; therefore, the adoption of Alternative B would result in insignificant cumulative impacts to the rare plants on Watts Bar Reservoir.

**Action Alternative C – Modified Conservation and Recreation:** As described above, there are no known populations of federally listed plants on Watts Bar Reservoir lands; therefore, no impacts to federally listed plants are expected under this alternative. Known populations of rare plants would continue to be protected by their inclusion in Zones 3 (Sensitive Resource Management) and 4 (Natural Resource Conservation) or through the environmental review of any development proposals. Therefore, insignificant direct or indirect adverse impacts to state-listed or other rare plants are expected under Modified Alternative C.

Under Modified Alternative C, about 45 percent (7,300 acres) of the total land area on Watts Bar Reservoir would be allocated to Zones 2, 5, 6, and 7 where impacts to rare plants would be most likely to occur. However, about 55 percent (8,900 acres) of the total TVA-owned land area would be allocated to Zones 3 and 4 for resource conservation (see Table 2.2-2) where rare plants would be protected. Adoption of Modified Alternative C would result in the least impacts of all the alternatives to the rare plants on Watts Bar Reservoir.

#### **4.3.2. Terrestrial Animals**

Land use allocations (see Table 2.1-2) would have varying degrees of potential effects on rare and sensitive terrestrial animals and sensitive ecological areas (e.g., caves and heron colonies) on the Watts Bar Reservoir lands. In general, the potential to adversely affect these sensitive resources depends on the type of action, specifically, the degree of site or ground disturbance and whether measures were taken to protect sensitive resources.

Adverse effects to sensitive terrestrial animals are not likely to occur on parcels allocated to Zones 3 (Sensitive Resource Management) and 4 (Natural Resource Conservation). These allocations, especially Zone 3, are designed to provide protection to sensitive resources. Proposed actions within these zones would typically be initiated by TVA, and actions that could adversely affect threatened or endangered species would not be considered. Proposed management actions within Zones 3 and 4 would typically be designed to have beneficial effects to rare and sensitive terrestrial animals and ecological areas.

Future actions in Zone 6 (Developed Recreation) parcels could have minimal to extensive impacts to sensitive terrestrial animals and their habitats, depending upon the type of recreation activities implemented. In particular, recreational activities involving extensive vegetation clearing or widespread landscape alteration would have a high potential to adversely affect terrestrial animals, including threatened and endangered species. Other associated activity such as increased boat traffic could also impact these resources.

Future activities on Zone 5 (Industrial) and some Zone 2 (Project Operations) parcels would have a generally high potential to affect sensitive terrestrial animals, their habitats, and any nearby sensitive ecological areas because they would likely involve habitat alterations (e.g., vegetation clearing and ground disturbance and other impacts).

Potential impacts from site-disturbing activities would be reduced through the use of BMPs and other avoidance measures. Such measures would be conditions of TVA approval of land

use requests. Likewise, potential effects to populations of rare terrestrial animals and sensitive ecological areas would be considered during TVA environmental reviews associated with specific project proposals and land use requests. Thus, the allocation of land use under any of the alternatives is not likely to adversely affect threatened or endangered terrestrial animals.

Because caves are extremely fragile and biologically significant, TVA has placed and would continue to maintain protective buffer zones around the known caves on TVA public land on Watts Bar Reservoir.

Gray bat colonies have been documented on only one parcel within the Watts Bar property. This parcel has been designated as Zone 3. This allocation would provide adequate protection to the cave and gray bats. Because gray bats forage over water, land management activities would not have any direct impacts to the gray bat foraging activities.

Impacts to eastern hellbenders are not expected under any of the alternatives, provided adequate BMPs are used when activities occur. Appropriate BMPs would be used to control sedimentation and runoff into rivers and streams that may contain hellbenders.

Habitat for four-toed salamanders, Tennessee cave salamanders, least bitterns, and eastern slender glass lizards does not occur within parcels subject to the proposed land allocations. Therefore, no impacts to these species are expected.

Habitat for sharp-shinned hawks, Bachman's sparrows, barn owls, eastern small-footed bats, southern bog lemmings, southeastern shrews, and northern pine snakes exists within the counties encompassing the Watts Bar Reservoir properties. Although no historic records occur for these species on TVA Watts Bar property, they may occur if suitable habitat occurs on TVA lands.

**Alternative A – No Action:** Under this alternative, TVA would continue to use the 1988 Plan, SMP, and other previous commitments to guide the management of 16,220 acres on the reservoir. Alternative A allocates a greater percentage of land (9.5 percent) for Zone 5 (Industrial) use than Modified Alternatives B (2.2 percent) and C (less than 1 percent). Adoption of this alternative has a greater potential for adverse impacts to rare terrestrial animals than Modified Alternatives B and C.

At the former CRBR site, under Alternative A, Parcels 144 and 146 (totaling 147 acres) would be designated as Zone 3. Another 1,109 acres (i.e., Parcels 142, 143, 145, 147, and 148) would be placed in Zone 5. The two parcels allocated as Zone 3 (Sensitive Resource Management) would be separated, and no protected corridors would connect them. State-listed southeastern shrews and Bachman's sparrows, which have been recorded in the area but not on the parcels, would be locally impacted by development under Alternative A and Modified Alternative B if they occur on these parcels. Southeastern shrews likely occur on the site; however, the species is likely found throughout other TVA Watts Bar properties. Bachman's sparrows have not been recorded from the area since 1987, and the habitat for them at the former CRBR site is marginal. Therefore, potential impacts to populations of these species would be minimal.

Bald eagles and ospreys have been observed roosting and foraging on or near Parcels 142 through 148. Site development under Alternative A would reduce the potential of these parcels as roosting sites. However, other suitable roost sites for these species exist within

the Watts Bar area. Therefore, potential impacts to roosting and foraging sites would be minimal at the former CRBR site.

If Alternative A were chosen, the Grassy Creek HPA (Parcel 146), which protects rare plant habitat and also has habitat for listed animal species, including eastern small-footed bats, could become isolated from other habitats resulting in minimal impacts.

Parcels 295 through 299 (the Lowe Branch area) contain habitat for roosting and nesting bald eagles, although no records are known from here presently. If Alternative A were chosen, 279 acres of land (Parcels 297 and 298) would be allocated to Zone 5. Given the amount of suitable nesting habitat in the vicinity, adoption of Alternative A would not result in adverse impacts to bald eagles.

Adoption of the No Action Alternative would minimally add to the cumulative impacts to protected terrestrial animals of Watts Bar Reservoir. Land activities under Alternative A could result in some additional fragmentation of an already fragmented landscape. Additional shoreline development may begin to limit the roosting and nesting potential of bald eagles, ospreys, and herons. These species may be limited to nesting on isolated islands and on inland sites further isolated from shoreline development.

**Action Alternative B – Modified Development and Recreation:** This alternative would allocate fewer acres of land to Zone 5 (Industrial) than under Alternative A which is somewhat offset by the allocation of Parcels 142, 143, 145, and 148 to Zone 2 (Projects Operations). In general, adoption of this alternative would have less potential to impact wildlife than Alternative A but more potential than Alternative C (see Table 2.2-1). Development of Watts Bar Reservation shoreline under Modified Alternative B could impact areas with potential for bald eagle, osprey, and heron nesting. Project operation site development at the former CRBR site could degrade the suitability of Parcels 142 through 148 as roosting sites for eagles and ospreys.

Similar to Alternative A, the Grassy Creek HPA (Parcel 146), which protects rare plant habitat and also has habitat for listed animal species, including eastern small-footed bats, could become isolated from other habitats. However a buffer zone would be incorporated around the site to reduce these effects. Under this alternative, impacts to species within the Grassy Creek HPA would be minimal.

Adoption of Alternative B would result in similar impacts to the protected terrestrial animals as those described in Alternative A. However with more tracts allocated for Zones 3 (Sensitive Resource Management) and 4 (Natural Resource Conservation) and lesser land area allocated for Zones 5 (Industrial) and 6 (Developed Recreation), adoption of Modified Alternative B would result in fewer impacts than Alternative A. Overall, impacts to protected terrestrial animals would be insignificant.

**Action Alternative C – Modified Conservation and Recreation:** Under this alternative, a greater amount of land would be allocated to Zone 4 (Natural Resource Conservation) than under the other alternatives. About 1,700 to 1,200 more acres would be allocated for natural resource conservation under Modified Alternative C than under Alternative A or Modified Alternative B, respectively. These additional acres would provide more wildlife habitat and foraging sites and would afford wildlife greater mobility. Wildlife and their habitats would be less disturbed under Modified Alternative C than under the other alternatives. No impacts are expected to protected terrestrial animals under this alternative. The selection of Modified

Alternative C is not likely to cause any significant cumulative impacts to sensitive terrestrial animals in the area.

Bald eagles and ospreys would benefit most under Modified Alternative C as compared to the other two alternatives. Under this alternative, over 950 contiguous acres at Lowe Branch would be allocated to Zone 4, which would offer protection to bald eagle and osprey habitat.

Under Modified Alternative C, most of the former 1,200-acre CRBR site would be designated as either Zone 3 or 4. Because extensive site disturbance is not likely within these two zones, sensitive resources at the former CRBR site would be protected. These parcels would form a contiguous wildlife habitat, allowing wildlife to move freely in the area. Thus, adoption of Modified Alternative C would not impact southeastern shrews and Bachman's sparrows on the former CRBR site, if they exist there. Adoption of Alternative C may also offer the best protection to eastern hellbenders that reside in the nearby Clinch River, because activities that could result in erosion would be unlikely. Adoption of Modified Alternative C may also improve the wildlife habitat potential of nearby Grubb and Jones islands by providing a natural buffer along the Clinch River.

#### **4.3.3. Aquatic Animals**

In general, ground disturbance activities that affect riparian areas (and therefore, water quality) have the greatest potential for impacting rare and sensitive aquatic species. That is, the greater the soil disturbance from an activity the greater the potential for adverse impacts to water quality due to runoff and the resulting sediment pollution impacts to habitat. Therefore, in most land use allocation situations Zone 5 (Industrial) or Zone 2 (Project Operations) would have the most potential for impacts to rare and sensitive aquatic species, while Zone 3 (Sensitive Resource Management) and Zone 4 (Natural Resource Conservation) would have the least adverse impacts and would likely have beneficial effects on water quality and aquatic habitat when compared other land uses. The impact from the allocation of other zones would vary depending on the degree of ground disturbance activities.

**Alternative A – No Action:** The federally listed as endangered mollusk (pink mucket) occurs in the Clinch River adjacent to the former CRBR parcels (142, 143, 145, and 148) allocated as industrial. Industrial activities could have some minor impacts to listed aquatic species from typical impacts like storm water runoff or sewage outfalls. Existing environmental review procedures for proposed projects on these parcels (including compliance with ESA) would ensure that TVA actions would not likely adversely affect the habitat of protected aquatic species in adjacent areas.

Ground disturbance activities associated with these Zone 5 (Industrial) parcels could have minor impacts to sensitive aquatic animal species (mollusks and fish) found in the reservoir and tailwater. The current land management plan would have no impact on sensitive aquatic animal species (fish) in flowage areas. Overall, allocating land in this alternative is not likely to adversely affect sensitive aquatic species.

**Action Alternative B – Modified Development and Recreation:** Under this alternative, the former CRBR parcels would be allocated for Zone 2 (Project Operations) with a conservation buffer established along the reservoir. Activities that could occur on this parcel could have minor impacts to protected aquatic species in Watts Bar Reservoir. An environmental review of any proposed development would occur before any future TVA action. Any subsequent

mitigation or conditions of the review would ensure that TVA actions would not likely adversely affect sensitive species or their habitat. Parcel 142 would also retain a riparian buffer with Parcels 138 and 144, thereby offering more protection to aquatic animals and their habitats. Existing environmental review procedures for proposed projects on these parcels (including compliance with ESA) would ensure that TVA actions would not likely adversely affect the habitat of protected aquatic species in adjacent areas.

Parcels 100, 134, and 137, which have protected aquatic species adjacent to them, would be placed under or remain in Zone 4 (Natural Resource Conservation). Parcels 97, 101, 138, 139, 140, 141, and 144 would be placed under or remain in Zone 3 (Sensitive Resource Management). Parcels in both Zones 3 and 4 would provide habitat protection for sensitive aquatic species by minimizing ground disturbance. Parcels 99, 102, 133, 135, and 136 would be placed under either Zone 6 (Developed Recreation) or Zone 7 (Shoreline Access), providing a lesser degree of protection to aquatic species. However, these properties make up a small portion of shoreline in areas where listed species may be present. Future activities on these parcels would undergo environmental review, at which time specific avoidance and mitigation measures needed to protect listed aquatic animal species would be determined. Overall, allocating land in this alternative is not likely to adversely affect sensitive aquatic species.

**Action Alternative C – Modified Conservation and Recreation:** Under this alternative, Parcels 142, 143 and 145 would be allocated to Zone 4 (Natural Resource Conservation). Otherwise this alternative would involve the same parcel allocation changes and potential impacts to listed aquatic species as discussed above in Modified Alternative B.

The cumulative effects of these actions could result in improved riparian buffer zones and may help improve water quality and aquatic habitats downstream of the project areas, including areas where sensitive aquatic species are known to occur. Because this alternative retains the largest amount of acreage in Zone 3 (Sensitive Resource Management) and Zone 4, it would provide the greatest degree of protection to sensitive aquatic species known from Watts Bar Reservoir and its tributary streams.

Future activities on planned parcels would undergo environmental review, at which time specific avoidance and mitigation measures needed to protect listed aquatic animal species would be determined. Overall, allocating land in this alternative is not likely to adversely affect sensitive aquatic species.

#### **4.4. Managed Areas and Sensitive Ecological Sites**

Overall, the development and implementation of TVA reservoir land plans has historically benefited the management and protection of managed areas and ecologically significant sites. TVA land planning allocates designated TVA managed areas that are HPAs, ECSAs, and SWAs into Zone 3 (Sensitive Resource Management). Likewise, WOAs are usually designated into Zone 4 (Natural Resource Conservation). In this environmental review of the alternatives for lands planning on Watts Bar Reservoir only a few specific proposed allocations have the potential to negatively affect this resource area.

Under any of the alternatives, there would be no impact to the NRI-listed streams that are in the vicinity of Watts Bar Reservoir (see Section 3.4). The NRI-listed segments of the Emory River, Little Tennessee River, and Piney River would be upstream to any proposed actions resulting from allocating land on Watts Bar Reservoir and not likely to incur any impacts.

Several TVA natural areas designation changes are proposed under Modified Alternatives B and C:

- Removal of TVA HPA designation from five areas where habitat protection for targeted species is no longer warranted (see Section 3.4.3). These areas would remain in Zone 3 or Zone 4, as appropriate, but with no TVA natural areas status.
- Removal of the “Ecological Study Area” designation from a 254-acre portion of Thiefneck Island, which is no longer used by local research institutions as a study area. This area would remain in Zone 3 but with no TVA natural areas status. This change is not expected to affect the public use or the management of the island.
- Addition of 87.5-acre Parcel 237 to the Whites Creek SWA to expand the opportunities afforded by this natural area.
- Designation of a 27.2-acre portion of Parcel 233 as a TVA HPA to protect its unique vegetation community and the state threatened plant, bay starvine.
- Increased acreage for Grassy Creek TVA HPA from 99 to 265 acres to expand the area of sensitive species and habitat protection.

**Alternative A – No Action:** Under Alternative A, TVA would continue to use the 1988 Plan as the basis for making land use decisions. Under this scenario, land uses would be reviewed on a case-by-case basis, and impacts to management areas would be evaluated as they are proposed. Some management areas no longer meeting the HPA criteria would continue to be protected as HPAs, while other areas meeting the HPA or SWA criteria for needed management and protection would not be designated. Therefore, the No Action Alternative directly impacts management areas by delaying needed changes in the designation of management areas and consequently the temporary loss of TVA resources and management for the benefit of any rare species or habitat. Selection of Alternative A is expected to result in insignificant temporary direct, indirect or cumulative adverse effects to TVA managed areas and ecologically significant sites.

**Action Alternative B – Modified Development and Recreation:** Under this alternative, in compliance with the TVA Land Policy, TVA would provide a compromise between conservation of natural resources and industrial development. Acreage zoned for Sensitive Resource Management and Natural Resource Conservation would increase (see Tables 2.2-1 and 2.2-2) over the No Action Alternative, but would be less than acreage allocated to these two zones in Modified Alternative C.

The proposed increased acreage for Grassy Creek TVA HPA would provide a buffer from surrounding parcels allocated for industrial development in this alternative. Overall, other proposed allocation changes along the reservoir would either not occur adjacent to management areas or would result in no change in the ecological integrity of management areas. While future industrial development of the former CRBR site would impact management objectives and current land uses of the Oak Ridge Reservation WMA, the Oak Ridge National Environmental Research Park Biosphere Reserve, and other USDOE-owned lands because of their proximity to this site, these impacts are considered to be minor and insignificant. Selection of Modified Alternative B is expected to result in beneficial direct, indirect, and cumulative impacts to TVA managed areas and ecologically significant sites.

**Action Alternative C – Modified Conservation and Recreation:** Under this alternative, TVA would allocate more land parcels to Zone 4 (Natural Resource Conservation) and fewer land parcels to Zone 5 (Industrial) (see Tables 2.2-1 and 2.2-2).

Under this alternative, the Zone 2 and 5 parcels of the former CRBR site, noted above under Alternative B, would be allocated to Zone 4. Under this alternative, the site parcels (Parcels 142 through 146 and 148) would be allocated to either Zone 3 or Zone 4 and would provide a contiguous parcel of land for natural resource conservation or protection. These allocations would complement the management objectives for the expanded Grassy Creek TVA HPA and the surrounding land uses managed by USDOE and TWRA. Overall, other proposed allocation changes along the reservoir would either not occur adjacent to management areas or would result in no change in the integrity of managed areas. Selection of Alternative C is expected to result in beneficial direct, indirect, and cumulative impacts to TVA managed areas and ecologically significant sites.

#### **4.5. Water Quality and Shoreline**

Water quality in any particular body of water is influenced by ‘point source’ pollution from specific sources, such as industrial and sewage treatment plants, and nonpoint source (NPS) pollution, which comes from many diffuse sources. Sources of NPS pollution include rainfall or snowmelt runoff, which moves over and through the ground, picking up natural and human-made pollutants. These pollutants may eventually be carried into lakes, rivers, wetlands, and other waters. Water quality is also influenced by the condition of the water entering the water body from upstream sources. Most of the water entering Watts Bar Reservoir (86 percent) comes from sources outside its own immediate watershed. These include the inflows of the Clinch River through Melton Hill Dam (19 percent) and the Tennessee and Little Tennessee rivers through Fort Loudon Dam (67 percent). The remaining 14 percent of the incoming volume is contributed by local inflows from the local 1,834 square miles of the Watts Bar Reservoir watershed, including direct drainage from TVA reservoir properties.

Increased levels of development and intensive use in a watershed would generally have a negative impact on water quality. Development and intensive land uses typically increase the amount of impervious surfaces (i.e., roofs, roads, paved areas), remove vegetation and expose soil to erosion, and increase the amount of NPS pollution. Results of increased development on a water body can include increased turbidity and sedimentation, increased levels of nutrients and bacteria from managed lawns and septic systems, increased levels of chemicals and substances toxic to aquatic life, and increased storm water pollution and velocity.

Increases of nutrient loading from NPS pollution can contribute to higher algal mass in the reservoir, which can lead to decreased levels of DO in the reservoir during periods of stratification. Increases in sediment discharge contribute to the muddy appearance of the water and interfere with the quality of aquatic habitat. Toxic materials such as metals, hydrocarbons, and pesticides in storm water runoff from residential and commercial land uses, streets, and intensively managed lawns can be toxic to aquatic organisms.

The use of BMPs (such as adequate sediment control and the establishment of buffer zones), and low-impact design and management concepts (such as porous pavement and constructed wetlands) can help to reduce some of the negative impacts to water quality from increased levels of development. However, if careful design, construction, and maintenance

practices are not followed, BMPs and low-impact design concepts would be less effective in protecting water quality. Prior to any proposed on-site development, TVA would conduct additional site-specific environmental reviews and recommend appropriate site design and management practices to minimize negative environmental impacts.

**Alternative A – No Action:** Under Alternative A, the extent to which a proposed land use might affect water quality depends on the nature and extent of development possible under the 1988 Plan allocations. Proposed land uses under the 1988 Plan are somewhat less restrictive than the proposed new zones. Future industrial and recreational developments on either TVA or private property have the potential to negatively impact water quality.

Under this alternative, any proposed use of TVA public land would be evaluated on a case-by-case basis to ensure it fits the allocated use and that the proposed use serves the needs and interests of the public, as well as meeting the Land Policy adopted in 2006. Six thousand seven hundred eighty-one acres or 42.1 percent of the TVA land on the reservoir would be allocated to Zones 3 and 4; however, of all the alternatives, this would be the least amount of land protected by conservation uses (Zones 3 and 4). Further, this alternative would have the most amount of land allocated to uses with the potential for greater development and adverse impacts to water quality (Zones 5 and 6).

The use of vegetated buffer zones and other BMPs would reduce negative effects of riparian vegetation removal associated with development. In addition, protective measures presently in place under TVA's land use approval process and SMI (TVA 1998) would substantially offset impacts of development of private property. With appropriate environmental reviews and use of any identified impact reductions methods, including existing BMPs, future activities under Alternative A would not significantly impact the reservoir's water quality.

**Action Alternative B – Modified Development and Recreation:** Under Modified Alternative B, approximately 800 acres (i.e., all or a portion of Parcels 15a, 16a, 17, 94, 98, 140, 144, 146, 159, 181a, 207a, 218, 240, 255, and 299) would move from a more developed status to a less developed status (e. g.; either a Zone 5, or 6 to a Zone 3 or 4). In addition, under Alternative B, 7,637 acres, or 47 percent of the public lands would be allocated to Zones 3 and 4, which are more protected.

Also under this alternative, most of Parcel 218 would change from a Zone 5 to a Zone 4 with the existing industrial and barge terminal remaining as Zone 5 as Parcel 218a. The present impacts from the existing site would continue; however, the future industrial use proposed for this site under the No Action Alternative would not occur. Therefore, the Alternative B allocation for Parcel 218 would have fewer impacts to water quality compared to the No Action Alternative.

While Modified Alternative B is not as conservation focused as Modified Alternative C, it would increase the total amount of land in more protected zones in comparison to the No Action Alternative, leading to an overall beneficial effect to water quality conditions.

**Action Alternative C – Modified Conservation and Recreation:** In general, management of land in less developed status throughout a watershed impacts water quality in a positive manner. Under Alternative C, about 2,100 acres (i.e., all or a portion of Parcels 9, 10, 15a, 16a, 17, 94, 98, 140, 142, 143, 144, 145, 146, 148, 159, 172, 181a, 207a, 218, 240, 255, 297, 298, and 299) would move from a more developed zone status (Zone 4, 5, or 6) to a

more protected zone status (i.e., Zone 3 or 4). In addition, under Alternative C, 8,878 acres, or 55 percent of the public lands would be allocated to Zones 3 and 4.

Allocation of these parcels to a more protected status would have a beneficial impact to local water quality in proximity to these parcels. As more watershed land develops (both on reservoir and off reservoir), it is likely that preserving less developed lands will become increasingly important to maintaining water quality in the reservoir. However, in consideration of all the impacts to water quality from sources outside of reservoir lands and the relatively small amount of TVA public lands throughout the watershed, allocation of these lands under Modified Alternative C would not likely impact the cumulative water quality in the reservoir.

#### **4.6. Aquatic Ecology**

Impacts to aquatic resources are directly related to changes of the existing natural shoreline conditions and water quality. Aquatic resources can be impacted by changes to shoreline (riparian) vegetation, vegetation on back-lying lands, and land uses. Shoreline vegetation, particularly trees, provides shade, organic matter (a food source for benthic macroinvertebrates), and shoreline stabilization. Trees also provide aquatic habitat (cover) as they fall into the reservoir. Shoreline vegetation and vegetation on back-lying land provide a riparian zone that functions to filter pollutants from surface runoff while stabilizing erodible soils. Therefore, there would likely be some degradation of aquatic habitats associated with development along the reservoir shoreline.

The littoral (shoreline) zone is the most productive habitat of a reservoir environment. Fish utilize littoral habitats because of their spawning requirements, the availability of submerged cover (i.e., rocks, logs, brush, etc.), and the presence of smaller fish and aquatic invertebrates as a food source for the fingerlings. In the future, the extent of woody shoreline cover on parcels allocated to Zone 3 (Sensitive Resource Management) and Zone 4 (Natural Resource Conservation) is expected to increase as natural succession on these lands continues.

Shoreline development can alter the physical characteristics of adjacent fish and aquatic invertebrate habitats, which can result in dramatic changes in the quality of the fish community. One of the most detrimental effects of shoreline development is the removal of riparian zone vegetation, particularly trees. Removal of this vegetation can result in loss of fish cover and shade, which elevates surface water temperatures. Also, fish spawning habitat, such as gravel and woody cover, can be rendered unsuitable by excessive siltation and erosion, which can occur when riparian vegetation is cleared. Additionally, shoreline development often results in the removal of existing aquatic habitat (i.e., stumps, brush, logs, boulders, etc.) in association with the construction of water use facilities.

**Alternative A – No Action:** Under Alternative A, the least acres of TVA public land would be allocated to Zone 3 (Sensitive Resource Management) and Zone 4 (Natural Resource Conservation), and the most acres would be allocated to Zone 5 (Industrial) and Zone 6 (Developed Recreation) (Table 2.2-1).

Use of TVA public land below the 745-foot contour has often been controlled by landrights of the adjacent property owners. As a result, various development activities below that contour, as well as private development of back-lying land, have resulted in loss of riparian woody vegetation at some sites. Clearing of trees and brush may have accelerated shoreline erosion, thereby impacting water quality and aquatic ecology. However, in some cases

where shorelines lack woody vegetation and aquatic habitat is poor, placement of shoreline stabilization structures, such as riprap or fixed docks, has improved aquatic habitat.

Industrial activities anticipated on Zone 5 parcels could have some minor impacts to aquatic species from typical impacts like storm water runoff, sewage outfalls, or the construction and operation of barge facilities. Future environmental reviews for any proposed projects on these parcels would ensure that TVA actions would not likely adversely affect the habitat aquatic species in adjacent areas. Ground disturbance activities associated with these Zone 5 parcels could have minor impacts to aquatic animals found in the reservoir and tailwater.

The 1988 Plan would have no change in impacts on aquatic animal species (fish) in the flowage areas as it proposes no change in their management. Under the No Action Alternative, the quality of aquatic habitats associated with various land use allocations would remain similar to the existing conditions. Overall, allocating land in this alternative is not likely to adversely affect the aquatic ecology of the reservoir.

**Action Alternative B – Modified Development and Recreation:** Under this alternative, more acres of TVA public land would be allocated to Zone 3 (Sensitive Resource Management) and Zone 4 (Natural Resource Conservation) than Alternative A, and fewer acres would be allocated to Zone 5 (Industrial) and Zone 6 (Recreation) than Alternative A (Table 2.2-1).

Approval requirements for proposed developments, such as commercial recreation areas and water access sites, could require protection of important natural features. The quality of shoreline aquatic habitats would improve with the protective zones mentioned above through the enhanced opportunity for natural succession, as well as protective vegetation management now required through TVA's SMP standards for private water use facilities. Narrow shoreline strips of TVA land fronting Zone 5 or Zone 6 lands can also be maintained in a natural condition since industrial and commercial recreation development seldom requires extensive clearing of shoreline vegetation.

However, under certain circumstances (e.g., denuded banks) construction of docks and piers, while having short-term negative impacts, can increase fish habitat. Fixed docks and piers, especially those with pilings driven into the substrate, provide shade and cover for fish and aquatic invertebrates. Fixed docks can actually enhance the shoreline aquatic habitat when combined with habitat improvements such as anchored brush, rock aggregations, log cribs, and/or other forms of cover.

Partial loss of riparian habitat and clearing of land beyond the shoreline management zone could allow runoff of soils, nutrients, fertilizers, and herbicides into streams and wet weather conveyances leading to Watts Bar Reservoir, thereby degrading aquatic habitats.

Aquatic ecology would likely improve under Modified Alternative B because more lands would be placed in Zones 3 and 4 designations than under the 1988 Plan, thereby protecting important aquatic habitats along the shoreline.

**Action Alternative C – Modified Conservation and Recreation:** Under this alternative, the most number of acres of TVA public land would be allocated to Zone 3 (Sensitive Resource Management) and Zone 4 (Natural Resource Conservation), and the least acres would be allocated to Zone 5 (Industrial) and Zone 6 (Recreation) (Table 2.2-1).

Forest, agricultural, and wildlife management activities in Zone 4 could potentially affect aquatic ecology through runoff of nutrients and soils. These potential impacts would be avoided through careful planning to limit the sizes of activities and through the use of BMPs during implementation.

Development of the private lands on the reservoir shoreline will likely continue under any alternative. However, somewhat more development and shoreline disturbances are likely under Alternative A and Modified Alternative B than under Modified Alternative C; therefore, the least impacts to aquatic ecology would be expected under Modified Alternative C. Aquatic ecology would likely improve under Modified Alternative C because the greatest amount of lands would be placed in Zones 3 and 4 designations, and the fewest acres would be allocated to lands where development may occur.

## **4.7. Wetlands and Floodplains**

### **4.7.1. Wetlands**

All wetlands, regardless of their ecological significance, are subject to various state and federal mandates and regulations. Specifically, regulatory protection is extended to certain wetlands under Section 404 of the Clean Water Act. In many cases, wetlands are also protected under the Aquatic Resources Alteration Permit program administered by the Tennessee Department of Environmental Protection. Also, TVA is subject to EO 11990 (Protection of Wetlands), which mandates that federal agencies take such actions as may be necessary to “minimize the destruction, loss or degradation of wetlands, and to preserve and enhance the natural and beneficial values of wetlands...” Generally, EO 11990 is relevant to TVA actions involving the disposal of land or the granting of approvals of water use facilities pursuant to Section 26a of the TVA Act. Consistent with the requirements of EO 11990, to the extent practicable, TVA takes measures to either avoid adverse wetland impacts or mitigate unavoidable effects to wetlands as a result of such actions.

However, even with these regulatory measures in place, adverse effects to wetlands could occur. These effects usually occur on small wetland areas, and some activities in wetlands may be permissible under the various protective regulations. Such activities include wetland fill, vegetation removal, and alteration of wetland hydrology. In most instances, compensatory mitigation would be required under the regulations for impacts to jurisdictional wetlands.

The potential for adverse effects to wetlands is generally associated with land use, especially in cases involving land-disturbing activities. In general, wetlands are best protected in lands allocated to Zone 3 (Sensitive Resource Management) and Zone 4 (Natural Resource Conservation). Development activities occurring on lands allocated to Zone 5 (Industrial) and Zone 6 (Developed Recreation) could potentially adversely affect wetlands. The degree of the potential wetland effect would depend on the amount of site disturbance associated with the proposed recreational or industrial facility, as well as the type, location, and condition of wetlands present on the site. However, these potential impacts are subject to both state and federal law, and they must be avoided and minimized where practicable. Despite regulatory mechanisms for wetland protection, there is the potential for both a temporary loss of wetland function as well as a cumulative, incremental loss of wetlands associated with small-scale wetland loss and alteration.

**Alternative A – No Action:** Under the No Action Alternative, TVA would continue to use the 1988 Plan, SMP, and the TVA Land Policy to guide decision-making regarding land use on TVA public land surrounding Watts Bar Reservoir. Land use requests within those parcels containing wetlands and allocated under the 1988 Plan for wetland wildlife management, waterfowl management, and HPAs would be evaluated to ensure the request would protect the integrity of wetland resources. On unplanned marginal strip parcels, potential impacts to wetlands would be regulated under state and federal law. In the event that site-specific wetland impacts appear likely, mitigation requirements could be required to offset any long-term loss of wetland functions. However, there could be some short-term loss of wetland functions during the time required for the mitigated wetland to mature. On unplanned marginal strip parcels, there may also be some incremental clearing of wetland vegetation by landowners. This could result in some minor, cumulative loss of wetland function. These functions include loss of shoreline stabilization capability, loss of ability to provide wildlife habitat, and loss of plant community diversity. Although some direct effects to wetland resources and functions could occur under Alternative A, these are expected to be minor and insignificant. Similarly, some long-term, cumulative effects are also possible, but these are also likely to be insignificant.

**Action Alternative B – Modified Development and Recreation:** Under this alternative, a lesser percentage of land would be allocated to potential industrial development (Zone 2 and 5) than under Alternative A. Thus, based on reasons stated above, there would be a slightly lesser potential for adverse effects to wetlands under this alternative as compared to Alternative A.

Any land use requests involving development proposals would be subjected to an environmental review. As a part of that review, a field survey would be performed to further determine the presence and quality of any on-site wetlands, as well as other sensitive biological or cultural resources. Any land use requests for parcels containing wetlands would be evaluated to ensure the proposed request would protect the integrity of wetland resources.

Under this alternative, potential effects to any wetlands on these parcels would be similar to those mentioned under Alternative A. An exception is the proposed extension of the shoreline buffer (Parcel 144) at the former CRBR site which would offer protection to the wetlands in that vicinity. Because there would be very minimal change in acreage designated as Zone 7 (Shoreline Access), potential cumulative effects to wetlands on these Zone 7 properties would be the same as those anticipated under Alternative A. Although there is a potential for some impacts to wetlands, significant wetland impacts are unlikely due to regulatory protection and required mitigation. Thus, potential direct, indirect, and cumulative effects to wetlands under Modified Alternative B are expected to be minor and insignificant.

**Action Alternative C – Modified Conservation and Recreation:** Under this alternative, the greatest amount of land would be allocated to Zone 3 (Sensitive Resource Management) and Zone 4 (Natural Resource Conservation). Importantly when compared to the other alternatives, some parcels would change from a Zone 5 (Industrial), Zone 2 (Project Operations) or Zone 6 (Developed Recreation) allocation to a Zone 4. This change would afford greater protection to wetlands in these parcels as existing wetlands on these parcels would be protected according to existing Zone 3 and 4 criteria. As with the Modified Alternative B, the proposed extension of the shoreline buffer (Parcel 144) at the former CRBR site would offer protection to wetlands in that vicinity.

As is the case under the other alternatives, any land use requests involving a change in use allocation would be subjected to an environmental review. Also, in all cases, wetland surveys would be performed to determine and verify the presence and quality of wetlands on the subject parcels as part of the environmental review for the particular land use request. Wetlands present within any of the allocation zones would be subject to state and federal law, and significant wetland impacts are regulated under these programs. In site-specific cases where some wetland impacts could occur, required mitigation requirements would offset any long-term loss of wetland functions. However, there could be some short-term loss of wetland functions during the time required for the mitigated wetland to mature. Some incremental clearing of wetland vegetation by landowners could occur on parcels designated as Zone 7 (Shoreline Access). Such activities may result in some minor, cumulative loss of wetland function, as described above. However, potential effects to wetlands resulting from the adoption of Modified Alternative C are expected to be minor and insignificant.

#### **4.7.2. Floodplains**

Although there are impacts to floodplains of varying degrees under all alternatives, potential impacts to floodplain values would be insignificant.

**Alternative A – No Action:** Under Alternative A, the development, and/or management of properties would proceed under the 1988 Plan, and evaluations would be done individually to ensure consistency with EO 11988. Potential development would generally consist of water use facilities and other repetitive actions in the floodplain that would result in minor floodplain impacts.

**Action Alternative B – Modified Development and Recreation:** Under this alternative, the potential adverse impacts to natural and beneficial floodplain values would be slightly less than those expected under Alternative A, because less land would be allocated for industrial and recreation development and more land would be allocated to sensitive and natural resource uses.

**Action Alternative C – Modified Conservation and Recreation:** The potential adverse impacts to natural and beneficial floodplain values under Alternative C would be less than those under Alternative A or Modified Alternative B because a substantial portion of the available land would be allocated for resource management and conservation activities.

### **4.8. Land Use and Prime Farmland**

#### **4.8.1. Land Use**

TVA manages public land on Watts Bar Reservoir to protect and enhance natural resources, generate prosperity, and improve the quality of life in the Tennessee Valley. TVA public land is used for public and commercial recreation, industrial development, natural resource management, and a variety of other community needs, often with adjoining or nearby private lands. Consequently, TVA is aware of at least six relatively large developments on Watts Bar Reservoir (see Table 4.8-1) in various stages of completion that require TVA's approval for Section 26a or land use permits. In addition to these developments, TVA anticipates that two additional private marinas could be proposed at the upper end of Watts Bar. These proposed developments would have an impact on the use of adjoining and nearby TVA lands.

**Table 4.8-1. New Private Developments on Watts Bar Reservoir**

Name	Location	Planned Development	Size (acres)
The Docks at Caney Creek - Roane County	TRM 561.5 R, adjacent to TVA shoreline access land and TVA Tract 207 (Zone 2)	200 homes total, 42 of which adjoin TVA property, private docks	94
Emerald Pointe - Roane County	TRM 560.6 R, adjacent to TVA shoreline access property	53 lots, 44 of which are interior; community slips for interior lot owners	58
Grande Vista Bay - Roane County	Just upstream of Thief Neck Island, adjacent to TVA shoreline access property, property that was transferred to TWRA, and TVA Parcel 213 (Zone 2)	160 lakefront lots with plans for multiple community docks for interior lots	1,200
Ladd Landing - Roane County	Clinch River, approximately 2 river miles east of the Kingston Fossil Plant, adjacent to TVA shoreline access property; former TVA property transferred to TWRA, and Parcel 162	Mixture of single family, multifamily, and light commercial development, private docks	800
Rarity Ridge - Roane County	West of the former K-25 site in Oak Ridge, on the south side of Watts Bar Reservoir, previously owned by USDOE	Mixture of single family, multifamily, and light commercial development, private docks	2,000
Tennessee National - Loudon County	Tennessee River in Loudon County, including a parcel of TVA Parcel 98 in the new plan (Preallocated for Zone 4.)	Mixture of single family, multifamily, and docks, water intake, and land use agreement	1,400
<b>Total Acres</b>			<b>5,552</b>

TVA would require that all these developments comply with SMP standards. These standards minimize the environmental impacts of residential development (TVA 1998) such as water quality, aquatic ecology, aesthetics, and other impacts.

On Watts Bar Reservoir, several large tracts of land allocated for industrial and commercial development, such as the former CRBR site and Lowe Branch area, have remained undeveloped. Over the course of several decades, these areas have become quality terrestrial habitat for native wildlife. Consequently, they have become important sources of dispersed recreation, such as hunting, wildlife observation, camping, and trails. Loss of this interim use when the original allocated land use is developed may be perceived by dispersed recreation users as a loss of public lands and the quality of life in the area.

Under Modified Alternatives B and C, TVA has proposed changes and allocations that are compatible with the local zoning ordinances of the cities of Harriman, Kingston, Loudon, and Spring City for TVA public land in and adjoining to land within their city limits. Proposed new development would result in changes to the 1988 Plan. The action alternatives would include the planning of an additional 6,000 acres not included in the 1988 Plan. The acreage of land use change resulting under each alternative is listed in Table 2.2-1. Parcels that would result in land use changes under Alternatives B and C are listed in Table 2.1-3. The new TVA Land Policy would be implemented under all alternatives.

Over a recent 15 year period in the Watts Bar area, except for Meigs County, acreage in county farms has increased by an average of about 8 percent (see Section 4.13.1, Socioeconomics). However, in Meigs County, the acreage in county farms has decreased by 11 percent or 6,031 acres. Information in the Socioeconomics Section (Section 3.13) indicates that the counties surrounding the Watts Bar Reservoir have grown faster in the past 10 years than either the state or the nation with projections that this faster growth is likely to continue for the next several years.

**Alternative A – No Action:** Under the No Action Alternative (Alternative A), TVA would continue to use the 1988 Plan that currently guides land use decisions affecting TVA lands surrounding Watts Bar Reservoir (see Section 2.1.1). All land use requests would be evaluated for consistency with the 1988 Plan and TVA's Land Policy and would undergo appropriate environmental and administrative reviews before being denied or approved. TVA Board approval would continue to be required for all uses that are incompatible with the plan.

The 1988 Plan used 19 allocation categories to manage 10,387 acres (see Table 2.1-1). Under Alternative A, these categories would continue to be used by TVA as the basis for future land use decisions. The 1988 Plan did not allocate residential shoreline or other marginal shoreline strips along the reservoir nor did it include TVA project lands at KIF, WBN, Watts Bar Fossil Plant (retired), and Watts Bar Dam Reservation. Also, the 1988 Plan did not include land transferred to other agencies under easement or other agreements that TVA still owns. Therefore under Alternative A, although some management would continue to be provided by TVA's SMP, the Watts Bar residential shoreline and marginal shoreline strips would continue to have no formal land use allocation. Activities on TVA project lands would continue to be planned independently by their respective TVA operative.

Under Alternative A, there would be minor changes to current land use. Land currently allocated for industrial use (1,544 acres) and developed recreation (1,998 acres) would eventually be developed. Direct and indirect impacts to land use would remain nearly the same without the changes or the new planning of additional reservoir lands proposed under the action alternatives. Therefore, the greatest impact of all the alternatives would occur under Alternative A.

**Action Alternative B – Modified Development and Recreation:** Under this alternative, developed recreation and industrial development would be promoted by allocating appropriate parcels of TVA public land to Zones 2, 5, and 6. When compared to the No Action Alternative, this would result in about 1,200 fewer acres being allocated for industrial development, which would decrease the total acreage in Zone 5 to 357 acres. Therefore, the number of land use agreements for industrial use such as industrial parks and barge terminals could decrease in the future. The smaller area available for industrial development would be offset in part by the addition of 760 acres of the former CRBR site as new Project Operations (Zone 2) which could have future TVA energy production facilities.

Under this alternative, Natural Resource Conservation (Zone 4) would increase about 500 acres to 3,857 acres, and Developed Recreation (Zone 6) would decrease about 400 acres to 1,552 acres. Land no longer required for commercial landings, protection of natural resources, or commercial recreation would be designated to other uses. Reciprocally, land required for specific uses or best suited to support TVA land planning goals are proposed to be allocated to navigation safety landings and harbors, recreation areas, and to protect sensitive resources. Although natural resource conservation and dispersed recreation would

predominate on the reservoir, economic development and developed recreation would occur on TVA land where those activities would have an opportunity for success.

Under Modified Alternative B, there would be moderate changes to overall current land use when compared to Alternative A, by the allocation of additional land to Natural Resource Conservation (Zone 4) from Developed Recreation and Industrial development land. Direct and indirect adverse impacts to land use would be less than Alternative A and would include the benefit of the proposed changes and planning of additional reservoir lands.

**Action Alternative C – Modified Conservation and Recreation:** Under this alternative, the conservation of natural resources and dispersed recreation would be promoted by allocating parcels of public land to Zone 4. When compared with the No Action Alternative, these allocation differences from Alternative A would result in an additional 1,700 acres to be included in Zone 4 for natural resource conservation. As a result, the total acreage allocated in Zone 4 would increase to 5,098 acres. Changes under Modified Alternative C would result in a significant decrease in total acreage of industrial development and to a lesser degree, developed recreation. The total acreage currently allocated for Zone 5 would include only the 77 acres of property already committed. As a result, 95 percent of the total acreage previously allocated to economic development in the 1988 Plan would be allocated to Zone 4, Natural Resource Conservation or to Zone 3, Sensitive Resource Protection. The land allocated for Developed Recreation (Zone 6) would also decrease by about 550 acres to 1,351 acres. Impacts to natural resources and recreation are further discussed in Sections 4.2 and 4.11.

Modified Alternative C proposes the greatest change to current overall use when compared to Alternative A and Modified Alternative B by the allocation of additional land to Natural Resource Conservation (Zone 4) from Developed Recreation and Industrial Development land. Direct and indirect adverse impacts to land use would be less than Alternative A and Modified Alternative B and would include the benefit of the proposed changes and planning of additional reservoir lands.

**Cumulative Land Use Impacts:** TVA has sold or transferred over 500,000 acres of land over the life of the agency (see Section 3.8.1). Currently, the majority of the remaining TVA land (75 percent) is managed for natural resource conservation and sensitive resource management and a total of about 11 percent of TVA reservoir land is managed for developed recreation or economic/industrial development (see Table 4.8-2).

**Table 4.8-2. TVA Land Use Valleywide**

<b>TVA Land Use</b>	<b>Thousand Acres</b>	<b>Percent of Total</b>
Natural Resource Conservation and Sensitive Resource Management	221	75.4
Developed Recreation	21	7.2
Shoreline Access	17	5.8
Not Currently Planned	17	5.8
Project Operations	13	4.4
Economic/Industrial Development	4	1.4
Total	293	100

Cumulative land use impacts in the Watts Bar region are ongoing and likely to continue in the foreseeable future, regardless of any of the alternatives selected. This is because of the continued population increase of the area and the expected accompanying residential and commercial growth. An important part of this land development is likely to occur on private land that borders TVA reservoir properties, where an estimated 17,000 acres of land is currently platted for residential subdivisions. It is estimated that about one-half of those 17,000 acres (8,500 acres) are all already developed and continue to be developed throughout the Watts Bar Reservoir area. In addition, TVA is aware of approximately 5,500 acres of privately owned land bordering the reservoir that is under development or proposed in the near future (see Table 4.8-1). In consequence, all types of public uses on TVA land are likely to increase.

Thirty-five percent of the 65,000 acres of land within 0.25 mile of Watts Bar Reservoir is private land currently planned for growth. In addition, 54 percent of the land around Watts Bar Reservoir is private land and, along with about 47 percent of the shoreline, is currently available for development at some point in the future. All TVA public lands comprise about 11 percent of the land around Watts Bar Reservoir with only about half designated to a planned use. Therefore, much private land is available for projected growth around the reservoir, far outstripping any potential use of TVA land for development and making the TVA land increasingly important as a public resource as development occurs.

Under all the alternatives, cumulative impacts to the use of land in the area would be minor and insignificant, although the increases in the use of public land for sensitive resource protection and natural resource conservation proposed in Modified Alternatives B and C may be beneficial over the long-term availability of public lands in the Watts Bar region.

**4.8.2. Prime Farmland**

Effects to prime farmlands can occur when actual or designated land uses are changed to other uses or designations, such as industrial or recreation development, that preclude the

property being used for agricultural purposes. Generally, those properties located in Zone 3 (Sensitive Resource Management) and Zone 4 (Natural Resource Conservation) are not subject to impacts to prime farmland, since they would be retained in a relatively 'natural' state and would not be converted to other land uses preserving any occurring prime farmland. However, parcels allocated to Zones 2, 5, 6, or 7 are subject to potential adverse effects to prime farmland because farmland in these zones could be devoted to other, 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 farmlands.
- Zone 3 (Sensitive Resource Protection) and Zone 4 (Natural Resource Conservation) by their function have little or no soil disturbance and would have no adverse impacts to Prime farmlands.
- 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 properties 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 possible 260) are given greater consideration of protection so that agricultural use can be preserved. Potential direct impacts on acreage of prime farmland are shown in Table 4.8-3.

**Table 4.8-3. Prime Farmland Acreage Potentially Affected Under Each Alternative**

Zone	Modified Alternative A			Modified Alternative B			Modified Alternative C		
	Prime Farmland (Acres)	Total Zone Allocation (Acres)	Percent of Zone	Prime Farmland (Acres)	Total Zone Allocation (Acres)	Percent of Zone	Prime Farmland (Acres)	Total Zone Allocation (Acres)	Percent of Zone
2	234	3587	6.5	262	4371	6.0	244	3611	6.8
3	889	3472	25.6	900	3780	23.8	900	3780	23.8
4	632	3300	19.2	712	3857	18.5	786	5098	15.4
5	139	1544	9.0	66	357	18.5	32	77	41.6
6	278	1998	13.9	233	1552	15.0	211	1351	15.6
7	699	2319	30.1	698	2303	30.3	698	2303	30.3
Total	2871	16220	17.7	2871	16220	17.7	2871	16220	17.7

**Alternative A – No Action:** Under the No Action Alternative, prime farmland could be converted to land uses incompatible with agriculture. There are 1,350 acres of prime farmland allocated to Zones 2, 5, 6, and unplanned marginal strip parcels (Zone 7). There would be no impacts to prime farmland in those parcels allocated to Zone 3 (Sensitive resource Protection) and Zone 4 (Natural Resource Conservation) or to those lands intended for undeveloped recreation and shoreline access. However, there could be impacts to the prime farmlands in those parcels where soil disturbance is expected, such as those allocated to Zone 5 (Industrial), to Zone 6 (Developed Recreation), and to a less degree on Zone 7 (Shoreline Access) and Zone 2 (Project Operations). A list of these parcels can be found in Table D-11, Appendix D.

The largest acreage of prime farmland in occur on Parcels 88, and 78 which are part of the Paint Rock Wildlife Refuge (Parcels 88 and 78), and on or near Watts Bar Dam Reservation (Parcels 3 and 285).

Those parcels allocated for recreation (i.e., allocated to Zone 6) that contain the most prime farmland are Parcels 201, 5, and 68 (see Table D-11). Parcel 201, which is partially adjacent to the Roane County Park, contains 25 acres of prime farmland. Parcel 5, Meigs County Park, has 22 acres of prime farmland, and Parcel 68, which is adjacent to the Southwest Point Golf Course, contains 20 acres of prime farmland. Any development on these parcels would require a farmland rating.

The retained strips of TVA land along the waterfront are allocated to Shoreline Access (Zone 7) (see Table D-11). Parcel 212 covers 76 acres and extends along portions of the shoreline from Bullet Branch past Pinoak Pointe and Lock Haven Estates past Johnson Bend to McDaniel Hollow. This stretch of land contains 26 acres of prime farmland soils, and 24 acres are classified as agricultural land use. Parcel 265, which borders Estes Woods Estate, has 43 acres of prime farmland on 51 total acres.

Adoption of Alternative A would have the most potential to negatively affect prime farmland, since the greatest amount of land would be impacted. Under Alternative A, 651 acres of prime farmland are allocated for project operations, industrial or recreation development (see Table 4.8-3). Converting this land would have negative impacts due to land use changes that are incompatible with agriculture. However, only about 0.2 percent of the total prime

farmland in the four counties of Watts Bar Reservoir would be affected, and any future impacts would be expected to be insignificant.

**Action Alternative B – Modified Development and Recreation:** Under Modified Alternative B, 561 acres of prime farmland are allocated for project operations, industrial or recreation development (see Table 4.8-3). Therefore, about 90 fewer acres of prime farmland would eventually be adversely impacted (see Table 4.8-3) as compared to the no action alternative. Implementation of Alternative B would have slightly fewer potential impacts to prime farmland than would Alternative A. These impacts are expected to be insignificant because this acreage comprises only about 0.2 percent of the total prime farmland in the four counties, i.e., 125,964 acres (see Table 3.8-4).

**Action Alternative C – Modified Conservation and Recreation:** Under Modified Alternative C, 486 acres of prime farmland are allocated for project operations, industrial or recreation development (see Table 4.8-3). With this alternative the least amount of prime farmland would eventually be adversely impacted (see Table 4.8-3) and about 1,687 acres of prime farmland would be protected by allocation to Zone 3 (Sensitive Resource Protection) and Zone 4 (Natural Resource Conservation).

Implementation of Modified Alternative C would have the least potential to negatively affect prime farmland; and potential effects of the large amounts of land allocated for Natural Resource Conservation or Sensitive Resource Protection would be beneficial. Overall, implementation of this alternative would have beneficial effects on prime farmland in the project area.

**Cumulative Impacts:** Development of TVA land surrounding Watts Bar Reservoir is not likely to produce any significant indirect or cumulative impacts to farmland. On a countywide basis, the percentage of agricultural land in the four-county area ranges from 26.1 to 54.6 percent (see Table 3.8-4). The current trend indicates that farm size is increasing in all counties except Meigs (see Table 3.8-3). Land in all four counties with properties to be classified as prime farmland totals 125,964 acres (Table 3.8-4). Prime farmland soils within the project area total 2,871 acres, and a maximum of 1,350 acres is subject to potential development (see Table 4.8-3), which is about 1 percent of the combined acreage in the four counties. Thus, cumulative impacts to farmland are not expected to be significant.

#### 4.9. Cultural Resources

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

A Programmatic Agreement (PA) was executed in October 2005 between TVA and the Advisory Council on Historic Resources and the Tennessee SHPO regarding the implementation of TVA Reservoir Land Management Plans for identification, evaluation, and treatment of historic properties that are eligible for inclusion on the NRHP (see Appendix G). 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.

#### **4.9.1. Archaeological Resources**

Archaeological resources are widespread on the Watts Bar Reservoir properties and have been identified in each of the seven allocation zones. Before approval of future activities on a specific parcel, additional archaeological investigations to identify and evaluate historic resources would be required unless the parcel has been previously investigated and no archaeological resources with a potential to provide information important to history or prehistory were identified. Approximately 16 percent of the area involved in this Land Plan has been subjected to intensive survey.

Under any of the alternatives, the land that has not been investigated will require a systematic survey in order to identify and evaluate any archaeological resources that may exist. If a land use proposal has the potential to affect archaeological resources, then TVA will abide by the stipulations set forth in the PA.

**Alternative A – No Action:** Under this alternative, site-specific activities proposed in the future would be approved or denied according to the significance of the resource. 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 cultural resources would be insignificant.

**Action Alternative B – Modified Development and Recreation:** Under Modified Alternative B, TVA would decrease the acreage allocated to Zone 5 (Industrial) by about 1,187 acres. The decrease in land allocated to Zone 5 would be offset by the allocation of 760 acres to Zone 2 (Project Operations) at the former CRBR site. Zone 6 (Developed Recreation) would decrease by about 381 (see Table 2.2-1). Conversely, the acreage dedicated to Zone 4 (Natural Resource Conservation) would increase about 446 acres, as compared to Alternative A. The acreage allocated to Zone 3 (Sensitive Resource Management), and Zone 7 (Shoreline Access) would be similar as under Alternative A.

Because of the likelihood of soil disturbance, the allocation of parcels to Zones 5 and 2 pose the greatest potential for affecting archaeological resources. Land use requests, and resultant activities on Zone 6 (Developed Recreation) parcels could also affect archaeological resources for similar reasons, but to a slightly lesser degree. Under Modified Alternative B, approximately 38 percent (by acreage) of the known archaeological resources on the proposed allocations would be placed in preservation or conservation (i.e., allocated to Zone 3 and Zone 4). The remaining 62 percent of the acreage would be allocated for purposes of development and recreation (i.e., 50 percent Zone 5, and 12 percent Zone 6). Thus, there is a potential for effects to archaeological resources under Modified Alternative B. However, because appropriate mitigation would be implemented under the stipulations of the PA, potential effects would be insignificant.

**Action Alternative C – Modified Conservation and Recreation:** Under Modified Alternative C, TVA would help promote conservation of natural resources and dispersed recreation by allocating about 55 percent of the TVA land on Watts Bar Reservoir to Zone 3 and Zone 4. Under Alternative C, less than 1 percent of the land would remain as Zone 5 and about 8 percent as Zone 6, resulting in the least potential impacts to archaeological resources of all the alternatives. All of the known archaeological resources within the proposed allocations on Table 2.1-3 would be placed in preservation and conservation (i.e., in Zone 3 and Zone 4). TVA would be selective in entertaining any land use requests within Zone 3 parcels in order to ensure protection of sensitive resources, including archaeological resources. Similarly, land use requests and proposed resource management actions within Zone 4 parcels would be scrutinized to prevent adverse effects to any sensitive resources present. Thus, adverse effects to archaeological resources are not likely to occur within Zone 3 or 4, and the potential for such effects would be less under Modified Alternative C than the other two alternatives. Because any potential adverse effects to archaeological resources would require appropriate mitigation under the PA, any such effects would be insignificant.

Overall, adoption of Modified Alternative B would have a greater potential to affect archaeological resources than Modified Alternative C. By the same token, Modified Alternative B would have a lesser impact on cultural resources than Alternative A. Under Modified Alternative C, more acreage would be allocated to Natural Resource Conservation and Sensitive Resource Management than under Alternative A or Modified Alternative B. Because of the types of activities expected within this zone, the potential for adverse effects to archaeological resources is low.

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

The historic structures data used for this study was derived primarily from the survey done for the 1988 Plan. For any proposal on a given parcel (regardless of zone allocation), a field check of the current status of these historic resources would be accomplished to determine the significance of the resource and will abide by the stipulations set forth in the PA. Under each alternative, review under Section 106 of the NHPA would take place for any proposed activity that has the potential to affect historic resources identified on or adjacent to TVA public land. Nearly all these historic resources are located on property adjacent to TVA land, not on TVA tracts. Historic properties, especially 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 subject to the PA to determine what historic properties exist on TVA public land and on adjacent lands within the APE. Also, the significance of any historic structures present and the degree of potential impact of the action on historic resources would be determined under each of the alternatives.

**Alternative A – No Action:** Activities on Zone 6 (Developed Recreation) parcels, particularly those developed for commercial recreation, have the potential to impact adjacent historic structures, because they could alter the visual characteristics surrounding the property that may contribute to their historic significance. This situation applies to Parcels 9, 10, 121, 230, and 5. Likewise, development activities on parcels allocated to Zone 5 (e.g., Parcels 142, 143 and 145) also would have the potential to visually impact adjacent historic structures. Actions on Parcels 120 and 122, which are allocated to Zone 2 (Project Operations), also could visually affect adjacent historic structures.

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

**Action Alternative B – Modified Development and Recreation:** Activities within parcels allocated to Zone 6 (Developed Recreation), especially those tracts developed for commercial recreation, have the potential to indirectly impact adjacent historic structures. Thus, recreational developments on Parcels 5, 9, 10, 44, 120, 121, and 230 have the potential to affect nearby historic structures. Likewise, future activities on land allocated to Zone 2 (Project Operations) (Parcels 122, 142 and 145) have the potential to indirectly impact adjacent historic structures. However, since potential effects to historic structures would be identified and mitigated appropriately under the PA, these effects would not be significant.

**Action Alternative C – Modified Conservation and Recreation:** Developed recreation could indirectly affect historic structures, depending upon the visual characteristics of the proposed development and visibility of the development from the potentially affected structure. In particular, recreational development on Parcels 120, 121, and 230 would have the potential to visually affect historic structures on adjacent, non-TVA properties. As is the case with Modified Alternative B, project operations on Parcel 122 could potentially affect historic structures. However, for the reasons stated above, potential effects to historic structures are expected to be insignificant.

Overall, adoption of Modified Alternative B would have a greater potential to affect historic properties than Modified Alternative C. Under Modified Alternative B, there would be more tracts and more acreage available for development. In general, this development would have the potential to affect historic properties, primarily indirectly. Under Modified Alternative C, more acreage would be allocated for Natural Resource Conservation and Sensitive Resource zones. Because of the types of activities expected within this zone, the potential for adverse effects to historic structures is low under either action alternative.

#### **4.10. Navigation**

Potential effects to commercial navigation as a result of a new Land Plan for Watts Bar Reservoir include the disruption or loss of barge terminal activities on TVA lands that are leased or licensed to a private entity and the possible loss of safety harbors and landings. Safety harbors and landings, designed by TVA prior to impoundment of the reservoir and shoreline in these areas, are allocated as Zone 2 (Project Operations). Navigation signs, lights, and dayboards on shoreline tracts are considered permanent features and are protected by the TVA Act (Section 26a regulatory process). Specifically, shoreline construction regulations and language in standard easements and leases stipulate that these aids may not be removed or obstructed. Thus, these navigation aids would remain unaffected by any changes in land management policy.

Commercial navigation is expected to remain at a fairly constant level of 600,000 to 800,000 tons per year on Watts Bar Reservoir under any of the alternatives. This level would likely fluctuate, depending on the overall health of the nation's economy, fluctuations in transportation costs, and the weather (the volume of road salt delivered to upper east Tennessee terminals is dependent on the previous winter's depletion of supply and

predictions of the coming winter's severity). Navigation traffic would likely increase if new waterway-using industries locate on Watts Bar Reservoir or upstream on Melton Hill, Fort Loudoun, or Tellico reservoirs.

A larger replacement lock downstream at Chickamauga Dam is being constructed and is scheduled to be completed in 2012. The existing lock can only handle one barge at a time. However, the replacement lock will allow nine barges to be locked through at one time, which will greatly reduce travel times and transportation costs, making upper Tennessee River industrial locations much more attractive to industries. However, any increase in barge traffic as a result of the new lock at Chickamauga would likely be gradual and may or may not involve new industries and terminals on Watts Bar Reservoir.

**Alternative A – No Action:** Under the No Action Alternative, there would be no immediate effect to commercial shipping or to any existing barge terminal on Watts Bar Reservoir. Three parcels that are currently designated Zone 5 for possible commercial or industrial development were designated as such because they possess deep water access along the shoreline suitable for a barge terminal. Such sites are Parcel 145 on the Clinch River at the former CRBR site, Parcel 140 across the Clinch River from the former CRBR site, Parcel 218 at King Creek, and Parcel 298 on the Watts Bar Dam Reservation. Part of Parcel 218 is currently under license to a local industry and is used intermittently as a barge loading facility. Should the other sites ultimately be developed by commercial waterway-using industries, growth in commercial shipping that originates or terminates on Watts Bar Reservoir could occur. The degree of actual effect is unknown at this time, but such development would be subjected to an environmental review specific to that development.

From the commercial navigation perspective, adoption of Alternative A would result in the fewest negative impacts to commercial navigation. None of the existing terminals would be affected, and the Watts Bar Reservoir area private and public entities would have the most flexibility in future industrial development options.

**Action Alternative B – Modified Development and Recreation:** Under Modified Alternative B, 367 acres would be available for industrial development, which is a fraction of the 1,544 acres proposed in Alternative A. This is offset by the addition of 760 acres of the former CRBR site to Project Operations (Zone 2). However, only Parcel 298 would be available for future barge terminal development. Still, the allocation of Parcel 298 as Zone 5 is arguably most significant to future commercial navigation interests which contain 34 acres suitable for barge terminal development near Watts Bar Dam Reservation. Parcel 298 has been identified as an excellent location for a year-round deep water barge terminal site. Along with the neighboring, 245-acre tract Parcel 297, Parcel 298 has potential for future development as a water-based industrial site with either a public or private barge terminal. Light and heavy industries that utilize the waterways typically have a highly skilled workforce, higher than average pay, and a high level of local investment.

Results of the industrial assessment indicate that Parcel 218 may be more suitable for recreation use. The company operating the terminal on Parcel 218 has an agreement with TVA to use a section of the 61-acre tract. Under Modified Alternatives B, Parcel 218 would be split with about 5 acres containing the existing barge terminal and supporting facilities remaining as Zone 5, while the majority of the parcel with 57 acres would be allocated to Zone 4 (Natural Resource Conservation), allowing it to be used for dispersed recreation purposes. Although the impact would be minor relative to the overall economy, maintaining terminal operations on Parcel 218 would not cause the facility to seek other, potentially more

expensive, transportation options, and would continue a positive affect on the local and regional economy.

In addition, under Modified Alternative B, all of the shoreline along the designated safety harbors or landings would be allocated to Zone 2 (Project Operations). Under the previous plan (the current Alternative A), shoreline designations associated with safety harbors and landings were inconsistent. Standardizing these designations helps to protect TVA's mission to provide a safe and efficient commercial waterway.

Under Modified Alternative B, there would be minor direct impacts to commercial navigation as it currently exists. Commercial navigation would benefit by the support of safe areas in the event of emergencies.

**Action Alternative C – Modified Conservation and Recreation:** Under this alternative, about 1,467 acres of TVA land that is proposed for industrial activities (Zone 5) under the no action alternative would be designated, primarily to Zone 4 (Natural Resource Conservation). Therefore, this acreage would no longer be available for any kind of industrial development without a board action. In particular, the three suitable sites for barge terminals and commercial navigation use would not occur. One would have been on Parcel 145, a section of the former CRBR site on the Clinch River; another on Parcel 140 across the Clinch River from the site; and the third on Parcel 297 at Lowe Branch.

Parcels 140 and 145 could be barge terminal sites, but are not ideal for that use and their allocation to other uses would have minor impacts. The most significant action to future commercial navigation interests would be the allocation of Parcel 298 to Zone 4, which could have provided a year-round deep water barge terminal site near the Watts Bar Dam Reservation. Along with the potential development of the neighboring, 245-acre tract Parcel 297, Parcel 298 has potential for future development as a water-based industrial site as previously described. However, these parcels have been available since at least the implementation of the 1988 Plan and have not been developed to date, being used in the interim for dispersed recreation.

Under Modified Alternative C, Parcel 218 would be split between Zone 4 and 5 as described under Modified Alternative B. The impacts would be similar to those described previously.

Adoption of Modified Alternative C would remove potential year-round deep water terminal sites between Knoxville and Chattanooga owned by TVA from the range of economic development options currently available. In addition, as in Modified Alternative B, the shoreline along the designated safety harbors or safety landings would all be allocated to Zone 2 (Project Operations), which would benefit commercial navigation by defining a clear use of the land at these sites. Overall, under Alternative C, there would be minor impacts to commercial navigation as it currently exists, but future opportunities for greater use of commercial navigation in conjunction with industrial development would be greatly reduced.

### **Recreational Navigation**

Recreational boat traffic on Watts Bar Reservoir is expected to increase under any of the alternatives under consideration. This is due to several factors. There are numerous high-quality boat manufacturers in east Tennessee and the level of interest in boating is high in the area. There is an abundance of recreational areas on Watts Bar Reservoir provided by TWRA and TVA. Watts Bar Reservoir has a number of refueling and boating supply facilities at public marinas. Area reservoirs, including Watts Bar Reservoir, generally provide good

fishing opportunities. Also, the predictable water levels on Watts Bar Reservoir tend to enhance boating conditions. These factors tend to attract boaters from elsewhere in the state, as well as out-of-state visitors, to the Watts Bar Reservoir area.

A Land Plan for Watts Bar Reservoir may affect the growth of recreational boating in several ways. First, the availability of shoreline access for residential development on which the owners may be able to build a dock for their own boat, directly affects recreational boating. Second, boating opportunities are influenced by the acreage made available for developed recreation, including marinas. Additionally, and perhaps contradictorily, maintaining a natural shoreline may also attract boaters as fish and wildlife habitats are maintained and/or improved. Because the land planning process merely allows for certain kinds of land use and there are few, if any, specific development plans for the future, prediction of the actual increase in the number of boats utilizing the reservoir in the future is imprecise, although some general conclusions may be drawn.

Although the acreage of land allocated to Zone 7 (Shoreline Access) would remain roughly constant at 2,300 acres under all three alternatives (see Table 2.2-1), there is some variation in the acres allocated for Developed Recreation (Zone 6). The No Action Alternative actually has the most acres allocated for Developed Recreation (1,998 acres or 12 percent of all TVA land on Watts Bar Reservoir), according to the 1988 Plan. Under Modified Alternative B, 1,552 acres (10 percent of the total TVA land) would be made available for Developed Recreation. However, under Modified Alternative C, 1,351 acres or 8 percent of total acres would be allocated to Developed Recreation. Although these acreages are very similar, the number of acres available for commercial recreation development places some limits on the number of additional public marinas and boat rental businesses that may eventually be available on Watts Bar Reservoir. Conversely, the reduction in developable acres and the increase in Natural Resource Conservation acres under Modified Alternative C may actually increase the number of boaters enjoying the scenery and wildlife.

An increase in recreational boating activity on Watts Bar Reservoir makes boating safety an issue of particular concern to both law enforcement agencies and the commercial navigation industry. In the period 1995 to 2004, 77 boating accidents on Watts Bar Reservoir were reported to the USCG, an average of about nine incidents per year. The National Boating Safety Council reports that there is typically a 10 to 30 percent under-reporting of accidents to the USCG. Thus, the actual number of incidents is likely to be 10 to 12 per year. Of the 77 reported incidents, 50 involved alcohol, careless or reckless operation, inexperienced drivers, operator inattention, or excessive speed. Less than one-third of the incidents reported were due to bad weather, equipment/mechanical failure, or hazardous waters. There were no reported incidents of collision with a commercial vessel or barge on Watts Bar Reservoir in this time period.

Regardless of the alternative selected, the amount of recreational boating is likely to increase on Watts Bar Reservoir as the desirability of lakefront living and the popularity of the region as a retirement destination increases. The reservoir already affords good accessibility for day users and there would likely be a demand for additional boat storage in the form of wet and dry slips. Scenic beauty is also an attraction for boaters; therefore, limiting development of commercial recreation facilities is not necessarily a means to control the numbers or types of boaters.

Future increases in boating on Watts Bar Reservoir could potentially increase the use of Watts Bar and Fort Loudoun locks by recreation boaters. These structures are aging and

expensive to maintain. 'Locking through' is a free service for recreational boats (and commercial vessels) used by thousands every year (see discussion above). The lock facilities are owned by TVA and operated by the USACE.

#### **4.11. Recreation**

Land proposed for allocation for Developed Recreation (Zone 6) under Modified Alternatives A, B, and C comprises 1,998 acres, 1,552 acres, and 1,351 acres, respectively. Dispersed recreation is an important part of Natural Resource Conservation (Zone 4), which is proposed for allocation under Modified Alternatives A, B, and C as 3,309 acres, 3,857 acres, 5,098 acres, respectively. With the exception of one abandoned marina and Parcel 9 within the Fooshee Recreation area, which are both allocated to Zone 4 under Alternative C, parcels where existing recreation commitments are in place would be zoned for Developed Recreation.

The Recreation and Industrial Assessment (Appendix E) found that future demand for public boat access, campgrounds, developed land-based opportunities, and dispersed land-based opportunities to be high, while future demand for commercial marinas and lodging is medium.

Supply of current developed facilities supporting these activities is presently meeting the recreation demand. Furthermore, the expansion capabilities of said facilities should be adequate to meet the future demand trends. Supply of dispersed land-based opportunities is currently meeting the demand. However, future demand trends indicate a need for additional acreage to supply the needs of the future.

Two major areas may be affected depending on the alternative chosen. The parcels comprising the former CRBR site (Parcels 142, 143, 145, 147, and 148, which total 814.8 acres under Modified Alternatives B and C) were previously allocated for industrial use in the 1988 Plan, but have since been used as part of the Oak Ridge WMA. This area is under a short-term revocable land use agreement granted to the TWRA that allows for quota deer and wild turkey hunts, thus allowing for an interim, dispersed recreation use. Since 1988, several timber harvests have been conducted by TVA. These parcels provide substantial high-quality habitat for a variety of terrestrial animal and plant species including high-density populations of white-tailed deer and eastern wild turkey.

Another area with a significant amount of recreational use is the Lowe Branch site, which includes Parcels 296, 297, 298, and 299 and total about 901 acres under Modified Alternatives B and C. Parcels 297 and 298 (279 acres, collectively) are both allocated for industrial use in the 1988 Plan. Since 1988, these parcels have been managed for forestry and wildlife habitat development and have received extensive use for a variety of dispersed recreation activities by the general public, especially for white-tailed deer hunting. In the late 1990s, TVA identified significant abuse to portions of this property including trash dumping, disposal of dead livestock, and severe off-road vehicle impacts. In an effort to control these abuses and better manage the area, TVA incorporated this area into its resource management plan for the LWBU (TVA 2000). This process and implementation plan led to the gating and control of land use abuses and the development of stakeholder partnerships (i.e., Quail Unlimited) to help better manage the site for wildlife resources.

As stated earlier, recreation has two components: developed recreation and dispersed recreation. Although there are some sites such as at Watts Bar Dam where recreation facilities were developed as a secondary or interim activity, developed recreation

opportunities are planned and allocated primarily through Zone 6 designation. Likewise while dispersed recreation opportunities are planned primarily into the Zone 4 designation, they also occur in the interim or unofficially on land allocated for other Zones (2, 3, and 5). Below is a comparison of Zone 4 and 6 acreages designated for each type of recreation opportunity by alternative (Table 4.11-1).

Under Modified Alternative B, there would be six fewer parcels for Developed Recreation as compared to Alternative A; four of these would be allocated as Zone 4, providing dispersed recreation opportunities. Under Modified Alternative C, there would be eight fewer parcels for Developed Recreation as compared to Alternative A; six of these would be allocated as Zone 4 providing dispersed recreation opportunities. In addition, Modified Alternative C would allocate seven additional Zone 4 parcels from Zone 5 (Table 4.11-2) as compared to Alternative A.

**Table 4.11-1. Acres of Developed and Dispersed Recreation on Watts Bar Reservoir**

Existing (1988) Allocation Categories	Current Land Use Zones	Modified Alternatives					
		A		B		C	
		Acres	%*	Acres	%	Acres	%
Wildlife Management Forest Management Agriculture, Informal Recreation, Open Space, Right-of-Way Protection	Zone 4 - Natural Resource Conservation	3,300	20.3	3,857	23.8	5,098	32.4
Public Recreation, Commercial Recreation, Water Access	Zone 6 - Recreation	1,988	12.3	1,552	9.6	1,351	8.3
<b>Total</b>		<b>5,298</b>	<b>32.6</b>	<b>5,409</b>	<b>33.4</b>	<b>6,449</b>	<b>40.7</b>

\* Percent of total TVA Land on Watts Bar Reservoir

**Table 4.11-2. Comparison of Recreation Allocation Differences by Alternative**

Parcel Number	Alternative A Acreage	Alternative A Zone	Alternatives B and C Acreage	Alternative B Zone	Alternative C Zone
1	10.5	6	10.5	2	2
9	122.5	6	122.5	6	4
10	78.4	6	78.4	6	4
98	9.4	6	9.4	4	4
140	7.8	5	6.4	3	3
142	319.5	5	302.5	2	4
143	391.3	5	181.6	2	4
145	332.9	5	265.6	2	4
148	21.5	5	10.5	2	4
218	61.4	5	56.8	4	4
218a	N/A	N/A	4.6	5	5
240	6.5	6	6.5	4	4
243	2.9	6	2.9	7	7
255	8.7	6	8.7	4	4
297	245.0	5	245.0	5	4
298	34.4	5	34.4	5	4
299	370.3	6	423.4	4	4

**Alternative A – No Action:** Under Alternative A, there are approximately 3,309 acres allocated for dispersed recreation opportunities. Parcels in the former CRBR site and the Lowe Branch area of Watts Bar Reservoir (Parcels 142, 143, 145, 148, 297, and 298) are allocated for economic development (1,345 acres) in Alternative A. Should these parcels be developed in the future, the available recreation opportunities they provide would be eliminated. Prior to development, the former CRBR site could continue to be used as part of the Oak Ridge WMA by TWRA and the Lowe Branch parcels (297 and 298) could continue to be used for dispersed recreation purposes.

Under the 1988 Plan (Alternative A), there are approximately 446 and 647 additional acres allocated for Developed Recreation than under Modified Alternative B and C, respectively. The Zone 6 assessments do not show a need for this additional acreage to be zoned for Developed Recreation.

Continuation of the current plan could adversely affect the amount of future dispersed recreation activities on Watts Bar Reservoir. Analysis of future demand trends indicates a need for a small amount of additional acreage to be available for dispersed recreation opportunities.

Although, impacts to total recreation use would be insignificant, there would be less diverse recreation opportunities. Consequently, Alternative A would continue to provide lands available for developed recreation, but could reduce or limit the number of dispersed recreation opportunities.

**Action Alternative B – Modified Development and Recreation:** This alternative attempts to incorporate economic development interests, natural resource conservation needs, and recreation demands. This alternative aligns with the analysis of current/future supply and demand for recreation opportunities through the Zone 6 assessments.

Under Modified Alternative B, the total acreage allocated for dispersed recreation opportunities is 557 acres more when compared to Alternative A and is 1,241 acres less when compared to Modified Alternative C (Table 4.11-1). Adoption of this alternative would provide approximately 446 fewer acres allocated for Developed Recreation than in Alternative A. Modified Alternative B would provide approximately 201 additional acres allocated for Developed Recreation than Modified Alternative C. Any presently committed tracts that have facilities considered as developed recreation, with agreements in place, would remain allocated as Developed Recreation. While the demand for developed recreation is expected to increase (per Zone 6 assessments), several public parks and marinas are not operating at full capacity. Thus, current operations supplying developed recreation opportunities can be potentially expanded, and efficiency gains could be sought without allocating additional acreage.

Under Modified Alternative B, parcels in the former CRBR site (Parcels 142, 143, 145, 148) would be allocated for project operations and the Lowe Branch area (Parcels 297, and 298) for industrial use. Both Zone 2 (Project Operations) and Zone 5 (Industrial) have similar impacts to recreation. Should these parcels be developed in the future, the recreation opportunities these parcels provide would eventually be lost (specifically hunting). Prior to development, the former CRBR site could continue to be used as part of the Oak Ridge WMA by TWRA, and the Lowe Branch parcels could continue to be used for dispersed recreation purposes.

Under Modified Alternative B, a riverside buffer is proposed by assigning 110 acres to Parcel 144 (Zone 3) from Parcel 145 (Zone 4 respectively) as compared to Alternative A. The establishment of a riverside buffer would enhance the recreation benefits of this area by providing a screen of natural environment to future development at the former CRBR Site, allowing water recreationists an opportunity to experience a more riverine environment. Further, as a Zone 3, 110 additional acres would be permanently available for dispersed recreation which would be a beneficial impact.

Parcel 240 (6.5 acres) would be changed from Zone 6 under Alternative A to Zone 4 in Alternative B and C. The operators of Arrowhead Marina have not indicated they have the need for expansion of their facilities. The proposed developed recreation use of the parcel for an expansion of an adjoining marina is unlikely. The allocation of Parcel 240 as Zone 4 would be beneficial to dispersed recreation.

Alternative B reduces the amount of land allocated for Developed Recreation but increases the amount of land available for dispersed recreation (Table 4.11-1). The total land available for overall recreation is increased by 111 acres from Alternative A. With the increase of total recreation area from Alternative A and the alignment with anticipated demand analysis (see Table 3.11-1), only minor adverse impacts to recreation are expected.

**Action Alternative C – Modified Conservation and Recreation:** Under this alternative, there are 5,098 acres allocated to Zone 4, providing a sharp increase in lands for dispersed recreation opportunities as compared to Alternatives A and B. Adoption of this alternative would provide 647 fewer acres allocated toward Developed Recreation than Alternative A and 201 fewer acres than Alternative B.

While the demand for developed recreation is expected to increase, several public parks and marinas are not operating at full capacity. Current operations supplying developed recreation

opportunities can be potentially expanded, and efficiency gains could be sought without allocating additional acreage.

Under Modified Alternative C, Fooshee Pass Campground (Parcel 9) would be allocated as Zone 4. This would remove important future camping opportunities on Watts Bar Reservoir. The recreation assessments found developed camping to be high demand with 27.3 percent of the local population participating.

Under Modified Alternative B, parcels in the former Clinch River Breeder site and the Lowe Branch area (Parcels 142, 143, 145, 148, 297, and 298) of Watts Bar Reservation would be allocated for Natural Resource Conservation (Zone 4). This would allow dispersed recreation and other activities to continue to occur.

Similar to Modified Alternative B, under Modified Alternative C a riverside buffer is proposed by transferring 110 acres to Parcel 144 (Zone 3) from Parcel 145 (Zone 4). No impacts are expected from this as Dispersed recreation activities can occur in both Zone 3 and Zone 4 allocations. However, allocating Parcel 240 (6.5 acres) from Zone 6 under Alternative A to Zone 4 would result beneficial impacts similar to Modified Alternative B.

While Modified Alternative C when compared to Alternative A would have fewer 647 acres of lands available for developed recreation, this would be somewhat offset by 1,798 more acres available for dispersed recreation. Although, Modified Alternative C would not have as many developed camping opportunities, which would put supply in a deficit with demand (Recreation and Industrial Assessment, see Appendix E), the addition of dispersed recreation opportunities would benefit recreation and aligns with the assessments of future dispersed recreation demand.

The total impact to recreation under Alternative C would be insignificant.

#### **4.12. 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 Class is determined by combining the levels of scenic attractiveness, scenic integrity, and visibility. Scenic Value Class and the foreground, middleground, and background viewing distances were described previously in Section 3.12.

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

minor visible change, such as recreational hiking, picnicking, bank fishing, and some selective forest management, could take place under both zone allocations. Some development with more visible modifications could take place under the Zone 4 designation as long as the location and appearance were subordinate to maintaining the desired visual characteristics.

The scenic character of major WMAs and wetlands would be preserved under all the alternatives. Many islands around the reservoir 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 reservoir would benefit under the action alternatives. Major sections of the riverine, upper reservoir 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 Watts Bar Reservoir would be beneficial for visual resources. Activities occurring during the management of TVA lands typically include road access, illegal dump cleanup and prevention, construction and maintenance of access trails, wildlife and forest management, and parking area provisions 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. As necessary and as practicable, visual buffers between 50 feet and 100 feet wide would be provided to screen timber harvest areas and commercial development from public thoroughfares and shorelines.

Likewise, future natural areas and wetlands management activities could preserve and enhance the exceptional natural, scenic, or aesthetic qualities of landscapes that are suitable for low-impact public use. TVA attempts to monitor and remedy, to the extent practicable, abuses found in these areas and which can 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 environmental reviews, including evaluation for potential visual impacts, prior to the approval of any proposed development on public land. These reviews may prevent the most serious scenic disruptions or loss of visual resources by requiring mitigation measures to reduce potentially significant visual impacts.

**Alternative A – No Action:** Under the No Action Alternative, a slow but noticeable decline in scenic resources, aesthetic quality, and visual landscape character is expected, as demands for residential, commercial, and industrial development are likely to continue to increase. This decline in scenic resources would likely reduce scenic class levels for some areas of the

reservoir by one level or more (e.g., from excellent to good, or from fair to poor). Areas with low scenic values are often influenced by small changes in visual character. Thus, reductions in scenic class level could be potentially significant for areas of common or minimal scenic quality or for those areas that have very little scenic importance.

Incremental additions of water use facilities may not be individually significant. However, when viewed together with similar structures over a wide area, they contribute to a cumulative reduction of visual harmony and scenic integrity along the shoreline. Visual shoreline congestion and related adverse contrasts would likely increase. Consequently, a gradual reduction of scenic attractiveness, which would degrade the visual landscape character and the aesthetic sense of place, is most likely under the No Action Alternative. Scenic integrity of the predominantly natural shoreline would likely continue to decrease under the No Action Alternative.

Continued use of Alternative A could result in adding to cumulative negative impacts including gradual losses of visual resources, scenic attractiveness, and undeveloped natural areas as well as adverse changes in the aesthetic sense of place. The overall result would be a minor but continuing decrease in the visual quality of the naturally scenic reservoir landscape.

**Action Alternative B – Modified Development and Recreation:** Under this alternative, the slow degradation of scenic resources described in Alternative A would continue, although to a lesser degree. Modified Alternative B calls for about 450 fewer acres to be considered for future industrial or additional project operation use (i.e., 1,545 acres compared to 1,072 acres, respectively). Eventually, these lands would likely be devoted to light manufacturing, general industrial purposes, or TVA energy related facilities.

Although insignificant, adoption of Modified Alternative B would have an overall greater adverse impact on the visual landscape character and aesthetic sense of place than Modified Alternative C, but less than Alternative A. Modified Alternative B provides for some protection of scenic resources and preservation of natural areas around the reservoir over time through the use of natural vegetative buffers, particularly on the former CRBR site (Parcels 144 and 146) and the Lowe Branch area (Parcel 294). Scenic integrity would remain moderate or higher. Consequently, implementation of this alternative would provide some protective management for visual resources to help preserve the scenic landscape character of Watts Bar Reservoir for long-term public enjoyment.

**Action Alternative C – Modified Conservation and Recreation:** Under Modified Alternative C, the most distinctive scenic areas on Watts Bar Reservoir would be preserved. Also, Modified Alternative C calls for balancing future development with sufficient areas of unaltered shoreline to retain a natural visual character.

Under Modified Alternative C, the acreage of Zone 4 lands would increase to 5,098 acres, as opposed to 3,857 under Modified Alternative B and 3,309 under Alternative A. This proposed increase in acreage in Zone 4 would tend to benefit scenic quality. The acreage of Zone 3 lands would remain 3,780 acres under Modified Alternatives B and C, and 3,472 acres under Alternative A (see Table 2.2-1).

Beneficial visual effects could occur for many parcels under Modified Alternative C as a result of the reallocation of some parcels from Zone 5 (Industrial) and Developed Recreation (Zone

6) to either Zone 3 or Zone 4. A summary of all potential visual impacts can be found in Appendix D, Table D-9.

Overall, this alternative has insignificant impacts on visual resources and the least impacts of all the alternatives. Like Modified Alternative B, Modified Alternative C provides for better protection of scenic resources and preservation of natural areas around the reservoir over time through the use of natural vegetative buffers. Consequently, implementation of this alternative would provide enhanced protective management for visual resources and would help preserve the scenic landscape character of Watts Bar Reservoir for long-term public enjoyment.

## **4.13. Socioeconomics and Environmental Justice**

### **4.13.1. Socioeconomics**

Socioeconomic impacts under the proposed alternatives would be due to the direct effects of the number and types of jobs created by development accommodated by the allocation of TVA lands to different zones. In addition, there would be indirect effects of population growth due to new development, as well as the effect on development potential of other lands due to the management of TVA land. Socioeconomic impacts could also occur as a result of changes in recreation opportunities, including dispersed recreation, in the area and changes in the overall attractiveness of the area as a place to live or to visit.

Under the November 2006 TVA Land Policy, the use of TVA land has been clarified specifically for industrial use and in particular water-based industries that would utilize water transportation or large amounts of process water. However, in many cases, future industrial, commercial, and residential development would still occur in the Watts Bar area on private land whether TVA land were available or not, and there would be little net effect on income and jobs.

There could be some cumulative adverse socioeconomic effects from future development under all the alternatives, depending on the intensity of future development of private tracts. In most cases, if industrial, commercial, or residential development occurs, use of these areas for natural resources including recreation would likely be excluded. The result is a potential decrease in the attractiveness of and the quality of life in the region, especially if large amounts of land are affected. Reduced attractiveness of the area could in turn lessen new population growth and economic development opportunities.

**Alternative A – No Action:** Presently, 1,544 acres of TVA land on the Watts Bar Reservoir are allocated for Zone 5 (Industrial), and another 1,998 acres are allocated for Zone 6 (Developed Recreation) (see Table 2.2-1). The Developed Recreation allocation includes commercial recreation as well as public recreation, greenways, and water access which are socially and economically important. About 6,772 acres are classified for Zones 3 (Sensitive Resource Management) and 4 (Natural Resource Conservation) and would be managed for the enhancement of natural resources for human use and appreciation. Under Alternative A, parcels would retain their current allocations. Current classifications would continue to be used, and future land use requests would be evaluated for consistency with the current classifications. Therefore, adverse potential socioeconomic effects are not anticipated under Alternative A. However, the potential socioeconomic impacts of any specific land use proposals on currently allocated land would still be evaluated as appropriate during the environmental review process, so the types of possible impacts are generally discussed here.

Many of the tracts that are or could be allocated for Zone 5 (Industrial) are small or narrow tracts that might provide reservoir access for terminal operations or water use for industries locating on adjacent back-lying private properties. Others, in particular, the former CRBR site in Roane County and the parcels in Rhea County near the Watts Bar Dam, could accommodate relatively large industrial facilities. In the rural counties of the Watts Bar Reservoir area with limited job opportunities and relatively high poverty level, as discussed in Section 3.13, use of these sites for such purposes could potentially have significant positive effects to the economy of the area if firms attracted to the sites would not have located in the area otherwise. Conversely, the loss of recreation opportunities and natural resources associated with industrial use could make the local area less attractive and possibly lower the quality of life in the surrounding area.

**Action Alternative B – Modified Development and Recreation:** Under this alternative, the amount of land available for Zone 5 (Industrial) use and the amount available for Zone 6 (Developed Recreation) would be about 45 percent less as compared to Alternative A. The amount of land for Zone 4 (Natural Resource Conservation) would increase about 15 percent. These proposed allocations would lessen the potential for increasing income and jobs in the area. However, the large site near Watts Bar Dam would still be available for development. The large former CRBR site would be allocated as Zone 2 (Project Operations) to make it available for future TVA power-related activities or for industrial uses, so most of the potential for beneficial socioeconomic impacts would remain. Therefore, the impacts would be slightly less than Alternative A.

As discussed in Section 4.10 (Navigation), the decrease in land available for Developed Recreation could negatively affect recreational boating opportunities and related businesses and could possibly have some negative effects on the local economy.

Most of the potential effects of this alternative would be likely to occur in Rhea and Roane counties, as all of the land that would be allocated for industrial use or for power related facilities is located in these two counties. The availability of the two sites discussed above for industrial use or similar purposes could lead to increased jobs and income in the Rhea or Roane County areas if the subject parcels are used for developments that otherwise would not have located in those counties. Conversely, the loss of recreation opportunities and natural resources associated with current land uses could make the local area less attractive and possibly lower the quality of life in the surrounding area.

In addition, except for land under license for an existing barge terminal, Parcel 218 in Roane County would be rezoned from Zone 5 (Industrial) under Alternative A to Zone 4 (Natural Resource Conservation). The 4.6 acres encompassing the barge terminal would remain Zone 5 as Parcel 218A. The potential impacts on the local economy and on transportation are as discussed in Section 4.10. However, the continuation of industrial activities at this site could have a positive influence on the local economy. Also, several other, generally small tracts in Roane County would be classified as Developed Recreation, which could also affect the local economy positively.

**Action Alternative C – Modified Conservation and Recreation:** Adoption of this alternative would almost completely eliminate the amount of land available for Zone 5 (Industrial) use for future development and reduce by about 32 percent the acreage for Zone 6 (Developed Recreation). It would increase by over 52 percent the amount available for Zone 4 (Natural Resource Conservation) (see Table 2.2-1).

The loss of land for industrial development could preclude much potential economic development in the area if alternate locations are not available in the local area. The result could be loss of potential jobs and income, although future industrial and commercial development could still occur in the Watts Bar area on private land. However, the allocation of this land for natural resource conservation would enhance quality of life and the attractiveness of the area, making it more inviting for other economic opportunities, such as housing on adjoining, private lands. This would result in positive economic effects on the local area and surrounding areas.

The remaining land available for Developed Recreation could produce jobs and income in the local area by attracting visitors and stimulating the development of recreation-related businesses such as motels and restaurants. However, these socioeconomic benefits would probably be lessened as compared to Modified Alternative B due to the smaller amount of land available for such uses.

#### **4.13.2. Environmental Justice**

**Alternative A – No Action:** Under the No Action Alternative, there would be no change in parcel allocations from their current designations. Therefore, no change in the current situation with respect to environmental justice is likely. Poverty levels are high in places, especially in Meigs and Rhea counties as discussed in Section 3.13, but the minority population in the area is small and unlikely to be disproportionately affected adversely by any development proposal under Alternative A (or any of the alternatives). In general, economic development proposals could benefit those in poverty by providing job opportunities. Specific land use proposals could potentially have significant adverse environmental justice impacts by reducing affordable public access to the reservoir and lands for dispersed recreation. These proposals would be evaluated as appropriate during the environmental review process. Significant cumulative impacts could occur if several tracts were developed, even if no single development caused significant impacts. However, the extent and degree of such impacts would depend on the specific proposals.

**Action Alternative B – Modified Development and Recreation:** Implementation of Modified Alternative B would decrease the amount of land available for Zone 5 (Industrial) and Zone 6 (Developed Recreation) as compared to Alternative A, thus reducing job opportunities that could benefit those in poverty. However, the amount of land for Zone 4 (Natural Resource Conservation) would increase. The net effect of this situation would be potentially increased access to public lands for dispersed recreation. This situation could especially benefit disadvantaged populations more than others because these populations, especially low-income populations, would be less able to afford developed recreation alternatives. This group is also less able to travel to other locations for dispersed recreation.

**Action Alternative C – Modified Conservation and Recreation:** Under Modified Alternative C, additional acreages would be made available for dispersed public recreation as compared to the other alternatives. Thus, adoption of Modified Alternative C would provide public lands that would be accessible and affordable for more people, including disadvantaged populations.

#### **4.14. Air Quality**

With respect to the Land Plan, the greatest potential for air quality effects is from industrial use on proposed Zone 5 (Industrial) properties. Activities, either current or future, associated

with Zone 6 (Developed Recreation) are not likely to cause any significant impacts to local air quality. Likewise, activities occurring on the remaining zones (Zones 3, 4, and 7) are not likely to generate any noticeable amount of air emissions, and thus are not likely to cause any significant effects to air quality. Most activities associated with Zone 2 (Project Operations) are similar to Zone 6 except where there are TVA power production facilities such as KIF. In these cases, the facilities on these parcels would have an impact on air quality and are subject to various federal, state, and local regulations (see [www.tva.com/environment/air/ontheair](http://www.tva.com/environment/air/ontheair)). However, the allocation of land by the Land Plan would have no influence on power production operations and their continuing impacts to air quality, and these existing impacts would continue under any of the alternatives.

For purposes of analysis, the potential for adverse air quality effects was assumed to be correlated to the amount of acreage available for industrial development, i.e., the acreage allocated to Zone 5. At this time, predictions of the nature of air emissions from industries that might locate on Watts Bar land tracts would be speculative. Any industry seeking to operate a facility that involves Watts Bar lands would be subject to various federal, state, and local regulations (see Section 3.14). Thus, from a regulatory standpoint, air quality impacts from industrial or commercial operations on Zone 5 areas would not be significant.

**Alternative A – No Action:** Under this alternative, the 1988 Plan would remain in place. This plan, along with TVA Land Policy, currently guides land use decisions on TVA public land surrounding Watts Bar Reservoir. The 1988 Plan used 19 allocation categories, which would continue to be used by TVA to make land use decisions. A total of 1,531 acres could be considered for industrial use. An appropriate level of environmental review would be done to document the extent of expected air quality impacts whenever a proposed land use request is received. Each such review that involved a tract in or potentially affecting a nonattainment area for ozone and/or PM<sub>2.5</sub> would require a conformity applicability determination pursuant to regulations implementing Section 176(c) of the Clean Air Act to assure compatibility with measures in local plans for achieving attainment. Although there could be some minor decrease in air quality under Alternative A, any effects are expected to be insignificant.

**Action Alternative B – Modified Development and Recreation:** Under Modified Alternative B, TVA would update land allocations using resource data, computer analyses, stakeholder input, and TVA staff input to generate a proposed mix of land allocations. Under Modified Alternative B, 357 acres would be allocated to Zone 5 for industrial use and an additional 760 acres for project operations at the former CRBR site. Overall, this alternative is expected to have a lesser impact on air quality than Alternative A as less acreage is allocated to industrial use, an environmental review would be performed for each expansion or development proposal to document the extent of expected air quality impacts. If a nonattainment area were involved, the same conformity applicability determination as stated for reviews under Alternative A would also be required. There would be less potential for adverse effects to air quality under Modified Alternative B; these effects would be held to insignificant levels by regulatory standards.

**Action Alternative C – Modified Conservation and Recreation:** Under Modified Alternative C, only 77 acres would be allocated to Zone 5 at previously developed sites. As with Alternative A and Modified Alternative B, the appropriate environmental review would be performed for any expansion or development proposal to document potential impacts on air quality. The small acreage so allocated would be much less than for either Alternative A or Modified Alternative B, and the potential for air pollution would likely be proportionally smaller.

Because of the small amount of acreage involved and because of regulatory controls, industrial development under Modified Alternative C is not expected to result in any significant effects to air quality.

#### **4.15. Noise**

The greatest potential for community noise impacts comes from industrial and commercial development, commercial transportation, and, to a lesser extent, from commercial recreational development. In the land use allocations in Modified Alternative C, the potential for community noise impacts are substantially reduced because of the large potential decrease in land available for noise-producing activities as compared to Alternative A and Modified Alternative B. Under Alternative A and Modified Alternative B, the land available for Zone 5 (Industrial) could be the original 1,544 acres (Alternative A) or a decrease to about 357 acres with an additional 760 acres for project operations at the former CRBR site (Modified Alternative B). None of the potential developments would likely be in close proximity to large existing residential areas; therefore, the potential for increased noise effects would be insignificant. Maximum land allocated for Developed Recreation (Zone 6) would decrease by approximately 450 to 650 acres, respectively, if Modified Alternatives B or C were approved.

Under Modified Alternative C, there is a substantial increase in the land allocated to Natural Resource Conservation (Zone 4). This would decrease the potential for noise effects in those allocations.

Overall, based on the amount of TVA public land available for development and the additional environmental evaluations, there would be an insignificant increase in the potential for community noise impacts from implementation of Alternative A or Modified Alternative B. Modified Alternative C would have the least impacts.

#### **4.16. Unavoidable Adverse Effects**

Because of the requirement that site-specific environmental reviews would be conducted prior to implementation, there are currently few, if any, adverse environmental effects that cannot be avoided should any alternative be implemented. However, regional development trends, such as residential shoreline development, will continue to result in losses of aquatic and terrestrial habitat regardless of which alternative is selected.

#### **4.17. Relationship of Short-Term Uses and Long-Term Productivity**

Commitments of the shoreline to shoreline access, commercial, industrial, and some types of recreational development are essentially long-term decisions that would decrease the productivity of land for agricultural, forest, wildlife, and other natural resource management. Long-term productivity decreases would likely be greatest under Alternative A and to a lesser extent under Modified Alternative B. As described in earlier sections, the types of changes that occur with development would result in a decline in the habitat quality for some terrestrial species and increase the habitat for others. Many of the water-related impacts of shoreline development could be minimized by the use of appropriate controls on erosion, added nutrients, and pesticide input.

Increased residential development could occur under any of the alternatives and result in population increase along the shoreline. New jobs and income would be generated by the spending activities of these new residents, leading to enhanced long-term socioeconomic productivity. This would be the case as long as the desirable features that prompted their move to the shoreline were maintained or enhanced.

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

Irretrievable use of nonrenewable resources (i.e., fuel, energy, and some construction materials) could occur under all of the alternatives due to residential shoreline development as well as commercial, industrial, and some types of recreational development. The proposed developments would result in region wide population increase. This means that the same development could occur somewhere else in the region. Therefore, use of most (if not all) of these resources could occur somewhere else in the region to provide the same residential development services regardless of the alternative chosen.

As shoreline is converted to residential, commercial, industrial, and some types of recreational use, the land is essentially permanently changed and not available for agricultural, forestry, wildlife habitat, natural area, and some recreation uses in the foreseeable future. This is an irreversible commitment of land, which would occur under all alternatives; over the long term, it would likely be greatest under Alternative A.

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

Energy is used by machines for fuel to maintain grassy areas on the TVA project lands, such as the dam reservation, and by the operation of the TVA power-producing facilities located on Watts Bar Reservoir. There are no short-term energy uses required for TVA project lands, as they are already established.

Energy is also used by machines to maintain areas set aside for Natural Resource Conservation. Although these activities are not likely to have much influence on regional energy use demands either, there would be some short-term energy use for fuel to conduct prescribed natural resource conservation activities, such as mowing, timber management, controlled burning, disking, planting of small grain crops, etc. Alternative C would have a greater requirement for this type of energy use, since it contains the largest amount of acreage allocated for Natural Resource Conservation.

Comparable amounts of TVA public land (21-23 percent) are allocated to Zone 3, Sensitive Resource Management, under all the alternatives. Some areas set aside for protection of archaeological sites could potentially be maintained by mowing, light disking, or controlled burning. There would be some short-term energy use of fuel for machines to conduct these types of activities. The level of these activities is considered minimal.

#### 4.20. Summary of Proposed Mitigation Measures

The following mitigation measures would be considered in preparing the ROD for the final EIS.

- All activities would be conducted in accordance with the stipulations defined in the Program Agreement between TVA, the Tennessee SHPO, and the Advisory Council on Historic Preservation.
- The construction of water use facilities and shoreline alterations within the marked limits of the safety landings and harbors would be prohibited.
- Requests for water use facilities on shoreline immediately upstream and downstream of the safety landings and harbors would continue to be reviewed to ensure that barge tows would have sufficient room to maneuver in and out of the safety landings and harbors without the risk of damaging private property.
- Because caves are extremely fragile and biologically significant, TVA has placed and would continue to maintain protective buffer zones around the known caves on TVA public land on Watts Bar Reservoir.
- As necessary and as practicable, visual buffers, between 50 feet and 100 feet wide, would be provided to screen timber harvest areas and commercial development from public thoroughfares and shorelines.
- Best management practices would be used on all soil-disturbing activities.
- Landscaping activities on developed properties would not include the use of plants listed as Rank 1, "Severe Threat," Rank 2, "Significant Threat," and Rank 3, "Lesser Threat," on the Tennessee Exotic Pest Plant Council's list of Invasive Exotic Pest Plants in Tennessee (Appendix D, Table D-7).
- Revegetation and erosion control work would utilize seed mixes comprised of native species or noninvasive nonnative species (Appendix D, Table D-8).
- If TVA were to develop facilities at any Zone 5 (Industrial) or Zone 2 (Project Operations) site, the following measures would be employed to minimize the potential for effects on federally listed species:
  1. TVA will consult with USFWS in order to determine if the proposed action could affect listed mussels present in the area.
  2. Pre-construction mussel surveys would be conducted in all areas of the Clinch River (Watts Bar Reservoir) that would be affected by construction and use of any future terminal associated infrastructure (e.g. barge terminal, water intakes or water outfalls)
  3. Any listed mussels found during these surveys would be dealt with according to terms and conditions imposed as a result of the USFWS consultation process. These could consist of minimization or avoidance measures implemented during construction and operation, or relocation of the mussels encountered if effects are unavoidable.