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FINAL ENVIRONMENTAL IMPACT STATEMENT
VOLUME 1

NATURAL RESOURCE PLAN

Alabama, Georgia, Kentucky, Mississippi, North Carolina, Tennessee, and Virginia

PREPARED BY:
TENNESSEE VALLEY AUTHORITY

JULY 2011

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Final Environmental Impact Statement **July 2011**

Proposed project: Natural Resource Plan
Alabama, Georgia, Kentucky, Mississippi, North Carolina, Tennessee, and Virginia

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Abstract: The Tennessee Valley Authority (TVA) proposes to adopt a Natural Resource Plan (NRP) to determine how TVA will manage its natural resources over the next 20 years. On May 19, 2008, the TVA Board of Directors approved the TVA Environmental Policy. The Environmental Policy sets forth principles to guide TVA in reducing the environmental impacts of its activities while continuing to provide reliable and affordable power to the Valley. By establishing the Environmental Policy, TVA committed to a more systematic and integrated approach to managing stewardship. The NRP addresses the planning processes and Environmental Policy objectives related to Water Resource Protection and Improvement, Sustainable Land Use, and Natural Resource Management. This environmental impact statement examines potential impacts associated with implementing the NRP proposed for these resources and reasonable alternative management strategies, including a No Action Alternative. Under the No Action Alternative, TVA would continue its current management approach. Under three Action Alternatives (Alternatives B, C, and D), TVA would alter its management approach to reflect the implementation of varying levels of activities across numerous stewardship programs. TVA's Preferred Alternative is Alternative D. The alternatives would result in few adverse impacts. Alternative C would result in the most beneficial impacts. The beneficial impacts of Alternative D would be less than Alternative C and more than Alternatives A and B.

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SUMMARY

PURPOSE OF AND NEED FOR ACTION

On May 19, 2008, the Tennessee Valley Authority (TVA or the Agency) Board of Directors (TVA Board) approved the TVA Environmental Policy. A biennial review of this policy occurred in August 2010 and did not result in an update or revision. The Environmental Policy sets forth principles to guide TVA in the reduction of the environmental impact of its activities while continuing to provide reliable and affordable power to the Tennessee Valley region. The Natural Resource Plan (NRP) addresses the planning processes and Environmental Policy objectives related to Water Resource Protection, Sustainable Land Use, and Natural Resource Management.

Historically, TVA has taken various approaches to managing biological, cultural, recreation, and water resources and to planning the use of reservoir lands. In its Environmental Policy, TVA committed to a more systematic and integrated approach to natural resource stewardship. The purpose of the NRP is to develop a plan to guide TVA's responsible management of natural resources over the next 20 years in a cost-effective manner while upholding TVA's mission. The following objectives and critical success factors in the Environmental Policy bear on this:

Water Resource Protection and Improvement Objective: TVA will improve reservoir and stream water quality, reduce the impact of its operations, and leverage alliances with local and regional stakeholders to promote water conservation.

Critical Success Factors

- *Integrate the impacts of water quality and quantity into the long-range planning and decision-making process.*
- *Promote the integration of energy efficiency and water conservation into community planning and building construction.*
- *Collaborate in community outreach and partnerships through voluntary demonstrations of the efficient use of water resources and protection of water quality.*

Sustainable Land Use Objective: TVA will strive to maintain the lands under its management in good environmental health, balancing their multiple uses, and will improve its land transaction processes to support sustainable development.

Critical Success Factors

- *Actively manage TVA lands to meet the desired conditions for their purpose as defined in the reservoir land management plans.*
- *Improve reservoir shoreline conditions through collaborative partnership initiatives and balance the multiple uses of the reservoirs in accordance with TVA's Land Policy and Shoreline Management Policy.*
- *Manage TVA lands, mineral rights, and shoreline access to better achieve environmental commitments while meeting the needs for recreation, residential access, and economic development.*

Natural Resource Management Objective: TVA will be a leader in natural resource management through the implementation of sustainable practices in dispersed

recreation while balancing the protection of cultural, heritage, and ecological resources.

Critical Success Factors

- *Allow for properly managed, ecologically friendly dispersed recreation while balancing the protection of biological, cultural, and heritage resources.*
- *Promote ecological diversity and wildlife habitats on TVA lands through partnerships and voluntary initiatives.*
- *Increase the level of environmental quality and management consistency among TVA-managed and -leased recreation facilities.*

This EIS evaluates various approaches to management of biological, cultural, water, and recreation resources; public engagement; and reservoir lands planning. The general goal of the NRP is to integrate the objectives of these resource areas, provide for the optimum public benefit, and balance competing and sometimes conflicting resource uses. These competing interests and development pressures, coupled with today's environmental awareness, underscore the necessity for a consistent approach to the management of TVA's lands. The specific goals of the NRP include:

1. Aligning TVA's stewardship programs and plans with the Environmental Policy
2. Providing a strategic plan that
    - Guides TVA's resource management decisions and actions
    - Integrates stewardship objectives for optimum public benefits while developing efficiencies for natural resources
    - Strikes a balance between the competing and sometimes conflicting resource uses on TVA-managed lands
3. Increasing the efficiency of environmental reviews of TVA actions
4. Providing TVA staff with a "reference manual" to guide implementation activities
5. Providing clarity and transparency to the public

The geographical scope for biological and cultural resources management and recreation management components of the NRP is limited to the approximately 293,000 acres of reservoir lands, as well as active and former fossil and nuclear properties, Raccoon Mountain Pumped Storage Plant, and Buffalo Mountain Wind Power Project site managed by TVA. The NRP would be implemented at TVA's fossil and nuclear properties and at Raccoon Mountain and Buffalo Mountain as interim and/or secondary management techniques, as appropriate. These properties will remain power assets, and primary management will remain as power generation. It would be at TVA's discretion to determine the appropriate programs and activities within the NRP for implementation on these power properties.

Recreation management focuses on the recreation facilities and programs managed by TVA, including campgrounds, day use areas, and stream access sites. The reservoir lands planning component of the NRP addresses the approximately 293,000 acres of TVA-managed reservoir lands. The geographical scope for the water resource management component of the NRP is the entire Tennessee River watershed and focuses on those discretionary programs and activities implemented by TVA to improve reservoir and watershed water quality.

ALTERNATIVES INCLUDING THE PROPOSED ACTION

TVA has evaluated four alternatives for the NRP. Alternatives were developed using information from multidisciplinary staff and from the public comments obtained during the scoping process described in Chapter 1. The alternatives were revised following the public review of the Draft NRP and EIS and additional analyses. Under each of the alternatives, the following conditions would apply:

> TVA would continue to conduct environmental reviews to address site-specific issues prior to the approval of any proposed activity on lands under TVA's control. Future activities and land uses would continue to be guided by the TVA Land Policy and other relevant policies. In its reservoir lands planning activities, the allocation of uses on TVA property is not intended to supersede deeded landrights that may be held by others.

Alternative A — No Action Alternative. Under the No Action Alternative, TVA would continue to implement the existing stewardship programs and tools, aligning with existing policies and strategies, and would continue to apply the existing methodology when planning lands along TVA reservoirs. This alternative emphasizes regulatory and technical requirements, assessments of TVA resources and partnerships, and capital projects associated with TVA recreational facilities. TVA would manage and support stewardship activities on its lands through existing prioritization methods that consider recreational needs and public safety while meeting applicable regulations and policies.

Alternative B — Custodial Management. Under Alternative B, specific programs that address safety and compliance with TVA's mission, applicable laws, regulations, and executive orders (EOs) and policies would be implemented. As laws, regulations, policies and EOs are created or amended; implementation activities would be revised to reflect this. In those areas in which TVA would discontinue programs or projects, existing contractual agreements relating to those programs or projects would be honored. In addition, TVA would focus on transitioning the management of certain recreational facilities through contractual agreements or would close the facilities. Relative to Alternative A, this alternative would reduce TVA's level of effort in some areas and increase it in others.

Alternative C — Flagship Management. Under Alternative C, TVA would aggresively explore, pilot test, and implement existing and new programs and activities to increase its resource stewardship to the "gold standard." TVA's proactive management of biological, cultural, and water resources would be greatly increased. Recreation management activities would emphasize enhancements of existing facilities while emphasizing sustainable technologies, develpment of trails, greenways and access areas, and repair of heavily impacted areas. This alternative takes into account the interconnectivity of the various programs and activities.

Alternative D — Blended Management. Under Alternative D, TVA has identified key programs that are integral toward enhancing future implementation efforts while maintaining activities and projects that address safety and comply with TVA's mission and applicable laws, regulations, policies, and EOs. This alternative takes into account the interconnectivity of each resource area and their supporting programs, helping to establish a foundation by which TVA may implement greater levels of programs in the future. The level of effort in many program areas would be greater than that of Alternatives A and B, and some program and activities would be implemented at the same level as Alternative C.

AFFECTED ENVIRONMENT

The primary study area, the TVA region, comprises 202 counties and approximately 59 million acres. In addition to the Tennessee River watershed, it covers parts of the Cumberland, Mississippi, Green, and Ohio rivers where TVA power plants are located. For some resources, such as air quality, and for the consideration of climate change issues, the assessment area extends beyond the TVA region. For some socioeconomic resources, the study area consists of the 170 counties where TVA is a major provider of electric power and Muhlenberg County, Kentucky, where the TVA Paradise Fossil Plant is located. The biological, cultural, and recreation programs and activities would primarily be implemented on TVA reservoir lands. The water resource management programs would be implemented on TVA reservoirs and elsewhere in the Tennessee River watershed.

Recreation. TVA currently manages 12 campgrounds, 63 day use areas, and 81 stream access sites. Recreation demand is driven by population levels, recreation participation rates, and innovations in recreation equipment. Analysis of the current United States Census data provides estimates over the next 20 years of population increases of about 17 percent for the TVA region. Assuming that current participation rates remain relatively constant, recreation demand is anticipated to grow in direct proportion to the population. Public pressure would increase on TVA lands, shoreline, and waterways in response to this demand.

Natural Areas. Natural areas occurring on TVA lands include both TVA- and non-TVA-managed areas and ecologically significant sites. They include small wild areas, habitat protection areas, ecological study areas, and wildlife observation areas. TVA manages 154 natural areas and conducts specific management activities compatible with the goals for each area. There are 229 natural areas and ecologically significant sites occurring on or adjacent to TVA lands that are managed by other agencies under contractual agreements.

Terrestrial Ecology. The TVA region spans nine ecoregions. The terrain across the Valley is diverse from mountains to bottomland hardwoods and cypress swamps. This area, rich in biodiversity, is composed of numerous habitats and plant communities, which house approximately 4,000 species of herbs, shrubs, and trees. Much of the region is heavily forested, and three forest regions and two subregions are recognized. TVA lands are dominated by relatively mature upland hardwood forests. Invasive plants occur on about 18 percent of TVA lands.

Approximately 55 species of reptiles, 72 species of amphibians, 182 species of breeding birds, and 76 species of mammals occur in these ecoregions. Although some wildlife species have widespread distributions, others have restricted ranges unique to specific ecoregions. For example, forest habitats in the Blue Ridge Mountains provide globally significant habitat for many species, especially amphibians and land snails. The high elevations found in the Blue Ridge ecoregion also provide habitat for relict populations of animals typically found in more northern latitudes.

Wetlands. Wetland resources vary in their types and extents across these ecoregions due to the influence of geology, topography, and land use patterns. In the Blue Ridge, Ridge and Valley, and Central Appalachians ecoregions located in eastern portions of the TVA region, wetlands occupy a relatively small percent of the landscape relative to uplands. These ecoregions are typically marked by relatively steep topography and deeply incised stream channels. Wetlands are typically small and isolated or linear in feature and associated with the floodplain areas of streams, rivers, and creeks. Moving westward across the TVA region, the topography levels out, and wetlands become more common.

Broad, flat floodplain areas are common features, and various types of wetland habitats, especially bottomland hardwood forested wetlands, are widespread.

Water Quality. Water quality is generally good in the TVA region. Most beneficial uses (as designated by the states) are supported in most water bodies, including fish and aquatic life, public and industrial water supply, waste assimilation, agriculture, and water-contact recreation. Of the approximately 42,000 perennial stream miles in the Valley, 8,500 miles are not fully supporting their designated uses (compiled from seven Valley states' 2008 305(b) reports), and 113,000 acres of lakes and reservoirs (compiled from seven Valley states' 305(b) reports [2008 and 2010]) (out of approximately 660,000 total acres) are not supporting their uses.

Aquatic Ecology. Rivers located in the TVA region support a large variety of freshwater fishes and invertebrates (including freshwater mussels, snails, crayfish, and insects). Due to the number of major river systems found in this region, the Southeastern United States is recognized as a globally important area for freshwater biodiversity. The EIS discussion of affected aquatic environments focuses on two distinct categories of water bodies: the TVA reservoir system within the Tennessee River drainage and "free-flowing" streams that are unaffected (or relatively unaffected) by the presence of TVA's dams and reservoirs.

Endangered and Threatened Species. *Aquatic Species.* The Tennessee River and its tributaries contain many species that are federally listed as threatened or endangered. Many more species are listed by the states in the Tennessee River drainage. None of these aquatic species are known to occur on the TVA lands that are a major focus of this plan. However, many of these species occur in streams and reservoirs adjacent to these lands. *Terrestrial Animals.* There are 33 federally listed, protected or candidate terrestrial animal species occurring in the TVA region. Five of these species occur on TVA lands. These are the bald eagle, gray bat, interior least tern, piping plover, and Indiana bat, listed in decreasing prevalence of occurrence. A sixth species, red-cockaded woodpecker, historically occurred on or near TVA lands. In recent decades, this species only occurs in isolated pockets in extreme southern portions of the region. Numerous state-listed species occur in the region and on TVA lands. *Plants.* There are 44 federally listed species, six federal candidate species, and 996 state-listed plant species within the TVA region. Over 80 percent of the federally listed species occur within four of the nine ecoregions: Eleven of the federally listed plant species, as well as numerous state-listed plants, occur on TVA lands.

Cultural Resources. The Tennessee Valley has a rich cultural heritage. The temperate climate and abundant resources attracted nomadic hunters into the region as early as 10,000 years ago. Through centuries of continuity and conflict, a rich diversity of Native American cultures evolved. Archaeological evidence of these cultures is found throughout the region, scattered over the region's landscape and buried under layers of flood-borne silt. TVA is responsible for many historic properties that are located on TVA lands or involved with the many different projects that take place in the TVA region. Various laws require TVA to manage, protect, and preserve these resources to the extent possible and mitigate impacts to these resources due to TVA-related projects. Archaeological survey of lands by TVA reservoirs varies across the Valley, and over 11,500 archaeological sites have been recorded to date. Approximately 5,320 historic structures have been recorded on or near TVA lands.

Land Use. The Tennessee River watershed includes approximately 40,913 square miles. The TVA power service area includes a total of 76,738 square miles, with 44,783 square

miles extending outside the Tennessee River watershed. Approximately 81 percent of the 293,000 acres (458 square miles) of TVA reservoir lands is forested, about 12 percent is in agricultural uses, and most of the remainder is developed. Adjacent non-TVA lands have less forest cover (63 percent), more agricultural land (24 percent), and more developed land (11 percent).

Prime Farmland. In the TVA region, approximately 17,360,515 acres are designated as prime farmland, farmland of statewide importance, or farmland of local importance. On average, this represents 33.2 percent of the total area farmed within the seven-state service area. About 12 percent of TVA reservoir land is prime farmland.

Visual Resources. TVA lands include dam reservations, power plant sites, and tracts of land adjacent to reservoirs that range in size from tenths of an acre to several hundred acres. Because the scenic features of the landscape are not limited by land boundaries, landscape character extends across TVA lands and other public and private lands alike. Large parts of the Tennessee Valley have the characteristics of a scenic, rural countryside.

Floodplains. As stated in the TVA Act, one of the primary reasons that TVA was established was to "control the destructive floodwater in the Tennessee River and the Mississippi River Basins." A series of dams and reservoirs was constructed to make flood control a reality. The operation of the integrated reservoir system substantially lowers the risk of flooding in the Valley and in the Ohio and Mississippi rivers basins.

Socioeconomics and Environmental Justice. The total population of the TVA region is about 10.7 million, as of 2010. The larger population concentrations tend to be located along the corridors of the Tennessee, French Broad, Cumberland, and Tennessee rivers. In 2009, the total employment for the study area was 5.74 million. In 2009, the per capita personal income for the study area was $32,643, about 82 percent of the national average of $39,635. However, the 2009 average income levels vary widely across the study area. Minorities constitute 22.2 percent of the population within the TVA region. However, their distribution within the region is very uneven. Minorities are a relatively large share of the total population in most counties located in the western portion of the study area. In 2009, the poverty level for the study area was estimated to be 17.4 percent, higher than the national average of 14.3 percent. County poverty levels are higher than the regional average more frequently in the western part of the region and in counties along or near the Tennessee-Kentucky border.

Navigation. Development of the Tennessee River navigation channel was essentially completed in 1945 with the construction of a series of 10 dams and navigation locks, extending commercial navigation from Knoxville, Tennessee, to Paducah, Kentucky, a distance of 652 miles. The Tennessee River waterway is an integral part of the interconnected, 12,000-mile National Inland Waterway System.

Air Quality. Air quality in the TVA region is generally good and has steadily improved over the last 30 years. There are currently no areas in the TVA region (nonattainment areas) that do not meet air quality standards for carbon monoxide, lead, nitrogen dioxide, sulfur dioxide (SO_2), ozone, and larger particulate matter (PM_{10}). A few counties in the eastern half of the region are designated as nonattainment for fine particulate matter ($PM_{2.5}$). Portions of the TVA region are expected to be designated as nonattainment for SO_2 and ozone standards, which were recently made more stringent.

Climate. The TVA region has a generally mild climate. Both annual average temperature and precipitation vary from year to year and neither shows significant long-term increasing or decreasing trends. Wind speeds are generally light with higher speeds in winter and spring and lower speeds in summer and autumn.

ENVIRONMENTAL CONSEQUENCES

Regardless of the alternative selected, some resources would not be directly affected either adversely or beneficially by the NRP, while other resources would likely be directly or indirectly affected in a minor way or to moderate degree across the range of alternatives.

Alternative C would create the greatest potential beneficial impacts for the following resource areas: recreation, natural areas, vegetation, wildlife, wetlands, water quality, aquatic ecology, endangered and threatened species, cultural resources, visual resources, land use, prime farmland, and socioeconomics.

Alternative A would create the least potential beneficial impacts for the following resource areas: natural areas, vegetation, wildlife, wetlands, listed aquatic species, listed terrestrial species, listed plants, cultural resources, land use, prime farmland, and visual resources. Alternative B would create the least potential beneficial impacts for socioeconomics, water quality, and recreation. The potential impacts to floodplains, navigation, air quality, and climate would be relatively similar under all alternatives. Table S-1 provides a comparison of resources and explains how each alternative could affect the resource. Relative beneficial impacts to the resource are shown in figures in Chapter 5.

Table S-1. Summary of Potential Effects by Alternative

Resource	Alternative A - No Action	Alternative B - Custodial Management	Alternative C - Flagship Management	Alternative D - Blended Management (Preferred Alternative)
Developed Recreation	Beneficial impacts but insufficient to meet recreation demand	Growing gap in meeting recreation demand	Increase in the quality and quantity of recreation opportunities	Increase in the quality of recreation opportunities but little change in quantity
Dispersed Recreation	Negative impact due to increased pressure on natural resources	Beneficial impact in meeting recreation demand and managing impacts	Provides the most beneficial impact in meeting recreation demand and managing impacts	More beneficial than Alternative B but less than Alternative C
Natural Areas	Slightly adverse impacts due to lack of active management	Less adverse than Alternative A	Beneficial impacts due to proactive management	Less beneficial than Alternative C
Terrestrial Ecology — Plants	Negative Impacts anticipated due to spread of invasive plants	Beneficial impact due to increase in invasive plant management	Provides the greatest beneficial impact due to increase in invasive plant management	Less beneficial than Alternative C

Resource	Alternative A - No Action	Alternative B - Custodial Management	Alternative C - Flagship Management	Alternative D - Blended Management (Preferred Alternative)
Terrestrial Ecology — Wildlife	No adverse impacts			
Wetlands	No materially different impacts		Provides the greatest beneficial impacts	Beneficial impacts due to identification, protection, and restoration efforts
Water Quality	Beneficial impacts due to the Water Resource Management programs	Adverse impacts due to the reduction in Water Resource Management programs	Provides the greatest beneficial impacts	More beneficial than Alternative B but less than Alternative C
Aquatic Ecology	Beneficial impacts due to ongoing stewardship management	No materially different impacts	Provides the greatest beneficial impacts	More beneficial than Alternatives A and B
Endangered and Threatened Species	No impacts to listed aquatic species and terrestrial animal species; impacts to listed plant species due to the spread of invasive species			
Cultural Resources	Potential negative impacts to historic properties with the exception of programs associated with Archaeological Resources Protection Act	Less negative impacts than Alternative A	Greatest beneficial impacts due to proactively promoting protection and preservation of resources	More beneficial than Alternatives A and B but less than Alternative C
Land Use	Slightly adverse impacts due to lost opportunities for recreation and natural resource protection	Greatest potential for adverse impacts	Provides the least potential for adverse impacts	Similar to Alternative C
Prime Farmland	Beneficial impacts due to biological and cultural resources programs	Greater beneficial impacts than Alternative A	Greatest beneficial impacts	More beneficial than Alternatives A and B but less than Alternative C
Visual Resources	Reduction in the scenic attraction of TVA lands	Increasingly beneficial impact in the scenic attraction of TVA lands	Most beneficial impact in the scenic attraction of TVA lands	Similar to Alternative C
Floodplains	Negligible loss of flood control and power storage, minimal effect on floodplain values			
Socioeconomics and Environmental Justice	No impacts	Small negative impacts to the economy and quality of life	Positive impacts to the economy and quality of life	Less beneficial than Alternative C

Resource	Alternative A - No Action	Alternative B - Custodial Management	Alternative C - Flagship Management	Alternative D - Blended Management (Preferred Alternative)
Navigation	Minimal impacts to commercial navigation			
Air Quality	No negative impacts			
Climate	No impacts			

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TABLE OF CONTENTS

CHAPTER 1 - PURPOSE AND NEED FOR ACTION 1

1.1. Introduction 1
1.2. The Tennessee Valley Authority 1
1.3. TVA's Stewardship Policies and Programs 1
1.3.1. Environmental Policy 1
1.3.2. Land Policy 2
1.3.3. Biological Resources Management 3
1.3.4. Cultural Resources Management 4
1.3.5. Recreation Management 4
1.3.6. Reservoir Lands Planning 6
1.3.7. Water Resources Management 6
1.4. Purpose and Need 8
1.5. Scope of the Natural Resource Plan 9
1.6. The Decision 11
1.7. Scoping and Public Involvement 11
1.7.1. Scoping 11
1.7.1.1. Scoping Response 12
1.7.1.2. Issue and Resource Identification 13
1.7.2. Public Review of the Draft NRP and EIS 15
1.8. Other Pertinent Environmental Reviews or Documentation 15
1.9. Statutory Overview and Necessary Federal Permits or Licenses 17
1.9.1. Statutory Overview 17
1.9.2. Necessary Federal Permits or Licenses 20
1.10. Environmental Impact Statement Overview 20

CHAPTER 2 - RESOURCE MANAGEMENT PROGRAMS 21

2.1. Biological Resources Management 21
2.1.1. Sensitive Biological Resources Management 21
2.1.2. Terrestrial Habitat Management 27
2.1.3. Land Management and Stewardship 40
2.1.4. Public Outreach Programs 43
2.1.5. Dispersed Recreation Management 44
2.2. Cultural Resources Management 47
2.3. Recreation Management 52
2.3.1. Campground Management 53
2.3.2. Day Use Areas Management 55
2.3.3. Public Outreach Programs 57
2.3.4. Recreation Assessment and Design Tools 58
2.4. Reservoir Lands Planning 60
2.4.1. Reservoir Lands Planning Methodologies 60
2.4.2. Property Administration 66
2.5. Water Resource Management 67
2.5.1. Aquatic Monitoring and Management 68
2.5.2. Partnership Programs 69
2.5.3. Public Outreach Programs 69
2.5.4. Water Resource Improvement Programs 72
2.5.5. National Water Resource Recovery Programs 75

2.5.6. Water Resource Improvement Tools 75
2.6. Public Engagement 85
CHAPTER 3 - ALTERNATIVES 87
3.1. Development of Alternatives 87
3.1.1. Development of Program Options 87
3.1.2. Natural Resource Plan Program Analysis Framework 88
3.1.2.1. Scenario Planning Analysis 88
3.1.2.2. Other Strategic Considerations 89
3.1.2.3. The NRP Program Mix 90
3.1.3. Reservoir Lands Planning Analysis Framework 90
3.1.4. Alternatives Development 90
3.1.5. Revisions Following Public Review of Draft NRP and EIS 91
3.2. Alternatives Evaluated in Detail 91
3.2.1. Alternative A – Current Management - No Action 115
3.2.2. Alternative B – Custodial Management 115
3.2.2.1. Biological Resources Management 115
3.2.2.2. Cultural Resources Management 116
3.2.2.3. Recreation Management 117
3.2.2.4. Reservoir Lands Planning 118
3.2.2.5. Water Resource Management 119
3.2.3. Alternative C – Flagship Management 120
3.2.3.1. Biological Resources Management 120
3.2.3.2. Cultural Resources Management 122
3.2.3.3. Recreation Management 124
3.2.3.4. Reservoir Lands Planning 125
3.2.3.5. Water Resource Management 125
3.2.4. Alternative D – Blended Management 127
3.2.4.1. Biological Resources Management 127
3.2.4.2. Cultural Resources Management 128
3.2.4.3. Recreation Management 129
3.2.4.4. Reservoir Lands Planning 129
3.2.4.5. Water Resource Management 129
3.3. Other Program Options Considered 130
3.3.1. Biological Program Options 130
3.3.2. Recreation Program Options 131
3.3.3. Water Resource Program Option 131
3.4. Comparison of Alternatives 131
3.5. The Preferred Alternative 133
CHAPTER 4 - AFFECTED ENVIRONMENT 135
4.1. Recreation 135
4.1.1. Facility-Based Recreation 135
4.1.2. Dispersed Recreation 136
4.2. Natural Areas 138
4.3. Terrestrial Ecology 141
4.3.1. Vegetation 141
4.3.2. Wildlife 150
4.4. Wetlands 153
4.5. Water Quality 157
4.6. Aquatic Ecology 162

4.7. Endangered and Threatened Species 164
4.7.1. Aquatic Animals 164
4.7.2. Terrestrial Animals 165
4.7.3. Plants 169
4.8. Cultural Resources 174
4.8.1. Archaeology 174
4.8.2. Historic Structures 178
4.9. Land Use 180
4.10. Prime Farmland 181
4.11. Visual Resources 183
4.12. Floodplains 186
4.13. Socioeconomics and Environmental Justice 187
4.14. Navigation 190
4.15. Air Quality 192
4.16. Climate 194

CHAPTER 5 - ENVIRONMENTAL CONSEQUENCES 203

5.1. Overview of Potential Environmental Impacts by Resource Management Programs 206
5.1.1. Biological Resources Management 206
5.1.2. Cultural Resources Management 207
5.1.3. Recreation Management 208
5.1.4. Reservoir Lands Planning 209
5.1.5. Water Resource Management 210
5.1.6. Public Engagement 211
5.2. Recreation 211
5.2.1. Developed Recreation 211
5.2.2. Dispersed Recreation 216
5.3. Natural Areas 220
5.4. Terrestrial Ecology 223
5.4.1. Vegetation 223
5.4.2. Wildlife 225
5.5. Wetlands 227
5.6. Water Quality 229
5.7. Aquatic Ecology 237
5.8. Endangered and Threatened Species 240
5.8.1. Aquatic Animals 241
5.8.2. Terrestrial Animals and Plants 242
5.9. Cultural Resources 244
5.10. Land Use 254
5.11. Prime Farmland 255
5.12. Visual Resources 257
5.13. Floodplains 259
5.14. Socioeconomics and Environmental Justice 260
5.14.1. Socioeconomics 260
5.14.2. Environmental Justice 262
5.15. Navigation 263
5.16. Air Quality 264
5.17. Climate 264

5.18. Unavoidable Adverse Effects 266
5.19. Relationship of Short-Term Uses and Long-Term Productivity 266
5.20. Irreversible and Irretrievable Commitments of Resources 266
5.21. Energy Resources and Conservation Potential 267
5.22. Summary of TVA Commitments and Proposed Mitigation Measures 267

CHAPTER 6 - LIST OF PREPARERS 269

6.1. TVA NEPA Project Management 269
6.2. ScottMadden Inc. Project Management 269
6.3. Other TVA Contributors 270
6.4. Cardno ENTRIX Economics 275

CHAPTER 7 - FINAL ENVIRONMENTAL IMPACT STATEMENT RECIPIENTS 277

6.5. Federal Agencies 277
6.6. Federally Recognized Indian Tribes 277
6.7. State Agencies 277
6.8. Regional and Local Agencies and Private Organizations 279
6.9. Individuals 279

CHAPTER 8 - LITERATURE CITED 283

GLOSSARY 295

INDEX 297

LIST OF TABLES

Table 1-1. Land Conveyed by TVA for Recreation Development 5
Table 2-1. Summary of Biological Resources Management Programs 22
Table 2-2. Listed Species Monitored by TVA and Partners on TVA-Lands and Near TVA Operations 23
Table 2-3. Former TVA Land and Water Areas Used for Federal and State Wildlife Management and Refuge Programs 40
Table 2-4. Conditions Reviewed During Comprehensive Land Conditions Assessment 41
Table 2-5. Activities Associated With Dispersed Recreation Improvements 45
Table 2-6. Summary of Cultural Resources Management Programs 47
Table 2-7. Summary of Recreation Management Programs 52
Table 2-8. Land Planning Methodology Applied to TVA Reservoirs 61
Table 2-9. Current Allocations and Proposed Comprehensive Valleywide Land Plan Allocation Ranges 63
Table 2-10. Comprehensive Valleywide Land Plan Allocation Baseline 64
Table 2-11. Summary of TVA's Water Resource Management Programs 67
Table 2-12. Water Quality Improvements from Targeted Watershed Initiatives 73
Table 2-13. Partnership Funding for Water Quality Improvements from Targeted Watershed Initiatives 74
Table 3-1. Program Options for Management of Biological, Cultural, and Water Resources and Recreation 87
Table 3-2. Reservoir Lands Planning Program Options 88

Table 3-3. Biological Resources Management Components of Alternatives A - D 93
Table 3-4. Cultural Resources Management Components of Alternatives A - D 102
Table 3-5. Recreation Management Components of Alternatives A - D 105
Table 3-6. Water Resources Management Components of Alternatives A - D 109
Table 3-7. Public Engagement Components of Alternatives A - D 114
Table 3-8. Rapid Lands Assessment Data for Reservoirs 119
Table 3-9. Summary of Potential Effects by Alternative 132
Table 4-1. Recreation Facilities Located Within the TVA Region 135
Table 4-2. Dispersed Recreation Participation in the 125-County Tennessee River Watershed 137
Table 4-3. TVA Reservoirs and Facilities Located Within the Ridge and Valley Ecoregion 143
Table 4-4. Invasive Plants in the TVA Region 147
Table 4-5. Regional Variation of Wetland Abundance by Ecoregion — 2000 153
Table 4-6. Proportion of TVA Lands With Wetlands — 2010 154
Table 4-7. Ecological Health Ratings of TVA Reservoirs 159
Table 4-8. State- and Federally Listed Aquatic Animal Species Present in the Tennessee River Watershed 165
Table 4-9. Federally Listed Endangered, Threatened, and Candidate Terrestrial Animals and Plants Potentially Impacted by the Natural Resource Plan 166
Table 4-10. State-Listed Plant Species Found Within 1 Mile of TVA Facilities 171
Table 4-11. Approximate Number of Archaeological Sites Identified on and Percent of TVA Lands Systematically Surveyed 175
Table 4-12. Numbers of Historic Structures Surveyed 179
Table 4-13 Acreage of Prime/Unique Farmland and Farming Trends in the Seven States Comprising the TVA Power Service Area 181
Table 4-14. Area of Prime/Unique Farmland Surrounding TVA Reservoirs 182
Table 4-15. Resident Population, Tennessee Valley States 188
Table 4-16. Metropolitan Area Population, 2009 188
Table 4-17. Navigation Locks on the Tennessee River Waterway 190
Table 4-18. National Ambient Air Quality Standards 193
Table 4-19. Monthly, Seasonal, and Annual Temperature Averages for Six National Weather Service Stations in the TVA Region for 1971-2000 196
Table 4-20. Monthly, Seasonal, and Annual Precipitation Averages in the Tennessee River Watershed for 1971-2000 197
Table 4-21. Monthly, Seasonal, and Annual Wind Speed Averages for Nine Sites in the TVA Region for 1973-2000 199
Table 4-22. Monthly, Seasonal, and Annual Cloud Cover Averages for Nine Sites in the TVA Region for 1973-2000 200

LIST OF FIGURES

Figure 1-1. TVA-Managed Reservoir Land 2
Figure 1-2. Natural Resource Plan Geographic Scope 10

Figure 3-1. Range of Program Options Developed for the NRP 88
Figure 3-2. Various Scenario Planning Analysis Inputs 89
Figure 4-2. Vegetation Types on TVA Zone 3 and Zone 4 Reservoir Lands by Percent of Land Cover 149
Figure 4-3. Wetlands of the TVA Reservoir System by Vegetation Class 155
Figure 4-4. Reservoir Wetland Types and Locations 156
Figure 4-5. Percentage of Federally Listed Endangered, Threatened, and Candidate Species per Ecoregion 169
Figure 4-6. Percentage of State-Listed Plant Species per Ecoregion 173
Figure 4-7. Land Use/Land Cover of TVA Reservoir Lands (a) and Non-TVA Lands within 0.25 Mile of TVA Reservoir Lands (b). 180
Figure 4-8. 1971-2000 TVA Region Annual Average Temperature (°F) Based on Data from Six National Weather Service Stations 196
Figure 4-9. Annual Average Precipitation (Inches) for the Tennessee River Basin 198
Figure 4-10. Prevailing Wind Direction for Surface Winds at Nine Regional Airports, 1973-2000 199
Figure 4-11. Annual Observations and Fitted Trend Lines for Cloud Cover at Selected Airports (a and b) and Solar Radiation at Selected Nuclear Plants (c and d) for 1976/1977-2008 201
Figure 5-1. Relative Beneficial Impacts of the Alternatives on Developed Recreation 215
Figure 5-2. Relative Beneficial Impacts of the Alternatives on Dispersed Recreation 220
Figure 5-3. Relative Beneficial Impacts of the Alternatives on Natural Areas 223
Figure 5-4. Relative Beneficial Impacts of the Alternatives on Vegetation 225
Figure 5-5. Relative Beneficial Impacts of the Alternatives on Wildlife 227
Figure 5-6. Relative Beneficial Impacts of the Alternatives on Wetlands 229
Figure 5-7. Relative Beneficial Impacts of the Alternatives on Water Quality 237
Figure 5-8. Relative Beneficial Impacts of the Alternatives on Aquatic Ecology 240
Figure 5-9. Relative Beneficial Impacts of the Alternatives on Listed Aquatic Species 242
Figure 5-10. Relative Beneficial Impacts of the Alternatives on Listed Terrestrial Species 244
Figure 5-11. Relative Beneficial Impacts of the Alternatives on Cultural Resources 253
Figure 5-12. Relative Beneficial Impacts of the Alternatives on Land Use 255
Figure 5-13. Relative Beneficial Impacts of the Alternatives on Prime Farmlands 257
Figure 5-14. Relative Beneficial Impacts of the Alternatives on Visual Resources 259
Figure 5-15. Relative Beneficial Impacts of the Alternatives on Floodplains 260
Figure 5-16. Relative Beneficial Impacts of the Alternatives on Socioeconomics 262
Figure 5-17. Relative Beneficial Impacts of the Alternatives on Environmental Justice 263
Figure 5-18. Relative Beneficial Impacts of the Alternatives on Navigation 264
Figure 5-19. Relative Beneficial Impacts of the Alternatives on Air Quality 264
Figure 5-20. Relative Beneficial Impacts of the Alternatives on Climate 266

ABBREVIATIONS, ACRONYMS, AND SYMBOLS

°C	Degree Celsius
°F	Degree Fahrenheit
ADA	Americans With Disabilities Act
ARPA	Archaeological Resources Protection Act
BMP	Best Management Practice
CFR	Code of Federal Regulations
CLCA	Comprehensive Land Conditions Assessment
CO_2	Carbon Dioxide
CWA	Clean Water Act
CWI	Clean Water Initiative
CVLP	Comprehensive Valleywide Land Plan
DDT	Dichlorodiphenyltrichloroethane
DO	Dissolved Oxygen
DU	Ducks Unlimited
EA	Environmental Assessment
EE	Environmental Education
EIS	Environmental Impact Statement
EO	Executive Order
EPRI	Electric Power Research Institute
ESA	Endangered Species Act
FONSI	Finding of No Significant Impact
FPPA	Farmland Protection Policy Act
GHG	Greenhouse Gas
GIS	Geographic Information System
HPA	Habitat Protection Area
HU	Hydrologic Unit
IBI	Index of Biotic Integrity
IPCC	Intergovernmental Panel on Climate Change
IRM	Integrated Resource Management
IRP	Integrated Resource Plan
LCA	Land Conditions Assessment
LNT	Leave No Trace
MOU	Memorandum of Understanding
NAAQS	National Ambient Air Quality Standards
NAGPRA	Native American Graves Protection and Repatriation Act
n.d.	Indicates “no date,” or date which Web site was accessed is unknown
NEMO	Nonpoint Education for Municipal Officials
NEPA	National Environmental Policy Act
NGO	Nongovernment Organization
NHPA	National Historic Preservation Act
NOI	Notice of Intent
NRCS	Natural Resources Conservation Service
NRHP	National Register of Historic Places
NRP	Natural Resource Plan
NSR	New Source Review
NWI	National Wetlands Inventory
NWS	National Weather Service
NWSG	Native Warm-Season Grasses
O&M	Operation and Maintenance
PA	Programmatic Agreement
PCBs	Polychlorinated Biphenyls
PIF	Partners in Flight
PSA	Power Service Area

PSD	Prevention of Significant Deterioration
QGP	Quality Growth Program
RLA	Rapid Lands Assessment
RLCA	Rapid Land Conditions Assessment
RLMP	Reservoir Land Management Plan
ROS	*Reservoir Operations Study*
RRSC	Regional Resource Stewardship Council
SFI	Sport Fishing Index
SHPO	State Historic Preservation Officer(
SMI	Shoreline Management Initiative
SMP	Shoreline Management Policy
SMZ	Streamside Management Zone
SQN	Sequoyah Nuclear Plant
STM	Stream and Tailwater Monitoring
SWA	Small Wild Area
TCP	Traditional Cultural Property
TDA	Tennessee Department of Agriculture
TDEC	Tennessee Department of Environment and Conservation
TRI	Targeted Reservoir Initiative
TVA	Tennessee Valley Authority
TVA Board	Tennessee Valley Authority Board of Directors
TVCMI	Tennessee Valley Clean Marina Initiative
TWI	Targeted Watershed Initiatives
TWRA	Tennessee Wildlife Resources Agency
USACE	U.S. Army Corps of Engineers
USCG	U.S. Coast Guard
USDA	U.S. Department of Agriculture
USDA-WS	U.S. Department of Agriculture Wildlife Services
USEPA	U.S. Environmental Protection Agency
USFS	U.S. Forest Service
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
WHC	Wildlife Habitat Council
WOA	Wildlife Observation Area

CHAPTER 1 - PURPOSE AND NEED FOR ACTION

1.1. Introduction

For more than seven decades, the Tennessee Valley Authority (TVA) has been improving the quality of life in the Tennessee Valley region through its threefold mission of providing affordable and reliable power, promoting sustainable economic development, and acting as a steward of the Valley's natural resources. The lands managed by TVA in the name of the United States of America are some of the most important resources of the region. They have provided the foundation for the dams and reservoirs that reduce flooding and provide the benefits of a navigable waterway and low-cost hydroelectricity. They are also the sites for power generating facilities and arteries for delivering that power. Many of the parks, recreation areas, and wildlife refuges that are so important for the region's quality of life are on lands owned or formerly owned by TVA. TVA's public lands have often been the catalyst for public and private economic development.

In May 2008, the TVA Board of Directors (TVA Board) approved the TVA Environmental Policy. The Environmental Policy sets forth principles to guide TVA in the reduction of the environmental impacts of its operations while continuing to provide reliable and affordable power to the Valley. By establishing the Environmental Policy, TVA committed to a more systematic and integrated approach to managing stewardship. The proposed Natural Resource Plan (NRP) addresses TVA's activities involving Water Resource Protection and Improvement, Sustainable Land Use, and Natural Resource Management. The proposed plan and alternatives to it are addressed in this environmental impact statement (EIS).

1.2. The Tennessee Valley Authority

President Franklin Roosevelt needed creative solutions to lift the nation out of the depths of the Great Depression, and TVA is considered one of his most innovative initiatives. Roosevelt envisioned TVA as an agency different from any other. He asked Congress to create "a corporation clothed with the power of government but possessed of the flexibility and initiative of a private enterprise." On May 18, 1933, Congress passed the Tennessee Valley Authority Act. A copy of the TVA Act is available at http://www.tva.com/abouttva/pdf/TVA_Act.pdf.

From the start, TVA established a unique problem-solving approach to fulfilling its mission: Integrated Resource Management. Each issue TVA faced—whether it was power production, navigation, flood control, malaria prevention, reforestation, or erosion control—was studied in its broadest context. TVA weighed each issue relative to the others. From this beginning, TVA has held fast to its strategy of integrated solutions, even as the issues changed over the years. A short TVA history is available at http://www.tva.com/abouttva/history.htm.

1.3. TVA's Stewardship Policies and Programs

1.3.1. Environmental Policy

As stated in TVA's 2007 Strategic Plan (http://www.tva.com/stratplan/tva_strategic_plan.pdf), "TVA will be proactive in addressing environmental concerns, including those related to global climate change." About half of the identified strategic objectives and critical success factors in the Plan relate directly to TVA's environmental activities and policy-making.

Following the release of the 2007 Strategic Plan, the TVA Board asked for the development of an integrated environmental policy to outline objectives and critical success factors across the multiple areas of TVA's activities. In 2008, the TVA Board approved the Environmental Policy, which provides guiding principles for reducing the environmental impacts of TVA operations

while continuing to provide reliable and affordable power to the Valley. In 2010, a biennial review of the Environmental Policy was completed and did not result in major changes or revisions. TVA's overarching Environmental Policy objective is to provide cleaner, reliable, and affordable energy; support sustainable economic growth in the Valley; and engage in proactive environmental stewardship in a balanced and ecologically sound manner. A copy of the Environmental Policy is available at http://www.tva.com/environment/policy.htm.

1.3.2. Land Policy

On behalf of the United States, TVA originally acquired approximately 1.3 million acres of land in the Valley. Creation of the TVA reservoir system inundated approximately 470,000 acres with water. TVA has transferred or sold approximately 508,000 acres, the majority of which was transferred to other federal and state agencies for public uses. TVA currently controls approximately 293,000 acres of reservoir lands, which continue to be managed pursuant to the TVA Act (Figure 1-1). As part of its management of these lands, TVA allocates them to various land use zones (see Sections 1.3.6 and 2.4). These TVA-managed lands are frequently referred to as "TVA lands" in this EIS.

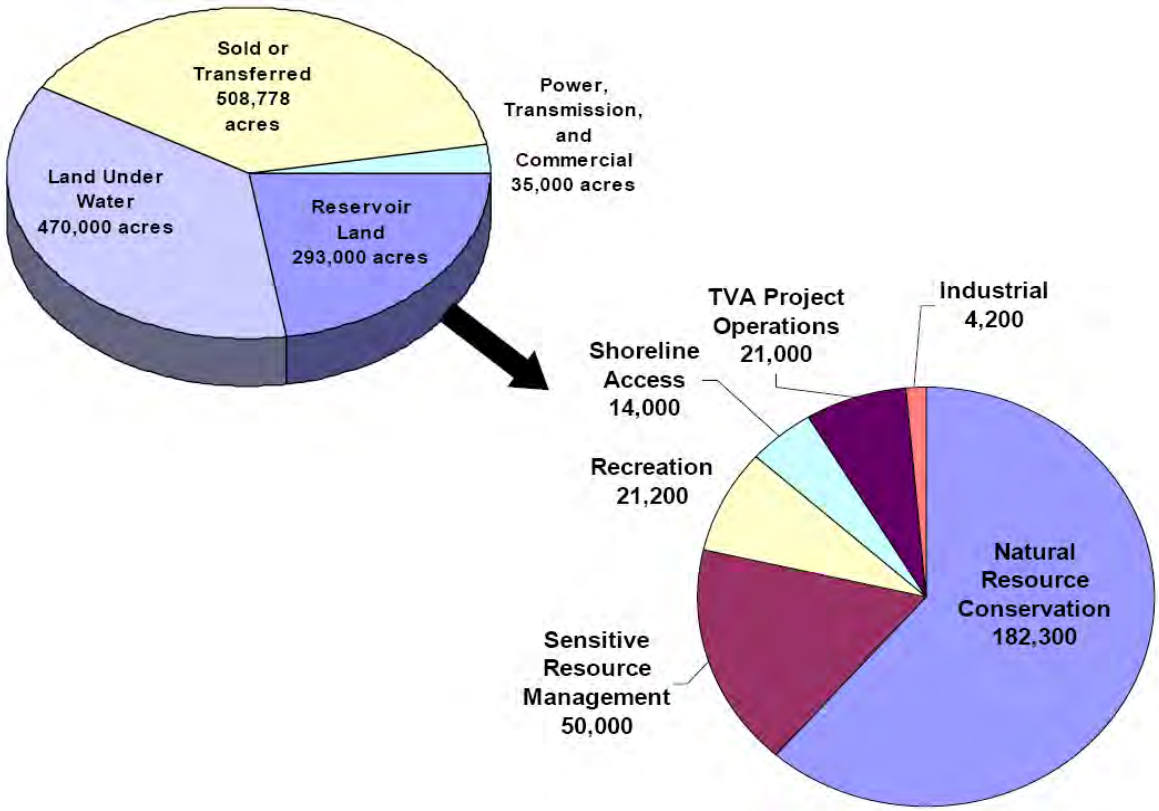


Figure 1-1. TVA-Managed Reservoir Land

In 2006, TVA adopted a Land Policy to guide retention, disposal, and planning of real property. Accordingly, it is TVA's policy to manage its lands to protect the integrated operation of the TVA reservoir and power systems, to provide for appropriate public use and enjoyment of the reservoir system, and to provide for continuing economic growth in the Valley. Recognizing that historical land transfers have contributed substantially to meeting multipurpose objectives, it is also TVA's policy to retain in public ownership the reservoir lands under its control except in those rare instances where the benefits to the public will be so significant that transferring lands

to private ownership or another public entity is justified. The Land Policy is available at http://www.tva.gov/river/landandshore/land_policy.htm.

1.3.3. Biological Resources Management

TVA manages biological resources while providing for many types of recreational opportunities. TVA has designated more than 182,000 acres of the lands under its control for natural resource conservation, which includes the enhancement of wildlife habitat and dispersed informal recreation. In addition, TVA has designated 50,000 acres for sensitive resource management, where the major focus is protecting and enhancing significant natural and cultural features. Together, these 232,000 acres of lands provide TVA with distinctive management opportunities in resource conservation and enhancement.

TVA has a long and storied history in the biological resources management arena, especially in the areas of forestry, land reclamation, and wildlife management. The TVA Act recognized the role of forest management in the full development of the region's natural and human resources. The goals of the early forestry programs included optimum forest productivity, economic expansion, watershed protection, and environmental enhancement. Through the years, TVA worked with other agencies and stakeholders to encourage improved forest management, more efficient wood utilization, environmental protection, reforestation, and mine reclamation.

TVA developed the first forest tree nurseries in the Valley and assisted Valley states in developing their own tree production capabilities. Between the 1930s and 1960s, more than 600 million seedlings were produced at TVA's two forest nurseries for distribution across the Valley region. From the 1950s through the 1970s, TVA conducted a Valleywide program to inventory all forested tracts in the region. This program complemented the United States (U.S.) Forest Service's (USFS) national inventory system. Through the 1980s and 1990s, TVA initiated some of the first computerized forestry planning tools in the nation, which were used to complete a systematic inventory of its forested properties. This inventory was used to guide forestry management activities. During the 1990s and 2000s, private land development adjacent to TVA land increased dramatically, putting more pressure on TVA's forests, and led TVA to balance these uses with traditional forest management goals.

Dating back to TVA's earliest days, there has been committed effort to protecting and improving wildlife populations and habitats. With a vast amount of impounded surface water, approximately 293,000 acres of land around the reservoirs, and 11,000 miles of shoreline, this land/water reservoir system represents a significant natural resource base offering numerous opportunities for productive wildlife management. Between the 1930s and 1950s, TVA provided more than 195,000 acres of land to federal and state agencies for the development of waterfowl and upland wildlife management areas and refuges. This effort provided significant benefits to both resident and migratory wildlife. In 1978, TVA initiated a wildlife restoration project aimed at restoring various animal populations. These efforts, conducted in partnership with other federal and state agencies and private organizations, resulted in establishing self-sustaining populations of several species, with reservoir habitat species such as osprey and bald eagles doing especially well. During the 1970s and 1980s, TVA was instrumental in developing techniques to restore productive wildlife habitat to previously disturbed lands. TVA was recognized nationally for its work in reclaiming surface mined lands and developing a wildlife-oriented model reclamation plan for southern Appalachia in cooperation with the U.S. Fish and Wildlife Service (USFWS).

In the 1970s, TVA created a regional Natural Heritage database to collect and store biological data to help guide effective conservation and land planning activities and to assist TVA when complying with the National Environmental Policy Act (NEPA), the Endangered Species Act

(ESA), wetland regulations under the Clean Water Act (CWA), executive orders (EOs), and other applicable federal and state legislation. Today, TVA's Natural Heritage database is the largest in the Valley region. In addition to maintaining the database, TVA developed procedures and collected data to determine the health and status of endangered and threatened plants and animals at approximately 40 sites on TVA lands.

1.3.4. Cultural Resources Management

The earliest TVA-related archaeological surveys began in 1933 with construction of the first TVA dam at Norris, Tennessee. As TVA rapidly began constructing dams across the Valley, archaeological surveys were conducted of the Wheeler, Pickwick, Guntersville, Hiwassee, Chickamauga, and Kentucky reservoir basins. Archaeological surveys conducted on TVA lands from 1940 through 1960 were sporadic until the National Historic Preservation Act (NHPA) was passed in 1966. NHPA requires federal agencies to consider the potential effects of a proposed action on historic properties, which include archaeological resources and historic structures. NHPA also outlines an approach for agencies to consider preservation of cultural resources. Since 1966, TVA has conducted archaeological surveys on 30 of its reservoirs.

Over the last few decades, archaeological survey techniques have improved due to scientific and technological advancements. Because some investigations were conducted prior to the development of modern survey methods, archaeological survey coverage and site documentation on TVA lands vary across the Valley. Of the approximate 293,000 acres of above-pool TVA lands along the reservoirs, about 30 percent (88,000 acres) has been systematically surveyed for cultural resources.

To date, TVA has documented an estimated 11,500 archaeological sites on and adjacent to its reservoir and power properties across the Valley. While the number of resources is quite large, only about 25 percent of these sites have been assessed for eligibility for the National Register of Historic Places (NRHP). The NRHP is maintained by the National Park Service as the official list of the nation's historic places worthy of preservation.

TVA manages a number of significant archaeological sites that have made an important contribution to the understanding of prehistory in the Southeast U.S. These resources include the Seven Mile Island Archaeological District (listed in the NRHP) and Dust Cave in Alabama, Hiwassee Island and Ledbetter sites in Tennessee, the Jonathan Creek site in Kentucky, and Yellow Creek in Mississippi, as well as hundreds of other sites that have been studied since the inception of TVA.

Approximately 5,320 historic structures have been recorded on or near TVA lands. Approximately 233 of these structures are considered either eligible or potentially eligible for listing in the NRHP, 85 historic structures are listed in the NRHP, and nine NRHP historic districts exist on TVA lands.

The majority of the historic structure data came from individual county surveys on file with the State Historic Preservation Officers (SHPOs) and from past TVA surveys, primarily associated with TVA's reservoir lands planning. Many of these surveys are incomplete or out of date. Comprehensive work at South Holston, Douglas, Chatuge, Normandy, and Tims Ford reservoirs and partial coverage at Boone, Fort Patrick Henry, and Norris reservoirs supplemented these surveys.

1.3.5. Recreation Management

From its beginning, TVA has developed recreational facilities on its reservoirs and encouraged others to develop a wide variety of outdoor recreational facilities and opportunities in the Valley.

Some of the construction villages for the early dams were converted to park facilities following the completion of the dams and eventually became state parks or were managed by others under license with TVA. TVA also developed numerous other recreational areas on its reservoirs, some of which have also become state parks. TVA developed and continues to operate 12 campgrounds and 63 day use areas on its reservoirs. TVA has also acquired 81 stream access sites; TVA operates 31 sites and the remainder is operated by others under contractual agreements with TVA.

TVA has made approximately 485,300 acres of land available for recreational development by other entities (see Table 1-1). Much of this land has been transferred to local, state, and federal agencies for recreational use. In many cases, such as for lands transferred to the National Park Service, USFS, and state fish and wildlife agencies, recreation is one of several uses of the land. In other instances, lands were sold for recreational purposes through auctions and/or other conveyances. TVA also has allowed third parties to manage its land for recreational purposes through land use agreements such as easements, leases, and licenses. Maps of TVA recreation areas are located in Appendix A, and a detailed chronology of TVA's recreation history is provided in Appendix B.

Table 1-1. Land Conveyed by TVA for Recreation Development

Type of Recreation Area	Number of Areas	Acres*
Public Parks	**213**	**40,826**
State Parks	77	33,276
County	61	3,910
Municipal	74	3,451
Fair Association	1	189
Public Access Areas and Roadside Parks	**178**	**1,110**
Federal (USFS)	17	42
State	116	988
Local	45	80
Wildlife Refuges	**30**	**202,002**
National Wildlife Refuges	2	115,872
State Management Areas and Refuges	28	86,130
National Parks and Forests	**6**	**232,423**
National Forests	4	61,992
National Park	1	170,000
National Parkway	1	431
Other	**332**	**8,974**
Group Camps and Clubs	32	3,473
Commercial Recreation Areas	300	5,501
Total Recreation Areas	**759**	**485,335**

*All acreage figures are approximate.

As recreational demands continued to increase, TVA developed a recreational program to address the development and management of future recreation projects across the Valley. The goal of this program is to add value by working in partnership with other agencies to enhance recreational opportunities and address unmet recreational needs while managing recreation areas on and along the Tennessee River system. The objectives of this program are to:

1. Support diverse recreational activities through management of river flows.

2. Provide recreational opportunities on TVA-managed lands.
3. Provide diverse recreational opportunities through collaborations and partnerships.
4. Plan, collect, and manage TVA recreational information.
5. Integrate operational activities and partnerships that support outdoor recreational opportunities to manage TVA's lands more effectively.

TVA continues to provide lands for recreational purposes through the reservoir lands planning process (see below and Section 2.4). Throughout the years, TVA has allocated approximately 21,200 acres for developed recreational purposes. Approximately 90 percent of these lands are currently committed under existing contractual agreements. TVA continues to entertain requests for the development of commercial or public recreation facilities on the remaining lands.

When the TVA Board approved the Land Policy in 2006, it also directed staff to review TVA land designated for recreational development purposes to verify their suitability for this use. This review evaluated needs for public boat access, commercial marinas, campgrounds, recreational visitor lodging, developed land-based day use facilities, and dispersed land-based opportunities. The results indicate increasing needs for public boat access, land-based day use facilities, and informal or undeveloped land-based recreation opportunities. The report is available at http://www.tva.gov/environment/land/assessment/recreation.htm.

1.3.6. Reservoir Lands Planning

Throughout its history, TVA has managed the public lands in its custody to meet a wide range of regional and local resource development needs and to improve the quality of life, both within specific reservoir areas and throughout the Valley. TVA lands, together with adjoining private lands, have been used for public parks, industrial development, commercial recreation, residential development, tourism development, and forest and wildlife areas, as well as to meet a variety of other needs of local communities and government agencies.

Shortly after its creation in 1933, TVA began a massive dam and reservoir construction program that required the purchase of land for creation of 46 reservoirs. As noted above, today, TVA manages approximately 293,000 acres of land along these reservoirs for support of TVA operations and the benefit of the public. An increasing demand for and use of these remaining lands sometimes results in conflicting public opinions regarding their most appropriate uses. These competing interests and development pressures, coupled with today's environmental awareness, underscore the necessity for a planned approach to the management of TVA's reservoir lands and related resources.

TVA began comprehensive reservoir land management planning in 1979. Since that time, TVA has developed reservoir land management plans (RLMPs) for 34 of its reservoirs using various methodologies. RLMPs allocate TVA lands to one of six broad land use zones, and a seventh zone reflects areas of private ownership where TVA has certain other land rights and/or regulatory responsibilities. A special study of the Muscle Shoals/Wilson Dam reservations and a recreation study for Fort Loudoun Reservoir have also been completed. Twelve of TVA's reservoirs do not have current RLMPs. More detailed information on the status of reservoir land plans is given in Section 2.4.

1.3.7. Water Resources Management

TVA operates the Tennessee River and its tributaries as an integrated system for the purposes of navigation, flood control, and power production, consistent with these purposes for other goals and public benefits such as water quality, as set forth in the *Reservoir Operations Study*

(ROS) EIS (TVA 2004). TVA has been involved with water resources and system integration since soon after the agency was created in 1933. Programs to study and manage suspended sediment (TVA 1968); limnology; water quality in reservoirs, rivers, and tailwaters (Churchill 1957); reservoir fisheries (Eschmeyer and Jones 1941); stream biology (Charles Saylor, TVA, personal communication, April 15, 2010); and the hydrology and water quality impacts of different land uses (TVA 1951) all began before 1940. This work was associated with construction of new dams and reservoirs and the broader stewardship mission of TVA.

These programs evolved with the needs of TVA and the Valley, and TVA scientists were often leaders in advancing the state of the art of water resources and watershed management. Along the way, TVA assessed water quality throughout the Valley (Scott and Jones 1945; TVA 1952; TVA 1973) and completed a series of biological and river habitat studies (e.g., TVA 1970). Reservoir conditions were explored across the Valley (Placke 1983), and river-basin-specific (e.g., Brown and Meinert 1976) and reservoir-specific (e.g., Cox 1986) water resource studies were conducted. TVA used advances in computer technology to help develop the ability to model watersheds (Betson et al. 1980) and reservoirs (Bender et al. 1990). TVA biologists began developing biological water quality assessment tools for the Valley and exploring applications of this new tool (Saylor and Scott 1987). TVA combined remote sensing and computer capabilities to develop aerial-photography-based land use inventories (Carroll and Sagona 1993) to locate pollution sources and later incorporated geographic information systems (GIS) and watershed modeling into this process (TVA 2002a).

Several stewardship programs took shape in the 1990s. These programs can be grouped by the ultimate outcomes for which the programs are designed. The goal of the first group, referred to as public outreach programs, is to encourage and demonstrate good stewardship of water resources. Current programs in this group include the Quality Growth Program (QGP) and the Tennessee Valley Clean Marina Initiative (TVCMI).

The programs in the second group, water resources improvement, are designed to create measurable water quality improvement in Valley watersheds. These programs, originally known as the Clean Water Initiative, are currently implemented through the Targeted Watershed Initiatives (TWI).

The last group consists of programs that collect, maintain, and distribute information about water resource conditions. The Stream and Tailwater Monitoring (STM) Program started in 1986, with the first TVA application of the Index of Biotic Integrity (IBI) (Saylor and Scott 1987) to measure the condition of stream fish communities. STM grew into the primary data source for the TWI Program, providing data to target projects, track project progress, and define the outcome for watershed work. Other monitoring programs are the Vital Signs Monitoring Program (see Section 4.5) and the Sport Fishing Index which assess water quality and aquatic community parameters in reservoirs. The data produced by these programs guide TWI efforts and are critical to several other programs and initiatives by TVA and other agencies and organizations.

Though TVA programs address water resource issues, TVA does not have the authority to regulate water pollution. The U.S. Environmental Protection Agency (USEPA) and each of the Valley states that share the river develop pollution regulations and grant permits for discharges to the Tennessee River and its tributaries. TVA facilities that have the potential to discharge pollutants into waters of the U.S., such as hydroelectric or steam electric generating plants, obtain the appropriate permits for routine facility discharges in accordance with these regulations.

1.4. Purpose and Need

Historically, TVA has taken various approaches to managing biological, cultural, recreation, and water resources and to planning the use of reservoir lands. In its Environmental Policy, TVA committed to a more systematic and integrated approach to natural resource stewardship. The purpose of the NRP is to develop a plan to guide TVA's responsible management of natural resources over the next 20 years in a cost-effective manner while upholding TVA's mission. The following objectives and critical success factors in the Environmental Policy bear on this:

Water Resource Protection and Improvement Objective: TVA will improve reservoir and stream water quality, reduce the impact of its operations, and leverage alliances with local and regional stakeholders to promote water conservation.

Critical Success Factors:

- *Integrate the impacts of water quality and quantity into the long-range planning and decision-making process.*
- *Promote the integration of energy efficiency and water conservation into community planning and building construction.*
- *Collaborate in community outreach and partnerships through voluntary demonstrations of the efficient use of water resources and protection of water quality.*

Sustainable Land Use Objective: TVA will strive to maintain the lands under its management in good environmental health, balancing their multiple uses, and will improve its land transaction processes to support sustainable development.

Critical Success Factors:

- *Actively manage TVA lands to meet the desired conditions for their purpose as defined in the RLMPs.*
- *Improve reservoir shoreline conditions through collaborative partnership initiatives and balance the multiple uses of the reservoirs in accordance with TVA's Land Policy and Shoreline Management Policy (SMP).*
- *Manage TVA lands, mineral rights, and shoreline access to better achieve environmental commitments while meeting the needs for recreation, residential access, and economic development.*

Natural Resource Management Objective: TVA will be a leader in natural resource management through the implementation of sustainable practices in dispersed recreation while balancing the protection of cultural, heritage, and ecological resources.

Critical Success Factors:

- *Allow for properly managed, ecologically friendly dispersed recreation while balancing the protection of biological, cultural, and heritage resources.*
- *Promote ecological diversity and wildlife habitats on TVA lands through partnerships and voluntary initiatives.*
- *Increase the level of environmental quality and management consistency among TVA-managed and -leased recreation facilities.*

This EIS evaluates the alternative approaches to TVA's management of biological, cultural, and water resources; recreation; reservoir lands planning; and public engagement. The general goal of the NRP is to integrate the objectives of these resource areas, provide for the optimum public benefit, and balance competing and sometimes conflicting resource uses. These competing interests and development pressures, coupled with today's environmental

awareness, underscore the necessity for a consistent approach to the management of TVA's lands. The specific goals of the NRP include:

1. Aligning TVA's stewardship programs and plans with the Environmental Policy
2. Providing a strategic plan that
    - Guides TVA's resource management decisions and actions
    - Integrates stewardship objectives for optimum public benefits while increasing efficiencies in natural resources management
    - Strikes a balance between the competing and sometimes conflicting resource uses on TVA-managed lands
3. Increasing the efficiency of the planning and review of specific implementing actions
4. Providing TVA staff with a "reference manual" to guide implementation activities
5. Providing clarity and transparency to the public

1.5. Scope of the Natural Resource Plan

The content of the NRP addresses biological, cultural, recreation, and water resources management; reservoir lands planning; and public engagement. During the development of this plan, TVA is continuing to implement activities consistent with its current resource management strategies and programs.

The geographical scope for biological and cultural resources management and recreation management components of the NRP focus on the approximately 293,000 acres of reservoir lands and approximately 9,100 acres of power plant properties. These include active and former fossil and nuclear properties, Raccoon Mountain Pumped Storage Plant, and Buffalo Mountain Wind Power Project site, (Figure 1-2 and http://www.tva.gov/sites/sites_ie.htm). The NRP would be implemented on TVA's fossil and nuclear properties and at Raccoon Mountain and Buffalo Mountain as interim and/or secondary management activities, as appropriate; these properties will remain power assets, and primary management will remain as power generation. It would be at TVA's discretion to determine the appropriate programs and activities within the NRP for implementation on these power properties. For example, the NRP could be applied to the portion of the nuclear properties located outside the secured area of each site to ensure that plant security requirements and needs are not affected. This geographical area is referred to below as TVA lands.

Recreation management focuses on those recreation facilities and programs managed by TVA. While many of these facilities are on TVA reservoirs and power plant reservations, they also include stream access sites located on rivers and streams in the Tennessee River watershed.

The reservoir lands planning component of the NRP addresses the approximately 293,000 acres of TVA-managed reservoir lands. The geographical scope for the water resource management component of the NRP includes the entire Tennessee River watershed (Figure 1-2) because of the programs associated with improving watershed water quality. The water resource management focus is on those discretionary programs and activities implemented by TVA to proactively improve reservoir and watershed water quality. The Tennessee River watershed and TVA's power service area (PSA) are collectively referred to below as the TVA region.

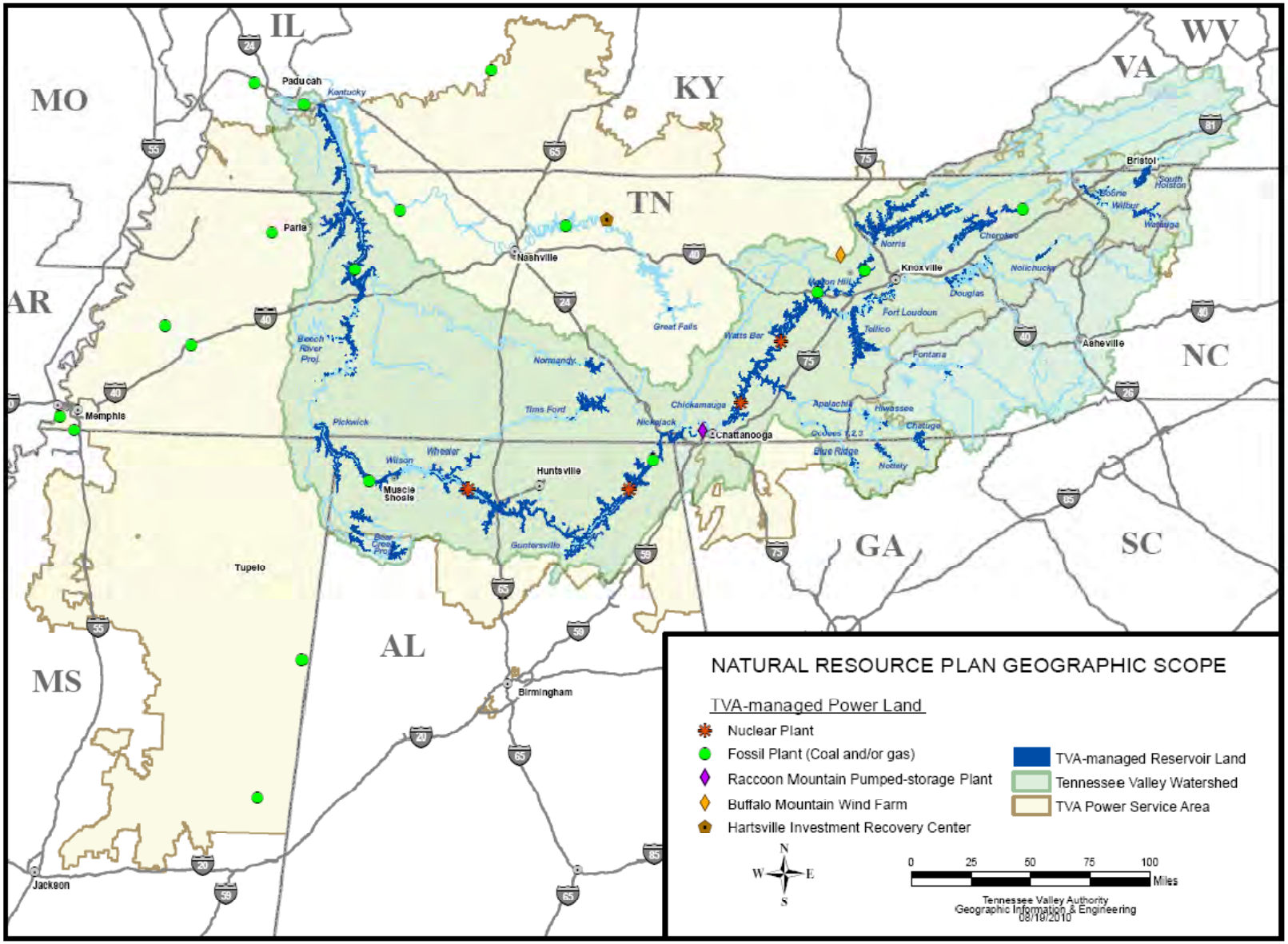


Figure 1-2. Natural Resource Plan Geographic Scope

Stewardship activities associated with TVA's Aquatic Plant Management, Mosquito Management, or Reservoir Releases Improvements Programs are not within the scope of the NRP. Similarly, this plan does not address reservoir operations or river flows, shoreline permitting activities, or the amount of shoreline open for residential development. These specific activities have been addressed in other comprehensive planning processes and their associated environmental reviews (see Section 1.8). It is TVA's intent to develop a mineral rights policy at a later date. Therefore, actions relating to TVA's mineral rights holdings or development of a mineral rights policy have been excluded from the scope of the NRP.

1.6. The Decision

The TVA Board of Directors will decide whether to adopt the final NRP developed by TVA staff, to adopt one of the other alternatives analyzed in this EIS, or to take no action.

1.7. Scoping and Public Involvement

Public involvement in the development of the NRP and associated EIS began with the public scoping process in the summer of 2009 and continued with the issuance of the Draft NRP and EIS for public review and comment in the spring of 2011.

TVA also used the Regional Resource Stewardship Council (RRSC) throughout the development of the NRP as an advisory and review group. TVA established the RRSC in 1999 to advise TVA on its stewardship activities and the priorities among competing objectives and values. The RRSC was established and operates under the Federal Advisory Committee Act. Its meetings are open to the public, and its proceedings are published on TVA's Web site at http://www.tva.gov/rrsc/. Agendas, presentations, and minutes of the RRSC meetings where the NRP was discussed are available at http://www.tva.gov/rrsc/readingroom5/index.htm and http://www.tva.gov/rrsc/readingroom6/index.htm.

1.7.1. Scoping

Scoping, which is integral to the process for preparing EISs under NEPA, is a procedure that solicits public input to the NEPA process to ensure that: (1) issues are identified early and properly studied; (2) issues of little significance do not consume substantial time and effort; (3) the EIS is thorough and balanced; and (4) delays possibly caused by an inadequate review are avoided. TVA's NEPA procedures require that the scoping process commence soon after a decision has been reached to prepare an EIS in order to provide an early and open process for determining the scope and for identifying the significant issues related to a proposed action.

On June 15, 2009, TVA published a notice of intent (NOI) (TVA 2009a) to prepare an EIS and to conduct a comprehensive study of its future energy and environmental stewardship needs, known as the Integrated Resource Plan (IRP). The IRP had two major objectives—to develop a plan for meeting the energy needs of the TVA region over the next 20 years and to develop implementation plans for achieving the objectives of the Environmental Policy including those focusing on management of natural resources.

The 60-day public scoping period for the project began on June 15, 2009. TVA issued press releases about the project and advertised it on its website (http://www.tva.gov/environment/reports/irp/index.htm). The IRP website materials included background information, a form for submitting scoping comments, a scoping questionnaire,

addresses for submitting comments by mail, by e-mail, or by fax, and information on public scoping meetings. Letters requesting comments on the scope of the IRP were mailed to 80 federal and state agency offices and the representatives of 21 federally recognized Native American tribes.

TVA held seven public meetings at different locations across the TVA region between July 20 and August 6, 2009. The meetings were advertised in local newspapers, by press releases, and on the project Web site. About 180 people attended these meetings; attendees included members of the public and representatives from state agencies and local governments, TVA power distributors, nongovernmental organizations, and other special interest groups. Exhibits, fact sheets, and other materials were available at each public meeting to provide information about the study and the EIS.

At each of these meetings, attendees were invited to submit oral and written comments. In addition to the public meetings, TVA invited the public to submit comments through its website and by e-mail, letter, and fax. The IRP questionnaire included three questions pertaining to stewardship activities. The responses to those questions have been organized by issue categories and quantified in figures and tables in Appendix C. At the close of the IRP public scoping period on August 14, 2009, 609 total comments pertaining to stewardship had been submitted.

Shortly after the public scoping period began, TVA decided it would be better to address environmental stewardship activities in a separate process and therefore decided to separate the IRP and NRP. The IRP would focus on TVA's future energy needs, and the NRP would focus on TVA's future environmental stewardship needs. Consequently, TVA announced an additional 30-day public comment period for the NRP beginning October 2, 2009. TVA staff mailed approximately 130 letters to federal, state, and regional agencies in the seven Valley states notifying them of the separation and requesting comments specifically on the NRP (Appendix C). During this comment period, information about the NRP, including an interactive comment form, was available on the project Web site, http://www.tva.gov/environment/reports/nrp/index.htm.

During the NRP and IRP scoping periods, written comments were received from seven federal agencies, 16 state and regional agencies, and eight organizations or community groups. The additional NRP scoping period concluded with 76 additional comments on the NRP for a total of 685 comments. Summaries of the public scoping comments are located in Appendix C.

In addition to the general public participation opportunities, TVA directly solicited input from 11 federal and state agencies in October and November, 2010. The agencies included the U.S. Army Corps of Engineers, USFS, and National Park Service and state natural resource agencies in each of the seven TVA region states. TVA staff independently met with each agency and discussed the programs associated with biological resource management, cultural resource management, recreation management, reservoir lands planning, and water resource management. Feedback from the agencies was taken into consideration in finalizing the alternatives as well as developing future partnership opportunities.

1.7.1.1. Scoping Response

The majority of public responses to the scoping notices focused on the use of public lands for recreational purposes. Many of the recreational comments addressed the accessibility

and management of public lands for dispersed and water-based types of recreation. Many stakeholders commented that public lands should be managed for multipurpose benefits such as recreation, natural resources, and wildlife habitat conservation. Several stakeholders voiced opposition to development and referred to the amount of existing recreational boat traffic. Specifically, stakeholders commented about the amount of recreational boat traffic on Pickwick Reservoir. Additional comments were received expressing concerns about the fiscal impacts associated with implementing the NRP.

Tennessee Department of Agriculture, North Carolina Division of Inland Fisheries, and USFWS commented on the need to revise TVA's existing forest management strategies. Tennessee Citizens for Wilderness Protection and USFWS commented on the need to address invasive plants. Tennessee Environmental Coalition and USFWS commented on the need to develop water conservation activities and to continue water quality improvement efforts. The USFWS commented on the need to partner with private landowners for enhanced habitat management, to increase programs for endangered species' protection and monitoring, and to begin plant and animal genetics studies. The comments received during the public scoping period are summarized in the *Summary of Public Participation* section attached to the scoping document issued in August 2010 (http://www.tva.gov/environment/reports/nrp/index.htm) and in Appendix C.

1.7.1.2. Issue and Resource Identification

Based on an analysis of the scoping activities, TVA has identified the following resources and issues that could be affected by implementing the activities associated with the NRP. The potential direct and indirect effects of each alternative are analyzed and disclosed for each resource. Other activities (existing and proposed) that may affect resources of concern for biological, cultural, recreation, and water resources management, and reservoir lands planning are also identified, and the potential effects of these activities on the NRP resources and trends in the resources are assessed. The major resource categories considered in the EIS are listed below.

Recreation – Current recreation facilities available to meet public recreation needs are identified, as well as those activities that are important for developed and dispersed recreation. The effects of adopting and implementing each alternative on recreation opportunities on TVA lands and reservoirs are evaluated.

Managed Areas and Sensitive Ecological Sites – These are special and unique natural areas on or in the vicinity of reservoirs set aside for a particular management objective or lands that are known to contain sensitive biological, cultural, or scenic resources.

Terrestrial Ecology – This resource includes the plants and animals comprising the terrestrial ecosystems and natural community types found on TVA and adjacent lands. Issues include the identification and protection of significant natural features, rare species' habitat, important wildlife habitat, and locally uncommon natural community types. Consistent with EOs 13186 and 13112, TVA also has programs addressing migratory birds and invasive species.

Wetlands – Wetlands found on TVA land and along the reservoir shoreline are reviewed with respect to the proposed activities under each alternative. TVA will comply with EO 11990 on wetlands and the CWA.

Water Quality – Water quality conditions affect the overall ecological conditions of the reservoir system. Water quality is influenced by activities that cause shoreline erosion, various land use practices, pollution, litter, and other factors.

Aquatic Ecology – Aquatic ecology includes the plants, animals, and fisheries found in the waters of the Tennessee River and its tributaries. Issues include the identification and protection of rare species' habitat, important aquatic habitat, and locally uncommon aquatic community types.

Endangered and Threatened Species – Federally or state-listed as threatened and endangered plant and animals and their habitats occurring on and near TVA lands and in adjacent waters are identified. TVA will comply with the ESA and considers similar state laws.

Cultural and Historic Resources – Archaeological sites, historic structures, and cultural landscapes and properties on or near TVA lands including sites eligible for or listed in the NRHP are reviewed with respect to the proposed activities under each alternative. TVA will comply with the NHPA and related laws.

Land Use – Existing land use patterns along the shoreline and adjacent back-lying land have been largely determined by TVA land acquisition, disposals, and land use agreements. Many TVA lands are committed to existing land uses with little to no potential for change. Proposed activities on TVA lands are evaluated using the goals of TVA policies and applicable laws and regulations.

Prime Farmland – Prime farmland is land with the best combination of characteristics to produce agricultural and silvicultural products. An important issue is the conversion of prime farmland to urban or industrial developments. TVA will comply with the Farmland Protection Policy Act (FPPA).

Visual Resources – The aesthetic setting of TVA lands is characterized and scenic and distinctive areas frequently seen by the public are identified. The effect of each alternative on the natural beauty of TVA lands and adjacent areas is evaluated.

Floodplains – Floodplain management is important with respect to flood control and water quality issues, and these areas are productive natural areas. TVA will comply with EO 11988 on floodplains.

Socioeconomics – The current population, labor force, employment statistics, income, and property values of the region are reviewed in respect to proposed activities of each alternative. A subset of these issues is environmental justice, the potential for disproportionate impacts to minority and low-income communities.

Navigation – The navigation of commercial and recreational watercraft is an important resource on the Valley reservoirs. Potential issues include recreational boat traffic as well as commercial navigation.

Air Quality and Climate – Air quality relates to public health and welfare. Attaining and maintaining the National Ambient Air Quality Standards (NAAQS),

established by USEPA to protect public health and welfare, is an important issue that is identified and discussed. This EIS also addresses climate change issues.

1.7.2. Public Review of the Draft NRP and EIS

TVA issued the Draft NRP and EIS to the public on March 25, 2011. The EPA published the notice of their availability on April 1, 2011, initiating a 46-day comment period that ended on May 16, 2011. TVA sent notices of the availability of the drafts to those on the project contact list and mailed printed or CD-ROM copies to agencies, federally recognized tribes, and others who requested them. The drafts were also posted on TVA's website.

TVA held three public meetings in April, 2011 to explain the NRP, answer questions, and receive comments on the drafts. The meetings were held in Knoxville, Tennessee, Benton, Kentucky, and Muscle Shoals, Alabama. Approximately 45 people attended the public meetings.

TVA accepted comments on the Draft NRP and EIS by mail and e-mail, through a form on the project website, and by written and oral comments at the public meetings. About 150 people, agencies, and organization submitted comments. About 40 percent of the comments were received via the project website, 27 percent by mail, 24 percent by e-mail, and the remainder was oral comments at meetings. TVA staff carefully reviewed the comment submissions and categorized them into 225 individual comments. These comments and TVA's responses to them are provided in Appendix N of this Final EIS. As a result of the comments, TVA made several changes to the Final NRP and EIS. TVA also considered the comments during the revisions to the Alternative D - Blended Alternative that appears in the Final NRP and this Final EIS.

1.8. Other Pertinent Environmental Reviews or Documentation

TVA's RLMPs and associated EISs and environmental assessments (EAs) are briefly described in this section, as are other environmental reviews and studies relevant to the resources under consideration in the NRP and this EIS. A listing of TVA's EISs and EAs completed during the last decade is provided on TVA's Web site, http://www.tva.gov/environment/reports/index.htm.

Reservoir Operations Study Final Programmatic Environmental Impact Statement (TVA 2004)
This study and EIS evaluated alternative ways to operate the TVA reservoir system to produce greater overall public value. The recommended changes in the operation of the reservoirs were implemented in 2004.

Shoreline Management Initiative: An Assessment of Residential Shoreline Development Impacts in the Tennessee Valley Final Environmental Impact Statement (TVA 1998)
In November 1998, TVA completed an EIS analyzing possible alternatives for managing residential shoreline development throughout the Tennessee River Valley. The alternative selected determined TVA's current SMP, which incorporates a strategy of managing public shoreline through an integrated approach that conserves, protects, and enhances shoreline resources and public use opportunities while providing for reasonable and compatible use of the shoreline by adjacent residents. The SMP defines the standards for vegetation management, docks, shoreline stabilization, and other residential shoreline alterations. The Shoreline Management Initiative (SMI) EIS is available at

http://www.tva.gov/river/landandshore/landuse_shore.htm. Key elements of the SMP are provided at http://www.tva.gov/river/landandshore/pdfs/shorelnk.pdf .

Clean Water Initiative Final Environmental Assessment (TVA 1997)
In May 1997, TVA issued a finding of no significant impact (FONSI) regarding its implementation activities associated with the Clean Water Initiative (CWI). The CWI activities included the implementation of agricultural best management practices (BMPs), stream bank and streambed restoration through bioengineering and structure placement; planting of native woody and herbaceous plants on stream banks and reservoir shorelines; and solid waste cleanup and disposal.

Lake Improvement Plan Final Environmental Impact Statement (TVA 1990)
This study includes an analysis of impacts of the Reservoir Releases Improvement Program.

Reservoir Land Management Plans

Since 2000, TVA has prepared the following RLMPs and associated EISs or EAs. These plans allocate TVA-managed reservoir lands into broad categories or "zones" that include Project Operations, Sensitive Resource Management, Natural Resource Conservation, Industrial, Developed Recreation, and Shoreline Access. These plans are available at http://www.tva.com/environment/land/land_mgmt_plans.htm.

- *Northeastern Tributary Reservoirs Land Management Plan Final Environmental Impact Statement* (TVA 2010a) – This plan addresses 5,000 acres on Beaver Creek, Clear Creek, Boone, Fort Patrick Henry, South Holston, Watauga, and Wilbur reservoirs in Tennessee and Virginia.
- *Douglas and Nolichucky Tributary Reservoirs Land Management Plan Final Environmental Impact Statement* (TVA 2010b) – This plan addresses 3,191 acres on Douglas and Nolichucky reservoirs in Tennessee.
- *Mountain Reservoirs Land Management Plan Final Environmental Impact Statement* (TVA 2009b) – This plan addresses 6,273 acres on Chatuge; Hiwassee; Blue Ridge; Nottely; Ocoees No. 1, No. 2, and No. 3; Apalachia; and Fontana reservoirs in Georgia, North Carolina, and Tennessee.
- *Watts Bar Reservoir Land Management Plan Final Environmental Impact Statement* (TVA 2009c) – This plan addresses 16,036 acres on Watts Bar Reservoir in Loudon, Meigs, Rhea, and Roane counties, Tennessee.
- *Pickwick Reservoir Final Environmental Impact Statement and Land Management Plan* (TVA 2002c) – This plan addresses 19,238 acres on Pickwick Reservoir in Colbert and Lauderdale counties, Alabama; Tishomingo County, Mississippi; and Hardin County, Tennessee.
- *Bear Creek Reservoirs Land Management Plan Environmental Assessment* (TVA 2001a) – This plan addresses 9,178 acres on the Bear Creek Reservoirs in Franklin, Marion, and Winston counties, Alabama.
- *Cherokee Reservoir Environmental Assessment and Land Management Plan* (TVA 2001b) – This plan addresses 8,187 acres on Cherokee Reservoir in Grainger, Hamblen, Hawkins, and Jefferson counties, Tennessee.
- *Guntersville Reservoir Final Environmental Impact Statement and Land Management Plan* (TVA 2001c) – This plan addresses 40,236 acres on Guntersville

Reservoir in Jackson and Marshall counties, Alabama, and Marion County, Tennessee.

- *Norris Reservoir Land Management Plan Environmental Assessment* (TVA 2001d) – This plan addresses 27,927 acres on Norris Reservoir in Anderson, Campbell, Claiborne, Grainger, and Union counties, Tennessee.
- *Tellico Reservoir Land Management Plan Final Environmental Impact Statement* (TVA 2000a) – This plan addresses 12,643 acres on Tellico Reservoir in Blount, Loudon, and Monroe counties, Tennessee.
- *Tims Ford Reservoir Land Management and Disposition Plan Final Environmental Impact Statement* (TVA 2000b) – This plan addresses 1,854 acres of TVA lands and 4,599 acres owned and managed by the Tennessee Department of Environment and Conservation (TDEC) on Tims Ford Reservoir in Franklin and Moore counties, Tennessee.

Resource Management Unit Plans Plans

Between 1998 and 2001, TVA developed 10 plans and associated EAs that prescribe natural resource management activities on discrete areas of reservoir lands. An example is *Boone Management Unit — Boone Reservoir Resource Management Plan and Environmental Assessment* (TVA 2002b) that addresses 566 acres on Boone Reservoir in Sullivan and Washington counties, Tennessee.

1.9. Statutory Overview and Necessary Federal Permits or Licenses

1.9.1. Statutory Overview

A number of federal statutes and EOs are relevant to the formulation and evaluation of the NRP alternatives. Some of the programs and activities under consideration in the NRP are required by laws such as ESA and NHPA. The implementation of other programs and activities can be influenced by requirements for compliance with these and other laws and regulations. Chapter 4, Affected Environment, and Chapter 5, Environmental Consequences, describe the regulatory setting for each resource and discuss applicable laws and their relevance to this analysis. The key laws and regulations that relate to this EIS are summarized below.

Tennessee Valley Authority Act

Congress charged TVA in 1933 with fostering the social and economic well being of the residents of the TVA region through the wise use and conservation of the region's natural resources. It was given broad authority to manage the Tennessee River system and to conduct activities to achieve this congressional mission.

National Environmental Policy Act

NEPA established a process by which federal agencies must study the effects of actions on the environment. Whenever a federal agency proposes an action, grants a permit, or agrees to fund or authorize an action that could affect the natural or human environment, the agency must consider the potential adverse and beneficial effects of the action. NEPA requires that an EIS be prepared for major federal actions, including the adoption of plans and policies that have potential for significant impacts. This process must include public involvement and analysis of a reasonable range of alternatives. TVA prepared this draft EIS to comply with the requirements of NEPA and to provide a structured process for public input.

Protection of Water Quality
The CWA was passed in 1972 to protect and improve the nation's water quality. The CWA is the primary law for regulating discharges of pollutants into the waters of the U.S. by enforcing water quality standards that are defined in Section 301 of the act. Two categories of pollutants enter streams, rivers, and lakes or reservoirs: nonpoint sources (runoff from the landscape) and point sources (direct discharge via a pipe or ditch into the water).

The issuance of federal permits for actions that result in discharges into waters of the U.S., including approvals under Section 26a of the TVA Act, is coordinated with the applicable states to receive water quality certification under Section 401 of the CWA. This certification is received by showing that the permitted activity is consistent with CWA requirements and will not adversely affect the water quality of the receiving stream, as defined by its designated uses. The designated use is determined by the primary uses of the water, such as recreation, water supply, and aquatic life. The states and USEPA have direct responsibility for protecting water quality, including that of the Tennessee River system.

Protection of Wetlands and Floodplains
Disturbance of wetlands or any other waters of the U.S. by the discharge of any dredge or fill material requires a permit from the U.S. Army Corps of Engineers (USACE) under Section 404 of the CWA. Under EO 11990 (Protection of Wetlands), federal agencies are required to avoid construction in wetlands to the extent practicable and to mitigate potential impacts as appropriate. State programs for protection of wetlands also exist. For example, the Tennessee Aquatic Resources Alteration Permit Program controls alteration of streams and wetlands for actions within the state of Tennessee.

Under EO 11988 (Floodplain Management), federal agency actions must, to the extent practicable, avoid siting projects in floodplain zones in order to reduce the risk of flood loss; minimize impacts of floods on human safety, health, and welfare; and restore and preserve the natural and beneficial values of floodplains. The Federal Emergency Management Agency has identified where floodplains occur, and many local governments have adopted regulations to control the development of these defined floodplains.

Protection of Air Quality
Under the Clean Air Act, proposed new air pollutant sources must have permits and demonstrate that they will not violate the NAAQS. State implementation plans are developed by each state; these plans outline how the state will protect air quality. They are based on the NAAQS, which are set by the USEPA for pollutants such as sulfur- and nitrogen-based air emissions, with margins of safety to protect human health and welfare. Sources of air emissions are controlled based on the quantity of the emission, its location, and the type of pollutant.

Protection of Endangered and Threatened Species
Under the ESA, federal agencies must conserve endangered and threatened species and ensure that their actions will not jeopardize the existence of these species or adversely affect their critical habitats. Under Section 7(a)(2) of the ESA, a federal agency that permits, licenses, funds, or otherwise authorizes activities must consult with the USFWS as appropriate to ensure that its actions will not jeopardize the continued existence of any listed species. In addition, Section 9 makes it unlawful to take or harm any listed species. The states within the Valley also have programs that protect state-listed species.

Protection of Cultural Resources
The NHPA and Archaeological Resources Protection Act (ARPA) were enacted to protect cultural and archaeological resources. NHPA requires agencies to consult the SHPO on undertakings that may affect historic properties. In some circumstances, the Advisory Council on Historic Preservation, a federal agency, must also be consulted. ARPA prohibits the removal, damage, defacement, or excavation of artifacts from archaeological sites on public land, including lands under TVA's control. The Valley states have additional requirements for protection of excavation of the remains of Native Americans on lands under state or local control. Some of these lands border TVA reservoirs and TVA actively works with the states to protect these resources.

Protection of Farmland
Under FPPA, federal agencies are required to identify and consider the potential adverse effects of a proposed action on prime farmland. The FPPA ensures, to the maximum extent practicable, that federal programs are administered in a manner compatible with state and local government and private programs to protect farmland. In addition, the State of Tennessee has enacted the Agricultural District and Farmland Preservation Act, which provides limited protection of farmlands that have been specially designated under the act.

Environmental Justice
EO 12898 (Environmental Justice) requires federal agencies to identify and address the adverse human health or environmental effects of federal programs, policies, and activities that may be disproportionately greater for minority and low-income populations. Federal agencies must ensure that federal programs or activities do not directly or indirectly result in disparate impacts on minorities or low-income populations. Federal agencies must provide opportunities for input into the NEPA process by affected communities and must evaluate the potentially significant and adverse environmental effects of proposed actions on minority and low-income communities during preparation of environmental documents. TVA is not subject to this EO, but evaluates environmental justice impacts as a matter of policy.

Other Regulations and Executive Orders
Other statutes and EOs may be relevant, depending on the type of specific projects that occur as a consequence of this EIS, including:

- EO 13112 (Invasive Species)
- EO 13514 (Federal Leadership in Environmental, Energy, and Economic Performance)
- Section 10 of the Rivers and Harbors Act
- Migratory Bird Treaty Act
- Bald and Golden Eagle Protection Act
- EO 13186 (Responsibilities of Federal Agencies to Protect Migratory Birds)
- The Safe Drinking Water Act and state drinking water regulations
- The Toxic Substances Control Act
- The Federal Insecticide, Fungicide, and Rodenticide Act
- The Resource Conservation and Recovery Act and other solid waste disposal regulations
- The Comprehensive Environmental Response, Compensation, and Liability Act.

1.9.2. Necessary Federal Permits or Licenses

No federal permits are required to develop the NRP. Site-specific information on reservoir resources has been characterized in this EIS to the extent possible, and potential impacts on these resources were considered when making recommendations. However, TVA would conduct appropriate site-specific environmental reviews, including compliance with ESA and NHPA, when implementing the NRP. The preceding section generally describes permits or approvals that may be required for future projects.

1.10. Environmental Impact Statement Overview

This EIS has been developed to address the environmental impacts of implementing the NRP and alternatives to it. The EIS includes two volumes as outlined below.

Volume 1:

- Chapter 1 describes the purpose and need for the NRP EIS, scope of the NRP, decision to be made, history of TVA and its stewardship programs and policies, NRP scoping process, public review and agency consultation requirements, relationship to other NEPA reviews, and EIS overview.
- Chapter 2 describes TVA's existing and proposed stewardship programs, tools, and activities.
- Chapter 3 includes a description of the process of developing and evaluating the NRP alternatives, a listing of the components of each alternative, and a summary of the environmental consequences of the alternatives considered. This chapter also identifies TVA's Preferred Alternative.
- Chapter 4 discusses the environmental resources and attributes potentially affected by the alternative actions.
- Chapter 5 describes the environmental consequences of each proposed alternative on the affected environment. This chapter also includes a discussion about cumulative impacts, irreversible and irretrievable commitments of resources, and a summary of TVA commitments and proposed mitigation measures.
- Chapters 6, 7, and 8 contain a list of preparers, a Final EIS distribution list, and other supporting information, respectively.
- Glossary
- Index

Volume 2:

- Appendices, including comments received on the Draft EIS and NRP and responses to those comments.

CHAPTER 2 - RESOURCE MANAGEMENT PROGRAMS

When developing the NRP, TVA identified programs and associated activities, tools, or elements that could be used to support different options for future management of biological resources, cultural resources, recreation, reservoir lands planning, and water resources, as well as public engagement efforts. All programs and activities, tools, or elements that are components of the No Action or any Action Alternative are discussed in this chapter.

2.1. Biological Resources Management

TVA manages biological resources in the Valley while providing for many types of recreational opportunities. TVA has designated more than 182,000 acres of public land for natural resource conservation, which includes the enhancement of wildlife habitat and dispersed informal recreation. In addition, TVA has designated approximately 50,000 acres for sensitive resource management, where activities that might endanger significant cultural or natural features are restricted. Together, these approximate 232,000 acres of public lands provide TVA with distinctive management opportunities in resource protection and enhancement and terrestrial GHG management.

In its approach to biological resource management, TVA has demonstrated leadership through the ecologically sound management of natural resources and the protection of nonrenewable resources. TVA is committed to increasing the portion of the resources it manages that meet the desired environmental conditions of sustainable recreation, ecological diversity, and cultural resource protection.

This section describes the existing and proposed programs and supporting activities associated with TVA's biological resource management and improvement efforts. These programs are summarized in Table 2-1. Their supporting activities are described in detail below, and the program and activity components of the alternatives are described in Chapter 3.

2.1.1. Sensitive Biological Resources Management

TVA is proposing to enhance sensitive biological resources management by establishing new programs and continuing and expanding existing programs.

Threatened and Endangered Species Program

Endangered Species Act Section 7 Consultation — TVA is required under Section 7(a)(2) of the ESA to consult with the USFWS concerning the potential for its proposed projects and actions that it authorizes to affect endangered and threatened species. This is a nondiscretionary obligation of TVA, as a federal agency, and occurs under all of the alternatives. In addition, any resulting reasonable and prudent measures and their terms and conditions are implemented and tracked. TVA will continue to comply with ESA requirements.

Threatened and Endangered Species Management —TVA has identified programs and activities to assist in the management of endangered species on TVA lands and reservoirs. These programs are bald eagle monitoring, cave gating, and protection plan development and implementation.

Table 2-1. Summary of Biological Resources Management Programs

Program Category	Program
Sensitive Biological Resources Management	Threatened and Endangered Species Program
	Wetland Management
	Sensitive Resources Data Management
	Natural Areas Management
	Conservation Planning
	Migratory Birds Management
Terrestrial Habitat Management	Grasslands and Agricultural Lands Management
	Dewatering Projects Management
	Forest Resource Management
	Nonnative Invasive Plant Management
	Nuisance Animal Control
	Terrestrial Greenhouse Gas Sequestration Management
	Wildlife Habitat Council - Third Party Certifications
	Wildlife Habitat Enhancement Partnerships
TVA Land Management and Stewardship Programs	Boundary Maintenance
	Land Condition Assessment and Land Stewardship Maintenance
Public Outreach	Resource Stewardship Campaigns
Dispersed Recreation Management	Dispersed Recreation Management
	Leave No Trace
	Trails Management

In support of the Bald and Golden Eagle Protection Act and in conjunction with conservation partners, TVA monitors bald eagles in the vicinity of its lands. In conjunction with partners, TVA has been able to identify population trends and assess the applicability of protective buffers outlined in the National Bald Eagle Management Guidelines developed by the USFWS (2007) to protect the species since its removal from the federal list of endangered species. TVA uses this monitoring information to assess the impacts of its actions on the bald eagle.

Cave habitats are home to endangered bats and other vulnerable cave-dwelling animal species. Caves used by rare species are protected and managed through the installation and maintenance of cave gates on TVA lands and in areas along TVA reservoirs. Due to the significant cultural resources associated with many of these caves, gating often serves the dual purpose of protecting both biological and cultural resources. TVA also uses additional measures, such as signage, data loggers, routine monitoring, and law enforcement, to protect and manage sensitive resources in caves.

For those target species identified by monitoring/cataloging efforts, TVA proposes to develop management plans. Particular emphasis would be placed on the development of protection plans for those species occurring on TVA lands. Then, TVA would implement

these plans through partnerships with other federal and state agencies, NGOs, and/or universities. TVA would also establish a public outreach program that would seek to inform stakeholders about the important natural resources of the region and promote awareness and cooperative effort to protect these resources.

Threatened and Endangered Species Monitoring — To support a thriving river system across the Valley and to demonstrate environmental leadership, TVA determines the impacts on endangered species for its actions, land use approvals, or actions subject to TVA approval under Section 26a of the TVA Act. These efforts play a major role in TVA meeting its goals of conducting business operations in a manner that fulfills environmental responsibilities while forming alliances to solve environmental problems. Part of these efforts is the monitoring of some populations of federally and/or state-listed species that occur on TVA lands or in areas affected by TVA operations. Monitoring data are used to assess past and present land management strategies and to guide future environmental policy for TVA.

Approximately 40 sites supporting populations of federally and/or state-listed animals and plants on TVA-managed or -influenced lands (Table 2-2) are monitored. The monitoring activities were designed in cooperation with the USFWS and, as appropriate, other federal and state agencies. The data obtained are reported to the appropriate resource agencies. They are used to protect these sensitive resources and to make informed land management and conservation planning decisions that would not result in adverse impacts to the species. TVA proposes to continue this monitoring and to develop and implement monitoring plans for all federally listed species and other high priority species on TVA lands. Target species would be identified in consultation with the USFWS and state agencies with emphasis on those subject to opportunities for TVA to enhance the survival of the species.

Table 2-2. Listed Species Monitored by TVA and Partners on TVA-Lands and Near TVA Operations

Common Name	Scientific Name	Long-Term Monitoring	Short-Term Monitoring
	Animals		
Boulder darter[1, 2]	*Etheostoma wapiti*		X
Bald eagle[2, 3]	*Haliaeetus leucocephalus*	X	
Pink mucket[1, 2]	*Lampsilis abrupta*		X
Gray bat[1, 2]	*Myotis grisescens*	X	
Snail darter[1, 2]	*Percina tanasi*		X
	Plants		
False foxglove[2]	*Aureolaria patula*		X
Ruth's golden aster[1, 2]	*Pityopsis ruthii*	X	
Mountain skullcap[1, 2]	*Scutellaria montana*	X	
Green pitcher-plant[1, 2]	*Sarracenia oreophila*		X

[1]Federally listed as endangered or threatened
[2]State-listed as endangered or threatened
[3]Formerly federally listed as threatened, protected under Bald and Golden Eagle Protection Act

Wetlands Management

TVA would continue the implementation of its current wetland management and protection practices for wetlands on TVA lands. TVA is considering the establishment of a partnership

with the Tennessee Department of Environment and Conservation (TDEC) to develop a proactive program to identify high-quality reservoir wetlands on TVA lands as a "Blue Ribbon" or "Reference Site" Reservoir Wetland Pilot Project. This project would increase the knowledge of reservoir wetlands and establish characterized reference sites for use in impact assessment and rehabilitation projects.

Sensitive Resources Data Management
TVA maintains two databases to assist in its management of sensitive resources.

TVA Natural Heritage Database — The TVA Natural Heritage database is a biological database that contains an ecological inventory of rare plants, animals, natural communities, natural areas, and other sensitive natural resource features. This extensive database also includes wetlands, champion trees, colonial bird nesting sites, and managed areas. The TVA Natural Heritage database is affiliated with and uses the same information storage system as the NatureServe (2009) network of heritage programs in North America. This ensures consistency of data among the seven Valley states in which TVA operates. The inventory records are continuously added or updated using information from the following sources:

- Data from museums and herbaria
- Results of field surveys by TVA and others
- Formal data exchanges with heritage programs in the seven Valley states
- Formal data exchanges with the USFWS
- Information from personal contacts in other agencies and academia
- Results from TVA's endangered species monitoring
- Unpublished and published scientific literature

Data users access the database for environmental reviews and planning purposes. All users are trained biologists, foresters, or ecologists that receive additional training on the use and proper interpretation of data contained in the database. They also receive supplemental training annually to improve interpretive skills and to be exposed to current conservation issues. TVA has established agreements to share natural heritage agreements with other state and federal resource agencies.

TVA Wetlands Database — In addition to the biological database, TVA also maintains a wetlands database. Several geospatial data layers have been developed to support the assessment of proposed projects on wetland resources. These data layers are used for a GIS-level resource assessment and preliminary reviews for ground surveys and wetlands' delineations. The wetland data available include more than 1,850 scanned National Wetlands Inventory (NWI) maps that have been georeferenced and combined to provide a seamless coverage of the TVA region. The NWI maps, covering approximately 70 percent of the TVA region, are in a digitized format for spatial analysis. TVA uses these data for environmental reviews.

As part of the NRP, TVA is proposing to expand its information gathering efforts for the identification of sensitive resources through partnerships with, for example, universities to develop predictive models for endangered and threatened species. It is also proposing to better integrate the natural heritage and wetlands databases.

Natural Areas Management

Natural areas include ecologically significant sites, lands designated for a particular resource management objective, and/or lands that contain sensitive biological, cultural, or scenic resources. In 1983, in recognition of the importance of unique natural resources, TVA established policy for the identification and protection of areas or features of natural and scenic significance. This policy provided for direct and cooperative actions by TVA in identifying significant natural and scenic areas of the region and in establishing protection for these resources. In order to implement this policy, a natural area identification and protection effort was established.

TVA natural areas are categorized as small wild areas (SWAs), ecological study areas, habitat protection areas (HPAs), and wildlife observation areas (WOAs). SWAs are sites with exceptional natural, scenic, or aesthetic qualities that are suitable for low-impact public use, such as foot trails and backcountry campsites. Ecological study areas are sites suitable for ecological research or environmental education. These study areas contain plant or animal populations of scientific interest and/or are located near an educational institution that would utilize and manage the area. HPAs are established to protect rare plants, animals, exemplary biological communities, or unique geological features. WOAs are sites that support concentrations of viewable wildlife such as shorebirds, songbirds, and waterfowl.

Natural Areas Management — TVA manages 154 natural areas throughout the TVA region. Activities included in natural areas management are similar to those conducted elsewhere on TVA lands; however, they are tailored to accommodate the type of natural area designation. Prominent activities include on-site condition assessments; erection of gates or barriers; and development of interpretive signage, overlooks, and interpretive pamphlets. Cooperative management agreements with state agencies and NGOs are used to support monitoring, maintenance, trail development, and invasive plant control. Typically, natural areas management activities would be conducted through partnership and volunteer efforts via stakeholders with an interest in helping maintain these unique areas. Invasive plant control would be conducted as described later in this chapter. Walking and hiking trails would be established and maintained with the use of both nonmechanized and mechanized equipment. See the dispersed recreation subsection for more information concerning the construction and maintenance of trails.

Natural Areas Protection — The environmental reviews associated with TVA projects, land use approvals, and approvals under Section 26a of the TVA Act, along with the use of TVA's Natural Heritage database, play an active role in the protection of natural areas. Information and boundaries of both TVA- and non-TVA natural areas are maintained in the TVA Natural Heritage database. When conducting environmental reviews, both TVA and non-TVA managed natural areas and ecologically significant sites are identified and considered for impact analysis. The following are typical activities identified during environmental reviews for the protection of natural areas.

- On-site assessments, as needed, to determine potential impacts as related to the specific project
- Determination of property boundaries and status of contractual agreements for non-TVA natural areas occurring on TVA lands
- Coordination with other agencies, stakeholder groups, and academic institutions to ensure that newly designated natural areas are added to the TVA Natural Heritage database

- Maintenance of TVA- and non-TVA areas and ecologically significant site records in the TVA Natural Heritage database to ensure that contacts, descriptions, and boundary information stored in the database and natural areas digitizing layer are current for use in environmental reviews

In addition to the continued maintenance of natural areas, TVA proposes to monitor and assess the maintenance needs of one-third of the areas annually. The results of this monitoring and assessment would be used to prioritize maintenance activities. TVA also proposes to establish criteria for a planning process to designate new and/or remove existing natural areas on TVA lands. TVA also proposes to develop and implement comprehensive natural area management plans.

Conservation Planning
TVA has participated in and provided data to many regional conservation-planning efforts throughout the Southeast U.S. These conservation planning efforts include ecoregional planning efforts with NGOs, development of recovery plans for federally listed species, development of state wildlife action plans and fisheries programs, as well as many other small- and large-scale conservation planning efforts. Because TVA's influence crosses state lines, TVA has been able to bring a unique perspective to these plans. TVA proposes to continue and expand its participation in planning organizations and small- and large-scale conservation planning efforts.

Migratory Bird Management
TVA's Migratory Bird Management Program is comprised of three components: Migratory Bird Management Plans, Partners in Flight, and Tennessee River Valley Shorebird Working Group.

Migratory Bird Management Plans — TVA proposes to develop management plans to inventory, monitor, and manage migratory birds on its lands. A component of a management plan would include agency guidelines for compliance with EO 13186 (Responsibilities of Federal Agencies to Protect Migratory Birds). TVA would also develop a memorandum of understanding with the USFWS on the conservation of migratory birds. This memorandum, required by EO 13186 for agencies whose actions have, or are likely to have, a measureable negative effect on migratory bird populations, addresses actions agencies would take to reduce their impacts on migratory bird populations. In addition, partnerships would be identified for inventorying and monitoring waterfowl and other water bird populations along TVA reservoirs. Conservation projects for migratory birds would be planned on TVA lands in cooperation with other federal and state partners. High priority birds for managing on TVA reservoirs include waterfowl, shorebirds, double-crested cormorants, and wading birds. TVA's management plans could be used in national and regional planning efforts to support the conservation of migratory birds.

Migratory Bird Management Planning Efforts — TVA is a signatory to a Partners in Flight (PIF) joint memorandum of understanding venture. PIF is a cooperative effort, among numerous agencies, to address the decline of land birds and their habitats. PIF projects have mostly occurred at Land Between the Lakes, a large area previously managed by TVA. Other national and regional migratory bird management planning efforts include the U.S. Shorebird Conservation Plan, North American Waterfowl Management Plan, Migratory Bird Joint Ventures, and Landscape Conservation Cooperatives. TVA proposes to support and participate in these efforts.

Tennessee River Valley Shorebird Working Group — In 2004, TVA altered the drawdown schedule on several reservoirs to maximize benefits to public recreation. Concern about the resulting impacts to shorebird populations led TVA to establish a five-year working group composed of federal and state agencies, NGOs, and volunteers to learn more about shorebird resources in the Valley.

In 2009, the working group was evaluated to determine the project's effectiveness and to identify improvements for similar future initiatives. Project accomplishments include more than 2,000 hours of shorebird monitoring (3,639 surveys at 127 sites), resulting in the largest shorebird monitoring effort ever undertaken in the Valley. TVA leveraged $94,000 in associated cost-sharing projects and $47,000 from in-kind and volunteer support. This effort funded three associated research projects through the University of Tennessee. In an online questionnaire, all working group members indicated they were satisfied with the results of this initiative, and all felt the group should continue beyond its original five-year mission. TVA proposes to continue its leadership role in this group.

2.1.2. Terrestrial Habitat Management

Terrestrial habitat management programs and activities are described below.

Grasslands and Agricultural Lands Management

TVA agricultural licenses are considered to maintain ground cover; provide open, early successional wildlife habitat; enhance local agribusiness; demonstrate carbon management and energy crop production; and provide cost savings to TVA. Each agricultural tract is managed to ensure that acceptable land use and soil management practices are implemented while preventing shoreline erosion and water quality degradation. Acceptable land use includes implementation of agricultural BMPs, restoration of natural vegetative buffers, leaving portions of crops in the field for wildlife consumption, implementation of effective soil management practices, and conversion of some pasturelands to native warm-season grasses (NWSG). To offset habitat loss from row crop and "clean" pasture farming on nearby private land, special provisions are often included in agricultural licenses to enhance TVA land for a wide variety of game and nongame wildlife.

Over the last 15 years, TVA has been converting license agreements for livestock grazing to hay forage management. Livestock are being removed from TVA lands in an effort to protect water quality and riparian habitat. Private farmers utilizing conventional agricultural practices and mechanized equipment manage the license areas. Special provisions in these agreements address soil nutrient amendments and harvest timing. Agricultural licensed TVA lands are available for public use, but public access can be restricted to protect crop investments.

In recent years TVA has converted several areas on dam reservations and other TVA lands from regularly mowed fields to NWSG. Several of these projects have been implemented in partnership with other organizations, as described below under Wildlife Habitat Enhancement Projects. Typical steps in these conversions include treating the field with herbicides to eliminate undesirable competing species, sowing NWSG seeds with a specialized planter, and periodic maintenance by controlled burning or mowing. TVA is considering increasing its efforts to establish and manage native grasslands in a prioritized manner on TVA lands.

Agricultural licenses can be canceled because of an unacceptable license violation, repeated instances of noncompliance, or conversion to other uses such as recreation or

planting of wildlife food plots. Agricultural licenses are not intended as an encroachment resolution tool, nor are they intended as a general license to authorize mowing or reservoir access. TVA proposes to continue to manage agricultural licenses and cooperative agreements with federal and state agencies for the management of over 10,000 acres of TVA lands. TVA also proposes to partner with agencies and non-governmental organizations to manage and enhance TVA grasslands and agricultural lands.

Dewatering Projects Management

TVA operates, either alone or in partnership, nine dewatering projects on Kentucky and Wheeler reservoirs (Figure A-2, Appendix A). These areas were developed as part of a long-term approach to mosquito control and were operated primarily for that purpose until the 1970s when TVA began reducing its mosquito-control efforts. Additional factors in the design, development, and operation of dewatering projects included providing food and habitat for wildlife, protecting bottomland hardwoods, making land available for farming, and avoiding expensive slope protection for relocated highways and railways. As TVA reduced its mosquito-control activities, these other benefits began to increase in value. Recreational activities, including fishing, waterfowl hunting, and bird watching, continued to contribute substantially to the local economies.

TVA has entered into agreements with the Alabama Department of Conservation and Natural Resources, Tennessee Wildlife Resources Agency (TWRA), and the USFWS for the management and cost sharing of operation and maintenance (O&M) of these areas.

Over time, TVA has reduced the resources allocated to the O&M of these dewatering projects. However, written agreements between TVA and agency partners dictate the level of resources expended on O&M of the dewatering projects. A dewatering project typically consists of levees, water control structures, and pump houses. TVA currently maintains the levees, water control structures, and pump house operations for several of these units. Specific activities associated with this maintenance include the mowing of earthen levees, repairing of levees, and operating pump house and water control gates. Levee repair consists of grading and rock surfacing. Pump house and water control gate O&M consist of the replacement of pump parts as necessary. Appropriate BMPs are identified prior to and implemented during maintenance operations.

Overall, the current operations of the Kentucky and Wheeler dewatering projects provide numerous primary and supplementary benefits. These units provide protection for power transmission line structures, relocated highway and railroad embankments, and bottomland hardwood forests; reduce mosquito-breeding habitat; and allow for continued farming of tillable cropland.

The continued operation and maintenance of the dewatering areas have resulted in the creation of high-quality overwintering waterfowl and migratory bird habitat that is recognized at both the state and national levels. Waterfowl habitat provided in the dewatering projects on both Wheeler and Kentucky reservoirs helps meet the federally and state-established goals and objectives for the lower Mississippi flyway zone as defined in the jointly developed United States and Canadian *North American Waterfowl Management Plan* (USFWS 2009a). Additionally, most of the project acreage is classified as wetland habitat and is included in TVA's (2004) ROS EIS. TVA committed to implementing a 15-year plan to document the effects of reservoir operational changes on wetland resources.

TVA is proposing to continue the management of the dewatering projects, including maintaining or upgrading contractual agreements. It is also considering refurbishing dewatering units based on the results of engineering and hydrologic reviews and operating and maintaining them at upgraded conditions. In recognition of the attractiveness of dewatering areas for both consumptive and non-consumptive wildlife uses, TVA is proposing to work with partners to incorporate nature-based tourism into their management.

Forest Resource Management

TVA's Forest Resource Management Program is comprised of four key components: forest access roads and parking areas, forest resource protection, forest vegetation management, and watershed protection and other public benefits. Forest management activities under consideration in the NRP include managing tree hazards and tree cutting/vegetation damage encroachments on TVA lands, continuing small-scale tree removal operations associated with storm or insect damages and forest wildlife habitat enhancements, and monitoring broad forest trends on TVA lands and conducting basic forest protection activities. Forest protection activities include treating insect and disease outbreaks, controlling invasive plants (described below in more detail), and prescribed burning. The four key forest management components are used when managing tree hazards, conducting tree removal operations, and conducting forest protection activities. The encroachments are often the actions of adjacent private landowners, from whom TVA may seek restitution. Other forest management activities under consideration are providing support to state forestry assessment plans, developing and maintaining a qualified fire management crew to protect TVA lands, and developing a formal forest resource inventory program.

Forest Access Roads and Parking Areas

Some TVA forestlands have preexisting unimproved roads with a limited number of improved roads that are used to gain vehicular access for management needs and to provide public access and parking (where appropriate). There are tracts of land where TVA has no deeded rights for vehicular access, and the only access may be by water. This impacts public access and use of these properties.

Forest roads are highly beneficial for often-overlooked management needs such as wildfire suppression resources. Forest roads are physically used for establishing wildfire control lines or fuel breaks. The existing improved roads and parking areas would be maintained through standard practices and installing BMPs to minimize any off-site water quality impacts. Unimproved roads would eventually need a higher level of improvement such as surface water drainage control, surfacing, and associated maintenance. Selective rerouting or reestablishment of roadbeds may be needed to reduce steep grades and for soil erosion control.

Several tracts of land used by the public have little or no vehicular parking. Parking areas for these tracts should be considered to minimize resource impacts, to offer public access, and to reduce conflicts with adjacent private property owners.

Forest Resource Protection

Forest resource protection activities address measures associated with watershed benefits, biodiversity, wildlife habitat, scenic quality, sensitive resources, wildfire control, unauthorized public uses, and other impacts.

Insect and Disease Control and Monitoring — TVA cooperates with other agencies, universities, forest industries, and private landowners to detect, monitor, and control impacts from forest insects and diseases.

Public Safety — TVA takes proactive measures to respond to and mitigate potentially hazardous situations such as tree hazards.

Sensitive Resources — TVA implements appropriate BMPs to protect natural features that are rare, uncommon, or unique and are often easily damaged. Examples of these features include wetlands, geologic features (caves), rare plant communities, special animal habitats, and cultural resources.

Wildfire Control — TVA cooperates with wildfire control agencies, fire departments, and others in both prevention and suppression of wildfires. The prevention of wildfires may include educational campaigns or programs.

Unauthorized Uses — TVA would take proactive measures to prevent unauthorized uses of forestlands such as damage to vegetation, site abuse, vandalism, dumping, and littering.

Forest Vegetation Management

Forest Vegetation Management addresses actions to protect, maintain, improve, enhance, and manage both herbaceous and woody vegetation to meet land management goals and objectives. This generally involves manipulation of both planted and naturally occurring vegetation as well as damaged vegetation. Examples of vegetation manipulation activities are as follows: (1) salvaging commercially important trees from insects, diseases, storms, and wildfire damages; (2) removal of trees to help control insects and spread of diseases; (3) removal of trees that present hazards to public use areas, private residences, structures, and other improvements; (4) removal of vegetation from earth dam faces, levees, and other water control structures to ensure their structural integrity; (5) removal of trees to support higher land uses and to address safety considerations such as airport expansions; (6) removal of trees to support wildfire fuels reduction efforts; (7) removal of trees to support invasive plant control efforts; (8) selective cuttings to enhance wildlife habitat and create more diverse plant communities; (9) selective cuttings to support sensitive resource needs; (10) selective cuttings to maintain or enhance public use vistas and viewsheds; (11) selective cuttings along established hiking trails to maintain accessibility; (12) selective cuttings or removal of undesirable vegetation to enhance growth of desirable vegetation to promote carbon sequestration; (13) selective cuttings or “day lighting” along secondary forest roads to allow better drying and protection as well as to create linear wildlife openings; (14) mechanical treatment of vegetation such as bush-hogging to control invading vegetation to maintain accessibility of public use forest access roads or to maintain forest wildlife openings in an early plant succession state; (15) chemical applications (see Nonnative Invasive Plant Management) to maintain or improve forest health; and (16) prescribed burns to meet resource objectives such as maintaining established NWSG stands or for forest understory habitat enhancement.

Vegetation Management Planning — A written vegetation management action plan would be prepared prior to manipulation of areas on 1 acre or greater. Depending on the site and nature of the action, the plan would address any or all of the following: property boundaries, streams and drainages, soil restrictions, slopes, environmental concerns, access routes, stream and drainage crossings, drainage structure spacing, and streamside management zones (SMZs). Seasonal timing of action would be included. The objective of

the vegetative management plan is to determine which BMPs are necessary to protect water and site quality and how those BMPs would be implemented. These plans would be used to identify sites where BMP compliance may be difficult. In some areas, additional protective measures would be implemented.

Vegetation Management Actions — Before actions begin, resource managers would consider the potential impacts of vegetation manipulation such as access roads and equipment staging areas. Careful preplanning would minimize potential impacts on water quality and reduce costs.

Any needed staging areas would be located at least 150 feet from the SMZ to minimize the impacts on natural drainages. Water turnouts would be constructed around the uphill side of staging areas as needed to divert water onto the adjacent forest floor. Adequate drainage on approach roads and trails would be provided. All equipment fueling and servicing areas would be located away from SMZs. On-site equipment would be serviced so that oil and other waste products would be drained into containers and disposed of properly. All accidental fuel or oil spills would be contained and reported. Trash and all materials resulting from servicing would be removed from the site and disposed of properly. Organic debris piles would be located no less than 100 feet outside of wet-weather drainages. Land disturbances would be revegetated to prevent movement of soil from the site. Compacted areas may be ripped, subsoiled, or disked for preparation of a suitable seedbed and/or planting site.

Access routes would be located outside SMZs. Instream disturbances would be avoided, and stream crossings would be minimized.

Access routes would be restored by installing and repairing water bars, removing stream crossing structures, shaping and smoothing, and revegetating any exposed areas subject to erosion.

Streamside Management Zones — SMZs would be maintained along all streams, lakes, ponds, natural springs, and all springs and reservoirs serving as domestic water supplies. SMZs would protect stream channels and banks from disturbance and form the “last line of defense” to filter sediment from surface runoff. SMZs also provide shade for streams to minimize thermal pollution.

Streams may be classified as perennial, intermittent, or ephemeral. SMZs would be maintained for all stream classifications. The level of vegetation manipulation within an SMZ would reflect the degree of potential water quality impact. The greatest protection would be given to perennial streams, followed by intermittent and ephemeral streams.

Site Preparation — This would include techniques to improve the site to support desirable vegetation. Activities could include measures such as the following:

> *Mechanical Operations.* Bulldozing would be limited to slopes of 30 percent or less, and the distance between windrows should be minimized. When a sloping site is raked and windrowed, the windrows would be placed on the contour to act as an interceptor and filter of any surface runoff. Windrows would be located well away from drains to prevent materials from being washed into streams. Occasional breaks would be provided in the windrows to permit access by fire suppression and other vehicles and to prevent damming of water. Soil disturbance would be kept to

a minimum. The topsoil, including the root mat, would be protected as much as possible to preserve site quality and minimize water quality impact. Stumps would be left in place except where removal is required on earth dam faces and levees.

Prescribed Burning. Prescribed burning would be carried out under favorable conditions of wind, humidity, and temperature to achieve desired results while preventing removal of surface duff and root mat and maintaining control of the fire. A plan would be prepared defining objectives and conditions under which burning would be conducted. All appropriate state and/or local permits would be obtained prior to beginning a prescribed burn. When possible, hot burns on pure pine stands and erodible sites during drought periods would be avoided. Hot burns consume most of the protective litter on the forest floor and would increase the chance of raindrop erosion of bare mineral soil. Burns conducted in the early morning or after a rain are more likely to leave a portion of the surface duff in place. The greatest threat to water quality in prescribed burning is from the construction of fire lines by heavy equipment. Fire lines would only be plowed immediately prior to burning and should be kept to a minimum. Forest access roads would be utilized where feasible. SMZs would be avoided, where practical, during prescribed burns.

Revegetation of Land Disturbances — All land disturbance including road surfaces, cuts, fills, and ditches would be revegetated. Native plants or plant mixtures adapted to the site would be selected, and the recommended rate of application and optimum seeding dates would be used.

Road surfaces would be shaped and smoothed prior to seeding. Heavily compacted areas may require scarification or disking to promote infiltration of water and create suitable seedbed. However, loosening soil on steeper slopes would be avoided. When desirable, mulch would be used in revegetating disturbed areas to hold seed in place, maintain moisture, and prevent extreme temperatures on the soil surface.

Bush-hogging would be utilized to maintain roads that would be used in the future and/or to maintain open areas for wildlife. Seeded areas would be protected from livestock grazing and unrestricted vehicle traffic.

Reforestation — Hand and/or machine plantings would be established to meet management objectives such as reforestation of old agricultural fields, storm-damaged areas, and unauthorized vegetative clearings, and for habitat enhancement. Planting stock could include cuttings, bare root seedlings, saplings, or balled and burlapped trees and shrubs. Natural regeneration methods could be used to help establish desirable species. This could include other methods such as direct seeding.

Damage Rehabilitation — Measures could be taken to restore or rehabilitate forestlands damaged by natural causes such as wildfire, storms, or unauthorized uses.

Forest Improvement — Mechanical or chemical practices (addressed under Nonnative Invasive Plant Section) could be used to maintain or improve forest health such as control of invasive exotic plants or other undesirable species. Such practices would support biodiversity, wildlife habitat, carbon sequestration, considerations for biofuels, and/or other benefits to forest stands.

Tree Improvement — TVA cooperates with other agencies and universities to provide historical research information as well as to assist with current tree improvement activities such as national efforts in restoration of the American chestnut.

Watershed Protection and Other Public Benefits

Best Management Practices — Continued effort would be placed on using state-of-the-art BMPs for vegetation management activities on TVA lands to ensure watershed protection benefits. TVA has developed its own BMPs to address the growing awareness of environmental issues and TVA's commitment to protect water quality. Special environmental concerns from TVA resource managers not addressed by existing federal and state guidelines have been included. Multiagency cooperation would continue to monitor, research, and develop new innovations and methods that would continuously update these BMPs.

Additional Conservation Practices — Other conservation practices would be used to control soil erosion and to maintain healthy forest cover, associated understory, and riparian vegetation that provide high-quality watershed protection benefits. Some examples of these practices include stabilizing critically eroding reservoir shoreline and stream banks, establishing and maintaining livestock exclusion fencing, and riparian corridor management. Additional practices could address energy conservation, pollution abatement, storm water control, and residential and urban benefits. Other special practices could address visual considerations valued by lake users, adjacent landowners, and the public.

Nonnative Invasive Plant Management

Invasive plants infest a variety of forested and nonforested habitats. They can reduce forest productivity, hinder forest use and management activities, and degrade diversity and wildlife habitat. Invasive plants can include trees, shrubs, vines, grasses, ferns, and forbs. Some have been introduced accidentally, but most were introduced as ornamentals or for livestock forage. Many infestations on TVA lands are the result of deliberate plantings in efforts to reduce erosion and improve wildlife habitat. Invasive species typically lack predators and diseases that inhibit their growth and reproduction and have increased to the point that widespread control and rehabilitation measures are necessary (Miller 2003).

Four plants in the TVA region are designated as noxious weeds according to the Federal Noxious Weed List of 2006 (U.S. Department of Agriculture [USDA] 2007a) and the Southeast Exotic Pest Plant Council (SE-EPPC 2008): cogongrass, giant salvinia, hydrilla, and tropical soda apple. Several more species occurring in the TVA region are considered to pose potential threats to native ecosystems and human health (SE-EPCC 2008).

Georgia, Mississippi, and Tennessee have developed MOUs with federal and state agencies to create an Early Detection Rapid Response Program to assist public and private landowners with controlling invasive species, particularly cogongrass. Cogongrass disrupts ecosystem functions, reducing wildlife habitat, decreasing tree seedling establishment and growth, and altering fire regimes and intensities (Evans et al. 2008). Miller et al. (2008) estimated the acres covered by 33 nonnative invasive species within the southern states. Their data show that 19 percent of Alabama, 5 percent of Georgia, 16 percent of Kentucky, 5 percent of North Carolina, 16 percent of Tennessee, and 10 percent of Virginia forests are estimated to be covered by nonnative species.

Nonnative Invasive Plant Prevention — According to the Center for Invasive Plant Management (2009), the most effective, economical, and ecologically sound approach to

managing invasive plants is to prevent them from invading. Infestations must be managed to limit the spread of invasive plants, but weed management that controls existing infestations while focusing on prevention and early detection of new invasions can be far more cost-effective.

Practices to prevent the establishment of invasive plants include the following:

- Early detection and eradication of small patches of weeds
- Evaluating the effectiveness of prevention efforts and adapting plans for the following year
- Limiting the introduction of weed seeds
- Maintaining desired plant communities through good management
- Minimizing the disturbance of desirable plants along trails, roads, and waterways
- Monitoring high-risk areas such as transportation corridors and bare ground
- Revegetating disturbed sites with desired plants

Nonnative Invasive Plant Removal (Manual and Mechanical Methods) — Weed removal often includes mechanical removal of the plant and application of herbicides. Removal involves pulling and cutting the plants or using mechanized equipment. Often, herbicides that have been approved by the USEPA are applied to the plants. TVA's use of mechanical and chemical controls for invasive plants would follow those used by the USFS (USDA 2009). Manual or mechanical methods would be the principal method for controlling small spot infestations. Examples of hand tools that might be used include shovels, saws, axes, loppers, hoes, or weed-wrenches. Mechanical methods could include cutting with a string trimmer, chainsaw, brush blade, or mower.

Nonnative Invasive Plant Removal (Chemical [Herbicide] Methods) — The objectives of herbicide use would be to control invasive plant infestations where manual or mechanical means would be cost-prohibitive or would result in excessive soil disturbance or other resource damage. All herbicides would be used according to manufacturers' label directions for rates, concentrations, exposure times, and application methods. Herbicides would be directly applied to the target plants using selective treatment, which would consist of various techniques for applying herbicides to target plants with minimal impact to desirable vegetation and other nontarget organisms including humans. Herbicide drift would be greatly reduced with selective treatments (relative to broad-scale or aerial application). Techniques include spraying foliage using a hand-held wand or backpack sprayer, basal bark and stem treatments using spraying or painting (wiping) methods, cut surface treatments (spraying or wiping), and woody stem injections. Only formulations approved for aquatic use would be applied in or adjacent to wetlands, lakes, and streams in accordance with label direction.

Herbicides that currently may be used to manage invasive plants on TVA lands are listed below. Detailed descriptions of these chemicals, including comprehensive risk assessments, can be found on the USDA's website (USDA 2007a). The list below is subject to change based on relevant published data pertaining to each herbicide and recommendations from other federal and state agencies.

- Glyphosate is a nonselective, broad spectrum, systemic herbicide used to control many grasses, forbs, vines, shrubs, and trees. Specific formulations of glyphosate have been labeled for aquatic application, and these can be effective on both emergent aquatics and shoreline vegetation. This chemical is a growth inhibitor that

can be applied through direct foliar application, stem injection, and cut surface application. It has been proven effective on a wide variety of invasive species. Commercial brand names include Accord™ and Rodeo™.

- Triclopyr is a selective herbicide that controls invasive, broadleaf herbaceous and woody plants, but has little to no effect on grasses. This chemical acts as a growth regulator and can be applied as a direct foliar application, stem injection, or cut surface treatment. Specific formulations of triclopyr have been labeled for aquatic application and can be effective on both emergent aquatics and shoreline vegetation. It has been proven effective on a wide variety of invasive species. Commercial brand names include Garlon 3A™, Garlon 4™, and Pathfinder II™.
- Clopyralid is a selective herbicide affecting broadleaf herbs, primarily legumes, composites, and smartweeds. This chemical acts as a growth regulator and is typically applied as a direct foliar application. With selectivity to legumes, this chemical is particularly useful in the control of kudzu, mimosa, and lespedeza. Commercial brand names include Transline™.
- Imazapic is a selective herbicide primarily used to control cool-season grasses. Warm-season grasses, many wildflower species, and legumes are resistant, while many cool-season grasses and broadleaf weeds are susceptible. Commercial brand names include Plateau™.
- Metsulfuron methyl is a systemic herbicide that is selective to woody species, broadleaf species, and many annual grasses. It has been proven effective in the control of lespedeza, Japanese honeysuckle, kudzu, and multiflora rose. Commercial brand names include Escort™.
- Dicamba is a somewhat selective herbicide that controls most annual and perennial broadleaf herbs and some woody species. Care must be taken, as it can damage or kill hardwood and pine seedlings, but has little to no effect on grasses. This chemical is known to be effective in the control of autumn olive. Commercial brand names include Vanquish™ and Overdrive™.

Nonnative Invasive Plant Management (Other Control Measures) — In addition to strict adherence to herbicide labels, standard project BMPs, and planned monitoring, the following additional measures would be implemented to reduce the spread of invasive plants and minimize the potential impacts associated with treatment methodologies.

- Equipment (including vehicles), boots, and clothing would be cleaned thoroughly before moving from treatment sites to ensure that seeds or other propagules are not transported to other sites.
- Fueling or oiling of mechanical equipment would occur away from aquatic habitats.
- Application staff would install barriers (silt fence) along stream edges and banks prior to any application of herbicides. If a silt fence cannot be easily secured on steep rocky banks, one member of an application team would maintain a mobile barrier between the herbicide application and the stream during the application.
- Plant parts capable of starting new plants (seeds, rhizomes, cuttings) would be properly disposed of. Plants would be piled and burned on site or bagged and moved off site. Bagged plants would either be incinerated or disposed of using standard garbage methods. For large woody bushes that are difficult to move, treatments would be scheduled prior to seed set, as practical.
- When work is conducted in areas containing rare or sensitive plant species, those plants would be flagged or marked to avoid spraying. A physical barrier would be used to protect nontarget species when they occur immediately adjacent to the

treatment area. All invasive plants located within 10 feet of any federally listed species would be cut back to within 6 inches of the ground for woody stems or to expose the root crown for vines.

- Herbicide would be applied to cut stems with a small wick applicator, if possible, or with a small spray bottle to minimize herbicide drift onto nontarget vegetation.
- Use of mowing as a control method would be timed to avoid spreading seeds. Native vegetation would be retained, and soil disturbance would be limited, to the extent practicable.
- Prior to any treatments, TVA would conduct the appropriate environmental review.
- Following treatments, exposed soils would be promptly revegetated to avoid recolonization.

As described below in Sections 4.2 and 4.3.1, a significant proportion of TVA land is infested with invasive plants. In recent years, TVA has conducted invasive plant control activities on about 600 acres per year. TVA would continue controlling invasive plants and is considering increasing the acreage annually treated. A related consideration is the development of a prioritized plan to control invasive plant on areas with sensitive resources such as natural areas, areas with habitat enhancements, and areas of high public use. TVA is also considering continuing its active participation in state exotic pest plant councils.

Nuisance Animal Control

TVA has managed the effects of nuisance animals for many years. This process can involve the removal of problem individuals or populations or can involve altering the affected area to make it less hospitable to the nuisance animals. Some species of wildlife become habituated to man's presence or adapt to human changes in the environment, which can result in property damage, safety issues, and risk transfer of disease to humans, or can interrupt critical TVA operations such as the operation of transmission lines. Common nuisance wildlife species for TVA include vultures, Canada geese, herons, pigeons, gulls, beavers, raccoons, squirrels, bats, groundhogs, and various other rodents.

TVA has entered into a contractual agreement for the management of nuisance animals with the Wildlife Services (WS) section of the USDA's Animal and Plant Health Inspection Service. USDA-WS has expertise in this management and holds all required federal and state permits that are required to conduct control activities with various wildlife species. USDA-WS has also reviewed and documented potential effects from nuisance animal control activities through various EAs. TVA either has adopted existing EAs or been considered a cooperating agency in the development of environmental impact assessments for specific animal damage control activities across the Valley. TVA proposes to continue the contractual arrangement with USDA-WS for nuisance animal control activities.

The primary objective of TVA's animal damage control program is to reduce damage in a practical, humane, and environmentally acceptable manner. Wildlife managers and wildlife control specialists base control methods on the habits and biology of the animals causing damage. In turn, their efforts maximize safety to the environment, humans, and other animals.

Examples of impacts from nuisance animals include:

- Flooding of adjacent private property from active beaver dams on TVA lands.
- Vultures roosting on TVA transmission line structures.

- Vultures damaging other structures including dam and lock walls and vehicles parked at boat launching ramps.
- Droppings from roosting pigeons, creating health and safety issues.
- Burrowing rodents creating dam safety integrity concerns.

TVA proposes to conduct proactive measures for nuisance animal damage prevention. Examples of proactive measures include:

- Design and placement of TVA structures not amenable to roosting behavior by vultures or nesting activity by raptors.
- Design and installation of barriers and/or exclusion devices to prevent certain birds and mammals from creating health and safety issues.

Feral animals, particularly cats, are a problem at some TVA facilities and other TVA lands. Feral animals can harm local populations of birds and other wildlife, spread disease, and cause sanitation problems. TVA is considering developing and implementing proactive strategies to manage feral animals on TV lands.

Terrestrial Greenhouse Gas Sequestration Management

Carbon sequestration is the capture and storage of carbon dioxide (CO_2) that would otherwise be emitted to or remains in the atmosphere. Terrestrial carbon sequestration is carbon stored in the biomass created by perennial vegetations such as root systems and tree trunks. Transformation of atmospheric carbon into a fixed state largely occurs through forest management activities such as planting trees and perennial grasses. These projects result in sequestration of emissions that, if achieved by a specific protocol, could earn a CO_2 reduction credit applicable toward a future mandatory CO_2 cap-and-trade program (described below).

Mandatory reductions of GHGs, mainly CO_2, may be required for the electricity sector. These reduction requirements may be in the form of a cap-and-trade program, which is a market-based approach of achieving emissions reductions. At the essence of the program are emissions caps and the distribution of allowances equal to the cap. An allowance authorizes the release of a specific amount of the regulated emission(s). CO_2 reduction credits, as discussed above, are expected to be equivalent to an allowance and would be applicable toward a compliance program. As such, TVA would review options to acquire CO_2 reduction credits by implementing emission-reduction projects either on TVA land or through bilateral contracts on land owned by others. Another option would be to consider purchasing credits from a market. The types of terrestrial carbon sequestration projects that TVA would consider are as follows:

- Forest creation/reforestation activities
- Forest type conversion
- Forest clearing/deforestation avoidance
- Conservation farming techniques

TVA is currently researching terrestrial carbon sequestration on 41 acres of TVA lands; current and potential research topics include the following:

- Ecological impacts of various carbon sequestration practices
- Reservoir carbon uptake
- Comparison of carbon offset generation and verification methodologies

- Soil and/or above ground measurement techniques

TVA has entered into two consortiums, the PowerTree Carbon Consortium and the UtiliTree Carbon Company engaged in reforestation and other forestry projects to sequester carbon and manage GHG emissions. As part of the NRP, TVA is considering increasing its involvement in terrestrial GHG sequestration management.

Wildlife Habitat Council – Third-Party Certifications
In 1998, TVA established a formal relationship with the Wildlife Habitat Council (WHC), a Maryland-based nonprofit organization that encourages corporations to enhance wildlife habitats on their properties. WHC biologists work with member companies to inventory wildlife populations, identify wildlife enhancement projects, and form teams of employees to administer them. Wildlife projects vary from site to site, but typically include maintaining wildlife food plots and providing artificial nesting structures for bluebirds, tree swallows, wood ducks, and other species. Native grass and wildflower meadows have also been established at several locations. TVA projects currently certified by the WHC include Colbert Fossil Plant, Raccoon Mountain Pumped Storage Plant, and the Muscle Shoals Reservation. TVA's Reservoir Releases Improvements Program has also received WHC certification. This program is credited with improving more than 300 miles of aquatic habitat by increasing the amount of dissolved oxygen (DO) and keeping the riverbed wet at all times.

Certifying sustainably managed forests is another option for forest landowners. Other third-party programs include certification standards for environmental protection and for the conservation of biological values such as species diversity and wildlife habitat. Compliance with standards is determined through third-party verification by independent, accredited auditors. The largest such program in North America is the Sustainable Forestry Initiative. This initiative has enrolled more than 136 million acres of forestland. Certifications to the standards of the Forest Stewardship Council, another major program, have been attained on 20.9 million acres in North America. In recognizing wildlife needs in forest and other program management, third-party certification would ensure that TVA fully considers wildlife objectives and habitat relationships in all forest planning and management activities. Additionally, third-party certification ensures support for old-growth forest protection and vegetation management programs that provide for the full diversity of habitats and species.

As part of the NRP, TVA would continue to maintain its current WHC certified projects and initiate WHC certification of the Natural Resource Plan. It is considering initiating new WHC certified projects and establishing a third party review and certification process for its wildlife management activities.

Wildlife Habitat Enhancement Partnerships
Habitat Partnerships — TVA has actively cooperated with various agencies along with stakeholder groups and NGOs (such as Quail Forever, Ducks Unlimited [DU], and the National Wild Turkey Federation) to improve habitat and increase wildlife-oriented recreational opportunities on TVA lands. Partnerships are used for developing and implementing techniques to restore productive wildlife habitat. Examples of such projects include the establishment of NWSG and food plots by local Quail Forever chapters on Tellico, Watts Bar, and Melton Hill reservoirs. DU chapters have assisted TVA in the construction and erection of wood duck nesting boxes on TVA lands across the Valley. In addition, DU has provided substantial resources to partner with TVA and TWRA on habitat restoration efforts on the Camden Dewatering Project and Wildlife Management Area. TVA

also incorporates a wildlife enhancement provision into some of its agricultural licenses in partnership with the licensee. In recent years, TVA has partnered with local native plant nurseries and enthusiasts, and the University of Tennessee's Native Landscape Design Laboratory, to establish and manage native wildflower meadows on TVA lands.

About 500 acres of TVA land is currently managed through these partnerships and TVA is considering increasing this area.

Habitat Enhancement and Management — Wildlife management is a general term for the process of keeping wild species at desirable levels determined by professional wildlife managers and others. Wildlife management has become an integrated science using disciplines such as mathematics, chemistry, biology, ecology, climatology, and geography to determine BMPs. Wildlife conservation has evolved from original wildlife management practices and aims to halt the loss in the earth's biodiversity by considering ecological principles. Such principles can include carrying capacity, disturbance, and succession and environmental conditions such as physical geography, soils, and hydrology with the aim of balancing the needs of wildlife with the needs of people.

There are two general types of wildlife management, often referred to as manipulative and custodial management. Manipulative management acts on a population, either changing its numbers by direct means or influencing numbers by the indirect means of altering food supply, habitat, density of predators, or prevalence of disease. Manipulative management is generally conducted by federal and state wildlife agencies through specific habitat management actions and hunting season regulations. In general, other federal and state laws and regulations apply to all TVA lands that are deemed open for legal hunting activities. On rare occasions, TVA may work with certain state and/or federal agencies to allow hunting on select areas in an effort to reduce populations of particular species.

Custodial management is largely preventive or protective. The aim of custodial management is to minimize external influences on a specific animal population and/or its habitat. Custodial management is appropriate in an area where one of the stated goals is to protect ecological processes and diversity. It is also appropriate for conservation of a threatened species where the threat is of external origin rather than being intrinsic to the system. TVA's wildlife management activities are largely considered custodial management. Wildlife habitat diversity is developed and managed through the establishment of native grassland and forbs, open land, periodic prescribed burning, planting of native shrubs and trees in riparian zones, harvesting timber in 15- to 25-acre blocks to diversify age and structure, establishing food plots and linear openings (usually in partnership with select NGOs), and erecting and maintaining nesting boxes for various species.

Wildlife habitat management is also accomplished through long-term agreements among TVA and other federal and state wildlife management agencies. This wildlife resource partnership began in the 1940s when TVA transferred land and water areas on many of its reservoirs to the USFWS and state game and fish agencies for wildlife management and refuge purposes (Table 2-3).

Table 2-3. Former TVA Land and Water Areas Used for Federal and State Wildlife Management and Refuge Programs

Agency	Reservoir	Acres
USFWS — Tennessee National Refuge	Kentucky	50,830
USFWS — Wheeler National Refuge	Wheeler	35,300
State of Alabama	Guntersville	25,000
State of Alabama	Pickwick	9,421
State of Alabama	Wheeler	9,484
State of Kentucky	Kentucky	3,274
State of Mississippi	Pickwick	1,597
State of Tennessee	Cherokee	224
State of Tennessee	Chickamauga	2,770
State of Tennessee	Douglas	1,230
State of Tennessee	Fort Loudoun	30
State of Tennessee	Kentucky	12,585
State of Tennessee	Nolichucky	733
State of Tennessee	Normandy	815
State of Tennessee	Norris	26,869
State of Tennessee	Tellico	5,900
State of Tennessee	Watts Bar	3,705
State of Tennessee	Columbia	12,800

These areas, which total over 200,000 acres Valleywide, have been critical to the management of both game and nongame wildlife species, in particular waterfowl. The juxtaposition of reservoir waters to adjacent bottomlands and other low-lying agricultural areas provides excellent habitat development opportunities for migratory waterfowl and other water birds. This habitat situation led to the creation of Wheeler and Tennessee National Wildlife Refuges. Both refuges are critical to waterfowl management in the Mississippi and Atlantic flyways. State wildlife management areas have provided similar enhanced habitats and opportunities for waterfowl hunting that have national significance. TVA has partnered with other federal and state entities to assist in the management of these areas by providing infrastructure maintenance and operation, materials and supplies, permit coordination, and technical advice on specific project initiatives. TVA proposes to continue these relationships and develop cooperative agreements with resource management partners.

2.1.3. Land Management and Stewardship

TVA currently utilizes a number of assessment and maintenance tools and techniques to manage its public lands. These assessment tools and techniques are described below.

Boundary Maintenance

Establishing and maintaining TVA's property boundaries help to reduce encroachments and protect natural resources. Boundaries are maintained by completing a four-step process. First, TVA identifies priority areas to conduct boundary maintenance based on developmental pressures on adjacent properties, lack of existing boundary markings, elapsed time since the last boundary maintenance, and/or outcomes of other TVA processes. Second, a desktop review is conducted using aerial photos of the area, site-

specific photos, and maps. This information, along with a data sheet, is taken to the site to be maintained. Next, the boundary line is located on the ground and denoted with the appropriate paint color. The following data are then recorded and added to a GIS database: date of boundary maintenance, feet of boundary marked, TVA monument numbers and conditions, and type of additional maintenance needed (if any).

TVA's boundary maintenance activities are currently prioritized according to encroachments, the potential of adjacent land development to result in encroachments, and existing boundary maintenance needs as assessed in the field. TVA proposes to develop a regional prioritization process for determining boundary maintenance needs at the reservoir level. TVA is also considering addressing all regional boundary maintenance needs on a fixed cycle while incorporating recent and evolving survey technologies such as the use of lasers and geographic positioning systems.

Land Conditions Assessment and Land Stewardship Maintenance
TVA conducts two types of Land Conditions Assessments (LCA): Comprehensive Land Conditions Assessment (CLCA) and Rapid Land Conditions Assessment (RLCA). This subsection describes TVA's methodologies for the two types of LCA.

Comprehensive Land Conditions Assessment — CLCA determines whether individual parcels of land meet desired conditions. The purpose of the CLCA is to identify stewardship needs for maintaining or improving the conditions of a parcel of land.

Teams consisting of natural resource professionals conduct field assessments by evaluating specific conditions that fall under four resource management categories (Table 2-4). After the field assessment is completed, an overall parcel rating is determined as "good," "fair," or "poor." These ratings are internally reported and tracked in a GIS database.

Table 2-4. Conditions Reviewed During Comprehensive Land Conditions Assessment

Category	Attribute Assessed
Public Safety and Use	Access, Boundary, and Signage
	Dispersed Recreational Impacts
	Public Safety
	Unauthorized Use(s)
Resources Protection	Sensitive Resources
	Species Protection
Soil and Water	Access Road Best Management Practices
	Shoreline Conditions
	Watershed Protection Benefits
Vegetation and Wildlife	Invasive Plants
	Nuisance or Invasive Animals
	Vegetation Impacts
	Wildlife Habitat

Assessments are conducted when vegetation is dormant to minimize field assessment time. Lands are selected for CLCAs via a desktop exercise where parcels are systematically evaluated. This desktop exercise determines which lands have the greatest public use and support the most critical resources. Assessments require professional judgment by experienced specialists applying established protocols and criteria. Parcels of land are physically assessed by vehicle, boat, and/or foot. A complete review is conducted of the boundary lines, shorelines, hiking trails, all-terrain vehicle routes, roads, and other identified undeveloped public use areas. Stewardship needs are prioritized in multiyear plans for improving land conditions.

Rapid Land Conditions Assessment — Under the RLCA, TVA conducts a desktop review to identify and prioritize health, safety, and compliance needs relating to natural resource management activities. Additionally, TVA considers asset preservation needs for a small subset of TVA lands such as dam reservations; resource management unit plans (Unit Plans); parcels allocated for sensitive resource management via the reservoir lands planning process; and parcels containing 50 acres or more receiving a single intensive recreational use, multiple recreational uses, or a prior stewardship investment within the last five years. Through the RLCA, TVA also identifies areas that require protection of prior investments including the creation of wildlife habitat, vegetative enhancements, or other on-the-ground management actions.

TVA collects the information obtained from RLCA and calculates needs for maintenance and improvement on specific parcels of land. The parcels of land are prioritized as having a low, medium, or high level of need. This expedited process provides a current “snapshot” of known and unknown parcel needs. This process directs prioritization of CLCA and provides a timely mechanism to address stewardship needs.

In the NRP, TVA is considering replacing the RLCA with increased use of the CLCA, and increasing the area annually assessed from the current 5,000 acres to as much as 50,000 acres.

Based on the results of the land condition assessments, TVA prioritizes and implements stewardship activities to address the following resource stewardship maintenance needs:

- Abused and misused sites
- Access roads and parking areas
- Agricultural fields
- Bank fishing sites
- Boundaries
- Dispersed recreational sites
- Nuisance wildlife controls
- Public access sites
- Public health and safety
- Sensitive resources
- Shoreline conditions
- Signage and interpretive communication
- Species protection
- Trails
- Vegetation
- Visual values
- Watershed protection
- Wildlife habitat

Integrated Resource Management Plans — Integrated Resource Management (IRM) is a collaborative process TVA has used to integrate stakeholder interests with coordinated management objectives to ensure viability of biological, cultural, visual, and recreation resources. TVA’s IRM process ensures that resource stewardship issues and stakeholder interests are considered while optimizing benefits and minimizing conflicts. IRM is based on cooperation, communication, coordination, and consideration of stakeholders potentially

affected by resource management. IRM recognizes that the management or use of one resource affects the management or use of others. Therefore, an integrated approach is more effective than considering resources individually. Specifically, the IRM process would:

- Identify data and technology needs
- Engage relevant stakeholders
- Focus on key management issues
- Merge disciplinary perspectives
- Resolve conflicting interests
- Make use of a wide range of available technologies
- Identify policy, technological, and management alternatives
- Foster adaptive management

Incorporation of the IRM process would allow TVA to manage public lands for an optimum level of multiple uses and benefits that protect and enhance natural, cultural, recreational, and visual resources in a cost-effective manner. TVA would develop IRM plans for prioritized reservoir lands.

Resource Management Unit Plan Implementation — Between 1998 and 2001, TVA developed 10 Unit Plans. Each Unit Plan addressed long-term land-based resource management activities on lands allocated for natural resource conservation and/or sensitive resource management.

The Unit Plans cover a total of 17,675 acres of land that were developed with substantial stakeholder input. Primary objectives of the Unit Plans were to provide sustainable amenities and benefits to the public through cost-effective management of unit-based resources including wildlife, forests, sensitive resources, and dispersed recreation opportunities. An example is the Boone Unit Plan (TVA 2002b) available at http://www.tva.gov/environment/reports/boone/.

In the NRP, TVA proposes to transition from IRM plans and the unit plan implementation methodology to the RLCA task prioritization methodology used on other TVA lands.

2.1.4. Public Outreach Programs

TVA is proposing to utilize a number of public outreach programs to aid in the management of public lands from a biological and cultural resources perspective.

Resource Stewardship Campaigns

To increase effectiveness and serve a larger portion of the Valley, TVA proposes to develop and implement a new Resource Stewardship Campaigns program. It would combine technical support and communications to promote natural resource improvement and protection. These campaigns could include focused efforts to improve riparian and streamside management, develop and promote dispersed recreation, and raise public awareness of biological and cultural resource management issues or other issues. In addition, TVA could provide technical support for existing restoration or wildlife habitat enhancement projects. Resource Stewardship Campaigns are intended to be short-term projects with high likelihood of measurable success. They would likely include materials for stakeholders developed in conjunction with other programs and activities listed in this chapter.

2.1.5. Dispersed Recreation Management

Dispersed recreation includes passive and unconfined recreational activities occurring on TVA lands and not associated with developed facilities. Examples of dispersed recreation include primitive camping, hiking, wildlife viewing, hunting, and bank fishing. Some improvements would be made to dispersed recreational areas to improve user access, increase health and safety, and/or mitigate damage to natural resources. In addition, dispersed recreational opportunities may occur on areas with highly concentrated or seasonally intensive use, as well as on noncontiguous lands. The current and proposed dispersed recreation activities are described below.

Dispersed Recreation Assessments

TVA quantitatively measures ecological and social impacts from dispersed recreational activities on TVA lands. The methodology is rooted in the framework of the limits of acceptable change assessment, which essentially establishes a threshold of impacts that is not acceptable and needs to be managed or mitigated (Guerry 2005). This process provides TVA the ability to assess the effects of dispersed recreation consistently and to guide resulting management or implementation activities. In addition, the types of recreational activities occurring on TVA lands are identified. TVA capitalizes on this information when establishing priorities for future actions, identifying potential land uses during the reservoir lands planning process, and evaluating the impacts of its potential actions.

Dispersed Recreation Improvements

Types of dispersed recreation improvements are dependent on the impacts to a specific area. Improvement activities would concentrate on the variables contributing the most impacts to the area. Examples of impacts caused by dispersed recreation include litter, vegetation removal, and the expansion of the boundaries of the dispersed recreation area. Improvements to offset these impacts would include litter removal, planting native vegetation, installing barriers, and graveling or hardening specific areas. TVA would also consider rezoning dispersed recreational sites to developed recreational parcels, as appropriate, during the reservoir lands planning process or in accordance with other TVA policies.

The activities associated with dispersed recreation improvements are dependent on the surrounding resources, general land access, and land configuration. Table 2-5 lists examples of activities that would be used to improve these areas. Appropriate BMPs are identified prior to and implemented during the construction activities associated with site management and improvement.

Dispersed Recreation Key Opportunities

TVA proposes to develop and implement key opportunities to support the need for dispersed recreation across the Valley. TVA would conduct a needs and gap analysis to identify these opportunities. This analysis would be conducted by projecting future demand, future population, and gaps in dispersed recreational needs. TVA would identify the most pressing needs and take steps to provide the public with key dispersed recreational opportunities. Examples of key dispersed recreational opportunities include improved access and bank fishing.

Table 2-5. Activities Associated With Dispersed Recreation Improvements

Activity Category	Improvement Activities
Site Management	Provide improvements to the site (gravel or hardening of surfaces) Plant native vegetation Install physical barriers Manage facilities Remove litter and other refuse
Rationing / Allocation	Limit access to the area by using reservations, a first-come, first-served system, lotteries, and/or merit/eligibility criteria Charge user fees
Regulation	Create zones for specific types of activities Limit the length of stays allowed Restrict the use or type of behavior at facilities Restrict or prohibit specific types of activities, equipment, and/or modes of travel Limit the size of the groups and/or types of stock or pets Restrict or prohibit the type of use in an area to protect environmental conditions
Deterrence / Enforcement	Install signs and/or kiosks Sanction visitors who engage in noncompliant behavior Provide enforcement personnel such as law enforcement
Visitor Education	Educate visitors about appropriate behaviors and altering use patterns

Dispersed Recreation Management Plans
Dispersed Recreation Management Plans are Valley-wide multi-year plans. They would allow TVA to holistically look at all facets of dispersed recreation and to ensure their integration with other program areas. These plans would be a proactive measure that address scheduled maintenance and future projects to maximize the efficiency and effectiveness of dispersed recreation management.

Dispersed Recreation User Surveys
These surveys would allow TVA to make scientifically based decisions on dispersed recreation projects, such as where and what key projects to implement, based on the specific needs of user of TVA lands. They would be designed to gather the user information necessary to make the most informed dispersed recreation management decisions. The proposed sample size of 600 annually would provide a robust, area-wide sample.

Dispersed Recreation Regulations
TVA would issue formal regulations concerning dispersed recreational uses of TVA lands to enhance enforcement capabilities.

Dispersed Recreation Outdoor Clinics
One of the biggest barriers to participation in outdoor and dispersed recreation is skill development. TVA is proposing to host outdoor skill clinics to break these barriers. These outdoor clinics could lead to a higher proportion of Valley stakeholders enjoying a healthy outdoor recreation lifestyle. Some examples of outdoor clinics include kayaking, fly-fishing, and camping.

Leave No Trace

Leave No Trace (LNT) is a national and international program designed to assist outdoor enthusiasts with their decisions about how to reduce their impacts when they conduct dispersed recreation activities. The program strives to educate all those who enjoy the outdoors about the nature of their recreational impacts as well as techniques to prevent and minimize such impacts. LNT is best understood as an educational and ethical program, not as a set of rules and regulations (LNT 2008). LNT information is rooted in scientific studies and common sense. The information is framed under the LNT principles: Plan Ahead and Prepare, Travel and Camp on Durable Surfaces, Dispose of Waste Properly, Leave What You Find, Minimize Campfire Impacts, Respect Wildlife, and Be Considerate of Other Visitors. Additional information pertaining to the LNT Program can be found at www.lnt.org.

TVA joined other land management agencies by becoming an LNT partner in 2008. TVA provides educational materials to the public in all of its watershed field offices. In addition, TVA provides informational signage about LNT at some of its most intensively impacted dispersed recreation areas. TVA staff has completed the LNT trainer certification course to become better communicators of the LNT message to the recreating public.

TVA is considering increasing its promotion of LNT throughout the region by providing educational information to users at recreation facilities and sites, through information kiosks and interactions with recreationists in the field, at local businesses, and on its website.

Trails Management

Over 100 miles of marked trails are located on TVA lands. Several of the trails or segments of the trails meet the Americans With Disabilities Act (ADA) standards for accessible design. A small portion of the trails is paved. However, most are single-track trails intended for hiking, backpacking, mountain biking, and general access to TVA lands. Activities associated with trails have recently become more popular across the U.S. For example, day hiking rose from 23.8 percent of the population participating in 1995 to 33.3 percent in 2001 (Cordell et al. 2004). Nationally designated trails located on TVA lands are listed below. A map showing these trails is presented as Figure A-1 in Appendix A.

- Appalachian National Scenic Trail
- Hemlock Bluff National Recreation Trail
- Lady's Bluff National Recreation Trail
- Muscle Shoals Trail Complex National Recreation Trails
- Natchez Trace National Scenic Trail
- Overmountain Victory National Historic Trail
- River Bluff National Recreation Trail
- Trail of Tears National Historic Trail

Trails on TVA lands allocated for natural resource conservation or sensitive resource management are typically narrow-path single-track trails. They are designed to not interfere with existing land uses or degrade sensitive resource areas. When constructing and maintaining trails, TVA or any associated partners adhere to trail best management design and implementation practices as outlined in accepted trails manuals such as USFS (2007) and International Mountain Bicycling Association (2004).

As part of the NRP, TVA proposes to more proactively manage its existing trail system by conducting a systematic inventory, developing a management plan, and a program for establishing new trails.

2.2. Cultural Resources Management

TVA is responsible for many historic properties that are located on lands it manages and on other lands potentially affected by TVA actions. These actions vary from the construction and management of power plants to approvals under Section 26a of the TVA Act. Historic properties include historic sites, historic structures, historic objects, and archaeological resources important to prehistory or history. Numerous laws and executive orders require TVA to manage, protect, and preserve these resources to the extent possible and mitigate impacts to these resources resulting from TVA actions.

This section describes the existing and proposed programs and supporting activities associated with TVA's cultural resource management and improvement efforts. These programs are summarized in Table 2-6. Their supporting activities are described in detail below, and the program and activity components of the alternatives are described in Chapter 3.

Table 2-6. Summary of Cultural Resources Management Programs

Program Category	Program
Cultural Resource Management	Archaeological Monitoring and Protection
	Archaeological Resources Protection Act Program
	Native American Consultation
	Native American Graves Protection and Repatriation Act
	National Historic Preservation Act Section 106
	Preservation Program
	Preserve America Program
Cultural Resource Partnerships	Cultural Resource Partnerships
Public Outreach	Archaeological Outreach (Thousand Eyes)
	Corporate History Program

Archaeological Monitoring and Protection Program

Pursuant to Section 110 of the NHPA and ARPA, TVA is obligated to protect the archaeological resources located on lands it manages. To meet these obligations, TVA proposes to establish a program for the monitoring and protection of archaeological sites potentially affected by TVA actions.

Archaeological Monitoring Program — TVA proposes to continue and potentially increase its monitoring of shoreline archaeological sites. As part of this effort, it proposes to develop long-term management and monitoring plans with a goal of improved protection and management of archaeological resources.

Archaeological Site Protection Program — TVA would continue to stabilize critically impacted archaeological resources and protect other resources (such as caves) that are being impacted by looting, erosion, and other damaging activities. TVA has historically taken measures to protect about 0.2 miles of shoreline containing archaeological resources per year. These measures often consist of protecting the area by covering it with geotextile fabric and rock riprap. The riprap is placed from either the bank or from a shallow draft barge, depending on the characteristics of the particular site. TVA is considering expansion of this program as described in Chapter 3.

Archaeological Resources Protection Act Program

ARPA was enacted to preserve and protect archaeological resources and sites on federal and Native American lands. The existing and proposed TVA-specific activities related to ARPA are described below.

ARPA Inspections and Investigations — Two TVA Police officers are currently dedicated to the enforcement of ARPA criminal provisions. They conduct approximately 1,000 security checks per year; these consist of visiting archaeological sites on TVA lands and monitoring for illegal activity. Between 10 and 20 cases are investigated each year, about 6 cases are submitted to the U.S. Attorney's office for further investigation, and about 6 per year are prosecuted. Criminal cases are tried through the federal court system when archaeological assessments include over $500 worth of damage, and cases can be tried as felonies with penalties of up to $20,000 in fines and up to two years' imprisonment. Individuals who damage archaeological resources, regardless of intent, also can be liable for civil penalties under ARPA. Under the different alternatives in this EIS, TVA would conduct a varying number of security checks on TVA lands per year.

ARPA Permitting Process — Any archaeological survey or excavation that occurs on TVA lands requires a permit issued by TVA under ARPA. TVA staff maintains and reviews all archaeological permit requests received by TVA and approves or denies these requests, which typically come from universities, professional archaeologists, or other federal and state agencies.

Archaeological Site Information Protection — ARPA excludes from public disclosure any information concerning the nature and location of any archaeological resource unless such disclosure would further the purpose of ARPA.

Agency-Specific Archaeological Regulations — TVA is proposing to issue regulations to supplement TVA's investigative authority by prohibiting the removal of any artifacts or historic items from archaeological sites or historic sites on TVA lands.

Native American Consultation

TVA formally consults with federally recognized tribes to meet the objectives of NAGPRA, NHPA, the American Indian Religious Freedom Act, EO 13007 (Indian Sacred Sites), EO 13175 (Consultation and Coordination With Indian Tribal Governments), the April 29, 1994, executive memorandum regarding government-to-government relationships with tribal governments (http://www.justice.gov/archive/otj/Presidential_Statements /presdoc1.htm), and the November 5, 2009, presidential memorandum regarding tribal consultation (http://edocket.access.gpo.gov/2009/E9-27142.htm). To facilitate such consultation, TVA has established a staff position designated as Native American liaison. TVA conducts a formal consultation workshop with federally recognized Native American tribes every five years. The NRP alternatives consider conducting these meetings more frequently.

Native American Graves Protection and Repatriation Act
The Native American Graves Protection and Repatriation Act (NAGPRA) provides for the protection of Native American cultural items and establishes a process for the authorized removal of human remains, funerary objects, sacred objects, and objects of cultural patrimony from sites located on lands owned or controlled by the federal government. NAGPRA also establishes a process for the transfer of ownership of cultural items to Native American individuals (e.g., direct lineal or cultural descendants), organizations, or tribes. It addresses the recovery, treatment, and repatriation of Native American cultural items by federal agencies and museums. NAGPRA-related activities include the following:

- Maintain NAGPRA inventory
- Complete Notices of Inventory
- Dispose of Native American human remains, associated funerary objects, and objects of cultural patrimony excavated or discovered after 1990
- Consult with museums and federally recognized tribes
- Repatriate Native American human remains, associated funerary objects, and objects of cultural patrimony curated prior to 1990.

National Historic Preservation Act Section 106
Section 106 of the NHPA requires federal agencies to consider the effect of its actions on historic properties and to allow the Advisory Council on Historic Preservation an opportunity to comment on the action. Archaeological sites, historic sites, and historic structures are evaluated in terms of their ability to meet the criteria for eligibility for the NRHP. The existing and proposed Section 106-related activities are described below.

NHPA Section 106 Reviews — TVA evaluates the potential effects of its actions on historic properties and consults with the SHPOs and federally recognized tribes when historic properties could be affected. Treatment and mitigation of adversely affected historic properties are determined through this consultation process.

Emergency Procedures for NHPA Section 106 Compliance — Federal agencies are encouraged to develop procedures for considering historic properties during operations that respond to a disaster or emergency declared by the President, a tribal government, or the Governor of a state, or which respond to other immediate threats to life or property.

Management of Existing Mitigation Obligations — TVA will continue to comply with existing obligations for mitigating impacts to cultural resources. TVA is proposing to establish a database to monitor and manage ongoing mitigation measures to ensure compliance with Section 106 of the NHPA agreements and NEPA documents.

Programmatic Agreements with Individual States Regarding Compliance for Repetitive Actions — TVA is also proposing to execute agreements with each state to ensure compliance with Section 106 of the NHPA for requests for approvals under Section 26a of the TVA Act for certain types of actions.

Preservation Program
Section 110 of the NHPA requires federal agencies to establish a historic preservation program to manage historic properties under the agency's purview. Federal agencies are responsible for identifying and protecting historic properties in a manner that benefits both the resource and the public. The existing and proposed activities associated with TVA's Preservation Program are described below.

Archaeological Identification Surveys — TVA has conducted systematic archaeological surveys on about 88,000 acres of its lands and currently surveys 2,000 - 3,000 acres per year. TVA is proposing to continue and potentially increase its annual archaeological identification surveys of TVA lands.

Historic Photo Collection — TVA currently maintains a collection of more than 17,000 photographic negatives documenting its history from its inception in 1933 to the mid-1980s. This collection also contains thousands of more recent original file copy prints and thousands of 35-millimeter negatives. This collection is currently being digitized to preserve the original negatives.

TVA Historic Agency Information — TVA currently receives hundreds of requests for information about its history from people with a broad spectrum of general and professional interests. TVA is proposing to systematically catalog its historic information to aid in efficiently responding to public requests.

Cemetery Database — TVA maintains a database of cemeteries that were once located on TVA lands and were investigated and moved prior to the construction of many of its reservoirs.

NRHP Historic Property Nominations — Pursuant to Section 110 of the NHPA, federal agencies are responsible for the identification, evaluation, and nomination of historic properties to the NRHP. While TVA currently has a small program in place for the identification of new historic properties each year, it has not routinely evaluated or nominated sites for inclusion in the NRHP. TVA is proposing annually evaluate and nominate a number of significant historic properties under its management.

Comprehensive Database — Pursuant to Section 112 of the NHPA, federal agencies shall ensure that records and other data are permanently maintained in appropriate databases. TVA maintains numerous data sources relating to historic properties under its management. However, because no comprehensive database has been developed, these sources are fragmentary. As a result, TVA does not have consolidated data on historic properties or survey data, site location information, and other historic data for the resources under its management. Development of a database with GIS components would improve efficiency and the overall management of TVA's historic properties.

TVA Historic Collection — TVA would maintain the unique collection of historic artifacts that it has acquired throughout its history. TVA is considering improving its curation of this collection to meet the standards consistent with 36 CFR 79 *Curation of Federally-Owned and Administered Archaeological Collections*. Another potential improvement to this program is the development of implementation procedures.

Historic Cemeteries on TVA Land — TVA is proposing to document cemeteries, identify unknown cemeteries, and nominate eligible cemeteries for listing in the NRHP.

Online Interactive Cemetery Database — TVA is proposing to develop an interactive online database for the public to access cemetery information. This database would include maps showing locations of existing or relocated cemeteries.

Traditional Cultural Properties — TVA is proposing to partner with stakeholders and other groups to identify sites that may be considered traditional cultural properties.

Preserve America
EO 13287 directs federal agencies to improve their knowledge about, and management of, historic resources in their care. The existing and proposed activities associated with Preserve America are described below.

Adaptive Reuse of TVA's Historic Buildings — TVA historic buildings that have been determined surplus are evaluated for the feasibility of adaptive reuse.

NHPA Section 3 Reporting on Section 110 Progress — Preserve America requires all federal agencies to prepare a report (Section 3 report) on these needs and submit it to the Secretary of the Interior and the Advisory Council on Historic Preservation by 2005. In addition, agencies are to submit progress reports every three years detailing the current status of their Section 110 progress.

Historic Properties and Heritage Tourism — TVA is proposing to develop and implement a plan to identify and maintain a list of properties suitable for supporting heritage tourism.

Partners for Heritage Tourism — TVA is proposing to seek partnerships to promote economic development and heritage tourism by using historic properties in ways that benefit both the resource and the public.

Cultural Resources Partnerships
TVA is evaluating the development of partnerships to support external stewardship activities such as the following:

Archaeological Field Schools – Historically, TVA has supported archaeological field schools on TVA lands. These types of schools support the training of students by offering opportunities for the identification, testing, and excavation of archaeological sites. When beneficial to the Agency, TVA is proposing to continue to support this training by allowing access to TVA lands and/or by providing grants to the field schools. Criteria for qualifying field schools would include research designs including use of new and emerging technologies, research benefits, schedules, consultation requirements, associated publication commitments, and site restoration plans.

Research and Publication Grants – TVA is evaluating the development of a program to support research and publications pertaining to cultural resources in the Valley. The publications would target both academic and nonacademic audiences and include topics on archaeological, historic, and tribal research in the Valley. They would support TVA's public outreach programs in promoting the need for protection of sensitive resources.

Archaeological Outreach (Thousand Eyes Program)
TVA is mandated by ARPA to establish a program to increase public awareness of the need to protect archaeological sites located on public lands. These public awareness activities would be incorporated into TVA's cultural, biological, and water resource management programs where appropriate. TVA has established the Thousand Eyes Program specifically to meet the obligations under this portion of ARPA. Program elements include presentation to school and other groups and the distribution of brochures. TVA is proposing to expand the program by sponsoring more outreach activities and developing partnerships with other agencies, SHPOs, tribal governments, and other interested organizations to increase efforts in better reach target audiences.

Corporate History Program
TVA has a fascinating history receives hundreds of questions each year about its past. The existing and proposed projects associated with TVA's Corporate History Program are described below.

TVA Timeline — TVA currently has a history timeline; however, it has not been updated for many years. TVA is proposing to conduct the necessary research and annually update this timeline.

Oral History Program — TVA's proposed oral history project would establish new and gather existing recordings or transcripts from planned oral interviews with individuals who were important in the shaping of TVA's history. These created and preserved interviews are intended for use by researchers and historians. This oral history project would serve to document TVA's history. Oral history frequently complements the written record.

TVA History Website and Outreach Program — TVA is proposing to develop a website on its history and historic programming showcasing the significant periods of TVA history.

TVA History and Archaeology Museum — TVA would create a center to interpret its role in the history of the region, nation, and the world. TVA's historic and archaeological collections and digital and digitized historic photographs would be used to develop exhibits for the museum. The museum would serve TVA's public outreach center regarding its significant legacy. It could also promote current TVA initiatives through the use of rotating exhibits. TVA would seek partnerships with nonprofit organizations for the development and implementation of this facility. TVA would also consider a curation facility to house archaeological collections from previous and future excavations.

2.3. Recreation Management

This section describes, in general terms, the existing and proposed facilities and programs associated with TVA's management of developed (facility-based) recreation. Programs for managing developed recreation are summarized in Table 2-7. Their supporting activities are described in detail below, and the program and activity components of the alternatives are described in Chapter 3. Activities associated with dispersed recreation are described in Section 2.1.

Table 2-7. Summary of Recreation Management Programs

Program Category	Programs
Campground Management	Management of Campgrounds on Dam or Power Plant Reservations
	Management of Campgrounds off Dam and Power Plant Reservations
	Day Use Areas on Dam Reservations
	Day Use Areas off Dam Reservations
	Greenways
	Stream Access Sites
Public Outreach	Annual Tours
	Tennessee Valley Camp-Right Campground Program
	Reservoir Lands Recreation Information

Program Category	Programs
	Management
	Recreation Management Regulations
Recreation Assessments and Design Tools	Boating Density Assessments
	Reservoir Lands Recreation Inventory Managements
	Recreation Design Principles
	Recreation Planning, Assistance, and Technical Support

2.3.1. Campground Management

TVA manages 12 campgrounds in Alabama and Tennessee with approximately 670 campsites available to the public (see Figure A-3, Appendix A). Campgrounds are operated seasonally from mid-March to mid-November. As each campground opens in the spring, TVA holds a lottery for the long-term or seasonal rentals of approximately 140 (21 percent) of the campsites. The remaining campsites are available to the public on a first-come, first-served basis. Currently, TVA charges campers from $16 per night for a campsite without hookups to $24 per night for a campsite with water, electric, and sewer services. In addition, picnic pavilions can be reserved for a flat fee of $50. From 2204 through 2009, TVA collected an annual average of $771,882 from campground and pavilion rentals; this amount exceeded the expenses of operating the facilities by an annual average of $260,910.

Campgrounds on Dam or Power Plant Reservations — TVA manages eight campgrounds on dam and power plant reservations. Six are located in northeast Tennessee (Cherokee Dam, Douglas Dam headwater and tailwater, John Sevier, Melton Hill Dam, and Watauga Dam), one is located in southwest Tennessee at Pickwick Dam, and one is located in northwest Alabama at Wilson Dam.

Cherokee Dam Campground is a self-service campground containing 42 campsites with water and electric hookups, three of which meet accessibility standards. The campground amenities also include restrooms with heated showers and flush toilets, dump station, children's play equipment, picnic tables and grills, group pavilion available by reservation, swimming beach, boat ramps above dam and below dam, lake and river fishing, paved walking trail, and bird watching. TVA employs a nonresident manager and volunteer campground hosts to oversee daily operations.

Douglas Dam Headwater Campground is a self-service campground containing 65 campsites, 61 with water and electric hookups and two that meet accessibility standards. The campground amenities also include restrooms with heated showers and flush toilets, dump station, picnic tables, swimming beach, boat ramp, walking trail, wildlife viewing area, and bird watching. Trotter Bluff SWA is located nearby and features walking trails through 30 acres of mature hardwood forest, limestone sinkholes, spring wildflowers, and vistas of the dam and tailwaters. TVA employs a nonresident manager to oversee daily operations.

Douglas Dam Tailwater Campground is a self-service campground containing 62 campsites with water and electric hookup and two that meet accessibility standards. The campground amenities also include restrooms with heated showers and flush toilets, dump station,

children's play equipment, picnic tables and grills, group pavilion available by reservation, boat ramp, river fishing with fishing pier, bait and tackle shop, wildlife viewing area, and bird watching. TVA employs a nonresident manager to oversee daily operations.

John Sevier Campground is located at John Sevier Fossil Plant on the Holston River. This is a self-service campground containing 74 campsites. The campground amenities include picnic tables, a bathhouse, and a boat ramp. TVA directly oversees daily operations at John Sevier Campground.

Melton Hill Dam Campground is a self-service campground containing 57 campsites, 33 with water and electric hookups; eight with water, electric, and sewer service; three that meet accessibility standards with water, electric, and sewer service; and 13 without hookups, nine of which are tent sites. Campground amenities also include restrooms with heated showers and flush toilets, dump station, multipurpose court, picnic tables with grills, group pavilion available by reservation, swimming beach, and boat ramps above and below the dam. TVA employs a nonresident manager and a volunteer campground host to oversee daily operations.

Pickwick Dam Tailwater Campground is a self-service campground containing 95 campsites, of which 66 have water and electric hookups. The campground amenities include restrooms with heated showers and flush toilets, dump station, picnic tables and grills, boat ramp below dam, tailwater bank fishing, and bird watching. TVA manages the Pickwick Dam Campground on an honor system, with plans to employ a volunteer campground host to assist with daily operations.

Watauga Dam Tailwater Campground is a self-service campground containing 29 campsites with water and electric hookups, three of which meet accessibility standards. The campground amenities include restrooms with heated showers and flush toilets, dump station, public phone, picnic tables and grills, canoe access, boat ramps above and below the dam, lake and river fishing, hiking trail, walking trail, wildlife viewing area, and bird watching. In addition, the Appalachian Trail crosses Watauga Dam. TVA employs a volunteer campground host to assist with daily operations.

Wilson Dam – Lower Rockpile Campground contains 23 campsites. The campground amenities include restrooms with heated showers and flush toilets, picnic tables and grills, group pavilion available by reservation, boat ramps above and below the dam, lake and river fishing, 10 miles of hiking trail, walking trail, natural area, wildlife viewing area, bird watching, and bicycling. Old First Quarters SWA, comprising 25 acres and located nearby, is managed to preserve biological and cultural features, including a rich array of spring wildflowers, woodland birds, and structures built by the Civilian Conservation Corps. TVA manages this campground on an honor system.

TVA proposes to continue to operate these eight campgrounds. It also proposes to proactively upgrade them consistent with ADA accessibility guidelines and make other upgrades to incorporate emerging technologies and reduce the environmental impacts of their operation.

TVA has recently upgraded the Melton Hill Dam Campground to demonstrate and evaluate how renewable energy, energy efficiency measures, water conservation, and recycled coal combustion products can be integrated into a sustainable recreation area. TVA proposes to continue this demonstration and evaluation.

Campgrounds Off Dam or Power Plant Reservations — TVA manages four campgrounds located on other reservoir properties. Two are located in central Tennessee (Barton Springs and Foster Falls), one in northeast Tennessee (Loyston Point Campground), and one in northwest Alabama (Mallard Creek Campground).

Barton Springs Campground is located adjacent to Normandy Reservoir. It contains 67 campsites, of which 40 campsites have water and electric hookups. The campground amenities also include restrooms with heated showers and flush toilets, dump station, picnic tables, group pavilion available by reservation, swimming beach, boat ramp above the dam, and a fishing pier. TVA employs a resident manager to oversee daily operations.

Foster Falls Campground is located about 40 minutes northwest of Chattanooga, Tennessee. It contains 26 campsites with one handicapped-accessible site. The campground amenities include restrooms with heated showers and flush toilets, picnic tables and grills, group pavilion available by reservation, hiking trail, natural area, and bird watching. Foster Falls SWA is located nearby and features a 60-foot waterfall, visible from sandstone overlooks, and 178 acres of forest including mountain laurel, azalea, and hemlock. A new handicapped-accessible trail to an overlook has been added. TVA employs a resident manager to oversee daily operations.

Loyston Point Campground is located adjacent to Norris Reservoir and contains 64 campsites, of which 39 campsites have electric hookups. The campground amenities include restrooms with heated showers and flush toilets, dump station, picnic tables, swimming beach, boat ramp, and a hiking trail. Hemlock Bluff National Recreation Trail, named for the prominence of hemlocks in the hardwood forest that the trail traverses, is a 7-mile loop along the steep ridges and bluffs of Norris Reservoir. TVA employs a resident manager to oversee daily operations.

Mallard Creek Campground is located adjacent to Wheeler Reservoir and contains 56 campsites with water and electric hookups. The campground amenities include restrooms with heated showers and flush toilets, dump station, children's play equipment, picnic tables, group pavilion available by reservation, swimming beach, boat ramp, lake fishing, and bird watching. TVA employs a resident manager to oversee daily operations.

TVA proposes to manage all four of these campgrounds through third-party agreements. One of these campgrounds (Foster Falls) would likely be closed if no third-party agreement can be negotiated as it provides limited camping opportunities, is costly to maintain, and provides limited cash flow. TVA also proposes to proactively upgrade the campgrounds remaining open consistent with ADA accessibility guidelines and make other upgrades to incorporate emerging technologies and reduce the environmental impacts of their operation.

2.3.2. Day Use Areas Management

Day Use Areas

Day use areas offer various types of recreational facilities available to the public from dawn to dusk and are typically free of charge. TVA manages 63 day use areas across the Valley (see Figure A-4, Appendix A). There are 30 day use areas located on TVA's dam reservations and 33 day use areas located on other types of TVA lands. In addition, TVA manages nine visitors' centers and 22 overlooks at dams. Typical day use amenities

include picnic sites, pavilions, fishing piers, restrooms, and trails. Play courts, children's play equipment, and open play fields are provided at some day use areas.

TVA manages 12 swimming beaches across the Valley. Swimming beaches are typically located within TVA campgrounds or day use areas and designated with a yellow floating line, "Swim at your own risk" and/or "No lifeguard on duty" signs. Unlike the day use areas, swimming beaches are seasonal and usually close around mid-September.

TVA manages 49 boat access areas across the Valley. These areas provide the public with boating access to TVA reservoirs and nearby rivers and streams. The boat access areas vary from concrete launching ramps and large parking areas to primitive graveled or dirt launching ramps and minimal parking areas. TVA often develops partnerships for the planning, construction, and maintenance of boat access areas. In addition, TVA has acquired 81 stream access sites, as discussed below.

TVA proposes to continue to operate and manage the day use areas. It also proposes to proactively upgrade them consistent with ADA accessibility guidelines and make other upgrades to incorporate emerging technologies and reduce the environmental impacts of their operation. TVA is also considering entering into contractual agreements for others to manage the day use areas off of dam reservations, as well as the possibility of closing these areas.

Greenways

A greenway is a long, narrow piece of land, often used for recreation and pedestrian and bicycle traffic. TVA currently manages five greenways and has provided land for an additional 25 greenways across the Valley. Often, greenways provide natural settings in otherwise developed landscapes. Some greenways include native plant gardens as well as typical park-style landscaping of trees and shrubs. They also tend to have a mostly contiguous pathway, allowing urban commuting via bicycle or foot.

TVA would continue to assist partners and stakeholder groups with the development of additional greenways.

Stream Access Sites

TVA, along with various partners, promotes the protection of streams while providing recreational opportunities. In 1978, TVA began to assist with acquisition of 147 stream access sites on 40 scenic streams throughout the Valley. TVA purchased small tracts of land or landrights adjacent to streams for public recreation purposes. TVA has transferred 66 of the stream access sites to other agencies or groups. However, 81 stream access sites remain under TVA's ownership with 50 managed by others under contractual agreements and 31 managed by TVA (see Figure A-5, Appendix A). A typical stream access site consists of an access road, parking area, and access to the stream. The stream access typically varies from a primitive dirt path, boat ramp, or steps to aid in launching and retrieving small boats and for fishing access.

A blueway is a water path or trail developed with launch points, camping locations, and points of interest for canoeists and kayakers. Physical and geopositioned markers guide trail users through the waterways. An ideal blueway trail also includes an abundance of scenery and wildlife as well as easy canoe and kayak access. The benefits of a system of paddling trails are many, including the promotion of healthy, nonpolluting, family-friendly outdoor recreation and the potential to contribute to our local economy. Many paddling

trails traverse areas with unique ecological, geological, or historical features, providing excellent educational opportunities for outdoor enthusiasts. Paddling a stream or river increases appreciation for good stewardship practices and may result in more support for cleanups, habitat restoration, and improved water quality. TVA currently manages blueway partnership located on the Tellico River and within the upper portions of Tellico Reservoir.

TVA proposes to continue the present management of the stream access sites, along with the option of closing sites should contractual agreements be terminated. TVA would consider developing and improving stream access sites on TVA lands and assisting partners with the acquisition and development of stream access sites. TVA also proposes to develop additional sites to support blueways and investigate partnerships for the development of blueways utilizing TVA land.

2.3.3. Public Outreach Programs

Annual Tours
TVA proposes to host media and technology transfer tours of campgrounds and day use recreational areas where emerging technologies are featured and showcased.

Tennessee Valley Camp-Right Campground Program
The Camp-Right Campground Program is a program that TVA would model after the TVCMI (see Subsection 2.4.1). Camp-Right would be a voluntary program developed and implemented by TVA and partners to promote environmentally responsible campgrounds and camping practices. This program would be established to support the LNT Program and to help campground operators protect the surrounding natural resources. The Camp-Right effort would encourage camper education, coordination among state agencies, resource conservation/recycling, and better communication of existing laws, and would offer incentives, when possible, for creative and proactive campground operators. Campgrounds that operate in accordance to the goals and objectives of the Camp-Right initiative would be rewarded for those efforts.

TVA proposes to establish the Camp-Right program and annually certify 1 to 2 campgrounds.

Recreation Information Management
TVA's recreation information is the foundation for many aspects of recreation. TVA uses this information to track recreation demand analysis and conduct impact analyses for projects or proposals involving TVA. Recreation information is also provided to partners and stakeholders. This information can be provided upon request or obtained from TVA's website.

TVA proposes to improve its recreation information management and dissemination capabilities. Proposed activities include maintaining and enhancing signage on TVA recreation areas, improving the recreation information on TVA's website, developing interactive maps of TVA recreation lands, and developing applications for emerging media and devices.

Recreation Management Regulations
TVA proposes to use the federal rule-making process to develop and implement regulations governing the recreational use of TVA lands. The rules would be codified in the Code of

Federal Regulations. TVA would ensure consistency with the NRP when developing these regulations.

TVA is also considering the development of a Resource Ranger Program to supplement TVA Police efforts at TVA recreational areas and on undeveloped TVA lands across the Valley. The rangers would receive instructions on being a good witness, radio procedures, recreational area rules and regulations, handling emergencies, and remaining safe while on duty as a ranger. These uniformed rangers would be available at various recreational sites looking for and immediately reporting violations of TVA rules, criminal mischief, and suspicious activity to TVA Police. They would also be available to assist those in need and answer questions visitors may have about TVA recreational areas or the community in general. On undeveloped lands, they would provide the public an interface and TVA presence. Resource rangers would ensure users abide by the rules and regulations governing TVA lands while providing education and outreach opportunities.

2.3.4. Recreation Assessment and Design Tools

Boating Capacity Studies
Boating capacity is the prescribed number of people/boats that a particular body of water can reasonably accommodate, given the desired biophysical/social/cultural resources, visitor experiences, and management program. Recreational boating capacity studies are aimed at describing existing conditions and evaluating whether proposed changes would impact current users. TVA completed a pilot boating capacity study on Tims Ford Reservoir in 2002 (TVA 2002d). TVA is considering partnering with state boating law administrators to annually conduct up to 2 comprehensive boating capacity studies.

Boating Density Assessments
TVA's recreational boating density assessments are similar to boating capacity studies. However, the boating density assessment methodology is specifically used for conducting impact analyses for TVA projects and proposals requiring TVA's approval. Collection and analysis of data provide useful tools for gaining a better understanding of future desired boating conditions and the need for altering management strategies. TVA uses data on the number of recreational watercraft stored in the vicinity of the reservoir to estimate on-water boat numbers during summer weekdays, weekend days, and holidays. These data assist planners and state boating law administrators in estimating impacts from current and proposed recreational watercraft storage/access projects along with the appropriate management regimes. TVA often coordinates the results of these studies with the appropriate boating law administration. TVA proposes to continue conducting these assessments.

Reservoir Lands Recreation Inventory Management
The purpose of this program is to create and maintain an up-to-date database on recreation facilities and services available on TVA reservoirs. This information is used by TVA in planning, managing, and public information initiatives. Decisions regarding data collection were based on the information needed to support future recreation and resource management planning efforts. These efforts include the preparation of management plans and recreation capacity studies.

TVA's Developed Recreation Inventory includes public, private, and quasi-public recreational opportunities on or near TVA lands and reservoirs. Public recreation includes opportunities provided by TVA or other federal, state, county, and municipal agencies.

Private recreation includes opportunities provided by private commercial areas operated for profit along with noncommercial areas for members/residents only. Quasi-public recreation includes those opportunities for members of nonprofit organizations.

While the primary focus of the inventory is on areas directly bordering the reservoir shoreline, large dry boat storage facilities located off reservoir (within 1 to 2 miles) are included to gain a sense of total level of water-related development and use. Information collected includes basic attribute data, such as area type, contact, and location information and facilities listing, encompassing a wide range of accommodations typically offered at water-oriented outdoor recreational operations.

The scope of information collected varies with the type of recreational facility. The most detailed information is gathered at TVA recreational areas and includes information on ramp widths, elevations, and presence of a courtesy pier. Details on facilities and services offered by other public agencies and commercial recreation areas are collected. Because of limited availability to the public, various levels of details are collected for quasi-public recreational areas. Similarly, information about members-only boating clubs and private residential community docks are generally limited to attribute data and an approximate count of boat slips.

TVA's Developed Recreation Inventory only includes those recreation areas with development and evidence of maintenance. By these criteria, undeveloped lands managed by TVA or other public agencies are excluded. While many of these lands offer important opportunities for informal recreation, they are considered to be beyond the scope of this initiative. Similarly, developed areas in poor condition without routine maintenance efforts were not included in the inventory.

TVA proposes to continue maintaining this inventory and is considering increasing the frequency at which reservoirs are surveyed from every three years to annually.

Visitor Assessments

Visitor assessments are a tool that TVA uses to obtain additional recreation information and help the Agency understand recreation trends and needs. They examine visitor use, demand, and preferences, and the results are used to set priorities for future development and planning. Surveys include a variety of techniques and media (i.e., site, phone, and Web surveys). Specific guidelines and methodologies for surveys follow established criteria as recognized by social science researchers. TVA proposes to continue conducting these surveys.

Recreation Design Principles

TVA implements and proposes to continue implementing standard construction designs and products that promote compliance with accessibility guidelines, principles of universal design, or other accredited design standards as appropriate. This process ensures that TVA recreation facilities and amenities are usable by all people, to the greatest extent possible, without the need for adaptation or specialized design.

In addition, TVA seeks to develop or adopt standards for interpretative and informative signage. These signs would be installed and maintained at TVA recreation areas. In addition, sign placement along highway systems using the International Highway sign symbols for TVA recreation areas is of interest to the agency. Resource conservation designs would be developed and implemented to encourage a variety of methods and

technologies such as resource conservation and recycling. TVA would ensure consistency with the NRP when developing recreation designs.

Recreation Planning, Assistance, and Technical Support
Through planning and technical assistance on a fee or sponsored basis, TVA provides guidance to various parks and recreation agencies, and recreation program managers on the development of reservoir-oriented facilities. TVA also furnishes information about recreational use and development of the region's resources for analyzing and evaluating recreational opportunities and needs. In addition, existing site plans are available to agencies upon request.

TVA proposes to continue providing this planning and technical assistance to local, state, and federal agencies, and for the potential development and expansion of recreation facilities on TVA lands zoned for developed recreation use.

2.4. Reservoir Lands Planning

2.4.1. Reservoir Lands Planning Methodologies

Over the years, TVA has implemented four different land planning methodologies for zoning reservoir lands: Forecast System, Multiple Use Tract Allocations, Single Use Parcel Allocations, and Rapid Lands Assessment (RLA). These land planning methodologies have guided land use decisions and, to varying degrees, have created systematic approaches to planning and managing multipurpose uses of TVA reservoir lands across the Valley. This section provides an overview and timeline of the four methodologies. Table 2-8 categorizes TVA reservoirs by land planning methodology.

Forecast System
Before 1979, when TVA began the comprehensive planning of its reservoir lands in a public forum, the Forecast System was used to guide land use decisions on most TVA reservoir lands. The Forecast System was an in-house process created in the 1960s to document actual and prospective uses for TVA reservoir lands using a variable set of designations described in Appendix D. A forecast record book was prepared to serve as a general guide for land use or potential development of each TVA reservoir. Decisions on the best use of the land were made based on TVA expertise and incorporated local and regional needs for various land uses as determined by the professional judgment of TVA specialists. Fort Loudoun and Wilson reservoir land are still managed with the Forecast System.

Multiple Use Tract Allocations
In 1979, TVA began using the Multiple Use Tract Allocations method, which was a systematic approach to planning reservoir lands for multiple uses. A planning team that included TVA staff representing various disciplines and areas of expertise was assembled to complete a detailed planning process for individual reservoirs. The planning team gathered existing reservoir data and regional trends, conducted field surveys of reservoir lands, conducted capability and suitability analyses, and sought input from local officials and the public. The lands were then subdivided into tracts and assigned multiple use designations.

Narrow strips of TVA land fronting property formerly owned by TVA, also known as marginal strips, were not planned using this methodology. For example, TVA shoreland fronting former TVA reservoir land that was sold for private development purposes with deeded rights to request private shoreline improvements was not planned. Additionally, the

Multiple Use Tract Allocation method often did not plan land that was committed to a long-term or permanent use, such as tracts encumbered by easements or used for TVA dam reservations or power plants.

Table 2-8. Land Planning Methodology Applied to TVA Reservoirs

Reservoir Lands Planning Methodology	Time Frame Applied	Reservoirs		
Unplanned	-	Beech River Project	Great Falls	Normandy
Forecast System	pre-1979	Fort Loudoun	Wilson	
Multiple Use Tract Allocations	1979-1999	Chickamauga	Nickajack	Wheeler
		Kentucky		
Single Use Parcel Allocations	1999-2010	Apalachia	Fontana	Ocoees
		Beaver Creek	Fort Patrick Henry	Pickwick
		Big Bear Creek	Guntersville	South Holston
		Blue Ridge	Hiwassee	Tellico
		Boone	Little Bear Creek	Tims Ford
		Cedar Creek	Melton Hill	Upper Bear Creek
		Chatuge	Nolichucky	Watauga
		Cherokee	Norris	Watts Bar
		Clear Creek	Nottely	Wilbur
		Douglas		
Rapid Lands Assessment*	2007 and 2010	Beech River Project	Great Falls	Normandy
		Chickamauga	Kentucky	Wheeler
		Fort Loudoun	Nickajack	Wilson

* RLA was conducted to communicate consistent Valleywide statistics to the public. Land use decisions are not being made from the RLA methodology and RLA data are not considered to be completed RLMPs.

The RLMPs were approved by the TVA Board and adopted as agency policy. The Multiple Use Tract Allocation approach of developing RLMPs was discontinued in 1999. A detailed description of the methodologies associated with this approach is presented in Appendix E. RLMPs based on Multiple Use Tract Allocations remain in effect for Chickamauga, Kentucky, Nickajack, and Wheeler reservoirs.

Single Use Parcel Allocations

The Single Use Parcel Allocations approach that TVA has used since 1999 is similar to the Multiple Use Tract Allocations approach in that the lands surrounding each reservoir are subdivided into small parcels. However, each parcel is designated for one of six single, generally broader uses or allocations listed in Table 2-9 and defined in Appendix F. A seventh zone, Zone 1 — Non-TVA Shoreland, is used by TVA to designate reservoir shoreland that TVA does not own and whose use is not affected by TVA RLMPs. These zone definitions have been modified slightly since 1999 to provide additional clarity and consistency. As part of the NRP, TVA is considering changes to some of the zone definitions. The most substantive of these changes is in the types of industrial development that could occur on Zone 5 lands. Under the current Zone 5 definition, industrial

development is restricted to “light manufacturing activities.” Under the proposed Zone 5 definition, the light manufacturing restriction is removed and industry could include manufacturing, fabrication, and distribution/processing/assembly involving chemical, electronics, metalworking, plastics, telecommunications, transportation, and other industries.

A planning team that included various TVA staff would be assembled to complete a detailed planning process for individual reservoirs or groups of reservoirs. First, the lands (including marginal strip and non-TVA managed lands) would be subdivided into parcels. Next, the planning team would gather existing reservoir data and regional trends, conduct limited field surveys, conduct capability and suitability analyses, and assign single use allocations or zones to each parcel.

Public input would be sought for the initial parcel allocations. The planning team would analyze the public input and make any necessary changes to parcel allocations. The RLMP would be approved by the TVA Board or appropriate designee and adopted as Agency policy. A detailed description of the methodology associated with the Single Use Parcel Allocation approach is presented in Appendix G.

Currently, TVA applies the Single Use Parcel Allocations approach when planning reservoirs or groups of reservoirs. Table 2-8 lists the reservoirs that currently use the Single Use Parcel Allocations approach for land management decisions. In order to have a consistent reservoir lands planning methodology across the Valley, reservoirs that have not been planned, have Forecast System designations, or have Multiple Use Tract Allocations would eventually be planned using the Single Use Parcel Allocations method.

RLMPs completed since the late 1990s using the Single Use Parcel Allocations methodology have generally taken between one and two years to complete. For those RLMPs with an EIS, the durations of the planning efforts were calculated from the dates that the NOI and the record of decision were published in the *Federal Register*. For those RLMPs with an EA, the durations of the planning efforts were calculated based on the beginning of evaluations and date of the Finding of No Significant Impact. Two exceptions are the Tellico and Watts Bar RLMPs. The Tellico RLMP required about 3.5 years, largely because of major changes to the alternatives while the plan was being developed. The Watts Bar RLMP required five years to complete. During this time frame, TVA developed the Land Policy and Environmental Policy. The Watts Bar planning efforts were suspended during the development of these policies and a supplemental draft plan and EIS were subsequently circulated for public review and comment. Each RLMP is anticipated to require from one to six years to complete.

Rapid Lands Assessment

With the varying methodologies and allocations, it was often difficult to calculate the acreage of TVA lands that had been planned for various uses such as sensitive resource management, natural resource conservation, industrial development, and developed recreation. In 2006, the Rapid Lands Assessment (RLA) methodology was developed to quickly convert the Forecast System designations and Multiple Use Tract Allocations to Single Use Parcel Allocations or zones. To date, the information obtained from RLA has only been used to estimate acreage of lands managed in the various allocations or zones. These estimates have not been approved by the TVA Board, but the estimates have been communicated to the public when consistent Valleywide statistics were needed.

A planning team that included various TVA staff was assembled to complete desk-top high-level zoning assessments for most of the reservoirs with Multiple Use Tract Allocations or Forecast System designations (Table 2-8). First, the planning team gathered and evaluated the existing reservoir data, information that had changed since the last RLMP (if applicable), regional trends, and existing land use agreements and deeds. Next, marginal strips and other previously unplanned TVA lands were divided into manageable parcels and assigned the single use allocation that best represented existing conditions or identified needs. A detailed description of the methodology associated with the RLA approach is presented in Appendix G.

Comprehensive Valleywide Land Plan

As part of the NRP, TVA is considering adopting a Comprehensive Valleywide Land Plan (CVLP) to help guide future reservoir land use decisions across the reservoir system. The CVLP would be a holistic approach to balancing shoreline development, recreational use, sensitive and natural resource management, and other uses in a way that maintains the quality of life and other important values across the Valley. The CVLP would establish the range of allocated uses for the lands TVA manages across its reservoir system. It would enable TVA and the public to consider the totality of those allocations across the reservoir system and whether too much or too little attention is being given to particular land uses on a system-wide basis. The system-wide current and proposed CVLP allocations are listed in Table 2-9. The current allocations are based on the RLMPs completed using the single use allocation methodology and the results of the Rapid Lands Assessment. Under the CVLP, the land use zone definitions would be slightly modified from those used in recent Single Use Parcel Allocations land plans; they are defined in Appendix F.

Table 2-9. Current Allocations and Proposed Comprehensive Valleywide Land Plan Allocation Ranges

Allocation Designation		Percent of Allocated Land Area	
		Current Allocation	CVLP Range
Zone 1	Non-TVA Shoreland	N/A*	N/A
Zone 2	Project Operations	7	5 - 7
Zone 3	Sensitive Resource Management	17	16 - 18
Zone 4	Natural Resource Conservation	61	58 - 65
Zone 5	Industrial	2	1 - 2
Zone 6	Developed Recreation	8	8 - 10
Zone 7	Shoreline Access	5	5

*Not applicable.

The above target ranges were developed by first creating a baseline using the allocations assigned in existing RLMPs with Single Use Parcel Allocation methodology. For all other reservoirs, the RLA methodology was used to assign comparable land use zone allocations. Together, these existing RLMPs and information obtained during RLA create a baseline of land use zone allocations for the CVLP (Table 2-10). Maps of the existing RLMPs and RLA data are available on TVA's website at http://www.tva.com/environment/land/land_mgmt_plans.htm and http://www.tva.com/environment/land/assessment/index.htm.

Table 2-10. Comprehensive Valleywide Land Plan Allocation Baseline

Reservoir	Percentage of Land Area by Single Use Allocation Designation					
	Zone 2	Zone 3	Zone 4	Zone 5	Zone 6	Zone 7
Reservoirs with Approved Single Use Allocation RLMP						
Apalachia	91	0	*	0	9	0
Beaver Creek	14	0	0	0	86	0
Big Bear Creek	7	82	0	0	10	0
Blue Ridge	62	3	6	0	3	26
Boone	24	17	51	0	9	<1
Cedar Creek	10	66	10	0	8	5
Chatuge	22	1	49	0	24	4
Cherokee	7	12	68	0	9	3
Clear Creek	100	0	0	0	0	0
Douglas	50	3	40	0	6	1
Fontana	43	0	5	0	47	4
Fort Patrick Henry	27	7	41	0	14	10
Guntersville	6	27	60	1	5	2
Hiwassee	36	11	44	0	4	4
Little Bear Creek	18	69	2	1	6	4
Melton Hill	11	49	24	1	8	6
Nolichucky	5	57	13	<1	25	0
Norris	3	18	67	0	7	5
Nottely	53	0	33	0	11	3
Ocoees	100	0	*	0	*	0
Pickwick	7	8	69	3	8	6
South Holston	28	<1	46	6	19	1
Tellico	5	17	56	2	15	4
Tims Ford**	9	15	58	1	6	10
Upper Bear Creek	6	81	8	0	3	2
Watauga	46	9	38	0	8	<1
Watts Bar	12	28	29	3	12	17
Wilbur	83	0	17	0	0	0
Average Percentage	10	23	53	1	9	5
Reservoirs without Approved Single Use Allocation RLMP						
Beech River Project	6	0	51	0	43	0
Chickamauga	9	34	40	1	7	10
Fort Loudoun	33	3	18	0	2	44
Great Falls	100	0	0	0	0	0
Kentucky	1	2	84	2	5	6
Nickajack	20	25	51	3	2	0
Normandy	13	15	67	0	4	<1
Wheeler	4	24	62	2	8	<1
Wilson	0	0	7	0	63	30
Average Percentage	4	12	70	2	7	5

Reservoir	Percentage of Land Area by Single Use Allocation Designation					
	Zone 2	Zone 3	Zone 4	Zone 5	Zone 6	Zone 7
Average Percentage - All Reservoirs	7	17	61	2	8	5

Note: Zone 1 – Non-TVA Shoreland is not represented because the parcels are private land (on which TVA owns flowage rights) and will not change as a result of the land planning process. Figures in this table have been rounded to the nearest whole number.
*Includes narrow strip of TVA-retained land along shoreline; acreage not calculated.
**Includes TVA lands only. Tims Ford Reservoir contains an additional 67 acres allocated to Zone 8 or a conservation partnership. The allocation of public lands to Zone 8 has been discontinued. However, TVA would continue to manage lands allocated to Zone 8 per Agency policy.

The ranges are based, in part, on the anticipation that some parcels of land may be better allocated to different land use zones from those initially identified. For example, field assessments may identify additional areas that warrant the sensitive resource management allocation. In addition, during the creation or update of each individual RLMP, TVA may determine, either for its own management purposes or as a result of public input, that certain parcels of land should be used differently from how they have been used in the past.

TVA lands support multiple uses. TVA's reservoir land base supports important operational activities allocated to Zone 2 - Project Operations, such as its dams and hydroelectric and thermal generating facilities. The continued availability of adequate land to support project operations will remain a priority in reservoir land planning. Based on the projected future needs for project operations, the land area allocated to Zone 2 is unlikely to increase in the future.

Lands allocated for industrial uses make up the smallest zone (Zone 5). As directed in the 2006 Land Policy, TVA staff reviewed lands allocated to Zone 5 to verify their suitability for industrial use. The results of this review (see http://www.tva.com/environment/land/assessment/econ_dev.htm) showed that about a third of the 4,272 acres allocated for industrial use is currently committed through a land use agreement for industrial purposes. The results also indicated that approximately 1.5 percent of TVA reservoir lands meet the criteria for industrial use. These results form the basis of the proposed range of lands allocated to Zone 5 in the CVLP. Due to the restrictions on making additional TVA lands available for residential development that have been implemented through the Shoreline Management Policy and the Land Policy, the amount of land allocated to Zone 7 - Shoreline Access is unlikely to change in the future.

Future land requirements for lands allocated to Zone 3 - Sensitive Resource Management are driven by events such as the discovery of previously unknown sensitive resources, additions and removals of species from the list of endangered and threatened species, and trends in the distribution and abundance of other sensitive resources. Currently, 17 percent of TVA's lands are allocated to Sensitive Resource Management. Future changes to this proportion are expected to be small.

TVA's years of reservoir lands planning has created an understanding of the value of these properties in meeting public needs, and Zone 4 - Natural Resource Conservation and Zone 6 - Developed Recreation are the two uses that receive the most attention and pressure. As directed in the 2006 Land Policy, TVA staff reviewed the development and suitability of lands zoned for developed recreation (see http://www.tva.com/environment/land/assessment/recreation.htm). This study found that 90

percent of the 21,211 acres zoned for developed recreation are currently committed through a land use agreement for recreation purposes. Based on projected population growth in the TVA region (see Section 4-13), TVA would need to increase its land area zoned for developed recreation by about 20 percent to maintain the current level of facility-based recreation over the next 20 years. The remainder of TVA reservoir lands would likely continue to be allocated to Zone 4 - Natural Resource Conservation. The bounds of the proposed CVLP range for Zone 4 were defined by the upper and lower CVLP ranges for the other land use zones.

During subsequent planning efforts, lands that are no longer be suitable or needed for their current allocation would typically revert to a Natural Resource Conservation (Zone 4) designation. If the land is capable and suitable for another use and the change aligns with the allocation ranges of the CVLP, reallocation to a different zone is possible. As an example, a tract allocated for Project Operations (Zone 2) would be reallocated to Natural Resource Conservation (Zone 4) when its primary use is no longer needed to support project operations. If existing recreational infrastructure is present of if there is an identified need for developed recreation facilities in the local area, the tract could be reallocated to Developed Recreation (Zone 6). Lands previously allocated to Sensitive Resource Management (Zone 3) would only be reallocated if it is determined that the sensitive resource and/or its habitat is no longer present. In that case, the tract would be reallocated to the suitable land use identified in the planning process.

2.4.2. Property Administration

As administrators of public land, TVA would use the NRP and RLMPs, along with TVA policies and guidelines, to manage resources and to respond to requests for the use of TVA land. All inquiries about or requests for the use of TVA land should be made to the TVA Environmental Information Center at 800-882-5263 between 8 a.m. and 6 p.m. Eastern time Monday through Friday.

Pursuant to the TVA Land Policy, TVA would consider changing a land use designation outside of the normal planning process only for the purpose of water access for industrial or commercial recreational operations on privately owned back-lying land or to implement TVA's SMP.

Additionally, there are a small number of TVA parcels in the Valley that have deeded access rights for shoreline access that are currently utilized for other uses such as commercial recreation and industrial. Should the private back-lying land become residential, a request for a change of allocation of the parcel to Zone 7 (Shoreline Access) would be subject, with the appropriate environmental review, to action by the TVA Board or its designee or to Board-approved policy.

Consistent with the TVA Land Policy, those parcels or portions of parcels that have become fragmented from the reservoir may be declared surplus and sold at public auction. Public works/utility projects, such as easements for pipelines, power or communication wires, roads, or other public infrastructure, proposed on TVA land that do not affect the zoned land use or sensitive resources would not require an allocation change as long as such projects would be compatible with the use of the allocated zone. Proposed public works/utility projects would be subject to a project-specific environmental review. Any other requests involving a departure from the planned uses would require appropriate approval.

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

2.5. Water Resource Management

This section describes the existing and proposed programs and supporting activities associated with TVA's water resource management and improvement efforts. These programs are summarized in Table 2-11. Their supporting activities are described in detail below, and the program and activity components of the alternatives are described in Chapter 3.

Table 2-11. Summary of TVA's Water Resource Management Programs

Program Category	Programs
Aquatic Monitoring and Management	Aquatic Ecology Management
	Stream and Tailwater Monitoring Program
	Climate Change Sentinel Monitoring
Partnership Programs	Case Studies / Research Initiatives
	Strategic Partnership Planning
Public Outreach Programs	Quality Growth Program
	Tennessee Valley Clean Marina Initiative
	Water Efficiency Program
	Water Resource Outreach Campaigns
Water Resource Improvement Programs	Reservoir Shoreline Stabilization / Riparian Management
	Targeted Reservoir Initiatives
	Targeted Watershed Initiatives
	Water Resource Grant Program
	Nutrient Source-Watershed Identification and Improvement
	Northern Gulf of Mexico / Mississippi River Basin Nutrient Load Reduction
Water Resource Improvement Tools	Access Controls and Lands Protection
	Agricultural Assistance
	Construction and Maintenance of Access Roads and Parking Areas
	Mine Land Reclamation
	Urban Storm Water Assistance
	Stream and Riparian Management and Restoration
	Wetlands Restoration, Creation, and Enhancement
	Water Pollutant Trading
	Water Resource Communications
Water Resource Management Assistance	Technical Assistance
	Water Resource Organizational Assistance

2.5.1. Aquatic Monitoring and Management

Aquatic Ecology Management
TVA proposes to partner and actively participate in enhancing aquatic biological communities. This may include activities such as habitat protection and enhancement, biological monitoring, and pollution reduction. In addition, TVA would develop and evaluate public outreach information and opportunities to raise public awareness of land use practices that degrade aquatic communities and of invasive aquatic animal species consistent with EO 13112. This may include activities such as developing presentations to deliver to communities, working with marinas to support proper boat hull cleaning, and providing information to stakeholders on steps they could take to reduce the spread of invasive species.

This program would include a collaborative focus on protection of aquatic biodiversity. The Tennessee River Watershed contains several of the most biologically diverse rivers in North America. Notably, the Clinch, Powell, and Duck Rivers support an almost unsurpassed variety of freshwater animal life that includes the most diverse assemblages of fish and mussel species in the entire world. This focus would include identifying protection needs of one or more of these three watersheds through biological monitoring and habitat assessment activities, fostering coordination efforts among stakeholders to make better management decisions, participating in public outreach to raise public awareness of exceptional biological diversity, and proactively implementing protection measures. TVA would leverage funding and resources to join with others in accomplishing these activities. This program aligns well with EPA's recent emphasis in its *Coming Together for Clean Waters* strategy (USEPA 2011) to identify and protect the Nation's "healthy waters."

Stream and Tailwater Monitoring
The U.S. Geological Survey (USGS) assigns each watershed a specific numerical hydrologic unit (HU) code. There are 611 HUs labeled with an 11-digit USGS code within the Tennessee River watershed. Typically, TVA refers to specific watersheds by the individual HU code.

In 1987, TVA began using biological monitoring to evaluate watershed condition (Saylor and Scott 1987). The main biological monitoring tool chosen was the Index of Biotic Integrity (IBI) for fish communities (Karr 1981). Initially, this method was applied at major inflows to TVA reservoirs as part of the fixed station ambient monitoring program. Later, the IBI methodology was adapted for assessment of smaller streams and was used to evaluate the success of stream restoration projects.

In 2000, IBI scores became a key tool in identifying projects and measuring the success efforts of the Targeted Watershed Initiative (TWI) Program (see below). In order to provide a complete assessment of Valley water quality, IBI stations were located to characterize each of the Valley's HUs. Because of practical considerations, some HUs cannot be monitored, and there are 516 IBI stations for the 611 Valley HUs. Since 2000, IBIs have been performed on each HU station once every five years.

The Stream and Tailwater Monitoring (STM) Program also provides diagnostic and supporting data. Routine monitoring also includes an evaluation of the health of the benthic community and characterizes habitat quality at the monitoring station. In addition to the TWI Program, STM-generated data are used to measure certain aspects of TVA reservoir operations in tailwaters for tracking operational changes implemented following the ROS

and supporting the analysis needed for environmental reviews. These data are also shared with other agencies and partners, as appropriate.

Climate Change Sentinel Monitoring
Climate change represents an unknown, but predicted to occur, impact on water resources and diverse aquatic communities that include many species that are unique to cold-water habitats, as well as those that are already under stress, including those listed as endangered or threatened. To determine the vulnerability of these resources to climate change impacts, TVA is proposing a new program within the Tennessee Valley of long-term sentinel monitoring in targeted watersheds to provide an early warning of climate-related impacts in sub-basin parameters, stream habitat, water quality, and biological diversity. Monitoring stream habitat, health, and climatic variables would provide useful information pertaining to ecosystem changes over time and provide data for future management options to mitigate adverse impacts in the event they develop.

This program would be a collaborative partnership effort with other federal and state agencies to detect and plan for climate change impacts on water resources. Activities to monitor several sites in targeted watersheds of the five predominant ecoregions in the Tennessee Valley and to conduct long-term trending and reporting would be coordinated or merged with a larger national-scale climate-effects monitoring network. Currently there has been no coordinated sentinel aquatic monitoring program involving TVA within the Tennessee River watershed.

2.5.2. Partnership Programs

Case Studies / Research Initiatives
TVA is proposing a new program that would increase partner abilities to improve overall stewardship awareness and generate increased participation in improvement activities. This program would demonstrate existing stewardship improvement tools and programs in settings where these tools would be valuable but are currently not being used. In addition, this program would seek to develop new applications for existing improvement tools and improve and document the effectiveness of existing tools. Lessons learned from these projects would be easily exported to other projects throughout the Valley and the nation.

Strategic Partnership Planning
Strategic partnership planning focuses on building strong partnerships with state, regional, and national organizations to address stewardship issues of mutual importance. Examples of projects may include facilitation of state working groups to develop collaborative projects, networking with current and prospective funders to enhance TVA's ability to secure external funding, providing technical assistance to expand programs into additional states, exploring “market”-based opportunities for improving water quality, and building relationships with key contacts at agencies and organizations throughout the TVA region.

2.5.3. Public Outreach Programs

Tennessee Valley Clean Marina Initiative
TVCMI is a program developed and implemented by TVA and its watershed partners to promote environmentally responsible marina and boating practices. This program, established in support of the National Clean Boating Campaign, helps marina operators protect the very resource—clean water—that provides them with their livelihood. TVCMI is designed as an ongoing program to reduce water pollution and erosion in the Tennessee

River watershed. The effort encourages boater education, coordination among state agencies, and better communication of existing laws, and offers incentives, when possible, for creative and proactive marina operators.

TVA developed and authored the *Tennessee Valley Clean Marina Guidebook* to support marina operators and owners who are striving to protect the water resources of the Valley (TVA 2009d). This manual is intended as an educational tool and reference for reducing water pollution and erosion from marina and boating activities and is available at http://www.tva.gov/environment/pdf/cleanmarina.pdf.

Marinas that operate in accordance to the goals and objectives of the TVCMI, as stated in the guidebook, are rewarded for their efforts. The marinas receive a certificate, authorization to use the TVCMI logo, and the prestigious TVCMI flag. The certified marinas are also recognized in press releases and listed on TVA's website and in other TVCMI promotions and events. Since 2002, a total of 85 marinas have been certified through this program; their location is shown on Figure A-7 (see Appendix A).

Water Efficiency Program

This program is currently being conducted as part of TVA's Sustainability Plan. It promotes using water wisely across the Valley through various outreach efforts. Specifically, TVA has become a USEPA WaterSense promotional partner. WaterSense is a USEPA-sponsored voluntary partnership program with the goal of protecting the future of the nation's water supply. By promoting and enhancing the market for water efficient products and services, WaterSense "makes every drop count" by leveraging relationships with key utility, manufacturer, and retail partners across the U.S. The WaterSense Program produces effective communication products that (1) make it simple for consumers to differentiate among products that use less water, (2) reinforce that saving water is easy, and (3) state that saving water does not require a major lifestyle change. TVA has collaborated with USEPA and local wastewater utility districts to promote the WaterSense Program and promote efficient water and energy use. Examples of WaterSense Program activities include:

- Hosting workshops for utility managers to learn about WaterSense and available water efficiency techniques and products.
- Promoting WaterSense to communities and counties that need to fulfill education needs, storm water reduction strategies, and/or state requirements for pollutant reductions on streams.
- Hosting workshops for irrigation professionals to learn about WaterSense and become USEPA certified.
- Encouraging stakeholders to become USEPA WaterSense promotional partners and/or adopt WaterSense practices.
- Promoting WaterSense concepts across TVA.

Water Resource Outreach Campaigns

To increase effectiveness and serve a larger portion of the Valley, TVA would develop communication products and delivery processes to promote water resource improvement and protection. Water Resource Outreach Campaigns would include focused efforts to raise public awareness and involvement in storm water management issues and sustainable land-use practices, develop and promote TVA blueways (Section 2.3.2), protect and improve reservoir shorelines, and address TVA and/or stakeholder needs, emerging

issues, or other resource concerns. These concerns include nutrient and sediment reductions, climate change, and impacts of nutrients on downstream waterbodies. The campaigns would demonstrate TVA's leadership in water resource stewardship and are intended to be flexible short-term projects with a high likelihood of measurable success. A campaign would include stakeholder products from various components of the Quality Growth Program, Water Efficiency Program, shoreline stabilization, water resource improvement tools, technical assistance, and organizational support. These campaigns would enhance the sense of public ownership in the day-to-day management of the Valley's water resources.

Quality Growth Program

The concept for the Quality Growth Program (QGP) began when the Tennessee Department of Agriculture (TDA) recognized that local communities needed support to protect water resources as they grew. Through funding from the USEPA, TDA convened a leadership team to develop and deliver the QGP. This leadership team is led by TVA, and team partners include the Southeast Watershed Forum and the University of Tennessee Water Resources Research Center.

The QGP was based on a set of best practices developed by the University of Connecticut's Nonpoint Education for Municipal Officials (NEMO) Program, along with watershed protection processes developed at the Center for Watershed Protection. QGP is a founding member of the National NEMO Network. NEMO best practices emphasize reducing impervious land cover (roads, parking lots, sidewalks, and buildings), encouraging denser development, preserving open space, and treating storm water runoff close to its source.

The QGP helps communities make decisions that are more informed about managing growth and its impact to land, water, air, energy, and other resources. A presentation/training package has been developed that recognizes regional culture and constraints. The presentations are delivered in such a way that fits the scale and partnership structure of communities across the state and the larger Southeastern region. Through this training and other technical assistance, local government officials, planners, and engineers gain information and tools to support their review and change of local plans, ordinances, and codes. Local officials from more than 300 Valley communities have participated in program activities. Of these, 120 have changed their development practices. Sustainable community and economic growth are being achieved through changes brought about by the QGP. As a result of these and future changes, Valley communities will continue to prosper as they preserve the natural beauty that has attracted development to this region.

The QGP workshop series has been conducted numerous times in Tennessee and piloted in Georgia, Kentucky, Mississippi, and Virginia (see Figure A-6, Appendix A). These workshops have prompted 230 communities to review existing codes and ordinances, and 123 communities either have changed or plan to change existing codes and ordinances. In addition, communities have reported that 57 "green" projects have been implemented because of QGP workshops. These types of "green" projects have included installation of porous pavement, preserved open space, grassy swales, rain gardens, and cluster design subdivisions. The interest raised from the QGP has sparked such states as Kentucky, Virginia, North Carolina, and Georgia to develop similar training programs.

2.5.4. Water Resource Improvement Programs

Reservoir Shoreline Stabilization / Riparian Management
TVA is charged with the management and stewardship of some 11,000 miles of reservoir shoreline. Therefore, TVA established criteria for determining the health of those shorelines by conducting reservoir shoreline assessments. Initial assessment results and the reservoir shoreline assessment methodologies are described in the SMI EIS (TVA 1998). During 2000 and 2001, assessments were completed on additional TVA reservoirs. TVA has subsequently continued to conduct assessments to update shoreline information.

Since 2001, TVA has used this information to prioritize stabilization efforts for critically eroded reservoir shoreline segments across the Valley. Stabilization plans are developed based on site-specific information including severity of shoreline erosion, location of nearby sensitive resources, appropriate BMPs, opportunities for innovative stabilization techniques, and installation methods. Typical reservoir shoreline stabilization techniques used by TVA include various forms of bioengineering, geotextiles, and rock riprap. TVA conducts the appropriate site-specific environmental reviews prior to stabilizing reservoir shoreline. TVA would continue to assess, prioritize, and set targets to stabilize critically eroded reservoir shorelines, which would include protecting significant cultural and other sensitive resources that would also improve water quality and enhance aquatic and wildlife habitat.

Targeted Watershed Initiatives
The TWI Program has been TVA's delivery mechanism for proactive water quality improvement work for several years. The TWI Program implements water quality improvement efforts that protect and improve water resources for human health, fishing, swimming, boating, drinking water supply, agricultural use, aquatic habitat, and economic development.

The TWI process begins with project selection, which is based on analysis of information about the condition of watersheds and streams throughout the Valley. TVA uses biological monitoring, examining fish and other aquatic life, to assess the water quality of the watersheds and streams. The projects are prioritized based on the likelihood of measurable water quality improvement or protection from measurable degradation. After projects are selected, TVA develops project-specific teams to assist local citizens, organizations, and agencies in identification of water quality problems. Working groups or coalitions are often formed from these partnerships. These coalitions then work collaboratively to develop watershed action plans and implement improvement actions. TVA provides technical support to leverage funds, build local partnerships/coalitions, promote outreach efforts, and implement water quality improvement projects. The TWI Program allows TVA and stakeholders to develop effective partnerships, create a sustainable effort, and protect water quality for present and future generations.

The success of TWI is determined by the rating of project HUs based on TVA biological monitoring. An IBI is used to assess water quality by applying ecologically based metrics to resident aquatic communities. Each metric rates the condition of one aspect of the community. Metrics are scored against the expected condition of regional unimpacted stream communities. Potential scores are 1-poor, 3-fair, or 5-good. Table 2-12 shows the condition of and improvements with the HUs since 2000. Watershed improvement requires changes to infrastructure and behavior along with time for water quality recovery.

Table 2-12. Water Quality Improvements from Targeted Watershed Initiatives

Year	Number of HUs and IBI Conditions			Total Rating Value	Maximum Rating Available	Total Hydrologic Units	Stream Performance (Percent)*
	Poor	Fair	Good				
2000	126	110	148	1196	1920	384	62.3
2001	162	147	223	1718	2660	532	64.6
2002	148	153	231	1762	2660	532	66.2
2003	138	155	239	1798	2660	532	67.6
2004	148	157	234	1789	2695	539	66.4
2005	143	165	239	1833	2735	547	67.0
2006	128	169	250	1885	2735	547	68.9
2007	131	162	254	1887	2735	547	69.0
2008	131	170	246	1871	2735	547	68.4
2009	128	174	245	1872	2735	547	68.4
2010	126	176	245	1879	2735	547	68.7

*Percent is based on the sum of all stream IBI rating scores (poor = 1, fair = 3, good = 5) compared to the maximum best possible score (total number of streams rated x 5).

A TWI could include various components of shoreline stabilization, water resource improvement tools, technical assistance, and organizational support. The TWI process has catalyzed effective partnerships to gain support in environmental stewardship. These partnerships leverage additional funding to implement projects that focus on improving and protecting water resources. Table 2-13 shows the amount of TVA and leveraged funding along with the stream performance since 2002. From 2002 to 2008, TVA funds decreased and leveraged dollars increased, while stream quality ratings trended upward. During this period, TVA focused the TWI Program in a more effective targeting and implementation process. Figure A-8 (see Appendix A) identifies the locations of TVA's TWIs in 2010.

Current goals of the TWI program are as follows:

- Reduce suspended sediment reaching streams by 234 tons per year
- Reduce phosphorus reaching streams by 350 pounds per year
- Improve 1 hydrologic unit in 5 years
- Deliver 50 stakeholder products per year

Table 2-13. Partnership Funding for Water Quality Improvements from Targeted Watershed Initiatives

Year	TVA Funding	Partnership Funding*	Total TWI Funding*	Stream Performance (Percent)
2002	$3,971,000	$2,000,000	$5,971,000	66.2
2003	$3,806,000	$2,000,000	$5,806,000	67.6
2004	$2,504,000	$2,000,000	$2,504,000	66.4
2005	$2,395,000	$2,000,000	$4,396,000	67.0
2006	$1,815,000	$2,800,000	$4,615,000	68.9
2007	$1,800,000	$3,800,000	$5,600,000	69.0
2008	$1,725,000	$2,200,000	$3,925,000	68.4

*The figures associated with Partnership Funding and Total TWI Program funding are approximate.

Water Resource Grant Program

By establishing a Water Resource Grant Program, TVA would be able to provide grant funding for the implementation of water quality improvement projects throughout the Valley. This program would target projects with documented water quality problems, would be connected to a state-approved watershed action plan, and would leverage outside funds and resources. The grant funds would be available for on-the-ground projects, for contracted technical support services, or for assisting stakeholders in grant writing, coalition building, plan development, and project implementation.

Grantees would be organizations capable of entering into cooperative agreements such as either local governments or nonprofit organizations. TVA would solicit requests for proposals on an annual basis. A review panel, consisting of representatives from TVA along with water resource stakeholders, would select grantees based on the following criteria:

- Alignment with a state-approved watershed action plan
- Organizational capability to successfully complete the proposed projects
- Alignment with TVA goals and programs
- Total measurable benefits to water resources

The grant program could be administered by TVA, and all projects funded by this grant program would be subject to a site-specific environmental review and all applicable local, state, and federal approvals.

Nutrient Source - Watershed Identification and Improvement

Consequences of not proactively addressing nutrients as a Valley-wide (and beyond) issue are great from both a current “needs” and a future regulatory perspective. EPA has identified the amount of nitrogen and phosphorus pollution entering our waters as being one of the costliest and most challenging environmental problems we face. The new Nutrient Source-Watershed Identification and Improvement Program would establish goals or targets to reduce nutrients in TVA reservoirs by identifying the three reservoirs having the greatest potential for nutrient source load reductions. TVA would then work in partnership with other agencies and stakeholders to reduce nutrient and sediment non-point source loading from major source watershed streams and nutrients from point sources to reservoirs. This program would develop reservoir-specific nutrient improvement plans and

target ranges of load reductions to be achieved in each reservoir. Specific program goals include the following:

- Developing reservoir-specific improvement plans for up to three reservoirs
- Implement plan activities to reduce point-source phosphorus reaching reservoirs by 5,000 pounds per reservoir per year
- Implement plan activities to reduce 720-1,080 tons per reservoir per year of suspended sediment transported from watershed streams into the reservoirs
- Implement plan to reduce 1,100- 1,650 pounds per reservoir per year of phosphorus transported from watershed streams into the reservoirs.

2.5.5. National Water Resource Recovery Programs

Northern Gulf of Mexico / Mississippi River Basin Nutrient Load Reductions
A nationally significant emerging water quality issue for the Tennessee River and other major tributaries to the Mississippi River Basin is nutrient loading (particularly nitrogen) and its effects on the northern Gulf of Mexico hypoxic zone. This expanding area of depleted oxygen concentrations, referred to as the "dead zone" in the Gulf, is having a tremendous ecological and economic impact and will be solved through reduction of nutrient loading from Mississippi River Basin's major tributaries, including the Tennessee River.

Although nutrient yields from the Tennessee River delivered to the Gulf may not be completely understood, TVA's proposed strategy is to demonstrate nutrient load identification and reduction techniques and opportunities that would target the major sources of nutrient loading for reducing non-point and point source inputs delivered to the northern Gulf of Mexico. This program would use existing and new data from lower Tennessee River reservoirs and watersheds to select one reservoir as the focus for nutrient source loading and delivery modeling and to develop a long-term action plan that supports the strategy of reducing nutrients delivered to the Gulf. Data sources for model development would include targeted sampling, and other data from TVA, U.S. Geological Survey, National Oceanographic and Atmospheric Administration, states, Mississippi River Basin Gulf of Mexico Hypoxia Task Force, and USEPA.

The nutrient reduction strategy would be tested by implementing practices, which would include many of those described below in Section 2.5.6, in a small watershed (reservoir embayment or tributary reservoir) to demonstrate nutrient yield reduction and validate the model. TVA would then work with partners to implement the strategies on a larger area.

This program would demonstrate TVA's commitment to improving water quality within the Tennessee River watershed to include protection and improvement of downstream uses. One option would use a number of effective water resource improvement tools to implement effective strategies to reduce nutrient yields from the Tennessee River.

2.5.6. Water Resource Improvement Tools

This section describes the existing and proposed tools and supporting activities associated with TVA's various water resource management and improvement efforts. These tools and activities were used in developing the programs chosen in the various alternatives. Several of these tools and activities are also used to implement activities listed under the Biological Resource Management, Cultural Resource Management, and Recreation Management programs and activities.

Access Controls and Lands Protection
In an effort to reduce the abuse of public lands, access control measures are utilized to protect natural and nonrenewable resources, minimize soil erosion, and prevent other environmental impacts. To facilitate the appropriate use of TVA lands, signage and/or kiosks would be installed, and trash or litter would be removed. If TVA deems the abuse to be severe, gates or other physical barriers would be installed to deter the unwanted actions. Appropriate BMPs are indentified prior to installation of physical barriers and implemented during construction.

Agricultural Assistance
Agricultural BMPs are an effective and practical means of preventing or reducing agricultural pollutants from entering waterways. Some of the most commonly used conservation practices for nutrient management and erosion control are described within this subsection.

Critical Areas Management — The need to manage critical areas occurs both in the agricultural and urban settings. Critical areas include highly erodible locations that have been altered by landscaping or sloping, or that support inadequate vegetation. Erosion control in such areas may involve reshaping, terracing, fertilizing, liming, placement of erosion-control matting, and seeding or tree planting to establish vegetative cover. In larger areas, standard industrial practices (e.g., placement of silt fences and straw barriers) would be used to reduce surface runoff during grade work.

Exclusion Fencing — Exclusion fencing is used to restrict the access of livestock to streams. Livestock exclusion can reduce direct inputs of pollutants from livestock, lessen erosion and stream bank deterioration, and protect riparian vegetation. Minor excavation is required for installation of fence posts.

Heavy Use Area Protection — Heavy use area protection is used in highly trafficked areas such as livestock feeding areas, watering areas, and loafing areas. This practice usually includes grading the surface and applying geotextile fabric and suitable rock/gravel materials for stabilization. Heavy use area protection can reduce soil erosion, soil compaction, and pollutant runoff from entering a nearby water body.

Livestock Water Systems — Livestock water systems are installed along with other agricultural BMPs to supply adequate water while preventing contamination of water bodies. This is accomplished by reducing the need for livestock to enter the stream and reservoir. Such water systems may consist of wells, spring developments, troughs and tanks, ponds and reservoirs, and stream crossings. Depending on the site characteristics and available water sources, these systems may require excavation for spring development, ponds, and/or pipelines.

Planned Grazing Systems — Planned grazing systems, also known as rotational or intensive grazing, involve using multiple fields on a rotational basis. A field would be divided into two or more pastures by fencing. Livestock are then moved from pasture to pasture on a prearranged schedule based on forage availability. Such measures can decrease erosion and potential impacts to water quality by improving vegetation cover. Installation of planned grazing systems may include one or more of these practices: exclusion or cross fencing, stream crossing installation, livestock watering system installation, and heavy use area protection.

Roof Runoff Management — In certain situations, runoff from roofs can cause pollution. The need to manage roof runoff occurs both in the agricultural and urban settings. Roof runoff management includes use of facilities to collect, divert, or dispose of water from roofs in situations where this runoff can contact waste or cause erosion. Measures may include the installation of gutters, downspouts, curbing, erosion-resistant channels, and subsurface building foundation drains. Such measures can prevent runoff across waste areas or barnyards, thereby preventing pathogens and concentrated nutrients from being washed into streams. Most of these installations require minor excavation for channels or pipes.

Stream Crossing — Stream crossings allow livestock to cross a stream at a controlled location and restrict free access to the stream and stream banks. Crossings would be located perpendicular to the stream channel and would be permanently fenced to prevent livestock from entering the stream. Depending on the physical characteristics of the stream, these crossings would take the form of culverts, concrete structures, or gravel crossings laid on geotextile fabric. Installation of crossings can reduce streambed and stream bank erosion and can improve water quality by reducing the inputs of sediment, nutrients, and organic matter. Depending on site characteristics and the particular crossing design, installation would require excavation of banks and/or bed, placement of geotextile, and placement of soil and/or gravel fill.

Waste Management Systems — A waste management system is designed to manage solid and liquid waste, including wastewater and polluted water from feedlots, in a way that does not degrade air, soil, or water resources. Components of these systems typically include sediment basins, composting facilities, dikes, diversions, fencing, grassed waterways, irrigation systems, drains, waste storage ponds or structures, and treatment lagoons. Most systems covered by this EIS would be installed on existing livestock facilities that currently have inadequate waste management systems. Some grading and/or excavation would be required for installing these systems. However, the extent of soil disturbance would be dependent on the particular system chosen.

Construction and Maintenance of Access Roads and Parking Areas

In some cases, access roads are needed to allow vehicle access for approved construction activities, agricultural and timber activities, fire suppression and prevention, official TVA business, and to improve roads outside developed recreational areas unless barricaded or otherwise posted. Existing roads, some of which may need upgrading, would be used where possible. New access roads would be designed to avoid sensitive resources, severe slope conditions, and minimize stream crossings. New access roads and parking areas would be surfaced with dirt or gravel. Culverts and other drainage devices, fences, and gates would be installed as necessary. Appropriate BMPs are identified prior to road construction or maintenance and implemented during the construction operations. If the access road or parking area were no longer needed, the areas would be planted with native vegetation after closure.

Mine Land Reclamation

Mine land reclamation BMPs address pollution associated with runoff and storm water associated with abandoned mine lands. Some examples are cited below.

Remediation of Acid Mine Drainage — Acid mine drainage occurs when surface water is contaminated by contact with pyrite. When pyrite, an iron sulfide, is exposed to air, it reacts with oxygen in the air and with water to form sulfuric acid and dissolved iron. Some or all of this iron can precipitate to form the red, orange, or yellow sediments in the bottom of

streams containing mine drainage. Various treatment options are used to restore streams affected by acid mine drainage. Installation of settling basins to receive mine drainage and the reinforcement of existing ponds can provide adequate treatment of acidic wastewaters. Often, neutralizing agents can be introduced into settling basins or ponds to provide additional treatment of acidic waters. Additional treatment includes the creation of new stream channels to divert streamflow away from acid-forming materials. This technique minimizes water contact with acid-forming mine spoils. In addition, neutralizing agents are used in the new stream channel to reduce the acidity of flowing waters before the new channel reconnects with the original stream.

Revegetation of Abandoned Mine Lands — Abandoned mine lands are areas of land that have been impacted from previous mining activities. Resource concerns associated with these lands include exposed subsoil, mine spoil, lack of vegetation, acidic substrates, and compacted soils. The condition of the soil or lack of topsoil often creates an environment that is not suitable for plant growth, which increases the likelihood of soil erosion and storm water runoff. Treatments to improve such sites include:

- Grading of existing site materials to increase the stability of the site.
- Conditioning of soil by addition of neutralizing materials to reduce the occurrence of acidic wastewaters and increase plant viability.
- Adding topsoil to provide a medium for plant growth and reduce the exposure of acid materials.
- Planting native vegetation to stabilize soils and enhance habitat.

Urban Storm Water Assistance
Urban BMPs reduce the amount of storm water entering a stream and address pollution associated with runoff and storm water facilities. Some examples are described below.

Critical Area Management — The need to manage critical areas occurs both in the agricultural and urban settings. Critical areas located in an urban setting often have the same characteristics as those located in a more rural or agricultural setting. Characteristics of critical areas include highly erodible locations that have been altered by landscaping or sloping or that contain inadequate vegetation. Erosion control in such areas may involve reshaping, terracing, fertilizing, liming, placement of erosion-control matting, and seeding or tree planting to establish vegetative cover. In larger areas, standard industrial practices (e.g., placement of silt fences and straw barriers) are used to reduce surface runoff during grade work.

On-Site Wastewater Installation and Repair — On-site wastewater systems treat household wastes in areas that do not have access to public sewer systems. These systems could include conventional septic tank and drain field systems or alternative systems. Installing or repairing wastewater systems can effectively reduce or eliminate these pollutants from entering surface water or groundwater. Local, state, and federal regulations provide minimum standards for installation and maintenance of wastewater systems. Appropriate systems would be selected for the sites and installed according to pertinent regulations.

Roof Runoff Management — In certain situations, runoff from roofs can cause pollution. The need to manage roof runoff occurs both in the agricultural and urban settings. Roof runoff management includes installing facilities to collect, divert, or dispose of water from roofs in situations where this runoff can contact waste or cause erosion. Measures may include the installation of gutters, downspouts, curbing, erosion-resistant channels, and

subsurface building foundation drains. Such measures can prevent runoff across waste areas, thereby preventing pathogens and concentrated nutrients from being washed into streams. Most of these installations require minor excavation for channels or pipes.

Runoff Filtration — These practices are designed to increase filtration of surface runoff by various methods as described below.

Rain gardens (biofiltration/bioretention) – Bioretention areas are shallow depressions filled with loose soil with a high organic matter and sand content. Surface runoff is directed into these areas, and pollutants are removed by filtration and biological processes. Rain gardens are created by using an existing depression or strategic excavation of a new depression.

Catch basin inserts and separators – A catch basin is a part of a storm drain or sewer system that is designed to trap debris so that it cannot enter the drainage pipes. Catch basins are a large-scale version of the traps used in home drains to accomplish a similar function. Most municipal sewer and storm drainage systems use catch basins. Catch basin inserts consist of a frame that fits below the inlet grate of a catch basin. Inserts are fitted with various trays that target specific pollutants, and often, more than one tray is included in the design. The first tray would remove sediment, and subsequent trays typically would address a specific targeted pollutant. Separators remove sediment and trash with hydrodynamic action, such as centrifugal force from swirling action. These practices are typically installed in existing catch basins.

Vegetated filter strips – Grassed filter strips are vegetated areas that treat sheet flow from adjacent impervious areas. Filter strips function by slowing runoff velocities and filtering sediment and other pollutants. Filter strips also provide some infiltration into underlying soils. The initial installation of a vegetative filter strip includes minor grading, placement of sod or seeds, and installation of erosion-control matting.

Sand or organic filters – Sand filters are usually two-chambered storm water treatment features. The first chamber is for settling, and the second is a filter bed filled with sand or another filtering medium. As storm water flows into the first chamber, large particles settle out, and the finer particles and other pollutants are removed as storm water flows through filtering media.

Runoff Retention and Detention

Dry detention ponds/extended detention ponds – Dry extended detention ponds are basins with outlets designed to detain storm water runoff for a specified duration. This design allows sediment particles and associated pollutants to settle. In some cases, existing detention ponds designed only for water quantity control can be converted to extended detention ponds (with improved water quality treatment capability) with little or no excavation. After treatment, the outflowing water can be channeled to streams or other existing treatment facilities.

Underground or inline detention structures – Detention tanks and vaults are underground structures used to control peak runoff flows. They are usually constructed of concrete (vaults) or corrugated metal pipe (tanks). Underground detention can also be achieved by retrofitting the overcapacity storm drainpipes with baffles. The baffles allow water to be stored in the pipes so it can be released at a slower rate. Pretreatment structures such as water quality inlets and sand filters can be used to treat runoff and remove trash and debris.

After treatment, the outflowing water can be channeled to streams or other existing treatment facilities.

Storm water wetlands – Storm water wetlands (or "constructed wetlands") are structural features similar to wet ponds (described below) that incorporate wetland plants in a shallow pool. As storm water runoff flows through the wetland, pollutants are removed by settling and biological uptake within the wetland. Wetlands are among the most effective storm water features in terms of pollutant removal and offer aesthetic value.

Wet ponds – Wet ponds (also called "storm water ponds," "retention ponds," or "wet extended detention ponds") are constructed basins that contain a permanent pool of water throughout the year (or at least throughout the wet season). Wet ponds treat incoming storm water runoff by settling and algal uptake.

On-lot treatment practices – The term "on-lot treatment" refers to a series of features that are designed to treat runoff from individual residential lots. The primary purpose of most on-lot features is to manage rooftop runoff and, to a lesser extent, driveway and sidewalk runoff. The primary advantage of managing runoff from rooftops is to disconnect these impervious surfaces, reducing the effective impervious cover in a watershed. Many of the impacts of urbanization on the habitat and water quality of streams are related to the fundamental change in hydrologic cycle caused by the landscape's increase in impervious cover. Examples of on-lot treatment features include rain barrels, soil improvement, vegetation management, and runoff routing.

Storm Water Infiltration — In general, these practices are designed to impede surface runoff and facilitate the infiltration of water into the ground. Specific techniques and options are described below.

Grassed swale – The term "swale" (also known as a "grassed channel," "dry swale," "wet swale," or "biofilter") refers to a series of vegetated, open channel features that are designed specifically to treat and attenuate storm water runoff for a specified water quality volume. As storm water runoff flows through the channels, it is treated through filtering by the vegetation in the channel, filtering through a subsoil matrix, and/or infiltration into the underlying soils. Swale construction requires excavation to shape an existing channel or construct a new one.

Infiltration basin – An infiltration basin is a shallow impoundment designed to infiltrate storm water into the soil. Infiltration basins are believed to have high pollutant removal efficiency, and they can help recharge the groundwater, thus restoring low flows to stream systems. Excavation is required to create or shape the basin.

Infiltration trench – An infiltration trench (also known as an "infiltration galley") is a rock-filled trench, with no outlet, that receives storm water runoff. Runoff is then stored in the voids of the stones and slowly infiltrated through the bottom and into the soil matrix over a few days. The primary pollutant removal mechanism of this practice is filtering through the soil.

Porous pavement – Porous pavement is a permeable pavement surface with an underlying stone reservoir that temporarily stores surface runoff before the runoff infiltrates into the subsoil. This porous surface replaces traditional pavement, allowing parking lot runoff to infiltrate directly into the soil and receive water quality treatment. There are several porous pavement options, including porous asphalt, pervious concrete, and grass pavers.

Depending on site characteristics, some combination of excavation and grading would likely be required to create a level area at the right elevation relative to adjacent land for installation of this feature.

Illegal Solid Waste Dump Cleanup and Disposal — Illegal dumps are often located near streams or reservoirs. Thus, such sites contribute to nonpoint source pollution. Such dumps frequently contain household garbage, automotive wastes, and larger items such as construction debris and old appliances. Heavy equipment would be used to gather and load the material. Collected waste would be transported to an approved landfill for disposal.

Solid Waste Litter Cleanup and Disposal — Litter cleanups would be organized at the local level. Local volunteers would be provided with necessary supplies. TVA would participate in the organization and logistical support of the cleanups. The collected litter would be taken to an approved landfill for disposal.

Stream and Riparian Management and Restoration

Stream bank and streambed restoration occurs when active bank erosion, bank failure, or excessive alteration of the streambed or riparian area is occurring. Stream restoration work performed by TVA under the programs in the NRP would use the principles of natural stream channel design and biostabilization techniques when possible. Available restoration techniques include vegetative bank protection, bank sloping, installation of flow deflectors, stabilization of the stream bank, and installation of structures in the stream. Stabilization plans are developed based on site-specific information including severity of shoreline erosion, location of nearby sensitive resources, appropriate BMPs, opportunities for innovative stabilization techniques, and installation methods.

Bank Stabilization — When the stream is likely to fail, or to allow for the installation of other stabilization features, the stream bank is shaped to a more stable slope. Sloping would likely be accomplished with heavy equipment. In some cases where there are sensitive resources that would be impacted by excavation, the desired slope may be reached by a combination of cut and fill or just fill. Bank toe stabilization and bank revetment are installed to protect newly planted vegetation and to prevent additional erosion. Depending on site characteristics, one or more of the following materials would typically be used for toe stabilization: whole cedar trees anchored with cables, coir (coconut fiber) rolls, permanent or biodegradable erosion-control mats, and/or rock. Flow deflectors are designed to deflect streamflow away from the stream bank in order to decrease bank erosion. They also provide habitat for fish and other aquatic life. These deflectors may be constructed of rock, logs, or logs with attached root wad. Additional structures are also constructed across the full width of the stream to stabilize the stream bottom elevation.

Riparian Vegetation Planting — In some instances, the establishment of native vegetation would be the only practice necessary to stabilize a stream bank site. Grasses and forbs may be established by planting seeds, sod, or sprigs. Woody vegetation may be established from plant cuttings, bare-root seedlings, or potted seedlings. An erosion-control mat may be used to protect soil and/or seed until the vegetation is established and/or to reinforce the vegetation after establishment.

In areas with beaver activity, wire mesh cylinders would be placed around the vegetation for protection. Where conditions warrant, stream bank protection measures using willow stakes along with posts and fascines made from several other tree and shrub species

would be used. These enclosures are usually smaller than 500 square feet and would be removed once the plants are established.

Hydroseeding and hydrosprigging would be used on eroding shoreline and hillsides of varying steepness. This method uses a slurry mixture of water, seed or plant parts (e.g., rhizomes, stem nodes), fertilizer, fiber mulch, and a binding agent. The mixture is sprayed via a hose onto the target shoreline area. Disking or scarifying may be necessary in some areas to break up compacted soil.

Wetlands Restoration, Creation, and Enhancement
Restoration of a wetland refers to returning a degraded wetland or former wetland to a preexisting condition or as close to that condition as possible. There are two general approaches to wetland restoration: passive restoration and active restoration. Passive approaches are generally used when restoration can likely be accomplished by eliminating or reducing the cause or source of degradation. The active approach involves techniques that are more advanced, such as recontouring a site to the desired topography, changing the water flow with water control structures, intensive plantings and seeding, intensive control of nonnative species, and soil substrate conditioning. Wetland creation involves converting a nonwetland area (either dry land or an unvegetated water body) to a wetland. Wetland enhancement involves increasing one or more of the functions performed by an existing wetland beyond what currently or previously existed in that wetland. Depending on the site requirements and constraints, excavation, fill, and stream channel modification are potential tools for achieving these conditions.

Water Pollutant Trading
Water pollutant trading is a market-based approach to improving water quality. Trades can take place between nonpoint sources (such as agriculture or urban runoff) and point sources (such as wastewater treatment plants or industrial facilities). Pollutant trading allows a pollution source to comply with a pollutant discharge limitation by purchasing credits generated by another pollution source that can control its pollutant discharge at a lower cost. The pollutant source buying the credit meets its pollution-reduction obligation at a lower cost than it would otherwise, while the source generating the credit further lowers its pollution-control cost.

The goal of water pollutant trading is to allow pollution sources to optimize the cost of meeting water quality goals across a watershed. Successful implementation of a trading program requires identification of the critical pollutant or pollutants, knowledge of costs of control for all pertinent sources, and the creation of a bank or other institutional structure to administer and oversee the trading process. Opportunities for pollutant trading are created by regulatory processes, such as a total maximum daily load or a stringent water-quality-based requirement in a discharge permit for a particular source. In order to provide trading opportunities, different sources within the watershed would have significantly different control costs, and there would be some gap between the maximum possible pollution reduction and the required levels of pollution reduction.

Before this tool could be utilized, regulatory agencies (states with USEPA oversight) would need to establish a regulatory structure to administer and oversee the trading process. It might also be possible under a water pollutant trading program to allow “banking” of pollution reduction “credits” for voluntary pollutant load reductions ahead of regulatory requirements to reduce those loadings. Maximum utilization of this tool could occur if interstate and inter-watershed trading rules were established.

Water Resource Communications
TVA engages in efforts to improve and protect resources of the Valley. The Water Resources Communication Program would highlight programs and projects to increase public awareness of TVA's work and provide useful information to stakeholders. Examples of Water Resources Communication Program activities include:

- Creating and maintaining a website to highlight water resource protection and improvement efforts and innovations of current TVA projects.
- Presenting information to stakeholders about TVA's management of resources.
- Presenting information to stakeholders that describes TVA's local stake in protecting and enhancing environmental resources.
- Communicating water efficiency messages through TVA's website.

Water Resource Management Assistance
TVA provides support and expertise to help guide watershed improvement and protection efforts throughout the Valley. Water resource assessments and technical assistance are provided to external stakeholders in order to facilitate collaboration and coordination, resulting in improved water quality.

Technical Assistance
Best Management Practices Design — TVA would offer design and/or construction supervision services for practices described in the NRP. TVA's designs would be constructed by TVA, other agencies, or stakeholder groups. The implementation of TVA's designs would be subject to an environmental review, as appropriate. In addition, designs provided by other agencies and constructed under TVA supervision would be subject to an appropriate environmental review process.

Stream Assessments and Monitoring — Monitoring gathers data about conditions of water chemistry, temperature, microbiology, and biota of water bodies to assess stream conditions, target improvement efforts, and track improvements. All sampling procedures are conducted according to established methodologies, and activities are approved by the appropriate federal and state agencies.

Water Resource Modeling — TVA has used computer models of both reservoirs and watersheds in support of stewardship programs. Models are used to determine causes and sources of pollution and quantify the pollution loads generated by different sources. They are also used to explore the response of a watershed and/or reservoir to changes in management practices. This information is critical to developing optimal treatment strategies for the water resource planning process. TVA has used a variety of models, from relatively simple ones that require only readily available data to much more complex versions that use detailed data from the area being modeled. Model choice is based on project requirements and available resources.

Watershed Assessment and Watershed Restoration Planning — Watershed assessment includes analysis of monitoring and inventory data to determine sources of pollution, severity and amount of pollutant, and optimum methods to reduce the level of pollutants present. Strategies and planning for implementation are generated with participation of stakeholders. The desired outcome of this analysis is a restoration strategy that makes optimum use of resources.

Watershed Inventories — Land use data are required to determine pollutant sources within a watershed. Depending on project needs, land use data can be developed from existing data infrastructure including maps, satellite images, or published database, or from project-specific data including purchased proprietary satellite images or aerial photography. The TVA Integrated Pollution Source Investigation process commissions color infrared photography for each project and analyzes the photographic images manually.

Water Resource Organizational Assistance

Communication Plan Assistance — TVA assists partners in identifying tools and strategies for developing communication plans. Communication plans are considered a vital component of a water quality improvement project and are used to create awareness, provide implementations tools, and foster stakeholder involvement.

Grant Writing Assistance — TVA assists partners in identifying available funding and developing grant applications to implement water quality improvement projects. These grants may be from federal, state, or local organizations as well as corporations or foundations. TVA may provide additional grant support through partnership development, project scope, and project management.

Organizational Support — TVA works with stakeholders to create sustainable partnerships and organizations that can implement water resource improvement efforts. TVA helps these groups set goals and develop a mission statement to guide their efforts, enhance their skill levels through training and support, and build their capacity. TVA also collaborates with established partnerships and organizations to provide assistance as needed.

Financial support for watershed organization staff. Knowledgeable staff increases the effectiveness of organizations and increases the probability that an organization would be self-sustaining. TVA support would be intended to help a new organization develop the skills and capacity to find further funding and be effective in implementing water quality improvement strategies. TVA's selection of organizations to provide financial support would complement other water resource improvement efforts.

Development of organizational and/or governance structure. TVA would support watershed organizations by providing information and guidance for selection and development of appropriate leadership structures and processes. In addition, TVA would assist with leadership skill development for board members and staff and help the organizations become effective partners in implementing watershed strategies.

Consulting and support for effective communications and marketing. TVA would support watershed organizations by providing services and training in effective communications and marketing. This opportunity would lead to increased recruiting for and participation in water quality improvement activities.

Leverage funding. TVA would provide assistance in seeking and securing non-TVA funding.

Water Resource Standard Best Management Practices

This section describes the standard BMPs associated with the programs and tools identified for water resource management. These BMPs would be identified when developing project or watershed action plans and would be implemented during construction, as appropriate.

Site-specific environmental reviews would be conducted to determine the appropriate BMPs on a project-by-project basis.

- When projects are located near streams or water bodies, temporary sediment barriers or traps would be installed, as appropriate, when implementing practices require grading or other soil disturbance.
- Native vegetative cover would be established as soon as possible following construction.
- Projects involving instream work or soil disturbance would be subject to the appropriate environmental review.
- Appropriate state and USDA requirements would be met, and standard practice guidelines would be followed, where applicable. Examples of USDA technical standards are presented at the Natural Resources Conservation Service's (NRCS) website, http://www.nrcs.usda.gov/technical/standards/nhcp.html.
- Projects would be scheduled to conduct work during dry weather conditions and to reduce soil exposure to erosion.
- Stream stabilization would be scheduled during periods of low flows, and disturbance by heavy equipment would be minimized.
- Tall-growing woody species would not be planted in front of navigation lights or markers.
- Appropriate vegetation would be planted under transmission lines.

2.6. Public Engagement

TVA proposes to develop and implement programs to increase public awareness and involvement across the broad spectrum of natural resource management activities.

Environmental Education Program

The Environmental Education Program would consist of comprehensive and coordinated public outreach efforts that teach stakeholders about the values and functions of natural resources and on the challenges faced in preserving, enhancing, and/or managing these resources for future generations. The program would focus on efforts within the education system, from primary to post-secondary schools, and on a variety of other audiences such as civic and peer groups, elected officials, business leaders, and the general public. Efforts to educate these audiences would include formal programs, print materials, museum displays and interpretation, websites, media campaigns, and information kiosks.

Volunteer Program

TVA proposes to establish a volunteer program to better manage its resources by encouraging volunteers to actively participate in resource conservation and enhancement activities. Potential activities include trail establishment and maintenance, tree planting, invasive species removal, shoreline biostabilization, green campground projects, habitat enhancement, surveys and data collection, and installation and maintenance of rain gardens, rain barrels, and native butterfly gardens. TVA would actively seek volunteers by joining http://www.volunteer.gov, engaging corporate volunteers and local students, hosting a short-term intensive Student Conservation Association-type volunteer program, and/or engaging other types of service or volunteer organizations.

Foundation and Trust Fund

TVA proposes to create an independent Foundation and Trust Fund or partner with an existing fund to solicit private donations to support conservation- and natural resource-related projects and programs. The fund would be similar to a corporate partnership program in which a center or foundation would be established to oversee and managing fundraising campaigns, trust funds, and requests for proposals. Funding would be available for on-the-ground projects, contracted technical support services, plan development, and project implementation.

CHAPTER 3 - ALTERNATIVES

The purpose of this EIS is to analyze, in a programmatic manner, the environmental impacts anticipated to result from the implementation of the NRP and the alternatives to it. This chapter describes the four alternatives considered in detail in this EIS, as well as the process used to develop the alternatives. The alternatives encompass a variety of approaches for managing biological, cultural, recreation, and water resources, and for conducting reservoir lands planning.

3.1. Development of Alternatives

3.1.1. Development of Program Options

The purpose of the NRP is to develop a plan to guide TVA's responsible management of natural resources over the next 20 years in a cost-effective manner while upholding TVA's mission. In order to establish a reasonable range of the natural resource management programs and activities that would meet this purpose and make up the NRP, TVA staff reviewed various aspects of biological resource management, cultural resources management, terrestrial GHG management, recreation management, reservoir lands planning, and water resource management. They first considered the major issues affecting the natural resources in TVA's custody. They then documented existing and proposed programs, tools, and activities that could be used to manage these resources. Next, they reviewed the comments submitted during public scoping, recommendations from the RRSC, and results of discussions with other federal and state natural resource agencies. They then defined new programs and revised existing programs, as described in Chapter 2. Finally, they grouped the programs to develop options for TVA's future management of natural resources.

Four program options were developed for the management of biological, cultural, and water resources and for recreation (Table 3-1). Three program options were developed for reservoir lands planning (Table 3-2). These program options were developed to provide a range of possible future activities for each resource area. They were defined based on the current condition of the resources TVA is proposing to manage through the NRP, the professional opinion of TVA staff, and comments and recommendations from the public, the RRSC, and other natural resource management agencies. The Custodial, Enhanced, and Flagship options are displayed graphically in Figure 3-1. TVA's current management options are generally grouped around the Custodial level or in the Custodial to Enhanced range.

Table 3-1. Program Options for Management of Biological, Cultural, and Water Resources and Recreation

Program Option	Descriptions
Current Management	There would be no NRP for future guidance. TVA would continue to operate in much the same way it does currently with varying levels of resource programs that include those addressing legal and policy requirements.
Custodial Management	TVA would operate in compliance with legal and policy requirements. This program option includes the essential functions for biological, cultural, recreation, and water resource management as outlined in the Environmental Policy.
Enhanced Management	TVA would operate in compliance with legal and policy requirements. This program option recommends a limited number of projects that begin to elevate TVA's stewardship programs.

Program Option	Descriptions
Flagship Management	TVA would operate in compliance with legal and policy requirements. This program option recommends Valleywide opportunities that elevate TVA's stewardship programs to the "gold standard."

Table 3-2. Reservoir Lands Planning Program Options

Program Option	Descriptions
Current Management	There would be no NRP for future guidance. TVA would continue to plan reservoir lands primarily on a reservoir-by-reservoir basis.
Programmatic Planning	TVA would continue to plan reservoir lands in much the same way it does currently. However, TVA would apply slightly different land use zone definitions than those used in recent RLMPs. Future reservoir lands plans would tier from this EIS, and TVA would prepare reservoir-specific environmental reviews for the plans.
Comprehensive Valleywide Planning	TVA would create a Comprehensive Valleywide Land Plan (CVLP), which would set threshold ranges for each allocation zone to guide the creation of future RLMPs. As TVA continues to plan its reservoir lands, it would revise the baseline allocations created by existing RLMPs and the RLA methodology.

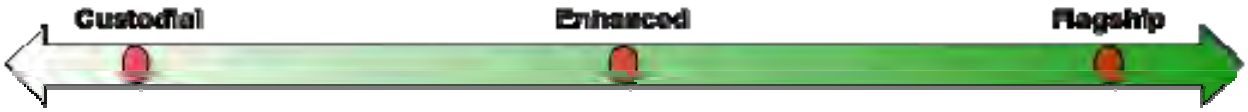


Figure 3-1. Range of Program Options Developed for the NRP

Once the program options were developed, costs were estimated using historical cost data and best professional judgment for:

- Full-time employees (FTEs)
- Program costs (in addition to FTEs)
- Capital expenditures and/or one-time costs (if applicable).

3.1.2. Natural Resource Plan Program Analysis Framework

The NRP analysis framework was developed to evaluate each program option based on a wide range of inputs to provide an accurate comparison of potential levels of implementation effort. Inputs to this framework included the results of scenario planning, input from external stakeholders, and other strategic considerations. The external stakeholder input at this stage included additional input from the RRSC, as well as the continued consideration of the scoping results, public comments on the draft, and discussions with other natural resource agencies.

3.1.2.1. Scenario Planning Analysis

A scenario is a set of uncertainties that describes a plausible future "world" or condition. Scenario planning provides an understanding of how near- and long-term decisions are

influenced and can respond to varying economic and regulatory conditions or circumstances that are outside of TVA's control. Comparing the performance of a range of plans across a number of potential scenarios provided an important data point when selecting a preferred alternative that is flexible and easily adapted to changing future conditions. Scenario planning aided in assessing the relevant risks, uncertainties, and challenges surrounding the various NRP alternatives. This framework integrates various inputs that are independently developed, ensuring objectivity while reducing bias from the results. Inputs to this process are shown in Figure 3-2.

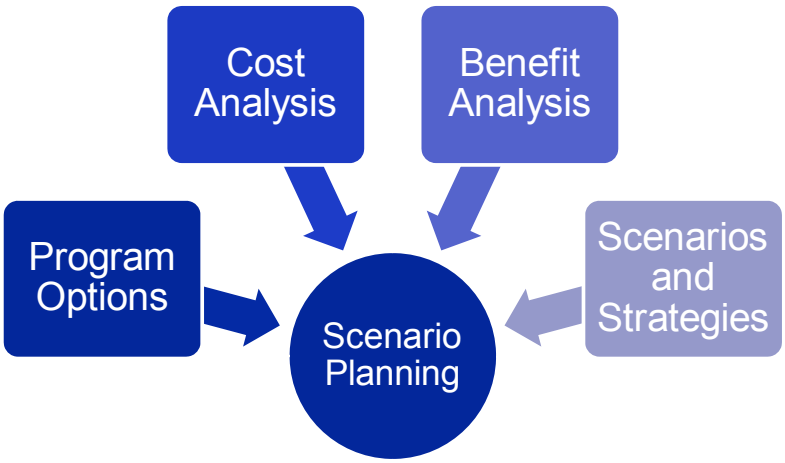


Figure 3-2. Various Scenario Planning Analysis Inputs

Costs of each program option were weighed against a benefit analysis that evaluated each program option based on the benefits it provides to the public, to TVA, and to the resource. To develop this benefit analysis, TVA retained a third-party natural resource economist to provide an independent evaluation of the expected benefits of each program option. This analysis (Cardno ENTRIX 2011) incorporated the varying nature of both qualitative and quantitative program benefits to the public and TVA.

Each program option was then ranked based on its benefit per dollar and assessed across four scenarios. The scenarios used in this analysis were adapted from those used in TVA's recently completed Integrated Resource Plan (TVA 2011; www.tva.gov/irp), and included those scenarios that were most strongly related to NRP programs and activities.

The results of scenario planning were used to analyze three potential strategies for the NRP, and there was limited variation across the resulting program mixes. Therefore, TVA selected a blended alternative for further analysis in the draft NRP; this alternative included components from each of the current, custodial, flagship, and enhanced program options.

3.1.2.2. Other Strategic Considerations

Once the initial NRP program mix was identified using the scenario planning process described above, TVA identified strategic or high-priority programs integral to the successful implementation of the NRP. These strategic considerations provided a third data point, along with scenario planning and stakeholder input, used in identifying the final program mix for the NRP and the preferred alternative in the EIS.

Any programs identified as a strategic consideration align with TVA's commitment to manage lands under its control to meet the desired land conditions for their defined purpose. Several of the programs establish infrastructure or provide essential assessments of resource conditions necessary to successfully implement other programs. Examples of these programs include the various databases and the biological, dispersed recreation, cultural, and water resource monitoring and assessment programs. Prioritizing certain programs helps to focus implementation efforts as partnerships and other resources become available. Criteria for selecting these high-priority programs included (but were not limited to) needs of nonrenewable resources, breadth of beneficial impact, partnership potential, and economic development.

3.1.2.3. The NRP Program Mix

The above analyses were used to define the programs and their level of implementation included in the draft NRP. The draft NRP identified three priority levels for implementation - Custodial, Blended, and Advanced. These levels were comprised of different levels of program options. The Custodial priority level included all custodial program options for each resource area and aligns with Alternative B in the EIS. The Blended priority level included the enhanced or flagship program options from each resource area that were identified as being strategic or high-priority and integral to the successful implementation of the NRP. These Blended priority level program options, as well as the Custodial program options for non-strategic and low-priority activities represent Alternative D (the preferred alternative) in the EIS. The Advanced priority level consisted of all remaining enhanced or flagship program options for each resource areas that were not identified as strategic or high-priority; these program options are included in Alternative C in the EIS. Programs in the Advanced priority level could be considered for implementation depending upon available resources and partnerships, and only to the extent that their implementation does not undermine implementation efforts of the program options identified in the Custodial and Blended priority levels.

3.1.3. Reservoir Lands Planning Analysis Framework

The Land Policy indicates that TVA will maintain a regular cycle and approach for RLMPs. Currently, TVA maintains a schedule for planning reservoirs. However, the time and resources required to plan reservoir lands and complete the associated reviews are significant and restrict TVA from revising land plans in a more timely fashion. In response, TVA seeks to streamline the reservoir lands planning process and update RLMPs in a more efficient manner. The expected result is for TVA to:

- Simplify the assessment process for future planning efforts
- Determine a consistent methodology for all future planning efforts
- Increase flexibility in future planning efforts.

The analysis framework for reservoir lands planning is as follows:

- Complete a current state assessment of the RLMPs
- Review the past methodologies used in developing RLMPs
- Identify gaps in RLMPs and methodologies
- Present future recommendations
- Select an NRP approach toward reservoir lands planning efforts.

3.1.4. Alternatives Development

The mix of programs identified for implementation in the draft NRP formed the basis for Alternative D, Blended Management. In addition to the No Action Alternative, two additional

action alternatives, Custodial Management and Flagship Management, were developed that spanned the range of program options. These alternatives are described in more detail below.

3.1.5. Revisions Following Public Review of Draft NRP and EIS

The program mix included in the draft NRP and the basis for Alternative D was refined in response to comments on the draft NRP and EIS, additional input from the RRSC, and additional discussions with other natural resource agencies. Some programs were eliminated from some alternatives and replaced with new programs. The implementation levels were changed for other programs. A frequent comment was that the discussion of the various program options, priority levels, and alternatives was confusing. As a result, their presentation was simplified and both the final NRP and the alternatives descriptions in the final EIS were revised to better define the goals and/or quantities associated with many programs. The major change to the reservoir lands planning alternatives was to narrow the range of the proportion of land that would be allocated to each of the zones under the Comprehensive Valleywide Land Plan.

3.2. Alternatives Evaluated in Detail

TVA evaluated the components of the No Action and Action Alternatives through the NRP analysis framework. The outcome of the analysis does not recommend one specific strategy going forward, but instead lays out an immediate course of action and a road map of options for TVA to use when evaluating future strategic decisions. The options resulting from the analysis are bounded by the No Action and Action Alternatives described below.

Under all alternatives, TVA would implement the programs and activities that address safety, TVA's mission and relevant laws, regulations, EOs, and policies. As laws, regulations, and policies are created or amended, implementation activities would be revised to reflect the changes and ensure continued compliance. In those areas in which TVA could discontinue programs or projects, existing contractual agreements relating to those programs or projects would be honored.

The No Action Alternative, Alternative A, represents the continuation of TVA's current natural resource management programs and activities. This alternative represents the baseline necessary to evaluate the action alternatives, both in terms of their environmental impacts and their effectiveness in meeting the needs of the various natural resources TVA manages. It emphasizes regulatory and technical requirements, assessments of TVA resources and partnerships, and projects associated with TVA recreational facilities. TVA would manage and support stewardship activities on its lands through existing prioritization methods that consider recreational and other resource needs, public safety, and public health while complying with all existing and future laws and regulations.

The Action Alternatives represent a range of effort and resources committed to minimal, primarily reactive natural resource management (Alternative B - Custodial Management) to aggressive proactive management (Alternative C - Flagship Management. Alternative D - Blended Management is TVA's preferred alternative and incorporates varied levels of effort and commitment of resources. The components of the four alternatives, other than those associated with reservoir lands planning, are listed in Tables 3-3 through 3-7. They are organized by resource area, program category, program, and activity. The programs and activities are described in Chapter 2. The unique characteristics of the four alternatives, including the different quantities associated with many activities (e.g., number of areas, acres, miles of

shoreline) and the different reservoir lands planning approaches, are described in more detail below.

Table 3-3. Biological Resources Management Components of Alternatives A - D

Program Category	Program	Goal / Activity	Alternative			
			A - Current Management (No Action)	B - Custodial Management	C - Flagship Management	D - Blended Management
Sensitive Biological Resources Management	Threatened and Endangered Species Program	Continue to comply with the requirements of the Endangered Species Act and implementation of biological opinion requirements.	●	●	●	●
Sensitive Biological Resources Management	Threatened and Endangered Species Program	Continue monitoring of select species populations.	●	●	●	●
Sensitive Biological Resources Management	Threatened and Endangered Species Program	Create monitoring plans, develop and implement management actions, seek partnerships and catalog select species where management opportunities and/or emergent issues exist within the region.			●	●
Sensitive Biological Resources Management	Threatened and Endangered Species Program	Continue cave protection activities.	●	●	●	●
Sensitive Biological Resources Management	Wetland Management	Continue implementation of current TVA wetland management and protection practices on TVA-managed lands.	●	●	●	●
Sensitive Biological Resources Management	Wetland Management	Investigate opportunity and potential establishment of a partnership with TDEC to develop a proactive program to identify high-quality reservoir wetlands on TVA-managed lands as a “Blue Ribbon” or “Reference Site” Reservoir Wetland Pilot Project.			●	
Sensitive Biological Resources Management	Sensitive Resources Data Management	Continue current management of TVA Natural Heritage and wetlands databases.	●	●	●	●

Program Category	Program	Goal / Activity	Alternative			
			A - Current Management (No Action)	B - Custodial Management	C - Flagship Management	D - Blended Management
Sensitive Biological Resources Management	Sensitive Resources Data Management	Honor data sharing agreements among TVA and other state and federal resource agencies.	●	●	●	●
Sensitive Biological Resources Management	Sensitive Resources Data Management	Expand information gathering efforts for identification of sensitive resources through partnerships. Incorporate wetlands identified during these surveys into the database.			●	
Sensitive Biological Resources Management	Sensitive Resources Data Management	Develop predictive models for federally and state-listed species.			●	
Sensitive Biological Resources Management	Sensitive Resources Data Management	Add new data users for environmental review and planning purposes.			●	●
Sensitive Biological Resources Management	Natural Areas Management	Monitor and assess TVA's natural areas to develop a prioritized list of maintenance or improvement needs (approx. 1/3 of natural areas assessed annually).	●	●	●	●
Sensitive Biological Resources Management	Natural Areas Management	Designate or remove natural areas via the reservoir lands planning process.	●			
Sensitive Biological Resources Management	Natural Areas Management	Develop and implement comprehensive natural area management plans (approx. __ natural areas annually).			33	15
Sensitive Biological Resources Management	Natural Areas Management	Establish criteria for a natural areas planning process to designate new and/or remove existing natural areas on TVA-managed lands.			●	●
Sensitive Biological Resources Management	Conservation Planning	Continue to be advisers/participants in planning organizations.	●	●	●	●

Program Category	Program	Goal / Activity	Alternative			
			A - Current Management (No Action)	B - Custodial Management	C - Flagship Management	D - Blended Management
Sensitive Biological Resources Management	Conservation Planning	Partner with regulatory and resource management agencies in state, local, and regional conservation planning efforts.		●		●
Sensitive Biological Resources Management	Conservation Planning	Expand role in large-scale planning efforts across the region via partnerships.			●	
Sensitive Biological Resources Management	Migratory Birds Management	Comply with Executive Order 13186.	●	●	●	●
Sensitive Biological Resources Management	Migratory Birds Management	Support and participate in national and regional migratory bird management planning efforts.		●	●	●
Sensitive Biological Resources Management	Migratory Birds Management	Continue leadership role in Tennessee River Valley Shorebird Working Group.	●	●	●	●
Sensitive Biological Resources Management	Migratory Birds Management	Partner with other agencies and NGOs to implement conservation projects and to manage migratory bird populations on TVA reservoirs.			●	●
Terrestrial Habitat Management	Grasslands and Agricultural Lands Management	Continue to manage agricultural licenses and cooperative Federal and State Agency agreements on over 10,000 acres of TVA-managed lands.	●	●		●
Terrestrial Habitat Management	Grasslands and Agricultural Lands Management	Partner with Federal and State Agencies and NGOs in efforts to manage and enhance TVA grasslands and agricultural lands.	●	●	●	●
Terrestrial Habitat Management	Grasslands and Agricultural Lands Management	Increase efforts to reestablish and manage native grassland plant communities in a prioritized manner on TVA lands.			●	

Program Category	Program	Goal / Activity	Alternative			
			A - Current Management (No Action)	B - Custodial Management	C - Flagship Management	D - Blended Management
Terrestrial Habitat Management	Dewatering Projects Management	Continue management of current projects (includes maintaining or upgrading existing contractual agreements).	●	●		
Terrestrial Habitat Management	Dewatering Projects Management	Refurbish dewatering areas based on dewatering unit engineering and hydrologic reviews.			●	●
Terrestrial Habitat Management	Dewatering Projects Management	Operate, manage, and maintain dewatering area projects at upgraded conditions.			●	●
Terrestrial Habitat Management	Dewatering Projects Management	Work with local and regional partners to incorporate nature-based tourism into management of dewatering areas projects.			●	●
Terrestrial Habitat Management	Forest Resource Management	Manage tree hazards and tree cutting/vegetation damage encroachments.	●	●	●	●
Terrestrial Habitat Management	Forest Resource Management	Continue small-scale vegetation (tree removal) operations associated with storm or insect damages and forest wildlife habitat enhancements.	●	●	●	●
Terrestrial Habitat Management	Forest Resource Management	Monitor broad forest trends on TVA-managed lands and conduct basic forest protection activities.		●	●	●
Terrestrial Habitat Management	Forest Resource Management	Provide support to state forestry assessment plans.	●		●	●
Terrestrial Habitat Management	Forest Resource Management	Develop and maintain a qualified fire management crew for local responses and to protect TVA assets.			●	●
Terrestrial Habitat Management	Forest Resource Management	Develop a formal forest resource program to guide future inventory efforts.			●	

Program Category	Program	Goal / Activity	Alternative			
			A - Current Management (No Action)	B - Custodial Management	C - Flagship Management	D - Blended Management
Terrestrial Habitat Management	Nonnative Invasive Plant Management	Control nonnative invasive plant management on __ acres of TVA-managed lands per year.	600	1,000	40,000	1,000
Terrestrial Habitat Management	Nonnative Invasive Plant Management	Develop a prioritized plan to control nonnative invasive plants on areas with sensitive resources, habitat enhancements, and/or high public use, emphasizing areas with high partnership potential.		●	●	●
Terrestrial Habitat Management	Nonnative Invasive Plant Management	Actively participate in state exotic pest plant councils along with regional early detection and rapid response initiatives.	●		●	
Terrestrial Habitat Management	Nuisance Animal Control	Resolve animal damage conflicts via existing contractual agreement with USDA-WS.	●	●	●	●
Terrestrial Habitat Management	Nuisance Animal Control	Develop and implement proactive strategies to manage feral animals on TVA-managed lands.		●	●	●
Terrestrial Habitat Management	Nuisance Animal Control	Develop programmatic TVA guidelines for addressing nuisance animals, establishing memoranda of agreement with agencies responsible for regulating wildlife, and developing and sharing BMPs with partners.			●	
Terrestrial Habitat Management	Terrestrial Greenhouse Gas Sequestration Management	Develop and implement a terrestrial GHG management plan that identifies a range of voluntary and carbon compliance-assistance opportunities.			●	

Program Category	Program	Goal / Activity	Alternative			
			A - Current Management (No Action)	B - Custodial Management	C - Flagship Management	D - Blended Management
Terrestrial Habitat Management	Terrestrial Greenhouse Gas Sequestration Management	Conduct research projects on __ acres focusing on issues related to terrestrial greenhouse gas management.	41	41	500	41
Terrestrial Habitat Management	Terrestrial Greenhouse Gas Sequestration Management	Continue existing or expand involvement in __ third-party consortiums focusing on issues related to terrestrial GHG management practices.	2	2	8	2
Terrestrial Habitat Management	Terrestrial Greenhouse Gas Sequestration Management	Maintain existing or conduct new demonstration projects (___#) focusing on issues related to terrestrial greenhouse gas management practices.	2	2	6	2
Terrestrial Habitat Management	Wildlife Habitat Council – Third Party Certifications	Continue management of current certified projects.	●	●	●	●
Terrestrial Habitat Management	Wildlife Habitat Council – Third Party Certifications	Apply for Wildlife Habitat Council certification of TVA Natural Resource Plan.		●	●	●
Terrestrial Habitat Management	Wildlife Habitat Council – Third Party Certifications	Initiate 5 Wildlife Habitat Council certified projects at 5 new locations on TVA-managed lands.			●	
Terrestrial Habitat Management	Wildlife Habitat Council – Third Party Certifications	Establish a third-party review and certification process for wildlife management activities on 10 percent of appropriate TVA–managed lands annually.			●	
Terrestrial Habitat Management	Wildlife Habitat Enhancement Partnerships	Improve habitat on __ acres of TVA-managed lands per year through partnership efforts (only).	500	750	20,000	750

Program Category	Program	Goal / Activity	Alternative			
			A - Current Management (No Action)	B - Custodial Management	C - Flagship Management	D - Blended Management
Terrestrial Habitat Management	Wildlife Habitat Enhancement Partnerships	Engage existing partners and seek opportunities to partner in the management of licensed lands on TVA property (target of 20,000 acres per year - specific to TVA-managed lands).			●	
Terrestrial Habitat Management	Wildlife Habitat Enhancement Partnerships	Develop cooperative agreements for use with resource management partners.			●	
TVA Land Management and Stewardship Programs	Boundary Maintenance	Conduct boundary maintenance at the reservoir level.	●	●	●	●
TVA Land Management and Stewardship Programs	Boundary Maintenance	Develop a regional prioritization process for determining boundary maintenance needs at the reservoir level.		●	●	●
TVA Land Management and Stewardship Programs	Boundary Maintenance	Address all regional boundary maintenance needs on a __ -year cycle while incorporating the latest and future survey technologies to assist in the process.			5	10
TVA Land Management and Stewardship Programs	Land Condition Assessment and Land Stewardship Maintenance	Assess __ acres of TVA-managed lands annually. Execute a comprehensive approach for assessing all TVA-reservoir properties in an effort to eventually replace the past rapid land condition assessments with a comprehensive land assessment.	5,000	20,000	50,000	35,000
TVA Land Management and Stewardship Programs	Land Condition Assessment and Land Stewardship Maintenance	Implement prioritized stewardship activities addressing public health and safety, asset preservation, and resource management needs based on land assessments.		●	●	●

Program Category	Program	Goal / Activity	Alternative			
			A - Current Management (No Action)	B - Custodial Management	C - Flagship Management	D - Blended Management
TVA Land Management and Stewardship Programs	Land Condition Assessment and Land Stewardship Maintenance	Transition from the unit plan implementation methodology to the RLCA/LCA task prioritization methodology.	●	●	●	●
Public Outreach (Biological)	Resource Stewardship Campaigns	Develop and implement this new program to promote natural resources improvements and protection; deliver 25 stakeholder products annually.			●	
Dispersed Recreation Management	Dispersed Recreation Management	Evaluate 70 dispersed recreation areas annually.	●			
Dispersed Recreation Management	Dispersed Recreation Management	Collect data on dispersed recreation sites identified during lands condition assessment.	●	●	●	●
Dispersed Recreation Management	Dispersed Recreation Management	Repair __ heavily impacted dispersed recreation sites annually.	1	5	25	15
Dispersed Recreation Management	Dispersed Recreation Management	Implement __ key projects annually.	1	5	20	10
Dispersed Recreation Management	Dispersed Recreation Management	Distribute 600 dispersed recreation user surveys annually.			●	
Dispersed Recreation Management	Dispersed Recreation Management	Conduct 100 outdoor clinics annually.			●	
Dispersed Recreation Management	Dispersed Recreation Management	Implement web based educational campaign to promote ecofriendly dispersed recreation.		●	●	●
Dispersed Recreation Management	Dispersed Recreation Management	Develop and implement multiyear dispersed recreation plans.			●	●

Program Category	Program	Goal / Activity	Alternative			
			A - Current Management (No Action)	B - Custodial Management	C - Flagship Management	D - Blended Management
Dispersed Recreation Management	Dispersed Recreation Management	Issue regulations on dispersed recreation facilities to enhance enforcement capabilities.			●	●
Dispersed Recreation Management	Leave No Trace	Continue to participate in Leave No Trace program.	●	●	●	●
Dispersed Recreation Management	Leave No Trace	Promote the Leave No Trace program throughout the Valley by providing educational information to users at recreation facilities/sites, local businesses, and on the web.			●	●
Dispersed Recreation Management	Trails Management	Proactively manage existing trail systems to include a systematic inventory and management/maintenance plan.	●	●		●
Dispersed Recreation Management	Trails Management	Develop and implement a Valleywide trails establishment and maintenance program.			●	
Dispersed Recreation Management	Trails Management	Add 20 trail miles per year in accordance with Dispersed Recreation multiyear plans.			●	

Table 3-4. Cultural Resources Management Components of Alternatives A - D

Program Category	Program	Goal / Activity	Alternative			
			A - Current Management	B - Custodial Management	C - Flagship Management	D - Blended Management
Cultural Resource Management	Archaeological Monitoring and Protection	Protect archaeological sites of __ tributary shoreline miles or __ mainstem shoreline miles per year.	mitigation projects only	0.3 - 0.4 / 0.4 - 0.6	1.1 - 1.3 / 1.9 - 2.1	0.4 - 0.6 / 0.9 - 1.1
Cultural Resource Management	Archaeological Monitoring and Protection	Monitor archaeological sites along __ miles of shoreline per year.	mitigation projects only	150	500	250
Cultural Resource Management	Archaeological Resources Protection Act	Conduct Archaeological Resources Protection Act inspections with __ security checks per year.	1,000	1,000	5,000	1,000
Cultural Resource Management	Archaeological Resources Protection Act	Train and outfit new officers and train Archaeological Resources Protection Act specialist.			●	
Cultural Resource Management	Archaeological Resources Protection Act	Issue regulations to supplement investigative authority.			●	
Cultural Resource Management	Native American Consultation	Coordinate and conduct consultation with federally recognized Indian tribes.	●	●	●	●
Cultural Resource Management	Native American Consultation	Conduct formal consultation workshops with federally recognized tribes every __ years.	5	5	2	5
Cultural Resource Management	Native American Grave Protection and Repatriation Act	Comply with Native American Grave Protection and Repatriation Act.	●	●	●	●
Cultural Resource Management	National Historic Preservation Act Section 106	Manage existing mitigation obligations.	●	●	●	●
Cultural Resource Management	National Historic Preservation Act Section 106	Conduct reviews required by National Historic Preservation Act Section 106.	●	●	●	●
Cultural Resource Management	National Historic Preservation Act Section 106	Establish database for managing mitigation obligations.		●	●	●

Program Category	Program	Goal / Activity	Alternative			
			A - Current Management	B - Custodial Management	C - Flagship Management	D - Blended Management
Cultural Resource Management	National Historic Preservation Act Section 106	Develop and implement programmatic agreements with individual states regarding compliance for repetitive actions.			●	
Cultural Resource Management	National Historic Preservation Act Section 106	Develop emergency procedures for requirements under National Historic Preservation Act Section 106.			●	
Cultural Resource Management	Preservation Program	Conduct archaeological surveys of __ acres of TVA-managed lands per year.	2,000	1,000	5,000	3,000
Cultural Resource Management	Preservation Program	Maintain historic photo collection, cemetery database, and TVA's historic agency information.	●	●	●	●
Cultural Resource Management	Preservation Program	Maintain the current database or develop a comprehensive database to unify TVA's cultural resource data sources in one location for improved resource management	●	●	●	●
Cultural Resource Management	Preservation Program	Improve curation and management of TVA Historic Collection.		●	●	●
Cultural Resource Management	Preservation Program	Conduct identification surveys of historic structures on TVA-managed lands.		●	●	●
Cultural Resource Management	Preservation Program	Annually evaluate and nominate __ sites to the National Register of Historic Places.		2	6	2 - 4
Cultural Resource Management	Preservation Program	Improve the preservation program through development of implementation procedures.		●	●	●
Cultural Resource Management	Preservation Program	Partner with stakeholders to identify traditional cultural properties.			●	
Cultural Resource Management	Preservation Program	Develop an online interactive cemetery database for public use.			●	
Cultural Resource Management	Preserve America	Conduct adaptive reuse studies of TVA historic buildings.	●	●	●	●

Program Category	Program	Goal / Activity	Alternative			
			A - Current Management	B - Custodial Management	C - Flagship Management	D - Blended Management
Cultural Resource Management	Preserve America	Submit National Historic Preservation Act Section 3 report on Section 110 progress every three years.		●	●	●
Cultural Resource Management	Preserve America	Develop and implement a plan for TVA-owned historic properties suitable for heritage tourism.		●	●	●
Cultural Resource Management	Preserve America	Develop 3-5 new partnerships per year to promote heritage tourism and historic properties.			●	
Cultural Resource Partnerships	Cultural Resource Partnerships	Provide 1 - 2 grant opportunities for archaeological and/or historical research for both academic and nonacademic publications.			●	
Cultural Resource Partnerships	Cultural Resource Partnerships	Provide support for 1 - 2 archaeological field schools.			●	
Public Outreach (Cultural)	Archaeological Outreach (Thousand Eyes)	Conduct __ events each year involving ___ partners.	2 - 3 events	3 - 5	10 - 15 events involving 5 - 10 partners	5 - 10 events involving 3 - 5 partners
Public Outreach (Cultural)	Corporate History Program	Develop a formal TVA corporate history program and provide regular updates to the TVA Timeline.			●	●
Public Outreach (Cultural)	Corporate History Program	Develop an oral history program.			●	●
Public Outreach (Cultural)	Corporate History Program	Develop an annual history public outreach component with 3-5 events and associated Web site.			●	website only
Public Outreach (Cultural)	Corporate History Program	Develop a history and archaeology museum.			●	

Table 3-5. Recreation Management Components of Alternatives A - D

Program Category	Program	Goal / Activity	Alternative			
			A - Current Management (No Action)	B - Custodial Management	C - Flagship Management	D - Blended Management
Campground Management	Management of Campgrounds on Dam or Power Plant Reservation	Manage 8 campgrounds.	●	●	●	●
Campground Management	Management of Campgrounds on Dam or Power Plant Reservation	Make proactive upgrades to __ campgrounds consistent with ADA accessibility guidelines and provide new or upgraded fixed assets with best tested sustainable technologies.	2	1	8	8
Campground Management	Management of Campgrounds on Dam or Power Plant Reservation	Establish and maintain one flagship campground for installation and testing of emerging technologies with innovative design and efficiency measures.	●		●	●
Campground Management	Management of Campgrounds off Dam and Power Plant Reservations	See third-party management agreements for __ campgrounds and consider closure of at least one if third-party agreement is unavailable.	4	3	4	4
Campground Management	Management of Campgrounds off Dam and Power Plant Reservations	Proactively upgrade up to __ campgrounds consistent with ADA accessibility guidelines and provide new or upgraded fixed assets with best tested sustainable technologies.			4	3
Campground Management	Management of Campgrounds off Dam and Power Plant Reservations	Seek and implement contractual agreements to manage campgrounds located on other reservoir properties.	●	●	●	●
Day-Use Area Management	Day Use Areas on Dam Reservations	Continue to operate and manage 30 day use areas located on dam reservations.	●	●	●	●

Program Category	Program	Goal / Activity	Alternative			
			A - Current Management (No Action)	B - Custodial Management	C - Flagship Management	D - Blended Management
Day-Use Area Management	Day Use Areas on Dam Reservations	Implement __ best-tested sustainable initiatives per year and upgrades to meet the ADA accessibility guidelines.	1		4	2
Day-Use Area Management	Day Use Areas off Dam Reservations	Continue to operate and manage 33 day use areas .	●		●	●
Day-Use Area Management	Day Use Areas off Dam Reservations	Proactively upgrade up to __ day use areas per year consistent with ADA accessibility guidelines.	1		4	2
Day-Use Area Management	Day Use Areas off Dam Reservations	Seek, develop, and implement contractual agreements to manage up to 33 areas or review the areas for closure.	●	●	●	●
Day-Use Area Management	Greenways	Assist with development of 20 greenway miles per year.			●	
Day-Use Area Management	Stream Access Sites	Manage 31 stream access sites and investigate blueways partnerships on TVA land.	●	●		●
Day-Use Area Management	Stream Access Sites	Manage fee ownership of 81 stream access sites.	●	●	●	●
Day-Use Area Management	Stream Access Sites	Develop and implement 81 improved stream access sites on TVA managed lands.			●	
Day-Use Area Management	Stream Access Sites	Continue to manage and/or seek, develop, and implement additional third party agreements for up to __ stream access sites. Includes option to close sites.	50	81	81	81
Day-Use Area Management	Stream Access Sites	Assist partners with acquisition and development of 6 stream access sites per year.			●	
Day-Use Area Management	Stream Access Sites	Develop __ sites per year to increase length of blueways.	1		4	

Program Category	Program	Goal / Activity	Alternative			
			A - Current Management (No Action)	B - Custodial Management	C - Flagship Management	D - Blended Management
Public Outreach (Recreation)	Annual Tours	Conduct up to __ annual tours that feature emerging green technologies on recreation areas.			6	4
Public Outreach (Recreation)	Recreation Information Management	Maintain and strive to enhance existing internet presence in support of the Environmental Information Center, partners and stakeholders.	●	●		●
Public Outreach (Recreation)	Recreation Information Management	Enhance current management to provide self-service and automated support for the Environmental Information Center.			●	
Public Outreach (Recreation)	Recreation Information Management	Develop interactive dispersed recreation land maps.			●	
Public Outreach (Recreation)	Recreation Management Regulations	Issue regulations on use of TVA recreational facilities to enhance enforcement capabilities.			●	
Public Outreach (Recreation)	Recreation Management Regulations	Develop and implement a Resource Rangers program to support enforcement of regulations.			●	
Public Outreach (Recreation)	Tennessee Valley Camp-Right Campground Program	Establish certification program to promote environmentally responsible campgrounds and camping practices.			●	●
Public Outreach (Recreation)	Tennessee Valley Camp-Right Campground Program	Certify 1 to 2 campgrounds per year.			●	●
Recreation Assessment and Design Tools	Boating Density Assessments	Conduct assessments as needed to support evaluation of permit requests and land use proposals.	●	●	●	●
Recreation Assessment and Design Tools	Boating Density Assessments	Partner with state boating law administrators to complete 2 comprehensive boating capacity studies per year.			●	

Program Category	Program	Goal / Activity	Alternative			
			A - Current Management (No Action)	B - Custodial Management	C - Flagship Management	D - Blended Management
Recreation Assessment and Design Tools	Reservoir Lands Recreation Inventory Management	Update recreation inventory for __ TVA-managed reservoirs per year.	15		46	23
Recreation Assessment and Design Tools	Reservoir Lands Recreation Inventory Management	Conduct user surveys, field reconnaissance, and assessments to ensure ongoing compliance with regulations.	●	●	●	●
Recreation Assessment and Design Tools	Recreation Design Principles	Implement standard construction designs that promote compliance with the ADA accessibility guidelines, principles of universal design, or other accredited design standards.	●	●	●	●
Recreation Assessment and Design Tools	Recreation Planning, Assistance, and Technical Support	Utilize regional recreation data to guide potential expansion of new campgrounds on TVA-managed lands allocated for developed recreation use.	●	●	●	●
Recreation Assessment and Design Tools	Recreation Planning, Assistance, and Technical Support	Utilize TVA technical staff, existing and emerging standards, and plan library to support Valley recreation plans and projects requested by local, state, and federal agencies on a fee basis.	●	●	●	●
Recreation Assessment and Design Tools	Recreation Planning, Assistance, and Technical Support	Provide technical support to other agencies and stakeholders and share recreation information.	●		●	

Table 3-6. Water Resources Management Components of Alternatives A - D

Program Category	Program	Goal / Activity	Alternatives			
			A - Current Management (No Action)	B - Custodial Management	C - Flagship Management	D - Blended Management
Aquatic Monitoring and Management	Aquatic Ecology Management	Partner and actively participate in maintaining and enhancing aquatic biological communities.		●	●	●
Aquatic Monitoring and Management	Aquatic Ecology Management	Join and support collaborative partnerships to identify and implement protection needs, foster partnerships, and conduct outreach efforts in up to ___ healthy watersheds (Clinch, Powell, and Duck watersheds).		1	3	3
Aquatic Monitoring and Management	Stream and Tailwater Monitoring	Conduct __ stream assessments per year.	110	110	150	125
Aquatic Monitoring and Management	Stream and Tailwater Monitoring	Share stream and reservoir data.	as requested	as requested	online interactive data	online
Aquatic Monitoring and Management	Climate Change Sentinel Monitoring	Monitor __ watershed(s) per year in each of the five predominant ecoregions in the Tennessee Valley (long-term trending analysis).		1	2	2
Aquatic Monitoring and Management	Climate Change Sentinel Monitoring	Monitor __ sentinel locations per watershed.		2	3	2
Aquatic Monitoring and Management	Climate Change Sentinel Monitoring	Manage data, conduct trending analysis, and report findings on a 5-year cycle.		●	●	●
Partnership Programs (Water)	Case Study / Research Initiative Program	Conduct 3 water improvement case studies/research projects per year and share results to increase partner awareness and education.			●	
Partnership Programs (Water)	Strategic Partnership Planning	Maintain existing relationships and partnerships for water quality protection and improvement efforts.	●	●	●	●

Program Category	Program	Goal / Activity	Alternatives			
			A - Current Management (No Action)	B - Custodial Management	C - Flagship Management	D - Blended Management
Partnership Programs (Water)	Strategic Partnership Planning	Develop new or enhance existing strategic relationships and partnerships focused on regional water resource planning efforts.			●	●
Public Outreach (Water)	Tennessee Valley Clean Marina Program	Collaborate with marina owners to maintain their clean marina certifications.	●	●	●	●
Public Outreach (Water)	Tennessee Valley Clean Marina Program	Develop and provide marina owners/operators with outreach materials and training on existing obligations and best management practices to protect water quality			●	●
Public Outreach (Water)	Tennessee Valley Clean Marina Program	Certify ___ new marina(s) per year			2	1
Public Outreach (Water)	Water Efficiency Program (Current Only)	Deliver 10 educational workshops per year	●			
Public Outreach (Water)	Water Resource Outreach Campaign	Evaluate, develop, and execute public outreach activities to raise awareness of water resource protection and improvement efforts.		●	●	●
Public Outreach (Water)	Quality Growth Program (Current Only)	Deliver 25 communication products including workshops, new training products, various awards, and/or conferences per year	●			
Water Resource Improvement Programs	Reservoir Shoreline Stabilization / Riparian Management	Stabilize __ miles of critically eroding shoreline per year.			8	3
Water Resource Improvement Programs	Targeted Watershed Initiative Program (Current Only)	Reduce suspended sediment reaching streams by 234 tons per year.	●			

Program Category	Program	Goal / Activity	Alternatives			
			A - Current Management (No Action)	B - Custodial Management	C - Flagship Management	D - Blended Management
Water Resource Improvement Programs	Targeted Watershed Initiative Program (Current Only)	Reduce phosphorus reaching streams by 350 pounds per year	●			
Water Resource Improvement Programs	Targeted Watershed Initiative Program (Current Only)	Improve 1 hydrologic units in 5 years	●			
Water Resource Improvement Programs	Targeted Watershed Initiative Program (Current Only)	Deliver 50 stakeholder products per year	●			
Water Resource Improvement Programs	Water Resource Grant Program	Develop and implement evaluation, management and implementation processes to establish a grant program.			●	
Water Resource Improvement Programs	Nutrient Source - Watershed Identification and Improvement	Conduct current targeted TVA Vital Signs and Fixed Station water chemistry monitoring programs		●	●	●
Water Resource Improvement Programs	Nutrient Source - Watershed Identification and Improvement	Use existing and new nutrient data combined with flow data to determine and quantify the top three reservoirs receiving the greatest phosphorus and nitrogen loadings.		●	●	●
Water Resource Improvement Programs	Nutrient Source - Watershed Identification and Improvement	Develop a reservoir-specific improvement plan for ___ of the top three reservoirs over the life of the NRP.		1	3	2
Water Resource Improvement Programs	Nutrient Source - Watershed Identification and Improvement	Implement plan to reduce point-source phosphorus reaching ___ reservoir(s) by 5,000 pounds per reservoir.			3	1

Program Category	Program	Goal / Activity	Alternatives			
			A - Current Management (No Action)	B - Custodial Management	C - Flagship Management	D - Blended Management
Water Resource Improvement Programs	Nutrient Source - Watershed Identification and Improvement	Implement plan to reduce 720 - 1,080 tons per reservoir of suspended sediment transported from watershed streams into ___ of the top three reservoirs.		1	3	2
Water Resource Improvement Programs	Nutrient Source - Watershed Identification and Improvement	Implement plan to reduce 1,100 - 1,650 pounds per reservoir of phosphorus transported from watershed streams into ___ of the top three reservoirs.		1	3	2
National Water Resource Recovery Programs	Northern Gulf of Mexico / Mississippi River Basin Nutrient Load Reductions	Obtain, consolidate, and evaluate existing data from lower Tennessee River reservoirs and watersheds and select one reservoir as the focus for nutrient source loading and delivery modeling.			●	●
National Water Resource Recovery Programs	Northern Gulf of Mexico / Mississippi River Basin Nutrient Load Reductions	Monitor selected reservoir for one year in order to support model development.			●	●
National Water Resource Recovery Programs	Northern Gulf of Mexico / Mississippi River Basin Nutrient Load Reductions	Develop a strategy and long-term action plan with partners that supports the strategy of nutrient load reduction to the Mississippi River Basin and Gulf of Mexico.			●	●
National Water Resource Recovery Programs	Northern Gulf of Mexico / Mississippi River Basin Nutrient Load Reductions	Test strategy by implementing practices in a small watershed (reservoir embayment or tributary reservoir) to demonstrate nutrient yield reduction and validate the model.			●	

Program Category	Program	Goal / Activity	Alternatives			
			A - Current Management (No Action)	B - Custodial Management	C - Flagship Management	D - Blended Management
National Water Resource Recovery Programs	Northern Gulf of Mexico / Mississippi River Basin Nutrient Load Reductions	Work with partners to implement modeled effective strategies to reduce nutrient discharge (yield) from the Tennessee River to the Mississippi River Basin and Northern Gulf of Mexico hypoxic zone.			•	

Table 3-7. Public Engagement Components of Alternatives A - D

Program Category	Program	Goal / Activity	Alternative			
			A - Current Management (No Action)	B - Custodial Management	C- Flagship Management	D- Blended Management
Public Outreach (Overarching)	Environmental Education	Develop and implement a comprehensive and coordinated Environmental Education Program.			●	●
Public Outreach (Overarching)	Volunteer Program	Establish and implement a formal volunteer program.		●	●	●
Public Outreach (Overarching)	Foundation and Trust Fund	Establish an independent "Foundation and Trust Fund" or form ties with an existing conservation focused foundation/trust fund (or equivalent) to solicit private donations to support conservation and natural resource related projects and programs.			●	●

3.2.1. Alternative A – Current Management - No Action

Under the Alternative A, TVA would continue its current natural resource management efforts by implementing the existing stewardship programs and tools aligning with existing policies and strategies and continuing to apply the existing methodology when planning lands along TVA reservoirs. This alternative emphasizes regulatory and technical requirements, assessments of TVA resources and partnerships, and projects associated with TVA recreational facilities. TVA would manage and support stewardship activities on its lands through existing prioritization methods that consider recreational and other resource needs, public safety, and public health while complying with all existing and future laws and regulations. Tables 3-3 through 3-6 list the programs and activities comprising Alternative A for biological resources, cultural resources, recreation, and water resources, respectively. The programs and activities are described in Chapter 2. There are no cross-media public engagement programs and activities (Table 3-7) associated with Alternative A.

Under Alternative A, TVA would continue to apply the Single Use Parcel Allocation methodology described in Section 2.4.1 and current land use zone definitions (Appendix F) when planning lands along TVA reservoirs, and an appropriate level of environmental review would be completed for each reservoir or group of reservoirs. Table 2-8 lists the nine reservoirs that are unplanned, use the Forecast System, or have Multiple Use Tract Allocations and for which Single Use Parcel Allocation plans have not yet been prepared. These reservoirs have a total of 143,000 acres of land to be planned.

3.2.2. Alternative B – Custodial Management

Under Alternative B, TVA would implement projects to meet the intent of the Environmental Policy including maintaining the character of TVA lands and recreational facilities and watershed water quality. TVA would develop and implement public outreach and improvement opportunities across the Valley and in associated communities. In addition, TVA would focus on transitioning the management of certain recreational facilities to other parties through contractual agreements or would close the facilities. Those specific programs that address safety and compliance with TVA's mission and relevant laws, regulations, EOs, and other policies would be implemented. As laws, regulations, and policies are created or amended, implementation activities would be revised to reflect the changes and ensure compliance. In those areas in which TVA would discontinue programs or projects, existing contractual agreements relating to those programs or projects would be honored per the terms of the agreement(s). Tables 3-3 through 3-7 list the programs and activities comprising Alternative B for biological resources, cultural resources, recreation, water resources, and public engagement, respectively. The programs and activities are described in Chapter 2. Characteristics of programs and activities specific to Alternative B are described below.

3.2.2.1. Biological Resources Management

Under this alternative, TVA would continue the current activities (as described for Alternative A) necessary to meet the requirements of laws, regulations, and policies relating to the management and protection of biological resources. A few activities not considered necessary would be eliminated and a few would be implemented at higher levels.

Sensitive Biological Resources Management

Natural Areas Management — TVA would no longer designate or remove natural areas through the reservoir lands planning process.

Terrestrial Habitat Management
Nonnative Invasive Plant Management — Under this alternative, TVA would increase its invasive plant control activities from about 600 to 1,000 acres per year. This increased acreage is based on existing commitments to manage invasive species (primarily Oriental bittersweet on the Fontana Dam Reservation) and the annual treatment of 5 percent of the 17,000 acres of TVA natural areas. TVA would also develop a new prioritized plan for controlling invasive species on areas with sensitive resources. TVA would cease participating in state exotic pest plant councils and regional early detection and rapid response initiatives.

Wildlife Habitat Enhancement Partnerships — The area of annual habitat improvements through partnership efforts would be increased from 500 to 750 acres. This increased area is based largely on the professional judgment of TVA wildlife biologists and their knowledge of the interests and available resources of existing and potential partners.

Land Management and Stewardship Programs
Land Conditions Assessment and Land Stewardship Maintenance — TVA would increase the area assessed annually from 5,000 to 20,000 acres. This increase is based on a schedule that would result in all Zone 3 and Zone 4 lands being assessed on about a 10-year cycle. Prioritized stewardship activities addressing public safety, asset preservation, and resource management needs would be implemented based on the land assessment results.

Dispersed Recreation Management
Dispersed Recreation Assessments — Under this alternative, TVA would stop the current annual evaluation of 70 dispersed recreation areas and replace them with the expanded land conditions assessments.

Dispersed Recreation Management — TVA would increase the number of heavily impacted sites annually repaired from 1 to 5; this represents about 10 percent of the known heavily impacted sites. This would provide for all of the heavily impacted sites to be repaired within 10 years, and is considered the minimum level to properly manage dispersed recreation as stated in the Environmental Policy. The number of key projects annually implemented would also increase from 1 to 5 based on the goal of dispersing a minimum number of projects across the reservoir system.

3.2.2.2. Cultural Resources Management

Under this alternative, TVA would continue and in some cases increase the current activities (as described for Alternative A) necessary to meet the requirements of laws, regulations, and policies relating to the management and protection of cultural resources. A few activities not considered to be essential custodial management would be eliminated and a few would be implemented at higher levels.

Cultural Resources Management
Archaeological Monitoring and Protection — Under this alternative, TVA would increase its efforts for protecting shoreline archaeological sites from the current amount required by project-specific mitigation to between 0.3 and 0.4 tributary shoreline miles or between 0.4 and 0.6 mainstem shoreline miles per year. This is considered to be a minimal level of effort focused on the most vulnerable shoreline sites. The length of shoreline annually monitored would similarly increase from the current mitigation-only basis to 150 miles. This

too is considered to be a minimal level of effort focused on identifying and monitoring the shoreline most threatened by erosion and looting.

Preservation Program — TVA would reduce its annual archaeological survey effort from the current 2,000 acres to about 1,000 acres; surveying this reduced area would allow TVA to meet its cultural resource responsibilities. TVA would initiate surveys to identify historic structures on its lands and set a goal of annually evaluating and nominating 2 sites to the National Register of Historic Places. This goal is based on a minimal level to better understand, raise awareness, and promote the preservation of these historic properties.

Public Outreach Programs

Archaeological Outreach (Thousand Eyes) — TVA would increase the annual number of events from 2-3 to 3-5 to better meet the minimal educational needs for archaeological resource protection and requirements for agencies to provide public outreach on this topic.

3.2.2.3. Recreation Management

In addition to the programs and activities listed below, TVA would continue to allocate lands for developed recreation purposes through the reservoir lands planning process. Approximately 21,200 acres of land have been recommended for future consideration for recreational development. Of the total, approximately 19,100 acres are currently committed under existing contractual agreements, leaving approximately 2,100 acres available for development. TVA would continue to entertain proposals for the development of commercial or public recreation facilities on these remaining lands and manage existing contractual agreements.

Campground Management

Management of Campgrounds on Dam or Power Plant Reservations — TVA would reduce its efforts to make proactive upgrades consistent with ADAAG and to provide more sustainable technologies from two to one campgrounds per year. While these upgrades are not otherwise defined as custodial, continuing one upgrade per year would maintain at least one area as a test and demonstration site. TVA would cease establishing and maintaining flagship campgrounds for the installation of emerging technologies and efficiency measures.

Management of Campgrounds off Dam and Power Plant Reservations — Under this alternative, TVA would either transfer one campground (Foster Falls) to third-party management or close it. TVA would continue to manage the other 3 campgrounds with annual positive cash flow.

Day Use Areas Management

Under Alternative B, TVA would reduce its operation of day use areas by transferring the 33 day use areas located off dam reservation properties to local, state, or federal agencies or closing them. As such, some picnic areas, picnic pavilions, swimming beaches, boat ramps, and other day use amenities may no longer be available to the public. Other amenities may be available to the public for a fee charged by the new manager. TVA would require all operators to meet relevant health, safety, and environmental protection standards and make proactive upgrades consistent with ADAAG. In the circumstance where a contractual agreement could not be reached, TVA would close that particular day use area. Unlike the other alternatives, TVA would not upgrade the off-dam reservation day use areas to meet ADA guidelines.

Stream Access Sites — TVA would close any of the 50 stream access sites currently managed under contractual agreements if the contracts cannot be renewed or new contractors found. TVA would stop its efforts to develop blueway sites.

Recreation Assessment and Design Tools
Reservoir Lands Recreation Inventory Management — TVA would stop updating the reservoir recreation inventory.

Recreation Planning, Assistance, and Technical Support — TVA would stop providing technical support and sharing recreational information with other agencies and stakeholders.

3.2.2.4. Reservoir Lands Planning

Under Alternative B, TVA would apply the Single Use Parcel Allocation methodology when planning reservoirs or groups of reservoirs. However, TVA would apply land use zone definitions (Appendix F) that vary slightly in terminology from those used for Alternative A. Table 3-8 lists the nine reservoirs for which Single Use Parcel Allocation plans have not yet been prepared. These reservoirs have a total of 143,000 acres of land to be planned.

For the purpose of this EIS, potential impacts associated with these programmatic approaches would be from a Valleywide perspective. Therefore, future environmental reviews for reservoir lands planning would tier from this EIS, and the level of NEPA review would be determined by each planning effort. All future planning efforts would be subject to TVA's NEPA procedures located at http://www.tva.gov/environment/reports/pdf/tvanepa_procedures.pdf.

TVA estimates that implementing Alternative B would reduce the duration of each planning effort. The nine reservoirs that have not been planned using the Single Use Parcel Allocation methodology are the Beech River Project1[1], Chickamauga, Fort Loudoun, Great Falls, Kentucky, Nickajack, Normandy, Wilson, and Wheeler reservoirs.

The land use zone definitions used for Alternative B are for the most part similar to those used for Alternative A. The few changes in the definitions have been captured under Zones 4, 5, and 6. In Zone 4, the proposed definition includes all islands without sensitive resources or existing development. In Zone 5, "light industrial" has been replaced with the less restrictive "industry" that includes manufacturing, fabrication, and distribution, processing, and assembly for a variety of industrial sectors including chemical, electronics, metalworking, plastics, telecommunications, and transportation. Finally, the Zone 6 definition has been revised to focus on the two types of recreation (public and commercial) described in the TVA Land Policy and to better categorize "water access" as a component of "public recreation."

As mentioned in Chapter 2, a step in the Single Use Parcel Allocation methodology includes gathering existing reservoir data. In future land planning efforts, the RLA methodology would be used as the existing reservoir data or as a baseline to compare regional trends. Table 3-7 shows the preliminary RLA allocations for those reservoirs to be planned using the Single Use Parcel Allocation methodology. Maps showing the RLA data

[1] Cedar, Dogwood, Lost Creek, Pin Oak, Pine, Redbud, and Sycamore reservoirs are considered by TVA to be the Beech River Project reservoirs and have been combined for comparison purposes.

can be found on TVA's Web site at http://www.tva.com/environment/land/assessment/index.htm.

Table 3-8. Rapid Lands Assessment Data for Reservoirs

Reservoir	Percentage of Land Area by Single Use Allocation Designation					
	Zone 2	Zone 3	Zone 4	Zone 5	Zone 6	Zone 7
Beech River Project	6	0	51	0	43	0
Chickamauga	9	34	40	1	7	10
Fort Loudoun	33	3	18	0	2	44
Great Falls	100	0	0	0	0	0
Kentucky	1	2	84	2	5	6
Nickajack	20	25	51	3	2	0
Normandy	13	15	67	0	4	<1
Wheeler	4	24	62	2	8	<1
Wilson	0	0	7	0	63	30
Average Percentage	4	12	70	2	7	5

Note: Zone 1 – Non-TVA Shoreland is not represented because the parcels are private land (on which TVA owns flowage rights) and will not change as a result of the land planning process. The figures in this table are an estimate based on the RLA and are subject to change pending additional verification.

3.2.2.5. Water Resource Management

TVA would measure the success of the programs implemented under this alternative by tracking products delivered to stakeholders and quantifying reductions in pollutant loads. The success of the Nutrient Source-Watershed Identification and Improvement program would be measured by the reduction in sediment and phosphorus reaching streams and reservoirs. TVA's methodology for measuring reductions in pollutant loads is presented in Appendix H.

Aquatic Monitoring and Management

Aquatic Ecology Management — TVA would initiate a new activity to join and support collaborative partnerships for enhancing one highly diverse watershed (the Clinch, Powell, or Duck watershed). The goal of working in one of these watersheds is based on professional judgment and meeting the goals of TVA's Environmental Policy.

Climate Change Sentinel Monitoring — This new program would be implemented by monitoring one watershed per year in each of the five predominant ecoregions. Within each watershed, two sentinel sites including headwater streams would be monitored. These are considered the minimum numbers necessary to establish a baseline to detect change.

Public Outreach (Water)

Under this alternative and Alternatives C and D, the Quality Growth and Water Efficiency Programs would be eliminated and replaced, in part, with the Water Resource Outreach Campaign.

Water Resource Improvement Programs

Nutrient Source - Watershed Identification and Improvement — This program, a component of Alternatives B, C, and D, would replace the Targeted Watershed Initiative Program of Alternative A. Under Alternative B, TVA would develop a reservoir-specific improvement

plan for one reservoir. TVA would then implement the plan to reduce suspended sediment transported into the reservoir by 720 - 1,080 tons per year and phosphorus transported into the reservoir by 1,100 - 1,650 pounds per year. The target of one reservoir is based on the intent of meeting TVA's Environmental Policy with a minimal level of invested resources. The sediment and phosphorus reduction targets are based on best professional judgment. These reductions would be achieved through partnership projects that over time will result in noticeable water quality improvements.

3.2.3. Alternative C – Flagship Management

Under Alternative C, TVA would aggressively implement existing and new programs and activities to increase its resource stewardship to the "gold standard." TVA's proactive management of biological, cultural, and water resources would be greatly increased. Recreation management activities would emphasize enhancements of existing facilities and use of sustainable technologies; development of trails, greenways, and access areas; and repair of heavily impacted areas. This alternative takes into account the interconnectivity of the various programs and activities described in Chapter 2. Tables 3-3 through 3-7 list the programs and activities comprising Alternative C for biological resources, cultural resources, recreation, water resources, and public engagement, respectively. The programs and activities are described in Chapter 2. Characteristics of programs and activities specific to Alternative C are described below.

3.2.3.1. Biological Resources Management

Under this alternative, TVA would continue the current activities (as described for Alternative A) necessary to meet the requirements of laws, regulations, and policies relating to the management and protection of biological resources. Many other programs and other activities would be implemented at higher levels than under Alternatives A and B.

Sensitive Biological Resources Management

Wetland Management — TVA would initiate a new pilot project to identify and characterize high quality "reference site" wetlands on TVA lands.

Sensitive Resources Data Management — TVA would increase its information gathering efforts and develop predictive models for endangered and threatened species.

Natural Areas Management — TVA would continue to maintain the current 154 ecologically and visually sensitive areas while monitoring a third of them annually. TVA would more proactively manage the natural areas by annually developing and implementing management plans for 33 areas until all areas are operating under a comprehensive management plan. The goal of 33 plans per year is based on having management plans developed for all current natural areas within 5 years.

Conservation Planning — TVA would increase its involvement in large-scale conservation planning by partnerships with planning efforts across the region.

Terrestrial Habitat Management

Grasslands and Agricultural Lands Management — TVA would transition from the agricultural licenses and cooperative agreements under Alternatives A, B, and D to increased efforts to reestablish and manage native grasslands in cooperation with partners.

Dewatering Projects Management — Under both this alternative and Alternative D, TVA would more proactively manage dewatering projects by refurbishing them based on the

results of engineering and hydraulic reviews, upgrade their operation, and work closely with partners to better incorporate public use into their management.

Nonnative Invasive Plant Management — TVA would increase the scale of its invasive plant control activities to 40,000 acres per year. This would annually address a large proportion of the Zone 3 and Zone 4 lands infested with invasive species. It would also allow for the necessary repeated treatments of areas to eliminate stump sprouts and seedlings expected to be present after the initial treatment.

Nuisance Animal Control — TVA would more comprehensively address nuisance animal problems by developing programmatic guidelines on their control, establishing memoranda of agreement with agencies responsible for regulating wildlife, and developing and sharing best management practices for their control.

Terrestrial Greenhouse Gas Sequestration Management — Under this alternative, TVA develop a terrestrial GHG management plan and pursue carbon offset projects on 500 acres of TVA lands for research purposes to build institutional knowledge of terrestrial carbon sequestration programs. This goal is based on best professional judgment of the land area needed for a robust research program while taking advantage of economies of scale and limiting the amount of land committed for the multi-decade span of the research program. TVA would also have a goal of entering into eight consortiums focusing on issues related to terrestrial GHG management and conducting up to six terrestrial GHG management demonstrations. These numbers are based on TVA assuming a leadership role in this research area to aggressively achieve GHG reductions.

Wildlife Habitat Council/Third-Party Certifications — TVA would initiate five new projects for WHC certification at five new locations on TVA lands. These target numbers are based on TVA's history with WHC certifications and professional judgment on the practicality of certifying facilities across the TVA region. TVA is a corporate sponsor of the WHC certification program and through this goal would show leadership in this area. TVA would also establish a third-party review and certification process for wildlife management activities on 10 percent of appropriate TVA lands annually. This annual goal is based on what TVA considers to be a sustainable level of effort on an approximate 10-year cycle to meet WHC certification criteria.

Wildlife Habitat Enhancement Partnerships — Through cooperative partnerships, TVA would improve wildlife habitat on 20,000 acres per year. This goal is in addition to existing Unit Plan implementation commitments. It is based on TVA becoming a leader in habitat enhancement partnerships on its lands under existing agreements with state and other federal agencies and through the creation of additional habitat enhancement partnerships with other organizations.

Land Management and Stewardship

Boundary Maintenance — TVA would set the goal of addressing all regional boundary maintenance needs on a 5-year cycle while incorporating new survey technologies. The 5-year goal is based on best professional judgment of the life expectancy of painted boundary markers and boundary signs and would result in all markings and signs being continuously visible and legible.

Land Conditions Assessments and Land Stewardship Maintenance — Approximately 50,000 acres would be assessed per year. This goal would result in all lands being

assessed in an approximately 5-year cycle to promote a more timely overview of their conditions and more responsive management activities.

Public Outreach (Biological)
Resource Stewardship Campaigns — In implementing this new program, TVA would deliver 25 stakeholder products annually. This number is based on the goal of addressing a variety of issues at multiple locations across the region.

Dispersed Recreation Management
Under this alternative, TVA would adjust the current systematic method of data collection and collect information only on those areas identified from the LCA. Independent dispersed recreational assessments would occur only as needed. To aid in planning, needs, and program evaluation efforts, TVA would distribute user surveys to 600 recreationists annually. This number is based on the minimum sample size needed for a statistically valid sample stratified by activity and region.

TVA would repair 25 heavily impacted dispersed recreational areas annually. This number represents about a quarter of the heavily impacted sites and would result in all of these sites being repaired within the 5-year cycle to review and update the NRP. TVA would implement 20 key dispersed recreational opportunities consistent with TVA's intent to provide ecofriendly dispersed recreation.

In an effort to break skill barriers to the full enjoyment of TVA dispersed lands, TVA would conduct approximately 100 outdoor clinics to teach members of the public how to responsibly enjoy dispersed recreation. This number is based on the plan to hold one clinic in most of the 125 counties in the Tennessee River watershed each year.

Trails Management — TVA would develop and implement a system-wide trails establishment and maintenance plan to more proactively and systematically address trail system needs. The target of adding 20 trail miles per year, while potentially exceeding the rate of increase in the popularity of day hiking (Cordell et al. 2004), would allow more trails designated for particular uses, reduce the potential for overuse of trails, and increase the feeling of solitude for trail users.

3.2.3.2. Cultural Resources Management

Under Alternative C, TVA would greatly increase its cultural resources management efforts to proactively survey for, monitor, and protect archaeological sites; improve relationships with federally recognized tribes; nominate TVA historic properties to the National Register of Historic Places (NRHP); promote heritage tourism; support archaeological research; and increase its public outreach efforts.

Archaeological Site Monitoring and Protection — TVA would monitor approximately 500 shoreline miles per year and establish targets to protect between 1.1 and 1.3 tributary shoreline miles or between 1.9 and 2.1 mainstem shoreline miles per year. These goals are based on the desirability of more proactive approaches to monitoring and protecting critically eroding or looted shoreline sites. Even at these greatly increased levels, about 4 percent of the total reservoir shoreline would be monitored each year and less than 0.1 percent of critically eroding sites on TVA land would be protected each year.

Archaeological Resources Protection Act Program — TVA would greatly increase its ARPA inspections by training and outfitting new officers to achieve a target of 5,000 security

checks per year. This level would help ensure adequate monitoring of archaeological sites and provide an increased police presence on TVA lands and waters. TVA would also issue regulations to supplement its investigative authority.

National Historic Preservation Act Section 106 — TVA would develop procedures for compliance with Section 106 under emergency situations. TVA would also pursue a programmatic agreement (PA) with individual states regarding compliance for repetitive actions such as routine requests for land use agreements and approvals under Section 26a of the TVA Act.

Native American Tribal Consultation — TVA would hold more frequent tribal consultation workshops (every two years) to improve relationships and partnerships on the management of archaeological resources on TVA lands.

Preservation Program — TVA would expand its archaeological identification surveys to cover 5,000 acres each year. This level is based on a significant increase in the resources dedicated to this activity to accelerate the completion of this inventory to about the year 2050. TVA would increase the number of nominations of TVA historic properties to the NRHP to six per year. This number is based on best professional judgment of an aggressive approach to better understand, raise awareness, and promote the preservation of these historic properties. TVA would also partner with stakeholders to identify traditional cultural properties on TVA land and develop an online interactive cemetery database for public use.

Preserve America — TVA would develop 3-5 new partnerships per year to promote heritage tourism and historic properties in a manner that benefits both the resource and the public. This range of numbers is based on best professional judgment of the interest in heritage tourism and potentially available staff resources to manage the partnerships.

Cultural Resources Partnerships — TVA would provide 1-2 grant opportunities for research leading to both academic and nonacademic publications. This number is based on the assumed availability of $100,000 to support the research; the exact number would depend on the proposals received from applicants. TVA would also provide support for 1-2 archaeological field schools per year hosted by universities at TVA sites. The number of field schools is based on available funding and academic interest in archaeological sites on TVA land.

Archaeological Outreach (Thousand Eyes) — TVA would continue this public outreach effort to sponsor 10 - 15 outreach programs per year involving 5 - 10 partners. These numbers are based on TVA proactively seeking partners to support educational activities throughout the region. By supporting 10-15 events per year, TVA would be able to reach audiences across the valley to promote widespread support for archaeological resource protection.

Corporate History Program — TVA would greatly increase its corporate history program activities including the development of a public outreach component with 3 - 5 events per year. This number is based on TVA providing opportunities across the TVA region to promote awareness of TVA's significant history. The number of events would ensure appropriate representation across the region for special events. TVA would also develop a history and archaeology museum.

3.2.3.3. Recreation Management

As described above, TVA would continue to allocate lands for developed recreation purposes through the reservoir lands planning process and would continue to entertain commercial or public recreation requests for development of lands already zoned for developed recreation and manage existing contractual agreements.

Campground Management

TVA Campgrounds on Dam and Power Plant Reservations — TVA would continue to operate and manage the eight campgrounds and would proactively upgrade all of them.

TVA Campgrounds off Dam and Power Plant Reservations — TVA would continue to operate and manage the four campgrounds and would proactively upgrade all of them.

Day Use Areas Management

TVA would continue to operate and manage the 63 day use areas located across the Valley. TVA would proactively upgrade four day use areas on dam reservations per year and four day use areas off dam reservations per year. These targets are based on the need to complete accessibility upgrades to all areas during the first 7-10 years of the 20-year planning period.

Greenways — TVA would assist with the development of 20 greenway miles per year; this goal is based on TVA's ability to provide the land rights to support partnerships for the greenway expansions.

Stream Access Sites — Of the 81 stream access sites owned by TVA, approximately 50 sites are managed under contractual agreements. TVA would maintain these agreements or seek new agreements for their operation. TVA would continue to operate the remaining 31 stream access sites. TVA also proposes to implement improvements at all 81 sites. TVA would assist partners with the acquisition and development of six stream access sites per year and develop four sites per year to increase the length of blueways. These goals are based on the anticipated availability of more funding, partnership opportunities, and meeting the increasing demand for stream access for paddle sports and fishing access.

Public Outreach (Recreation)

Annual Tours — TVA would host six annual media and technology transfer tours of campgrounds and day use recreational areas where emerging technologies would be featured and showcased. This goal is based on gaining maximum exposure of TVA's efforts in this area.

Recreation Information Management — TVA would greatly increase its efforts to make recreation information more available to the public by developing online interactive maps highlighting dispersed recreation opportunities and adding more self-service features to TVA's website and other media.

Tennessee Valley Camp-Right Campground Program — Under both this alternative and Alternative D, TVA would establish a program to certify one to two environmentally responsible commercial campgrounds per year.

Recreational Assessment and Design Tools

Boating Capacity Studies — TVA would partner with state boating law administrators to complete two studies per year. This number is based on the perceived willingness of partners to manage these studies and TVA's ability to provide funding assistance.

Reservoir Lands Recreation Inventory Management — TVA would maintain and annually update its inventory of recreation facilities at all 46 of its reservoirs. This goal of a complete annual update is based on the need to provide 100 percent accurate information on reservoir recreation opportunities.

3.2.3.4. Reservoir Lands Planning

Under Alternative C, TVA would adopt the Comprehensive Valleywide Land Plan (CVLP) described in Section 2.4.1. RLMPs would subsequently be developed and updated for a portion of a reservoir, an entire reservoir, or a group of reservoirs using the Single Use Parcel Allocation methodology. The sequence of reservoirs to be planned would be based on a prioritized list, and the highest priority reservoirs are likely to be Kentucky, Nickajack, and Wheeler. The planning process would validate and revise, as appropriate, the allocation baseline created by the existing RLMPs and the RLA methodology. At a minimum, the reservoir lands planning process would consist of the following steps:

- Collaboration with other federal and state agencies to share information and data pertaining to developed recreation, natural resource management, and water resources.
- Identification of existing conditions by assimilating existing resource data, conducting capability and suitability analysis (as appropriate), and predicting future public needs for specific allocations.
- Creation of draft plans either for a portion of a reservoir, entire reservoir, or a group of reservoirs. The draft plans would include an overview of the new lands planning process, detailed parcel descriptions, and a set of detailed maps.
- Consideration of proposals for alternative uses of TVA lands.
- Seeking and incorporation of input from the public on the draft plans.
- Issuance of a final plan, which would include an overview of the lands planning process, parcel allocations, and a set of detailed maps.
- Inclusion of the outcomes of each planning effort in future updates of the NRP. TVA would track allocation changes to assure that they continued to fall within the CVLP total allocation percentages.

TVA would also adopt the proposed changes in the land use zone definitions (Appendix F). As described above for Alternative B, the largest change in definition is the removal of the restriction to "light industrial" development on Zone 5 lands.

In summary, Alternative C includes the key components of the new lands planning implementation strategy and target ranges for Valleywide land use allocations (Table 2-11). In addition, any specific development proposal on TVA land would be subject to a site-specific environmental review.

3.2.3.5. Water Resource Management

Under Alternative C, TVA would implement programs and activities to foster increased stakeholder awareness of water resource issues and participation in water resource management. The increased emphasis would focus efforts on improvement opportunities

for watersheds and/or communities having identified water quality problems, stakeholder interest, and leveraged funding sources. An increased emphasis on shoreline stabilization and water resource improvements would be intended to enhance the characteristics of stewardship and improve the health of streams and reservoirs within the Valley. TVA would measure the success of the programs implemented under this alternative by tracking products delivered to stakeholders, quantifying reductions in pollutant loads, and counting the miles of shoreline stabilized. TVA's methodology for measuring reductions in pollutant loads is described in Appendix H.

Aquatic Monitoring and Management

Aquatic Ecology Management — Under this alternative, TVA would join and support collaborative partnerships for enhancing the three highly diverse Clinch, Powell, and Duck watersheds. The inclusion of all three watersheds is based on best professional judgment of a flagship level of commitment and meeting the goals of TVA's Environmental Policy by enhancing the most biodiverse major watersheds in the Tennessee River drainage.

Stream and Tailwater Monitoring — Under this alternative, TVA would conduct 150 stream assessments per year; this target is a 37 percent increase over the current/custodial level and would result in better coverage of large sub-watersheds not sufficiently covered by the current single samples, additional sampling for quality assurance in areas exhibiting large changes in results, and increased ability to take advantage of new cooperative monitoring opportunities. All streams would continue to be sampled on a least a fixed, five-year rotation.

Climate Change Sentinel Monitoring— This new program would be implemented by monitoring two watersheds per year in each of the five predominant ecoregions. Three sentinel sites (an increase of one site) would be monitored to include headwater streams within each watershed. These targets would provide a more robust data set than the Alternative B and D targets with a moderate expenditure of resources. Because climate change impacts are unlikely to occur equally across the entire Tennessee River watershed, or among watersheds in the major ecoregions, the flagship number of waterbodies and sites provide the more sensitive level of sentinel monitoring to detect onset of climate change impacts.

Partnership Programs

Case Studies and Research Initiatives — TVA would undertake three case studies or research projects annually. The goal of three annual studies would expose stakeholders across the Valley to information that would help them protect and improve water resources.

Public Outreach Programs

Tennessee Valley Clean Marina Program — This program would aim to certify two new marinas per year. This goal is based on best professional judgment of the interests of marina owners and outreach materials and incentives available to them.

Water Resource Improvement Programs

Reservoir Shoreline Stabilization / Riparian Management — The goal of this program would be to stabilize eight miles of critically eroding shoreline per year and would result in a total of 160 miles of shoreline stabilized during the 20-year NRP planning period. This goal is based on the upper end of the range of past annual shoreline stabilization efforts.

Nutrient Source Watershed Identification and Improvement — Under Alternative C, TVA would develop and implement reservoir-specific improvement plans for three reservoirs. This target is based on best professional judgment and the intent of meeting TVA's Environmental Policy with a higher level of invested resources. The suspended sediment and phosphorus transport goals described for Alternative B would be increased from one to three reservoirs and there would be the additional goal of reducing point-source phosphorus reaching three reservoirs by 5,000 pounds per reservoir per year. These goals are based on best professional judgment of the achievable reductions by project partners and the amount of reduction necessary to noticeably improve reservoir water quality.

National Water Resource Recovery Programs

Northern Gulf of Mexico / Mississippi River Basin Nutrient Load Reductions — Under both Alternatives C and D, TVA would establish this program focusing on modeling nutrient source loading and delivery and developing a strategy and action plan to reduce nutrient loading. Under Alternative C, TVA would extend the program by testing and implementing nutrient reduction measures.

3.2.4. Alternative D – Blended Management

Under Alternative D, TVA has identified key programs that are integral toward enhancing future implementation efforts while maintaining activities and projects that address safety, meet the intent of the Environmental Policy, and comply with TVA's mission and relevant laws, regulations, EOs, and policies. This alternative takes into account the interconnectivity of the various programs described in Chapter 2, helping to establish a foundation by which TVA may implement greater levels of programs in the future. Tables 3-3 through 3-7 list the programs and activities comprising Alternative D for biological resources, cultural resources, recreation, water resources, and public engagement, respectively. The programs and activities are described in Chapter 2. Many programs and activities would be implemented at levels between those of alternatives A or B and C. Characteristics of programs and activities specific to Alternative D are described below.

3.2.4.1. Biological Resources Management

Under this alternative, TVA would continue to meet the minimum requirements of laws, regulations, and EOs relating to the management and protection of biological resources.

Sensitive Biological Resources Management

Natural Areas Program — TVA would continue to maintain the current 154 ecologically and visually sensitive areas while monitoring a third of them annually. TVA would more proactively manage the natural areas by annually developing and implementing management plan for 15 areas until all areas are operating under a comprehensive management plan. The goal of 15 plans per year is based on having management plans developed for all current natural areas within 10 years.

Terrestrial Habitat Management

Nonnative Invasive Plant Management — TVA would control invasive plants on 1,000 acres per year, as under Alternative B. This goal is based on existing commitments to manage invasive species (primarily Oriental bittersweet on the Fontana Dam Reservation) and the annual treatment of 5 percent of the 17,000 acres of TVA natural areas.

Wildlife Habitat Enhancement Partnerships — Through cooperative partnerships, TVA would improve wildlife habitat on 750 acres per year. This goal is based on professional

judgment of TVA wildlife biologists and their knowledge of the interests and available resources of existing and potential partners.

Land Management and Stewardship
Boundary Maintenance — TVA would set the goal of addressing all regional boundary maintenance needs on a 10-year cycle while incorporating new survey technologies. The 10-year goal is based on best professional judgment of the cycle necessary to maintain adequately marked boundaries.

Land Conditions Assessments and Land Stewardship Maintenance — Approximately 35,000 acres would be assessed per year. This goal is based on what TVA considers to be a sustainable level of effort to holistically address needs on Zone 3 and Zone 4 lands to meet the spirit of the Environmental Policy.

Dispersed Recreation Management
Under this alternative, TVA would repair 15 heavily impacted dispersed recreational areas annually. This number represents about 15 percent of the heavily impacted sites and was selected as an intermediate level between the numeric goals of the other alternatives. TVA would implement 10 key dispersed recreational opportunities; this goal also represents an intermediate level between the goals of the other alternatives.

3.2.4.2. Cultural Resources Management

Under Alternative D, TVA would increase several of its cultural resources management efforts to more proactively survey for, monitor, and protect archaeological sites; nominate TVA historic properties to the National Register of Historic Places (NRHP); and increase its public outreach efforts.

Archaeological Site Monitoring and Protection — TVA would monitor approximately 250 shoreline miles per year and establish targets to protect between 0.4 and 0.6 tributary shoreline miles or between 0.9 and 1.1 mainstem shoreline miles per year. These goals are based on an intermediate level of effort between Alternatives B and C. They would likely result in the stabilization of the two to four sites annually, 0.05 percent of critically eroding sites.

Preservation Program — TVA would expand its archaeological identification surveys to cover 3,000 acres each year. This represents an intermediate level between level between Alternatives A, B, and C and would result in the inventory being completed in about year 2070. TVA would evaluate and nominate two to four TVA historic properties to the NRHP per year. This number is based on an intermediate level of effort to promote more sites each year when funding is available.

Archaeological Outreach (Thousand Eyes) — TVA would continue this public outreach effort to sponsor 5 - 10 outreach programs per year involving 3 - 5 partners. These numbers are based on providing a more proactive intermediate level of support of public outreach across the valley. Because TVA covers such a broad geographic area, the events would to be distributed across the valley. By seeking 3-5 partners per year, TVA would solicit support from other groups, agencies or academic institution to reach a broader audience and offset the costs for public outreach activities.

3.2.4.3. Recreation Management

As described above, TVA would continue to allocate lands for developed recreation purposes through the reservoir lands planning process and would continue to entertain commercial or public recreation requests for development of lands already zoned for developed recreation and manage existing contractual agreements.

Campground Management

TVA Campgrounds on Dam and Power Plant Reservations — TVA would continue to operate and manage the eight campgrounds and would proactively upgrade all of them.

TVA Campgrounds off Dam and Power Plant Reservations — TVA would continue to operate and manage the four campgrounds and would proactively upgrade the three with annual positive cash flow. Foster Falls campground would not be upgraded.

Day Use Areas Management

TVA would continue operate and manage the 63 day use areas located across the Valley. TVA would proactively upgrade two day use areas on dam reservations per year and two day use areas off dam reservations per year. These targets are based on the need to complete accessibility upgrades to all areas during the 20-year planning period.

Public Outreach Programs

Annual Tours — TVA would host four annual media and technology transfer tours of upgraded campgrounds and day use recreational areas, likely two each in the spring and fall.

Recreational Assessment and Design Tools

Reservoir Lands Recreation Inventory Management — TVA would maintain and annually update its inventory of recreation facilities on half of its reservoirs. This goal of a complete update on a two-year cycle is based on the need to provide reasonably accurate information on reservoir recreation opportunities.

3.2.4.4. Reservoir Lands Planning

Under Alternative D, TVA would adopt and implement the same reservoir lands planning strategies, land use zone definitions (including the “light industrial” restriction), and ranges in allocations as described in Alternative C (Section 3.2.3.4), including the Comprehensive Valleywide Land Plan (CVLP) described in Section 2.4.1.

3.2.4.5. Water Resource Management

Under Alternative D, TVA would implement most of the programs and activities associated with Alternative C but at a somewhat lower level of effort.

Aquatic Monitoring and Management

Aquatic Ecology Management — Under this alternative, TVA would join and support collaborative partnerships for enhancing the three highly diverse Clinch, Powell, and Duck watersheds as in Alternative C. This target is based on best professional judgment of a flagship level of commitment and meeting the goals of TVA’s Environmental Policy with a moderate investment of resources.

Stream and Tailwater Monitoring — Under this alternative, TVA would conduct 125 stream assessments per year; this target is based on an intermediate level of effort between those

of Alternatives A and B and Alternative C. All streams would continue to be sampled on a least a fixed, five-year rotation.

Climate Change Sentinel Monitoring— This new program would be implemented by monitoring two watersheds per year in each of the five predominant ecoregions. Two sentinel sites would be monitored in headwater streams within each watershed. These targets would provide a more robust data set than the Alternative B targets and would collect the minimal amount of data needed for trending analysis.

Public Outreach Programs
Tennessee Valley Clean Marina Program — This program would aim to certify one new marinas per year. This goal is based on best professional judgment and a minimal increase in program funding.

Water Resource Improvement Programs
Reservoir Shoreline Stabilization / Riparian Management — The goal of this program would be to stabilize three miles of critically eroding shoreline per year, resulting in a total of 60 miles of shoreline stabilized during the 20-year NRP planning period. This goal is based on the lower end of the range of past annual shoreline stabilization efforts.

Nutrient Source Watershed Identification and Improvement — Under Alternative C, TVA would develop reservoir-specific improvement plans for two reservoirs. This target is based on best professional judgment and the intent of meeting TVA's Environmental Policy with a moderate level of invested resources. The plans would be implemented to reduce point source phosphorus entering one reservoir and reduce suspended sediment and phosphorus inputs into two reservoirs. The numbers of reservoirs are again based on a moderate level of invested resources. The goals for nutrient reductions in terms of pounds and tons per reservoir per year are the same as those for Alternatives B and C.

3.3. Other Program Options Considered

This section describes program options and approaches that were considered but eliminated from detailed evaluation in this EIS because they either do not align with TVA's Environmental Policy or did not otherwise fulfill the NRP purpose and need.

3.3.1. Biological Program Options

Forest and Terrestrial Greenhouse Gas Management Focus
TVA would only conduct those programs and activities associated with forest management while seeking opportunities for increased terrestrial GHG sequestration. In addition, TVA would continue to implement those programs and activities to maintain or improve the health of TVA lands. The TVA lands allocated for Natural Resource Conservation and Sensitive Resource Management via the reservoir lands planning process would be utilized to implement this option. TVA would only conduct the programs relating to biological and cultural resources management that are required by laws and regulations, and the programs associated with recreation and water resource management would not be implemented.

Dispersed Recreation and Wildlife Habitat Management Focus
TVA would only implement those programs and activities associated with sustainable practices in dispersed recreation and promotion of ecological diversity and wildlife habitats on TVA lands while balancing the protection of cultural and ecological resources. In

addition, TVA would continue to implement those programs and activities to maintain or improve the health of its lands. The lands allocated for Natural Resource Conservation and Sensitive Resource Management via the reservoir lands planning process would be utilized to implement this option. TVA would only conduct the programs relating to biological and cultural resources management that are required by laws and regulations, and the programs associated with recreation and water resource management would not be implemented.

3.3.2. Recreation Program Options

Terminate Management of Recreation Facilities
Under this program option, TVA would terminate all of the programs and activities related to recreation facility management described in Section 2.3. Those contractual agreements relating to recreation management would be honored per the terms of the agreements. The recreation facilities managed by TVA would be closed, and the programs would be terminated.

Transition TVA-Managed Recreational Facilities
Under this option, TVA would transfer or seek contractual agreements for all recreational facilities and programs as described in Section 2.3. In the circumstance where a transfer or contractual agreement could not be reached, TVA would close the facility and/or conclude the program.

3.3.3. Water Resource Program Option

Terminate Water Resource Improvements
The scope of the Water Resource Management portion of this EIS has been limited to those discretionary programs or activities implemented by TVA to improve reservoir and watershed water quality proactively. Under this option, TVA would terminate all of the water resource management programs described in Section 2.5. Those contractual agreements relating to water resource improvements would be honored per the terms of the agreements.

3.4. Comparison of Alternatives

Regardless of the alternative selected, some resources would not be directly affected, either adversely or beneficially, while other resources would likely be directly or indirectly affected to a small to moderate degree across the range of alternatives. The relative impacts for each resource area are shown in figures throughout Chapter 5. The potential impacts to floodplains, navigation, air quality, and climate would be relatively similar under all alternatives.

Alternative C would create the greatest potential beneficial impacts for the following resource areas: recreation, natural areas, vegetation, wildlife, wetlands, water quality, endangered and threatened species, cultural resources, land use, prime farmland, visual resources, socioeconomics, and environmental justice. Alternative A would create the least potential beneficial impacts for the following resource areas: natural areas, vegetation, wildlife, wetlands, endangered and threatened species, cultural resources, land use, prime farmland, and visual resources. Alternative B would create the least potential beneficial impacts for environmental justice, socioeconomics, water quality, and recreation. Table 3-9 provides a comparison of resources and explains how each alternative would

affect the resource. Relative beneficial impacts to the resource are shown in figures in Chapter 5.

Table 3-9. Summary of Potential Effects by Alternative

Resource	Alternative A (No Action)	Alternative B (Custodial Management)	Alternative C (Flagship Management)	Alternative D (Blended Management)
Developed Recreation	Beneficial impacts but insufficient effort meet recreation demand	Growing gap in meeting recreation demand	Increase in the quality and quantity of recreation opportunities	Increase in the quality of recreation opportunities but little change in quantity
Dispersed Recreation	Negative impact due to increased pressure on natural resources	Beneficial impact in meeting recreation demand and managing impacts	Provides the most beneficial impact in meeting recreation demand and managing impacts	More beneficial than Alternative B but less than Alternative C
Natural Areas	Slightly adverse impacts due to lack of active management	Less adverse than Alternative A	Beneficial impacts due to proactive management	Less beneficial than Alternative C
Vegetation	Negative Impacts anticipated due to spread of invasive plants	Beneficial impact due to increase in invasive plant management	Provides the greatest beneficial impact due to increase in invasive plant management	Less beneficial than Alternative C
Wildlife	No adverse impacts			
Wetlands	No materially different impacts		Beneficial impacts due to identification, protection, and restoration efforts	Provides the greatest beneficial impacts
Water Quality	Beneficial impacts due to the Water Resource Management programs	Adverse impacts due to the reduction in Water Resource Management programs	Provides the greatest beneficial impacts	More beneficial than Alternative B but less than Alternative C
Aquatic Ecology	Beneficial impacts due to ongoing stewardship management	No materially different impacts	More beneficial than Alternatives A and B	Provides the greatest beneficial impacts
Endangered and Threatened Species	No impacts to listed aquatic species and terrestrial animal species; impacts to listed plant species due to the spread of invasive plants			
Cultural Resources	Potential negative impacts to historic properties with the exception of programs	Less negative impacts than Alternative A	Greatest beneficial impacts due to proactively promoting protection and	More beneficial than Alternatives A and B but less than Alternative

Resource	Alternative A (No Action)	Alternative B (Custodial Management)	Alternative C (Flagship Management)	Alternative D (Blended Management)
	associated with Archaeological Resources Protection Act		preservation of resources	C
Land Use	Slightly adverse impacts due to lost opportunities for recreation and natural resource protection	Greatest potential for adverse impacts	Provides the least potential for adverse impacts	Similar to Alternative C
Prime Farmland	Beneficial impacts due to biological and cultural resources programs	Greater beneficial impacts than Alternative A	Greatest beneficial impacts	More beneficial than Alternatives A and B but less than Alternative C
Visual Resources	Reduction in the scenic attraction of TVA lands	Increasingly beneficial impact in the scenic attraction of TVA lands	Most beneficial impact in the scenic attraction of TVA lands	Similar to Alternative C
Floodplains	Negligible loss of flood control and power storage, minimal effect on floodplain values			
Socioeconomics and Environmental Justice	No impacts	Small negative impacts to the economy and quality of life	Positive impacts to the economy and quality of life	Less beneficial than Alternative C
Navigation	Minimal impacts to commercial navigation			
Air Quality	No adverse impacts			
Climate	Minimal adverse impacts			

3.5. The Preferred Alternative

TVA's Preferred Alternative for the NRP is Alternative D. The programs described in tier one of Alternative D would result in overall beneficial impacts to the environment while providing TVA with a concise focus for implementing stewardship programs and activities over the next 20 years.

CHAPTER 4 - AFFECTED ENVIRONMENT

The existing conditions of various environmental resources that could be affected by implementation of the proposed NRP are described in this chapter. Because of the nature of this project, TVA has determined that adoption of the No Action or any Action Alternative would not result in waste stream generation or alteration involving solid or special wastes. Likewise, TVA has determined there would be no impacts to noise or traffic.

4.1. Recreation

4.1.1. Facility-Based Recreation

For the purpose of this EIS, the discussion of facility-based recreation focuses primarily on those recreation areas and facilities owned by TVA. The majority of TVA recreation facilities occur on TVA dam reservations and on other TVA reservoir lands allocated to Zone 6 - Developed Recreation. Developed recreation facilities are also located on TVA's.Bellefonte and Browns Ferry Nuclear, Raccoon Mountain Pumped-Storage, and John Sevier, Cumberland, and Kingston Fossil Plant reservations. TVA also owns 81 stream access sites located on streams and rivers throughout the Tennessee River watershed. Recreation facilities on dam and power plant reservations are typically operated by TVA. Other TVA recreation facilities are either operated by TVA or by another party under contract with TVA. TVA recreation facilities make up a notable proportion of all of the recreation facilities located in the TVA region (Table 4-1).

Table 4-1. Recreation Facilities Located Within the TVA Region

Facility Type	Number in TVA region	Number of TVA Facilities	Percent of Facilities in Region Managed by TVA
Picnic tables	4,000	400	10
Pavilions	400	16	4
Trail miles	3,100	100	8
Fish berms/piers	250	25	10
Swimming beach	150	12	8
Swimming/splash pools	150	0	0
Playgrounds	400	6	2
Play courts	400	6	2
Golf courses	500	0	0
Amusement parks	65	0	0
Visitor centers	40	9	23
Overlooks	75	22	29
Museums	400	0	0
Campsites with water and electric hookups	18,000	270	2
Campsites without water and electric hookups	5,000	400	8
Boat ramps	1,200	49	4
Boat ramp parking	24,000	1,200	5
Wet boat slips	35,000	0	0
Dry boat slips	5,000	0	0

Facility Type	Number in TVA region	Number of TVA Facilities	Percent of Facilities in Region Managed by TVA
Stream access sites	200	81	41

Source: Extracted from State Comprehensive Outdoor Recreation Plans inventory data for TVA region states

Recreation demand is driven by population levels, recreation participation rates, changing preferences for different types of recreation, and innovations in recreation equipment. Analysis of the current U.S. Census data provides estimates over the next 20 years of population increases of about 17 percent for the TVA region (Table 4-15). Assuming that current participation rates remain relatively constant, recreation demand is anticipated to grow in direct proportion to the population. Consequently, public use of TVA lands, shoreline, and waterways to fill the recreation demand will likely increase.

TVA currently has around 21,200 acres committed to helping fill demand for developed recreation through their designation as Zone 6 - Developed Recreation in RLMPs. About 2,100 acres (10 percent) of this Zone 6 land is not committed through a land use agreement to developed recreation and a small portion of the committed land is not yet developed. If TVA chooses to assist in filling the projected increase in recreation demand over the next 20 years and provide the same proportion of facilities as listed in Table 4-1, it would require an additional commitment of around 3,500 to 3,600 acres and increased development of facilities and infrastructure by between 18 and 19 percent. TVA currently provides around 5 to 10 percent of the public recreation facilities in the region, and TVA could choose to operate in that range over the next 20 years.

As described in Section 2.3, TVA operates several campgrounds and day use recreation areas. TVA currently has land use agreements for the operation of 164 campground and 135 marinas on its Zone 6 lands by private and other public operators. These are a major component of the approximately 350 campgrounds and 190 marinas in the region. Assuming that most facilities are operating at or close to their capacity, there would need to be an overall increase of an additional 63 to 67 campgrounds and 34 to 36 marinas to provide for recreation needs over the next 20 years.

TVA would continue to provide land use agreements for public and commercial recreation facilities on TVA lands. Currently, TVA provides land for 24 state parks. In order to meet demand over the next 20 years, TVA would need to provide land and funding assistance for up to four additional state parks as the increasing population increases demand for recreation facilities in the region. Probable locations for these state parks include lands at Douglas, Watts Bar, Fontana, and Kentucky reservoirs.

TVA's current recreation strategy includes a process to ensure access to TVA's technical staff in support of recreation needs throughout the region. This process is known as the "Power Service Protocol." TVA staff provides planning and technical services for new or existing parks, recreational programs and other public-oriented facilities in the TVA power service area on a fee or sponsorship basis. Services include recreation consultation and access to TVA's library of standard plans and site plans.

4.1.2. Dispersed Recreation

TVA manages approximately 220,000 acres that are available for dispersed recreation activities. Examples of popular dispersed recreation activities on TVA lands include hiking, bank fishing,

wildlife observation, hunting, and primitive camping. Lands suitable for dispersed recreation are primarily those zoned for Natural Resource Conservation (Zone 4) and Sensitive Resource Management (Zone 3). Dispersed recreation opportunities also occur on several dam reservations (Zone 2) and on some lands zoned for Developed Recreation (Zone 6) but not yet developed. It is estimated that 6 million people engage in dispersed recreation activities on TVA lands annually (Cardno ENTRIX 2011). The general trend is rising participation rates for dispersed recreation in the Tennessee Valley region (Table 4-2).

Table 4-2. Dispersed Recreation Participation in the 125-County Tennessee River Watershed

Dispersed Recreation Activities	Participants in 2004, Millions	Projected Participants in 2010, Millions
Canoeing	0.35	0.5
Day Hiking	1.76	2.48
Migratory Bird Hunting	0.08	0.11
Kayaking	0.11	0.15
Rock climbing	0.2.0	0.27
Orienteering	0.06	0.08
Primitive Camping	0.84	1.12
Backpacking	0.44	0.58
Warmwater fishing	1.54	1.92
Swimming	1.78	2.02
View birds	1.57	1.96
Big Game Hunting	0.48	0.52
Small Game Hunting	0.51	0.65
Total All Activities	**9.72**	**12.36**

Source: Cordell et al. 2006

Most TVA land is in relatively narrow strips along the shoreline of TVA reservoirs. Of the approximately 11,000 miles of reservoir shoreline, approximately 6,800 miles is TVA-owned and managed and not encumbered by the access rights of adjacent residential landowners (TVA 1998). The spatial configuration of TVA lands is unique in that many large population centers are in close proximity to TVA land and dispersed opportunities. That is, for many Tennessee Valley residents, TVA land is the closest land to their residence which offers dispersed opportunities. While many dispersed recreation enthusiasts will travel once or twice a year to engage in their chosen activity, lands close to home provide “everyday” access to these activities.

In times of economic downturn and uncertainty recreational activities which are close to home and cost effective are often preferred. This highlights the importance of TVA lands being in close proximity to large population centers. In addition, dispersed activities on TVA lands do not require user fees which allow members from all economic classes to participate. With general trends in participation of dispersed recreation activities rising and these opportunities being available to a wide segment of the public, TVA lands are experiencing increased pressures and only become more valuable to the public as dispersed recreation assets.

TVA lands also serve as the conduit which allows the public access to the reservoirs. Recreationists who engage in water-based reservoir recreation utilize TVA lands to facilitate those activities. On many reservoirs, TVA lands are the only free public access to the water allowing for many dispersed opportunities.

TVA manages over 100 miles of trails for public use. Many trails offer multi-use opportunities such as hiking, horseback riding, and mountain biking while others are considered for foot traffic only. Trails are an important aspect of dispersed recreation management as they facilitate some of the most popular, and growing, dispersed activities such as day hiking. Trails also offer access to interior portions of TVA managed lands and facilitate other popular activities such as wildlife observation and bank fishing.

As discussed above, dispersed recreation use of TVA lands is growing. As use increases, the associated impacts resulting from this use increases as well. Impacts from use can damage the ecology of an area as well as diminish the experience of the user. For example, dispersed camping can alter or kill vegetation where tents and fire rings are placed and litter left behind after the activity is unsightly for the next user of that area. In addition, as different types of use increases the potential for user conflicts grows. Proper management is key to ensuring environmental impact is kept to a minimum and user experience remains positive.

4.2. Natural Areas

Natural areas are lands designated for a particular management objective or lands that are known to contain sensitive features or resources (TVA 2002e). For example, TVA has designated lands for protection and enhancement of sensitive resources and other features important to the area viewscape or natural environment (TVA 2010b). These lands are also managed for the enhancement of natural resources for human use and appreciation. Recreational activities, such as hunting, wildlife observation and camping on undeveloped sites, may occur in these areas. However, the overriding focus of the natural area is protecting and enhancing the sensitive resources. Natural areas may provide habitat for nationally or regionally rare species, contain exemplary biological communities and geological and important scenic features, and provide opportunities for ecological research, environmental education, or high-quality, nature-oriented recreation.

TVA natural areas (Figure A-9, Appendix A) include small wild areas (SWAs), habitat protection areas (HPAs), ecological study areas, and wildlife observation areas (WOAs) and are defined in the following paragraphs. TVA manages these areas to restrict activities that might alter or destroy significant natural elements. TVA conducts specific management activities that are suitable for a particular natural area designation (TVA 2002e). Examples of management activities are listed in Section 2.1.2. There are 31 TVA SWAs located throughout the TVA region (Figure A-9, Appendix A).

SWAs are locations with exceptional natural, scenic, or aesthetic qualities suitable for low impact public use. Appropriate development is undertaken (e.g., foot trails, signs, parking areas, backcountry campsites) to provide recreational opportunities for the public while also protecting and enhancing their exceptional qualities. SWAs require on-site assessments for determination of their condition and maintenance needs to ensure that management objectives are met and the integrity of the areas and their sensitive resources are intact.

There are 111 TVA HPAs (Figure A-9, Appendix A). HPAs are established to protect populations of species that have been identified as threatened or endangered by the USFWS or that are rare in the state in which they occur. Unusual or exemplary biological communities or

unique geological features may also be designated as HPAs. They normally have little to no development to accommodate public use. HPAs require on-site assessments for determination of their condition, status of their target species or features, and maintenance needs to ensure that management objectives are met and the integrity of the HPA and their sensitive resources are intact.

There are five TVA ecological study areas (Figure A-9, Appendix A). They consist of locations suitable for ecological research or environmental education. These areas are usually large enough to allow establishment of both experimental and control research plots. These areas typically contain plant or animal populations of scientific interest or are usually located near an educational institution that will utilize and manage the area. Ecological study areas require on-site assessments for determination of their condition, status of plant and animal populations and vitality, and maintenance needs to ensure that management objectives are met and the integrity of the ecological study area and sensitive resources protected there are intact.

There are six TVA WOAs (Figure A-9, Appendix A). The WOAs have concentrations of watchable wildlife (e.g., shorebirds, songbirds, and waterfowl) and typically are found in drawdown zones, dam reservations, urban wetlands, and bluffs. They are typically established in cooperation with TWRA's Watchable Wildlife Program. WOAs require on-site assessments for determination of their condition and maintenance needs to ensure that management objectives are met and the integrity of the WOA and resources located there are intact.

There are 229 natural areas and ecologically significant sites occurring on or adjacent to TVA lands and managed by other agencies under contractual agreements (Figure A-10, Appendix A). These non-TVA-managed areas consist of state parks, local city parks, county parks, state and national trails, state natural areas, potential and existing national natural landmarks, state wildlife management areas, national wildlife refuges, streams listed on the Nationwide Rivers Inventory, research natural areas, camps, state and national forests, mussel sanctuaries, fish hatcheries, historical areas, cultural areas, greenways, and WOAs.

There are an additional 2,379 non-TVA natural areas and ecologically significant sites throughout the TVA region not occurring on TVA lands. These additional non-TVA natural areas are not within the scope of this project.

Ecologically significant sites are areas that have some ecological or scenic significance occurring on or immediately adjacent to TVA lands. They are not necessarily managed by TVA. Several criteria are used to designate ecologically significant sites, including the following:

- Species that are listed or proposed for listing as endangered or threatened by the USFWS
- Species listed as endangered, threatened, or otherwise sensitive by any of the seven Valley states
- Unique or exemplary geological or scenic features and biological communities

Most ecologically significant sites have approximate boundaries and include designated critical habitats, potential national natural landmarks, nonessential experimental population status areas, colonial bird nesting areas, champion trees, and other areas deemed ecologically significant. Some of these locations may have a steward responsible for active or passive management of the site.

Status, Trends, and Management Needs of TVA Natural Areas
Several factors can affect the condition of natural areas. Natural events such as landslides, storm damage, wildfire, and plant succession can radically alter important habitat; human disturbance can eliminate plant and animal populations; and litter or overuse can destroy aesthetic qualities. Often a "hands off" policy with regular monitoring of significant elements is sufficient. However, some plant and animal populations and other natural features are vulnerable to human disturbance and stringent measures must be taken to protect them. Roads may have to be blocked, trails may need to be maintained or obscured, and cave entrances may need to be gated. Several species require active management to ensure their survival. Wetlands or meadows may have to be burned; other areas may require hand clearing.

Current management issues for TVA natural areas include: frequency of monitoring, lack of management plans, invasive species, vegetation management, trail maintenance, boundary marking and signage, maintenance of facilities, gates and barriers, litter and dumping, improper use, adjacent land-use and encroachment.

Because of budget constraints, TVA does not monitor its natural areas on a regular cycle. TVA staff has recently opportunistically assessed 9 of TVA's 154 natural areas; these 9 areas comprise about 15 percent of the approximately 15,000 acres of TVA natural areas. An additional 19 natural areas totaling 1439 acres have been recently assessed as part of the Land Condition Assessment (LCA; see Section 2.1.3). Five TVA natural areas have area-specific management plans.

Vegetation management of natural areas is important in eradicating or controlling invasive plants, maintaining trails, and wildlife enhancement. Invasive species are a large threat to TVA Natural Areas and were present on 6 of the 9 opportunistically inspected areas. Based on the LCA invasive plant assessment criteria, 5.4 percent of the natural area acreage was considered poor (greater than 25% coverage of invasive plants), 53.4 percent considered fair (between 5% and 25% coverage), and 41.2 percent considered good (less than 5% coverage). Using these criteria estimates, 180 acres (12.5%) are infested with one or more invasive plants. Assuming the 12 assessed natural areas are representative of all TVA natural areas, approximately 1,875 acres of TVA's approximately 15,000 acres of natural areas are infested with invasive plants.

Developed trails occur on 19 TVA natural areas. LCA results identified four natural areas with trails that needed maintenance in the form of tree removal or had recently had downed trees removed. Four of the nine opportunistically assessed natural areas contained formal trails; all of these trails were in relatively good shape with only minor repairs needed to hand railings and steps. This is not typical of SWA trails, where tree removal and minor to major repairs to bridges, steps, and hand railings are commonly needed. Other trail maintenance activities can include repairing erosion and washouts, installing and maintaining erosion control devices, and maintaining and restoring trail tread (footpath surface).

Boundary marking and signage maintenance is necessary for all TVA natural areas to ensure that the property and trails, if present, are properly marked. Signs are used to direct the public to the natural areas where low impact recreation is allowed and are placed on roads, trailheads, along trails for directional use. Signs also alert the public to use cautionary measures along bluffs or waterfalls. Of the 9 opportunistically assessed natural areas, 7 had proper boundary markers and the 4 with formal trails had proper trail markers. All 9 of these areas needed signs replaced or added and trail markers repainted due to fading. Twelve of the 19 areas assessed by the LCA needed signs replaced or added and boundaries marked.

A common problem at TVA natural areas is littering and illegal dumping; trash was noted at all 28 areas recently assessed by the two methods. Littering and illegal dumping are less of a problem at cooperatively managed TVA natural areas where there may be more frequent visitation by interested user groups and schedule trash clean-ups. Another improper use of high management concern is inappropriate use by off-road vehicles (ORVs), mountain bikers, horseback riders, rock climbers, and cavers and campers. Evidence of these improper uses, mainly from ORVs, was found on 10 of the recently assessed natural areas.

Incompatible adjacent land uses and encroachment are management issues due to their potential for introduction of invasive plants from urban and suburban gardens, tree-cutting, trampling of vegetation from heavy pedestrian or high-impact recreational use, and increased noise. Many TVA natural areas along shorelines have also been impacted by residential encroachment. Of the 9 opportunistically assessed natural areas, 3 had encroachments ranging from slight to major in severity. Encroachments were noted at 11 of the 19 assessed through the LCA.

Identification, protection and management of significant natural areas are a continuing process. As new information regarding occurrences of rare plant and animal species on TVA lands becomes available, additional areas are assessed and those judged significant are proposed for TVA natural area designation. Established natural areas that are consistently monitored are more likely to meet management objectives and ensure that significant elements of each area receive adequate protection. Condition assessments can then be analyzed for issues and resolutions to problems identified can be made. Management practices can be changed, if necessary, to benefit the natural area.

4.3. Terrestrial Ecology

4.3.1. Vegetation

For the purpose of this EIS, the terrestrial ecology discussion focuses on the lands within the combined watershed and power service area. This TVA region encompasses nine ecoregions as illustrated in Figure 4-1 and adapted from Omernik (1987). The terrain across the Valley is diverse from the mountains of the Blue Ridge to the bottomland hardwoods and cypress swamps of the Mississippi Alluvial Plain. This area, rich in biodiversity, is composed of numerous habitats and plant communities and approximately 4,000 species of herbs, shrubs, and trees (A. Weakley and B. E. Wofford, personal communication, July 6, 2010). Much of the region is heavily forested.

Ecoregions

The nine ecoregions spanned by the TVA region include the Blue Ridge, the Ridge and Valley, the Central Appalachians, the Southwestern Appalachians, the Interior Plateau, the Interior River Valley and Hills, the Southeastern Plains, Mississippi Valley Loess Plain, and the Mississippi Alluvial Plain (Omernik 1987).

The easternmost part of the TVA region is in the Blue Ridge ecoregion, an area composed of remnants of an ancient mountain chain. This region has a greater variation in terrain than other regions in the Valley. Terrain ranges from nearly level along floodplains to rugged mountains that reach elevations of more than 6,000 feet. The southern Blue Ridge ecoregion is one of the richest centers of biodiversity in the eastern U.S. and one of the most floristically diverse (Griffith

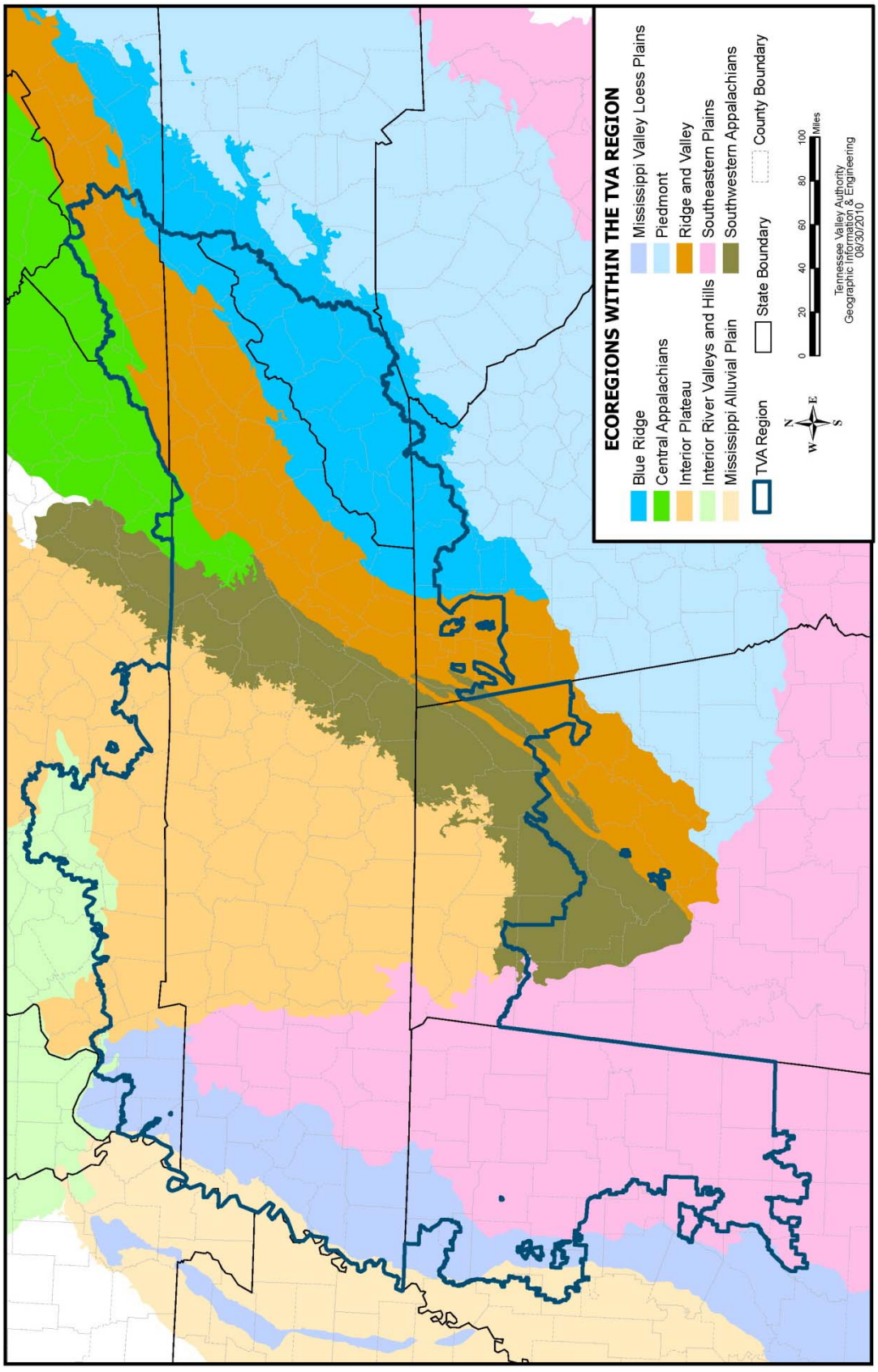


Figure 4-1. Ecoregions Within the TVA Region. Adapted from Omernik (1987).

et al. 1998). The land cover in this ecoregion is dominated (80 percent) by mesophytic forest, which includes the Appalachian oak forest, and 13.5 percent of the land cover is in the form of agriculture (Dyer 2006; USGS 2008). Within the forest regions are several significant plant communities such as the northern hardwood forests, and at the highest elevations in Tennessee and North Carolina, the southeastern spruce-fir forest. Shrub, grass, and heath balds, hemlock, cove hardwoods, and oak-pine communities are also significant. The 11 TVA reservoirs found within the Blue Ridge ecoregion include Apalachia, Blue Ridge, Chatuge, Fontana, Hiwassee, Nottely, Ocoees 1, 2, and 3, Watauga, and Wilbur.

The Ridge and Valley ecoregion is located east of the Southwestern Appalachians ecoregion and west of the Blue Ridge ecoregion. The Ridge and Valley ecoregion has complex folds and faults with alternating valleys and ridges trending northeast to southwest. Ridges have elevations of up to 3,000 feet and are generally capped by dolomites and resistant sandstones on the west sides, and valleys have developed in more soluble limestones and dolomites. The dominant soils in this province are residual clays and silts derived from in-situ weathering. Karst features such as sinkholes and springs are numerous in the Ridge and Valley ecoregion. Soils vary in their productivity, and 56 percent of the land cover is forested (USGS 2008). Mesophytic forest and Appalachian oak forest are the dominate forest regions; southern mixed forest and the oak-pine section occur in the southernmost area of the ecoregion (Dyer 2006). Land cover also includes pasture, intensive agriculture (30 percent), with 9 percent in urban and industrial areas (USGS 2008). Table 4-3 lists the TVA reservoirs and facilities located with the Ridge and Valley ecoregion.

Table 4-3. TVA Reservoirs and Facilities Located Within the Ridge and Valley Ecoregion

Beaver Creek Reservoir	Norris Reservoir
Boone Reservoir	South Holston Reservoir
Cherokee Reservoir	Tellico Reservoir
Chickamauga Reservoir	Watts Bar Reservoir
Clear Creek Reservoir	Bull Run Fossil Plant
Douglas Reservoir	Kingston Fossil Plant
Fort Loudoun Reservoir	John Sevier Fossil Plant
Fort Patrick Henry Reservoir	Buffalo Mountain Wind Farm
Melton Hill Reservoir	Watts Bar Nuclear Plant
Sequoyah Nuclear Plant	

The Central Appalachians ecoregion stretches from central Pennsylvania through West Virginia, Maryland, Virginia, and Kentucky, and into northern Tennessee (Omernik 1987). It is primarily a high, dissected, rugged plateau composed of sandstone, shale, conglomerate, and coal. The Cumberland Mountains of Tennessee and Kentucky are known for their rugged terrain, cool climate, and infertile soils. As a result, this limits agriculture, and most of the land cover is forested. According to USGS (2008), approximately 83 percent of the central Appalachians consist of mesophytic forests with areas of Appalachian oak forests covering the high hills and low mountains. The remaining land use is in the form of agriculture and urban or developed areas. No TVA reservoirs or power generating facilities occur within this ecoregion.

The Southwestern Appalachians ecoregion, subdivided into the Cumberland Plateau and Sequatchie River Valley, rises about 1,000 to 1,500 feet higher than the adjoining Ridge and

Valley ecoregion to the east and Interior Plateau to the west. It extends about 175 miles, ranging northeast to southwest across central Tennessee. The bedrock is a sequence of near horizontal Pennsylvanian sandstones, shales, conglomerates, and coals, underlain by Mississippian and older shale and carbonates. The area underlain by the resistant Pennsylvanian sandstones has produced a “table-top” landscape. Groundwater usually occurs in areas of shallow, sandy soils and in deeper cracks in the bedrock. At depth, the Mississippian carbonates possess mature Karst features. Sinkholes, large caves, sinking streams, and springs typify the landscape, resulting in a complex aquifer system. Rapid groundwater movement is typical. Approximately 75 percent of the land cover is mesophytic forest with 16 percent considered agricultural lands and almost 3 percent developed (USGS 2008). Guntersville and Nickajack reservoirs, Widows Creek Fossil Plant, Raccoon Mountain Pumped Storage Plant, and Bellefonte Nuclear Plant are in the Southwestern Appalachians ecoregion.

The Interior Plateau ecoregion is a series of grassland plateaus and forested uplands that are generally lower in elevation than the Appalachian Mountains to the east but higher than the plains to the south (USGS 2008). This ecoregion occupies much of central Tennessee and parts of Kentucky and northern Alabama. The Interior Plateau consists of the east and west Highland Rim and the Central Basin. The Highland Rim was formed from flat-lying Mississippian carbonates, and these formations constitute the most extensive aquifer in the Tennessee region. The Central Basin (Nashville Basin) is an oval area in middle Tennessee lying about 200 feet below the surrounding Highland Rim. The bedrock is carbonate rocks that are generally flat lying but are locally folded, and the soil cover is usually thin and home to a globally uncommon ecosystem, the Limestone cedar glades and barrens. The plant communities associated with the cedar glades and barrens within the Central Basin are home to 544 plant species, 448 of which are native, and of those, 21 are endemic to the glades/barrens (Baskin and Baskin 2003). The forested area of the Central Basin has closer affinities to the beech-maple-basswood forest of the Midwest than to the mesophytic forests of the other sections of the Interior Plateau. Fifty percent of the land use is in the form of agricultural practices, with 38 percent being forested and approximately 10 percent developed. TVA reservoirs found within the Interior Plateau include Great Falls, Normandy, Tims Ford, Wheeler, Wilson, and a portion of Kentucky. Power plants in the Interior Plateau are Cumberland and Gallatin Fossil Plants on the Cumberland River, and Colbert and Johnsonville Fossil Plants and Browns Ferry Nuclear Plant on the Tennessee River.

A small portion of the Interior River Valley and Hills ecoregion occurs in the TVA region in northwest Kentucky where it is comprised of nearly level lowlands dominated by agriculture and forested hills. It is characteristically underlain by carboniferous sedimentary rock drainage conditions, and terrain strongly affects land use. Wetlands are common on lowlands and bottomlands. Bottomland deciduous forests and swamp forests were once extensive on poorly drained, nearly level lowland sites, but most have been replaced by cropland and pastureland. Hilly uplands remain mostly forested. This ecoregion includes a portion of the Illinois Basin coalfield where both underground and surface coal mining are extensive. Siltation from mining and agriculture has increased flooding and prompted remedial channelization projects (Woods et al. 2002). Paradise Fossil Plant, located on the Green River in western Kentucky, and a portion of Shawnee Fossil Plant on the Ohio River occur within the Interior River Valley and Hills ecoregion.

The Southeastern Plains ecoregion, the largest ecoregion in the eastern U.S., extends from near the Gulf of Mexico in the south to Maryland in the north and up to Tennessee in the west. In the TVA region, this ecoregion is found in parts of western Alabama, eastern Mississippi, and

western Tennessee. The irregular, relatively flat plains of the region are covered by a mosaic of forests (51 percent), agricultural lands (22 percent), and wetlands (10 percent). Natural forests of pine, hickory, and oak once covered most of the ecoregion, but much of the natural forest cover has been replaced by heavily managed timberlands (USGS 2008). Three of TVA's combustion turbine facilities (Gleason, Caledonia, and Kemper) are found in the Southeastern Plains ecoregion. Reservoirs in the ecoregion are the Beech River projects, the Bear Creek projects, Pickwick, and a portion of Kentucky Reservoir.

Sandwiched between the Mississippi Valley Alluvial Plain to the west and the Southeastern Plains to the east, the Mississippi Valley Loess Plain ecoregion extends from western Kentucky south to Louisiana. The topography consists primarily of irregular plains. A highly erodible, thick layer of loess, a unique geologic deposit consisting almost entirely of wind-transported, silt-sized grains of quartz and other common minerals, is the distinguishing characteristic of this region (Omernik 1987). Forest, agriculture, and developed land account for more than 90 percent of the land cover in the ecoregion. Agriculture is the dominant land use in the northern portion. Trees, cotton, corn, soybeans, strawberries, and tobacco are common crops grown throughout the region (USGS 2008). The southern portion of the Shawnee Fossil Plant Reservation along with Brownsville, Lagoon Creek, and Marshall combustion turbine facilities occur within the Mississippi Valley Loess Plain ecoregion.

The Mississippi Alluvial Plain occurs along the Mississippi River floodplain on the very western edge of the TVA region. Bottomland hardwood forests and cypress swamps, also referred to as forested wetlands, are the dominant natural plant communities in this region. A key factor in the development and maintenance of these communities is their ability to survive extended periods of flooding. Much of land use within the region is agricultural, with some areas of deciduous forest. According to Griffith et al. (1998), soybeans, cotton, corn, sorghum, and vegetables are the main crops. The natural vegetation consists of southern floodplain forest (oak, tupelo, bald cypress). Allen Fossil Plant and Southhaven Combined-Cycle Plant occur within the Mississippi Alluvial Plain.

Forest Regions

Based on recent forest inventory and analysis plot data Dyer (2006) recognized three forest regions and two subregions in the TVA area. Much of the TVA region is dominated by the mesophytic forest, which is the most diverse among the regions with 162 tree species. No species assumes canopy dominance across the region, but red maple and white oak have the highest average importance values. Within the mesophytic forest, the Appalachian oak section is a subsection, which is dominated by various species of oak: black oak, chestnut oak, northern red oak, scarlet oak, and white oak. Dyer (2006) also notes, as previously mentioned, that the area of the Nashville Central Basin has close affinities with the beech-maple-basswood forests that dominate the Midwestern U.S. Species associated with this region are American basswood, American beech, American elm, black cherry, northern red oak, sugar maple, white ash, and white oak. The oak-pine section of the Southern Mixed forest region is found in portions of Alabama, Georgia, and Mississippi where the dominate species are loblolly pine, sweetgum, red maple, and southern red oak (Dyer 2006). The black belt area of Alabama and Mississippi has close affinities to the Mississippi Alluvial Plain and is known for its rich, dark soils. Much of the area has been cleared for agricultural purposes. The Mississippi Alluvial Plain is the final forest region found within the TVA region and is restricted to the Mississippi River Valley. The bottomland forests in this region are dominated by American elm, bald cypress, green ash, loblolly pine, sugarberry, and sweetgum.

Globally Rare Communities and Sensitive or Threatened Ecosystems
NatureServe (2009) recognizes 83 community associations (distinct assemblages of plants classified by their dominant and diagnostic species) within the TVA region as having a global ranking of G1. The G1 ranking defines communities that are critically imperiled and at a high risk of extinction due to extreme rarity (often five or fewer occurrences worldwide). A list of the G1-ranked communities can be found in Appendix J. The G1 communities are classified based on their NatureServe vegetation classification, the state in which they are found, whether they occur in rare ecosystems (described below), and in what ecoregion(s) they occur. Often, rare communities harbor endangered and native plant and/or animal species, as well as species not found outside the TVA region. Therefore, knowledge of these globally imperiled communities is important for the future implementation of the NRP.

These globally rare communities are often found in sensitive or threatened ecosystems such as the southern Appalachian spruce-fir forest; cedar glades; grasslands, prairies and barrens; Appalachian bogs, fens, and seeps (including ponds); and bottomland hardwood forests (Appendix J). Most of these sensitive ecosystems are being threatened by anthropogenic-related causes such as urban development, agricultural practices, and the introduction of exotic species. The Blue Ridge contains almost two-thirds of the globally rare communities reported from the TVA region, followed by the Interior Plateau with 17 percent and the Southwestern Appalachians with 10 percent.

Invasive Plants
Most lands in and around the TVA region have been affected by invasive plants. According to NatureServe (2009), invasive plants are the second-leading threat to imperiled native species. Not all nonnative plants pose threats to our native ecosystems. Many plants introduced by European settlers are naturalized additions to our flora and are considered nonnative noninvasive species. These “weeds” have very little negative impacts to native vegetation. Examples of these are Queen Anne’s lace and dandelion. However, other nonnative species are considered invasive and do pose threats to the natural environment. EO 13112 defines an invasive species as any species, including its seeds, eggs, spores, or other biological material capable of propagating that species, that is not native to that ecosystem and whose introduction does or is likely to cause economic or environmental harm or harm to human health (USDA 2007a). This executive order directs all federal agencies to address invasive species concerns and to refrain from actions likely to result in the introduction and/or spread of invasive species.

Invasive plants infest under and beside forest canopies and occupy small forest openings, increasingly eroding forest productivity, hindering forest use and management activities, and degrading diversity and wildlife habitat. They occur as trees, shrubs, vines, grasses, ferns, and forbs. Some have been introduced into this country accidentally, but most were brought here as ornamentals or for livestock forage. These robust plants arrived without their natural predators of insects and diseases that tend to keep native plants in natural balance. Now they increase across the landscape with little opposition, beyond the control and reclamation measures applied by landowners and managers on individual land holdings (Miller 2003).

Four plants designated as noxious weeds under the Federal Noxious Weed List of 2006 (USDA 2007b, 2009) occur in the TVA region: cogongrass, giant salvinia, hydrilla, and tropical soda apple. In addition, SE-EPPC (2008) provides a list of invasive plants that could pose threats to native ecosystems and human health in southeastern states. Currently, Georgia, Mississippi, and Tennessee have developed MOUs with federal and state agencies to create Cooperative Weed Management Areas to implement an Early Detection Rapid Response Program to assist public and private landowners with controlling invasive species. All three states have developed

these plans in hopes of controlling cogongrass. Cogongrass is an aggressive invader of natural and disturbed areas throughout the Southeast disrupting ecosystem functions, reducing wildlife habitat, decreasing tree seedling establishment and growth, and altering fire regimes and intensities (Evans et al. 2008).

Invasive plants are known to occur across southern Appalachian forests, accounting for 15-20 percent of the documented flora (USFS 2009). Miller et al. (2008) estimated the acres covered by 33 invasive plants within the southern states. These data show that 19 percent of Alabama, 5 percent of Georgia, 16 percent of Kentucky, 5 percent of North Carolina, 16 percent of Tennessee, and 10 percent of Virginia forests are estimated to be covered by one or more of the invasive plants listed in Table 4-4.

Table 4-4. Invasive Plants in the TVA Region

Growth Form	Species
Trees	Tree-of-heaven (*Ailanthus altissima*)
	Silktree or mimosa (*Albizia julbrissin*)
	Princesstree or paulownia (*Paulownia tomentosa*)
	Chinaberrytree (*Melia azedarach*)
	Tallowtree or popcorntree (*Triadica sebifera*)
	Russian olive (*Elaeagnus angustifolia*)
Shrubs	Silverthorn (*Elaeagnus pungens*)
	Autumn olive (*Elaeagnus umbellata*)
	Winged burning bush (*Euonymus alatus*)
	Chinese and European privets (*Ligustrum sinense* and *L. vulgare*)
	Japanese and glossy privets (*Ligustrum japonicum* and *L. lucidum*)
	Nonnative bush honeysuckles (*Lonicera maackii, L. morrowii, L., tartarica, L. fragrantissima,* and *L. xbella*)
	Nandina (*Nandina domestica*)
	Nonnative roses (*Rosa multifora, R. bracteata,* and *R. laevigata*)
Vines	Oriental bittersweet (*Celastrus orbiculatus*)
	Nonnative climbing yams (*Dioscorea oppositifolia* and *D. bulbifera*), Wintercreeper (*Euonymus fortunei*)
	English ivy (*Hedera helix*)
	Japanese honeysuckle (*Lonicera japonica*)
	Kudzu (*Pueraria montana*)
	Vincas or periwinkles (*Vinca minor* and *V. major*)
	Nonnative wisterias (*Wisteria sinensis* and *W. floribunda*)
Grasses and canes	Giant reed (*Arundo donax*)
	Tall fescue (*Lolium arundinaceum*)
	Cogongrass (*Imperata cylindrica*)
	Nepalese browntop or microstegium (*Microstegium vimineum*)
	Chinese silvergrass (*Miscanthus sinensis*)
	Nonnative bamboos (*Phyllostachys aurea,* other *Phyllostachys* spp., and *Bambusa* spp.)

Growth Form	Species
Ferns and forbs (broad-leaved plants)	Japanese climbing fern (*Lygodium japonicum*)
	Garlic mustard (*Alliaria petiolata*)
	Shrubby lespedeza (*Lespedeza bicolor*)
	Chinese lespedeza (*Lespedeza cuneata*)
	Tropical soda apple (*Solanum viarium*)

According to the Center for Invasive Plant Management (2009), the most effective, economical, and ecologically sound approach to managing invasive plants is to prevent them from invading. Land managers often concentrate on fighting well-established infestations, at which point management is expensive, and eradication is unlikely. Infestations must be managed to limit the spread of invasive plants, but weed management that controls existing infestations while focusing on prevention and early detection of new invasions can be far more cost-effective. Weed prevention depends on the following:

- Limiting the introduction of weed seeds
- Early detection and eradication of small patches of weeds
- Minimizing the disturbance of desirable plants along trails, roads, and waterways
- Maintaining desired plant communities through good management
- Monitoring high-risk areas such as transportation corridors and bare ground
- Revegetating disturbed sites with desired plants
- Evaluating the effectiveness of prevention efforts and adapting plans for the following year

Vegetation Types and Trends On TVA Lands

Major Vegetation Types — Based on an analysis of land use/land cover data for typical Zone 3 and Zone 4 reservoir lands, the dominant vegetation types are upland deciduous hardwood , bottomland hardwood, mixed, and evergreen forests (predominantly pine and eastern red cedar) (Figure 4-2). These four vegetation types cover about 85 percent of the land area. Four other vegetation types cover the remainder of the land area.

Forests on TVA lands are similar to forests found in Tennessee as reported by Oswalt et al (2009), where the most common forest type are deciduous hardwood forests dominated by oak-hickory. A large portion of the evergreen or pine-dominated forests on TVA lands are mature loblolly pine plantations in the southern and western Valley. Compared to Tennessee as a whole, TVA land contains a higher percentage of bottomland forest. This is largely due to the location of most TVA lands along the Tennessee River and its tributaries, where bottomlands can be extensive.

TVA has not collected Valley-wide forest inventory data since the 1990s and therefore the precise average age of its forests is not known. However, based on the most recent inventory data and the fact that TVA has only conducted very limited salvage timber harvests (primarily associated with storm or insect damage) in recent years, TVA's forested lands have likely increased in age class structure. In addition, similar trends reported in Tennessee forests (Oswalt et al. 2009) can be inferred to be occurring on TVA lands as well. These trends show the peak in age class distribution has shifted to the 56-60+ year old age class and acreage in most of the younger age classes has declined.

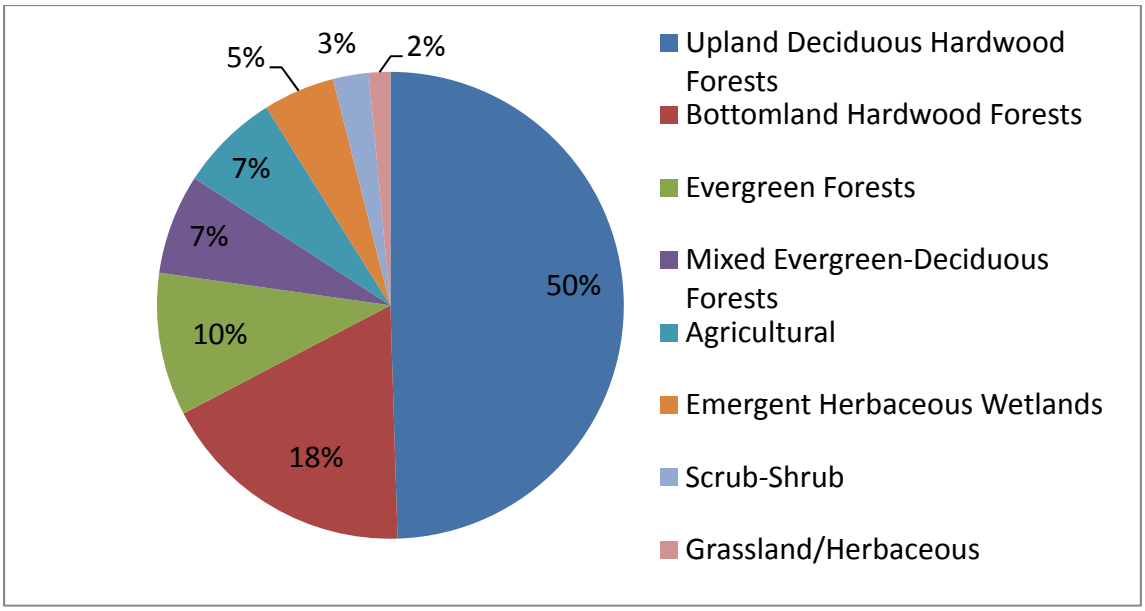


Figure 4-2. Vegetation Types on TVA Zone 3 and Zone 4 Reservoir Lands by Percent of Land Cover

In general, early successional vegetation types are decreasing across Tennessee Valley. One exception to this can be found in former agricultural license tracts in the southern and western Valley that are reverting back to bottomland hardwood forests, particularly sweetgum, green ash and red maple. Also, the loss of some loblolly pine plantations to southern pine bark beetle infestations has created pockets of early successional vegetation, particularly in the eastern portion of the TVA region. Unfortunately, much of the regenerating vegetation in these areas is impacted by the increase in nonnative invasive species that reduce plant diversity and value to wildlife habitat.

Trends in forest types between 2000 and 2010 on federal lands in Tennessee other than Forest Service and National Park Service lands were analyzed using Forest Inventory and Analysis data (USFS 2011). TVA lands make up the majority of these federal lands. This data shows large decreases in pine-dominated, other softwood, and oak-pine forest types and corresponding increases in oak-hickory and maple-beech-birch forest types to 57 percent and 13 percent of the forest area, respectively. Factors in the reduction of pine and other softwood forest types include mortality from southern pine beetle outbreaks and the hemlock wooly adelgid.

Invasive Plants

Land Conditions Assessments (LCA; see Section 2.1.3) conducted over the last three years on 33,113 acres on six reservoirs (Norris, Tellico, Melton Hill, Guntersville, Kentucky and Watts Bar) identified the extent of invasive plant infestation on TVA lands as follows:

- Good (between 0 and 5% invasive plant coverage): 11,174 acres (33.7 percent)
- Fair (between 5% and 25% invasive plant coverage): 17,435 acres (52.7 percent)
- Poor (greater than 25% invasive plant coverage): 4,504 acres (13.6 percent).

Based on these data, a total of 5,800 of the 33,113 acres (17.5%) assessed is infested with one or more invasive plant species. Using this estimate and assuming similar conditions across

other reservoir lands, at least 38,000 of the 220,000 acres of Zone 3 and 4 reservoir properties are likely infested with invasive plants.

The magnitude of invasive plant infestations on TVA lands is due in large part to the configuration of its land base. Much of TVA land is relatively linear and narrow with extensive edges where most invasive plants tend to become established. Invasive plants established for landscaping on adjacent private lands can spread onto TVA lands. Reservoirs, waterways, transmission and highway ROWs can serve as vectors for the transport of invasive plants Past efforts by TVA and other resource agencies to plant several species now considered invasive for erosion control, wildlife habitat improvement, and landscaping purposes have also contributed to the introduction and spread of invasive species.

4.3.2. Wildlife

The TVA region contains portions of nine ecoregions (see above section) providing a unique mixture of wildlife habitat. Ranging from bottomland hardwood swamps in the floodplains of the Mississippi Alluvial Plain to high elevation balds and spruce-fir/northern hardwood forests in the Blue Ridge Mountains, this diverse mixture of habitats supports a rich assemblage of wildlife communities.

Approximately 55 species of reptiles, 72 species of amphibians, 182 species of breeding birds, and 76 species of mammals occur in these regions throughout the TVA region (Ricketts et al. 1999, Stein 2002, Tennessee Ornithological Society 2007, TWRA 2005). Although some wildlife species have widespread distributions, others have restricted ranges unique to specific ecoregions (TWRA 2005). For example, forest habitats in the Blue Ridge Mountains provide globally significant habitat for many species, especially amphibians and land snails (Ricketts et al. 1999). The high elevations found in the Blue Ridge ecoregion also provide habitat for relict populations of animals typically found in more northern latitudes.

Federal legislation and policies that apply to wildlife in the TVA region include the Migratory Bird Treaty Act of 1918 and EO 13186—Responsibilities of Federal Agencies to Protect Migratory Birds. The Migratory Bird Treaty Act established the framework for regulated hunting of migratory birds and otherwise prohibited harm to migratory birds and their parts (including eggs, nests, and feathers). Conflicting decisions in various federal district courts disagree on whether this prohibition applies to the actions of federal agencies. EO 13186 requires federal agencies implementing or planning actions that could affect migratory birds and their habitats to “support the conservation intent of the migratory bird conventions by integrating bird conservation principles, measures, and practices into agency activities and by avoiding or minimizing, to the extent practicable, adverse impacts on migratory bird resources when conducting agency actions.” The EO requires federal agencies whose actions may negatively affect migratory birds to develop MOUs with the USFWS to promote migratory bird conservation. TVA has not developed this MOU. The Migratory Bird Treaty Act provides for the conservation of all native birds in the U.S. except non-migratory game birds that are managed by states.

Wildlife Trends

Many wide-ranging species occur throughout the TVA region; most species that are tolerant to humans continue to thrive in the region. Wildlife populations have been greatly altered by loss and modification of habitats due to agriculture, mining practices, forestry practices, urbanization, and the construction of impoundments. While some species flourish under these changes, others have shown marked declines (USFWS 2008). For example, grassland and woodland-dependent birds have shown dramatic decreases in their numbers (Southern Appalachian Man and Biosphere 1996). Approximately, 48 percent of grassland breeding birds are of

conservation concern, and 23 species are significantly declining in number (North American Bird Conservation Initiative [NABCI] 2009). Approximately, 22 percent of area-dependent woodland birds are of conservation concern. These numbers have declined by 10 percent through 1980 but have shown some increases in recent years (NABCI 2009). Habitats used by these species have been modified largely by urban development and agricultural practices.

In general, gulls, wading birds, waterfowl, raptors, game birds, game mammals, and nongame wildlife (reptiles, amphibians, and small mammals) exhibit stable or increasing numbers throughout the TVA region. Populations of white-tailed deer, wild turkey, coyote, and beaver have shown significant population increases. Species associated with river corridors such as osprey, herons, and Canada geese have also shown notable recoveries, largely since the ban of dichlorodiphenyltrichloroethane (DDT). This trend is quite noticeable on the Tennessee River, as breeding populations of these species had been relatively scarce in portions of northwest Alabama or northeast Tennessee up to the late 1990s. However, in recent years, breeding populations of these species have expanded into these areas and have become more evenly distributed throughout the Valley. Recent surveys show that shorebirds and waterfowl communities are quite diverse in portions of the Valley, especially during autumn and spring migrations. However, numbers of several species of songbirds continue to decline in the region, especially those typically found in grassland or unfragmented forests.

TVA Lands

While TVA manages lands across the region, most TVA lands are concentrated around its reservoirs. Habitats on TVA lands are just as complex as other lands found throughout the TVA region, supporting diverse communities of wildlife. Important habitats found in the Valley include riparian corridors, bluffs, swamps, grasslands, rivers, reservoirs, islands, large unfragmented forested landscapes, and karst habitats.

Riparian habitats associated with the Tennessee River and its tributaries provide important habitats for wildlife. Coupled with unique features such as vernal pools, oxbows, bluffs, and islands, these areas provide a diverse array of nesting and foraging habitats for wildlife.

Open lands are comprised of old-field, pasture, agricultural, and other early successional habitats. Most of these areas have been greatly modified by intensive row cropping and timber harvesting. Yet, these habitats also provide needed environment for species favoring early successional habitats.

Caves are abundant features throughout much of the Valley, especially in north Alabama, northwest Georgia, and the eastern half of Tennessee. These sites provide a unique mixture of microhabitats used by a diverse array of cave-dependent species, some endemic to single cave systems.

TVA partners with federal and state agencies to manage wildlife habitat on a number of wildlife management areas. In many cases, TVA lands are managed in conjunction with back-lying lands to form larger wildlife management units providing a more diverse and extensive land base to attract wildlife for both consumptive and nonconsumptive uses. Key Cave National Wildlife Refuge, for example, is managed collectively by USFWS, TVA, and the Alabama Department of Conservation and Natural Resources. The cave entrance is located on TVA land, and much of the aquifer underlies land owned by the USFWS. This site is used by a large maternity colony of endangered gray bats and is the only known locality of the endangered Alabama cavefish.

Hunting, Fishing, and Wildlife-Associated Recreation
Wildlife-related recreation is prevalent on TVA lands, especially on those properties surrounding TVA impoundments. The USFWS summarizes hunting, fishing, and wildlife-associated recreational trends at national and state levels. This comprehensive study began in 1955 and is performed every five years (USFWS and U.S. Census Bureau 2007). Statistics are developed using a study group ages 16 years and older. In 2006, 87.5 million Americans spent more than $122 billion on wildlife-related recreation. Approximately 30 million people fished, 12.5 million people hunted, and 71.1 million people participated in wildlife watching (USFWS 2006). While there were slight declines in hunting and fishing between 2001 and 2006, there were marked increases in wildlife-related recreation. These national trends were also observed in states within the TVA region. The TVA-region states had high participation rates in fishing, hunting, and wildlife watching relative to much of the rest of the country (USFWS and U.S. Census Bureau 2007).

TVA lands and reservoirs play an important role in supporting wildlife-related recreation. TVA works with federal and state agencies, universities, NGOs, and volunteers to support these activities. The dewatering projects on Kentucky and Wheeler reservoirs are examples of areas that are collectively managed by TVA and its partners. These areas provide a host of benefits for the public and wildlife that use them and provide economic benefits to surrounding communities.

Although hunting is not allowed at most TVA power generating facilities (Gallatin and Shawnee Fossil Plants are exceptions), several, such as Raccoon Mountain Pumped Storage Plant, provide opportunities for wildlife viewing, bank fishing, or access to waterways. Several generating facilities also allow access to warm-water discharge areas to provide additional fishing opportunities, especially during winter and spring. Ash handling and water treatment facilities at some TVA fossil plants also provide wildlife viewing opportunities.

TVA has several WOAs where the public can observe large aggregations of migratory birds or evening emergences of bats. Examples include WOAs at Kentucky Dam Reservation and Nickajack Cave TVA natural area, which is also a TWRA wildlife management area. Many of these sites are promoted by various state agencies and regional ornithological groups.

Nuisance Wildlife Management
TVA has a contract with the U.S. Department of Agriculture's Wildlife Services (USDA-WS) group to address nuisance animal issues throughout the TVA region. Based on review of annual and quarterly reports provided by USDA-WS, the most common species creating issues at TVA facilities (fossil, hydro and nuclear plants) and other infrastructure (e.g., transmission line towers) are pigeons, vultures and beavers. Species creating the most issues on TVA reservoir land and recreational areas are beavers and vultures. Based on review of USDA-WS 2010 annual report, nuisance animal issues were managed at 32 individual facility or infrastructure sites and at 24 different sites on TVA reservoir properties. Some sites, such as transmission line towers with vulture roosts, require almost constant surveillance and continuous actions while some others can be handled as one time occurrences. Additional species that can create damage and/or health and safety issues include striped skunk, raccoon, feral cat, groundhog, vole, muskrat, opossum, river otter, little brown bat, coyote, great blue heron, osprey, common grackle, Canada geese, red-tailed hawk, mourning dove, house finch, European starling and English sparrow. In general, issues with nuisance animals have increased over the last five to ten years particularly associated with increasing populations of certain species, in particular vultures, beaver, great blue heron and osprey.

4.4. Wetlands

Wetlands are highly productive and biologically diverse ecosystems that provide multiple public benefits such as flood control, reservoir shoreline stabilization, improved water quality, and habitat for fish and wildlife resources.

EO 11990 (Protection of Wetlands) directs federal agencies to minimize the destruction, loss, or degradation of wetlands and to preserve and enhance the natural and beneficial values of wetlands. In addition, activities in wetlands are regulated under the authority of the federal CWA and state regulations. Wetlands are defined by TVA Environmental Review Procedures (TVA 1983) as "those areas inundated by surface or groundwater with a frequency sufficient to support, and under normal circumstances do or would support, a prevalence of vegetation or aquatic life that requires saturated or seasonally saturated soil conditions for growth and reproduction. Wetlands generally include swamps, marshes, bogs, and similar areas such as sloughs, potholes, wet meadows, mud flats, and natural ponds."

Wetlands are typically transitional ecosystems between terrestrial and aquatic communities. The abundance of wetlands varies across the nine ecoregions encompassing the TVA region (Table 4-5). In the eastern portions of the TVA region, wetlands occupy a relatively small percent of the landscape relative to uplands within the Blue Ridge, Ridge and Valley, and Central Appalachians ecoregions. These ecoregions are typically marked by relatively steep topography and deeply incised stream channels; wetlands are typically small and isolated or linear in feature and associated with the floodplain areas of streams, rivers, and creeks (Hefner et al. 1994). Farther west, the topography levels out and wetlands become more common. Broad, flat floodplain areas are common features, and various types of wetland habitats, especially bottomland hardwood forested wetlands, are widespread.

Table 4-5. Regional Variation of Wetland Abundance by Ecoregion — 2000

Ecoregion	Proportion (Percent) of Ecoregion Covered by Wetlands (all types of wetlands)
Blue Ridge	>0.1
Ridge and Valley	>0.1
Central Appalachians	0.3
Southwestern Appalachians	0.2
Interior Plateau	>0.7
Interior River Valley and Hills	4.6
Southeastern Plains	10.3
Mississippi Valley Loess Plain	4.6
Mississippi Alluvial Plain	19.0

Source: U.S. Department of the Interior 2008

Palustrine wetlands are the predominant wetlands in the TVA region. As described by Cowardin et al. (1979), these are nontidal wetlands dominated by trees, shrubs, persistent emergent vegetation, and emergent mosses or lichens. These wetlands include bottomland hardwood forests and upland swamps (forested wetlands), scrub-shrub wetlands, beaver ponds (aquatic-bed or emergent wetlands), wet meadows and marshes (emergent wetlands), and highland bogs (forested, scrub-shrub, or emergent wetlands that have organic soils). Lacustrine

(i.e., related to a lake) and riverine (i.e., related to a river) systems are also wetland types found within the region. These wetlands consist of aquatic beds containing floating or submersed aquatic plants.

The type and extent of wetlands within the TVA region are estimated using aerial photography and remote sensing data. The primary data source is NWI maps produced by the USFWS. TVA maintains an in-house database of NWI maps for the TVA region. Produced in the 1980s, the NWI data have somewhat limited value because of age. For this EIS, as well as most other TVA environmental reviews, these data are supplemented by more recent aerial photography and land use/land cover analyses (Table 4-6).

Table 4-6. Proportion of TVA Lands With Wetlands — 2010

Location	Proportion (Percent) of Forested/Scrub-Shrub Wetlands in Study Area	Proportion (Percent) of Emergent Wetlands in Study Area
Adjacent to Reservoirs	16.0	<0.2
On Power Generation Facility Reservations	11.0	<0.4
Total	**15.0**	**0.8**

Source: TVA Data 2010

Approximately 90 percent of the wetlands on TVA lands are located on the mainstem Tennessee River reservoirs. Tributary reservoirs have few wetlands because of the steeper slope of the shorelines and the larger drawdown for flood control. The topography around mainstem reservoirs is flatter, lending itself to the establishment of wetlands. In addition, there is much less drawdown from summer pool elevation to winter pool elevation on mainstem reservoirs. In addition, there is about three times as much shoreline on mainstem reservoirs as there is on tributary reservoirs (Snoddy and Cooney 1999).

The above conclusions are supported by data prepared for the ROS (TVA 2004), as well as land use/land cover data compiled for this study. NWI data were analyzed to determine the type and extent of wetlands associated with the TVA system of reservoirs; this analysis was not limited to TVA lands and included land within groundwater influence of the reservoirs. The analysis showed approximately 197,000 acres of wetlands are found along the TVA reservoir system and within the groundwater influence area of the reservoirs.

The data showed that vegetated wetlands occur with greater frequency and size along the mainstem reservoirs and tailwaters than along the tributary reservoirs and tailwaters. This is due in part to the larger-sized watersheds of mainstem reservoirs resulting in a greater volume of water; greater predictability of the annual hydrologic regime; shoreline and drawdown zone topography (wider and flatter floodplains, riparian zones, and drawdown zones and large areas of shallow water); and larger sections of relatively still, shallow-water areas. Wetlands tend to be smaller and do not occur as frequently on tributary reservoirs because of the relatively steep drawdown zones, the rolling to steep topography of adjacent lands, shoreline disturbance caused by wave action, and the lower predictability and shorter duration of summer pool levels.

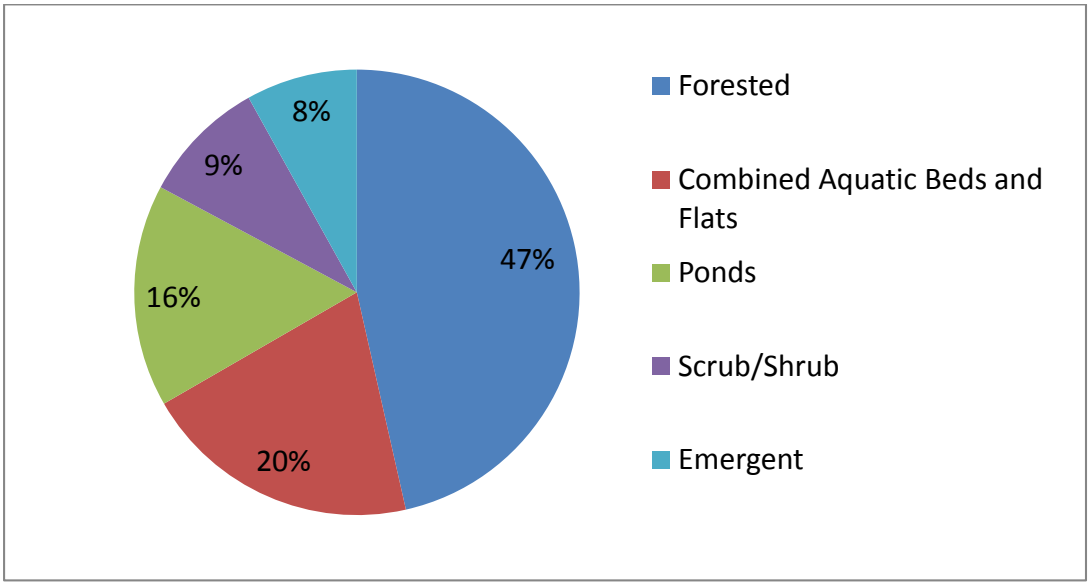
Within mainstem reservoirs, wetlands occur on flats between summer and winter pool elevations, on islands, along reservoir shorelines, in dewatering areas, in floodplains, on river terraces, along connecting rivers and streams, around springs and seeps, in natural depressions, in areas dammed by beaver, in and around constructed reservoirs and ponds

(diked and/or excavated), and in additional areas that are isolated from other surface waters. On tributary reservoirs, wetlands are typically located at the backs of coves where tributary streams enter the reservoir, and in very patchy, small (<0.01 acre) areas along the shoreline.

As shown in Figure 4-3, forested wetlands are the most common wetland type found on TVA land located adjacent to reservoirs and within the area of groundwater influence of the river system. Aquatic bed and pond wetlands are the next most common types of wetland, followed by scrub-shrub and emergent wetlands. Figure 4-4 shows the types and locations of wetlands along TVA reservoirs.

For the purposes of this EIS, an analysis was conducted of wetland types specific to TVA lands adjacent to reservoirs. This analysis showed that wetlands are less common on TVA lands than throughout the overall reservoir system. The percentage of forested and scrub-shrub wetlands is 16 percent of the overall land use/land cover. Emergent wetlands make up less than 0.2 percent as contrasted with 0.8 percent of the overall land use of the entire reservoir system.

TVA also manages lands associated with power generation facilities and dam reservations. In general, emergent wetlands (marshes) are common around ash disposal ponds and water treatment ponds at power generation facilities. Forested wetlands occur on lower-lying, undisturbed areas and along tributary streams on power generation sites. Land use/land cover data indicated forested and scrub-shrub wetlands comprise approximately 11 percent of the total land use/land cover status of the power properties. Emergent wetlands are much less common, comprising less than 0.4 percent of total land use.



Source: TVA data.

Figure 4-3. Wetlands of the TVA Reservoir System by Vegetation Class

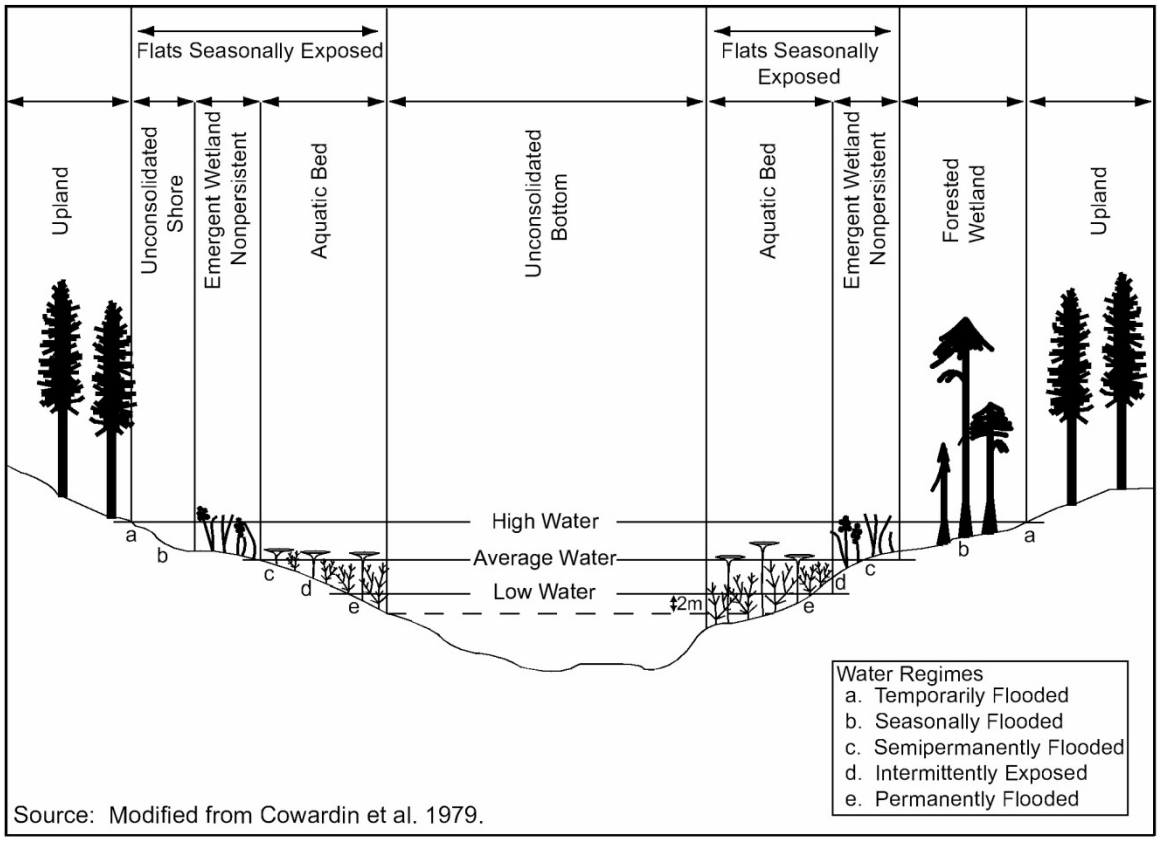


Figure 4-4. Reservoir Wetland Types and Locations

Status and Trends

Historically, the wetland acreage across the TVA region has declined over the past 30 years, but the rate of loss has slowed significantly over the past 10 years due to regulatory mechanisms for wetland protection. National wetlands trend studies (Dahl 2000) indicate that, between 1986 and 1997, freshwater forested wetlands declined 2.3 percent, and freshwater emergent wetlands declined 4.6 percent. Parts of these declines were due to conversion of forested and emergent wetlands to scrub-shrub wetlands and freshwater ponds during the study period. Timber harvesting, agriculture, natural succession, beaver activity, changes in land use (including urban and rural development, mining, and recreation such as golf courses), and conversion of bottomland forests to managed pine plantations played a role in these trends in wetland change. These trends are likely to continue to various degrees over the next 30 years. National trend data do not include analyses of flats and aquatic bed coverage; however, TVA data indicate an increase in coverage of aquatic beds between the 1960s and 2000s (TVA 2004).

National trends are mirrored by general trends in the Southeast. These data indicate that forested, emergent, and scrub-shrub wetlands have suffered a net loss in acreage. This is primarily due to transportation impacts, the continued growth of urban/suburban development associated with continued population growth, and to a lesser degree, agriculture and timber harvesting (Hefner et al. 1994; Dahl 2006; Keeland et al. 2004). These same data indicate a net increase in open water ponds created as agricultural impoundments, by urban and suburban

development, and as the result of compensatory mitigation for the loss of emergent wetlands for regulatory purposes (Dahl 2006).

The area of emergent, scrub-shrub, and forested wetlands (located on and immediately adjacent to TVA reservoirs) has remained relatively stable as compared to the trend for these wetland types in the Southeast (Hefner et al. 1994). Forested wetlands have been the most heavily impacted on private land throughout the TVA region over the last 50 years. The presence of wetlands on or adjacent to TVA reservoirs appears related to the development status of the shoreline. Within the 0.25-mile shoreline area, the proportion of total wetlands acreage was greater along undeveloped shorelines than along developed shorelines. This is partially explained by the fact that many wetlands occur in low-lying or flood prone areas where development is often restricted (TVA 1998).

Current Management Issues
In general, wetlands on TVA lands face less threat of direct impacts related to development than wetlands on private land. Where direct impacts do occur as the result of TVA projects or land disposal actions, impacts are typically mitigated to offset any immediate or cumulative effects. Common problems across TVA lands are typically more indirect types of impacts including:

- Invasive species
- Lack of buffer zones
- ATV impacts
- Encroachments, especially unauthorized removal or alteration of wetland vegetation
- Changes in vegetation community structure (e.g., decline of buttonbush on Kentucky reservoir)
- Impacts of beaver populations/impoundments on forested wetlands (e.g., conversion to open water, scrub/shrub and emergent wetlands)
- Impacts of climate change.

These types of problems are recorded during land condition assessments and their trends will be assessed in future assessment efforts. Overall, these management problems are not unique to TVA lands, and lead to subtle changes in the type, extent, and quality of wetland habitats.

4.5. Water Quality

The quality of the region's water is critical to protection of human health and aquatic life. These water resources provide habitat for aquatic life, recreation opportunities, domestic and industrial water supplies, and other benefits. Water quality can be affected through point sources, such as wastewater treatment plants and industries, and through nonpoint sources, such as air emissions and deposition, construction and development, urban runoff, mining, agriculture, and silviculture.

The Tennessee River basin contains all except one of TVA's dams. A series of nine locks and dams built mostly in the 1930s and 1940s regulates the entire length of the Tennessee River and allows navigation from the Ohio River to Knoxville. Virtually all the major tributaries have at least one dam. In addition to the nine reservoirs on the mainstem of the Tennessee River, TVA operates 38 tributary dams for various combinations of power generation, flood control, pumped storage, navigation, recreation, water supply, economic development, and fish and wildlife habitat. This system of dams and their operation is the most significant factor affecting water quality and aquatic habitats in the Tennessee River and its major tributaries.

Water quality is generally good in the TVA region. Most beneficial uses (as designated by the states) are supported in most water bodies, including fish and aquatic life, public and industrial water supply, waste assimilation, agriculture, and water-contact recreation. Of the approximately 42,000 perennial stream miles in the Valley (TVA 1971), 8,500 miles are not supporting their designated uses (compiled from seven Valley states 2008 and 2010 305(b) reports), and 113,000 acres of lakes and reservoirs (compiled from seven Valley states 2008 and 2010 305(b) reports) (out of approximately 660,000 total acres [compiled from 2000 U.S. census GIS coverage]) are not supporting their uses.

Ecological health in TVA reservoirs is monitored by the Vital Signs Monitoring Program. This program uses five metrics: chlorophyll concentration, fish community health, bottom life, sediment contamination, and DO. Values of good, fair, or poor are assigned to each metric. All TVA reservoirs have at least two monitoring locations, one in the deep area near the dam (forebay), and one in the upstream end of the reservoir (inflow). Larger reservoirs also have a midreservoir site, and some have sites in major embayments. These scores are combined for a representative summary score for each reservoir. The principal water quality concerns in TVA reservoirs identified by Vital Signs monitoring, along with state 303(d) and 305(b) information and state-issued fish consumption advisories, are summarized in Table 4-7.

TVA also monitors ecological health in the streams of the Valley. The STM Program assesses the condition of the biological community at sites throughout the Valley. The primary tool in this assessment is a fish IBI that uses 12 metrics to arrive at an overall score for the health of the fish community at each site. This program also collects data on the health of the benthic community. These data complement state monitoring programs and are frequently used by them to aid in assessing use support.

Of the 869 active monitoring stations, 544 have been matched to 11-digit HUs to track and evaluate the overall water quality on an HU basis. These HU stations are typically monitored on a five-year cycle. A combination of reservoir and stream monitoring data is used to rate a total of 598 HUs; the remaining seven Valley HUs have no suitable location for collecting data to characterize their condition (see Figure A-12, Appendix A).

Most of the state listings for impaired streams in the TVA region are ascribed to pollution from sediment or bacterial contamination. Sediment sources are mostly erosion from agriculture, silviculture, and construction activities. Bacteria are from contamination from fecal material from livestock, malfunctioning septic systems, leaking sewage collection systems, and urban runoff. Plant nutrients are also an important pollutant. These come from agriculture, wastewater treatment plants, and urban runoff. Nutrients stimulate the growth of algae and cause shifts in aquatic communities. In reservoirs, excessive algae growth consumes DO, which in turn limits available aquatic habitat in the reservoir and can influence the health of the aquatic community. Low DO levels in stream reaches downstream of TVA dams are associated with low DO within the reservoirs. Long stretches of river can be affected, especially in areas where pollution further depletes DO. In addition, flow in these sections of stream can be determined by the amount of water released from the upstream dams, and in the past, some of the tailwaters were subject to periods of little or no flow. Since the early 1990s, TVA has addressed these issues by installing equipment to increase DO concentrations below 16 dams. At the same time, TVA made operational changes and installed additional equipment to ensure minimum water flows through its dams.

Table 4-7. Ecological Health Ratings of TVA Reservoirs

Reservoir	Ecological Health Rating	Score	Latest Survey Date	Concerns	State Listing as Impaired	Causes	Sources	Fish Consumption Advisory
Apalachia	Good	84	2008		None			Hg North Carolina statewide
Bear Creek	Fair	64	2007	DO	AL, 654 acres	Organic enrichment, low DO		Hg
Beech	Poor	51	2008	DO, chlorophyll	None			None
Blue Ridge	Good	83	2007	DO	None			Hg
Boone	Poor	50	2007	DO, chlorophyll, bottom life	TN, 1968 acres	PCBs, Chlordane	Contaminated sediment	PCBs, chlordane
Cedar Creek	Fair	69	2007	DO	None			None
Chatuge	Fair	59	2008	DO, bottom life, sediment quality	None			Hg
Cherokee	Fair	63	2008	DO, chlorophyll, bottom life	TN, 2816 acres	Mercury	Atmospheric deposition-sources outside state	None
Chickamauga	Good	78	2009	Chlorophyll, bottom life	TN, total of 4,235 acres (Hiwassee River Embayment)	Mercury, E. coli	Industrial point source and/or atmospheric deposition (Hg); undetermined source (E. coli)	None
Douglas	Fair	59	2009	DO, chlorophyll	None			None
Fontana	Fair	69	2008	Bottom life	NC, 171 acres (Tuckasegee arm)	Fecal coliform		Hg North Carolina statewide
Fort Loudoun	Poor	50	2007	DO, chlorophyll, bottom life	TN, 14,066 acres PCBs; 534 acres Mercury and PCBs	Contaminated sediment (PCBs) Atmospheric deposition (Hg)		PCBs

Reservoir	Ecological Health Rating	Score	Latest Survey Date	Concerns	State Listing as Impaired	Causes	Sources	Fish Consumption Advisory
Fort Patrick Henry	Fair	60	2007	Chlorophyll, bottom life	None			None
Guntersville	Good	79	2009	Chlorophyll	None			None
Hiwassee	Fair	67	2008	DO, chlorophyll	NC, 143 acres	Low pH		None
Kentucky	Fair	70	2009	DO, chlorophyll	None			Hg Kentucky statewide
Little Bear Creek	Fair	70	2009	DO, bottom life	AL, 1,435 acres	Nutrients	unknown	None
Melton Hill	Fair	65	2008	Bottom life	TN, 5,690 acres	PCBs, Chlordane	Contaminated sediment	PCBs
Nickajack	Good	85	2009	Chlorophyll	TN, 10,370 acres	PCBs, Dioxin	Contaminated sediment	PCBs
Normandy	Poor	52	2008	DO, chlorophyll	None			None
Norris	Fair	60	2007	DO, chlorophyll, bottom life	TN, 23,198 acres (Clinch River portion)	Mercury	Atmospheric deposition	None
Nottely	Poor	50	2009	DO, chlorophyll, bottom life	None			Hg
Parksville	Good	81	2009	Sediment quality	TN, 1,280 acres	Copper, iron, zinc, loss of biological integrity due to siltation	Mill tailings, mine tailings, contaminated sediments, impacts from abandoned mines	None
Pickwick	Good	78	2006	Chlorophyll	None			None
South Holston	Fair	60	2008	DO, chlorophyll, bottom life	TN, 7,577 acres VA, 1,699 acres	Mercury (TN); mercury and PCBs in fish tissue (VA)	Atmospheric deposition (TN)	Hg (TN and VA); PCBs (VA)
Tellico	Poor	55	2009	DO, chlorophyll, bottom life	TN,16,500 acres	PCBs, mercury	Contaminated sediment (PCBs); atmospheric deposition (Hg)	PCBs
Tims Ford	Poor	52	2008	DO, bottom life	None			None
Watauga	Good	75	2008	DO	TN, 6,427 acres	Mercury	Atmospheric deposition	None

Reservoir	Ecological Health Rating	Score	Latest Survey Date	Concerns	State Listing as Impaired	Causes	Sources	Fish Consumption Advisory
Watts Bar	Fair	59	2008	DO, chlorophyll, bottom life	TN, Total of 36,050 acres	PCBs, low DO	Contaminated sediments (PCBs, 36,050 acres); upstream impoundment (low DO, 1,971 acres)	PCBs, Hg
Wheeler	Poor	57	2007	DO, chlorophyll, bottom life	AL, 1569 acres	pH, nutrients	pasture grazing, non-irrigated crop production	DDT
Wilson	Poor	54	2008	DO, chlorophyll	None			None

Abbreviations: DDT = Dichlorodiphenyltrichloroethane; DO = Dissolved oxygen; Hg = Mercury; PCBs = Polychlorinated biphenyls

Nine dewatering areas are associated with TVA reservoirs (see Section 2.1.2). To prevent mosquito breeding, certain areas that would be shallow backwater at normal summer pool elevations are regulated with dikes and pumps. These areas are kept dry and farmed during the summer and flooded to provide waterfowl habitat in the winter. Water discharged from these areas can contain fertilizer and other agricultural chemicals from summer farming, along with nutrients and bacteria from the large winter waterfowl populations. Most of these areas discharge directly to the reservoir and quickly diluted. However, 3.7 acres of the West Sandy Embayment is listed by the state of Tennessee as impaired by nutrients, low dissolved oxygen and siltation, caused at least in part by discharges from the West Sandy Creek Dewatering Area.

4.6. Aquatic Ecology

Rivers located in the TVA region support a large variety of freshwater fishes and invertebrates (including freshwater mussels, snails, crayfish, and insects). Due to the number of major river systems found in this region, the Southeastern U.S. is recognized as a globally important area for freshwater biodiversity (Stein et al. 2000). This discussion of affected aquatic environments focuses on two distinct categories of water bodies: the TVA reservoir system within the Tennessee River watershed and "free-flowing" streams that are unaffected (or relatively unaffected) by the presence of TVA's dams and reservoirs.

The TVA Reservoir System

The construction of the TVA dam and reservoir system fundamentally altered both the water quality and physical environment of the Tennessee River and many of its tributaries. While dams promote navigation, flood control, power benefits, and river-based recreation by moderating the flow effects of floods and droughts throughout the year, they also disrupt the daily, seasonal, and annual flow patterns that are characteristic of a river. Damming of the rivers was done at a time when there was little regard for aquatic resources (Voigtlander and Poppe 1989). ROS (TVA 2004) describes in great detail the aquatic communities and resources present in the TVA reservoir system.

Prior to construction of the TVA reservoir system, aquatic communities were structured by water quality and physical habitat condition, which were driven by physiographic region and climate. Streamflow was proportional to rainfall, and flow regime followed the same trends as the annual rainfall pattern. Flow established physical habitat conditions (depth, velocity) within a stream and maintained stream shape and other habitat conditions (substrate). Relatively infrequent high-flow events (flows that only occur every one to two years) were responsible for maintaining large-scale habitat patterns such as the number of riffles or pools (Rosgen 1996). High water flows clean substrate by flushing out fine sediments, which may suffocate fish eggs or mussels and fill in the spaces between rocks needed by aquatic insects. These "free-flowing" streams and rivers represent the natural condition of these waterways. Because historical flow was proportional to rainfall, over short-time intervals, such as days, flow was relatively predictable—meaning that yesterday's flow was likely to be similar to today's flow, and from hour to hour, there was little change except during storm events.

Floods were common during spring, and flows decreased throughout the year with the lowest typically occurring August through October, the warmest part of the year. Spring flooding was an important component in the life cycles of some fish species that use flooded overbank areas for spawning or nursery areas. The Tennessee River was shallow, with expansive areas of rocky or gravel shoals, which are critical features that contribute to the great diversity of aquatic life (Etnier and Starnes 1993).

Tributary Reservoirs and Tailwaters — Reservoirs located on the tributaries to the Tennessee River are typically of the deep storage type that retains water for long periods of time. Little flow and regular periods of thermal stratification result in oxygen depletion in the deeper water. These aquatic habitats are simplified relative to undammed streams, and fewer species are found. Lack of minimum flows and low DO in the first few miles below tributary dams may severely limit the habitat needed by native fish. This may restrict their movement, migration, reproduction, and available food supply. Large seasonal fluctuations in reservoir levels also affect aquatic communities within the reservoir pool.

Dams located on tributary rivers affected the habitat of benthic invertebrates (benthos), which are a vital part of the food chain of aquatic ecosystems. Benthic life includes worms, snails, and crayfish, which spend all of their lives in or on the streambeds, and aquatic insects, mussels, and clams, which live there during all or part of their life cycle. Many benthic organisms have narrow habitat requirements that are not always met in reservoirs or tailwaters below dams. Further downstream from dams, the number of benthic species increases as natural reaeration occurs and DO and temperatures rise.

TVA has implemented several programs to improve the water quality of releases at tributary dams including establishment of minimum flows from all of its tributary dams and the addition of active and/or passive reoxygenation systems at many of its tributary dams. Improvements in habitat conditions and freshwater communities have occurred in over 300 miles of TVA's tailwater areas as a result of these actions.

Improved year-long cold-water discharges in seven TVA tailwaters in Tennessee has allowed development of highly valued put/grow/take trout fisheries and resulted in Tennessee's assigning these tailwaters a "Trout Stream" use designation, along with protective water quality criteria in its Water Quality Standards. This fishery resource has been developed and is managed by TWRA. TWRA has estimated the number of fishing trips in tailwaters on the Clinch, Duck, Elk, Hiwassee, and South Fork Holston rivers over comparable 26-week fishing seasons (2003 estimates) ranged from 2,722 on the Duck to 24,242 and 24,635 on the South Fork Holston and Clinch, respectively (Williams and Bettoli 2003). Total number of trips for the five rivers was 77,288, representing a "Travel Cost Method" total value of $4.5 million over a 26-week fishing season. Total 26-week expenditures for these five rivers were $2.2 million, ranging from $148,213 on the Elk to $1,513,043 on the Hiwassee. These tailwaters have unique value for supporting such fisheries, especially if natural trout habitats were to become impacted by climate change (higher temperatures and reduced flow).

Mainstem Reservoirs — The nine mainstem reservoirs on the Tennessee River differ from tributary reservoirs primarily in that they are shallower, have greater flows, and thus retain the water in the reservoir for a shorter period of time. They generally do not become as strongly stratified as tributary reservoirs. Although DO in the lower lake levels is often reduced, it is seldom depleted. Winter drawdowns on mainstem reservoirs are much less severe than tributaries, so bottom habitats generally remain wetted all year. This benefits benthic organisms but promotes the growth of aquatic plants in the extensive shallow overbank areas of some reservoirs.

Tennessee River mainstem reservoirs generally support healthy fish communities, ranging from about 50 to 90 species per reservoir. Good to excellent sport fisheries exist, primarily for black bass, crappie, sauger, white and striped bass, sunfish, and catfish. The primary commercial species are channel and blue catfish and buffalo. The benefit of the system

minimum-flow mode of operation has already been seen during a recent (2006-2008) drought period in the Valley. TVA monitoring data indicated that while there was a decline in aquatic communities across the Valley, these declines were somewhat mitigated in the regulated portions of the Tennessee River watershed.

The TVA Vital Signs Monitoring Program rates environmental conditions in reservoirs using a fish and benthic IBI (Dycus and Meinert 1991). TVA also monitors sport fish populations using the Sport Fishing Index (SFI), which incorporates the status of population quantity and quality along with available angler catch information. Within a reservoir, SFI scores monitor positive or negative trends in population status, relative to fishing experience (Hickman 2000). Beyond the SFI Monitoring Program, TVA operates certain hydropower operations in a manner that provides important flow levels for spring spawning grounds of certain fishes. For example, prescribed spring flows are provided downstream of Watts Bar Reservoir to enhance sauger spawning.

"Free-Flowing" Streams and Rivers in the Tennessee River Watershed
The "free-flowing" streams within the Valley hold a much higher diversity of aquatic life (including state- and federally listed species) than are found in the TVA reservoir system. The Clinch River and Duck River in Tennessee and Virginia are recognized as global "hotspots" for freshwater biodiversity.

While aquatic communities in these rivers and streams are much more diverse than within the reservoir system, it is recognized that these watersheds have their own water quality issues. Land management practices such as agriculture; industrial, residential and recreational development; and forestry have led to the degradation of water quality and habitat in many of the region's streams and rivers.

4.7. Endangered and Threatened Species

A total of approximately 94 aquatic animals, 33 terrestrial animals, and 44 plants listed under the Endangered Species Act as endangered, threatened, proposed for listing, or candidates for listing have been reported from the TVA region. Numerous additional species listed as endangered, threatened, or of other conservation concern by one or more of the TVA region states also occur in the TVA region. Several of these species would potentially be affected by the NRP alternatives. These species are described in more detail below.

4.7.1. Aquatic Animals

The Tennessee River and its tributaries contain 62 species of aquatic animals that are federally listed as endangered, threatened, or proposed or candidates for such listing. Many more species are listed by the states in the Tennessee River watershed. A summary of the number of state- and federally listed aquatic animal species known from the Tennessee River watershed is presented in Table 4-8. Because almost all proposed NRP activities that could result in direct physical impacts (beneficial or adverse) would be conducted on TVA lands, or within the Tennessee River watershed, only aquatic species known from the Tennessee River watershed are discussed here. The exceptions to this would be small-scale activities occurring on generation facility properties on the Cumberland River (Cumberland and Gallatin Fossil Plants), the Green River (Paradise Fossil Plant), the Ohio River (Shawnee Fossil Plant), and the Mississippi River (Allen Fossil Plant).

Detailed lists of the species reported from the Tennessee River watershed in each of the seven Valley states are presented in Appendix J. None of these species are known to occur on TVA lands that are a part of this plan. However, many of these species occur in streams and reservoirs adjacent to these lands.

Table 4-8. State- and Federally Listed Aquatic Animal Species Present in the Tennessee River Watershed

State	Crustaceans		Insects		Mollusks		Fish		Total	
	State	Federal	State	Federal	State	Federal	State	Federal	State	Federal
Alabama	8	1	14	0	73	26	38	6	133	33
Georgia	0	0	0	0	3	0	35	4	38	4
Kentucky	0	0	0	0	26	6	15	0	41	6
Mississippi	0	0	0	0	8	0	14	0	22	0
North Carolina	9	0	1	0	18	4	31	2	59	6
Tennessee	15	0	9	1	67	37	56	13	147	51
Virginia	10	1	2	0	41	18	46	6	99	25
Tennessee River Watershed	37	2	22	1	124	42	123	17	306	62

The Tennessee River watershed supports an unusually diverse group of aquatic animals. Although their diversity was historically higher, exceptional species diversity is still observed in fish; mollusks, crayfish, aquatic insects, and various other invertebrate groups. Even before impoundments were constructed on the Tennessee River system, human activities resulted in adverse impacts to streams and the animals living there. Hughes and Parmalee (1999) presented convincing evidence that the pristine stream habitats in the Tennessee River system that had been inhabited by nearly 100 freshwater mussel species were beginning to be affected by human activities by the mid-1800s, and that many of these freshwater mussels were already extirpated before the Tennessee River mainstem impoundments were constructed (see Ortmann 1918, 1925; van der Schalie 1939; Stansbery 1964; Isom 1969). The paucity of early fish collections do not allow a similar comment about the impact of these activities to Tennessee River mainstem fish assemblages, but Etnier et al. (1979) speculated that there are probably species of Tennessee River fish that became extinct before they were known to science.

The historic loss of the Tennessee River watershed's exceptional aquatic diversity is of global significance (Stein et al. 2000). Ichthyology books (Boschung and Mayden 2004, Etnier & Starnes 1993, Jenkins and Burkhead 1993, and Mettee et al. 1996) discuss the historic diversity of the Tennessee River watershed and the extirpation and extinction of various fish. Likewise, Parmalee and Bogan (1998) discuss the same topics with regard to mussels. There are no definitive texts, however, that describe the status of the other components of the aquatic community. Population trends vary among species groups with the majority of listed species experiencing declines across their ranges.

4.7.2. Terrestrial Animals

There are 33 federally listed, protected, or candidate terrestrial animal species occurring in the TVA region (Appendix J). Of these species, five occur on TVA lands (Table 4-9). A

sixth species, red-cockaded woodpecker, historically occurred on or near TVA lands. In recent decades, this species has only occurred in isolated pockets in extreme southern portions of the region. TVA's resource management activities would not result in impacts to this species.

Table 4-9. Federally Listed Endangered, Threatened, and Candidate Terrestrial Animals and Plants Potentially Impacted by the Natural Resource Plan

Common Name	Scientific Name	Federal Status
Terrestrial Animals		
Bald eagle	*Haliaeetus leucocephalus*	PROT
Interior least tern	*Sterna antillarum athalassos*	LE
Piping plover	*Charadrius melodus*	LT/LE
Gray bat	*Myotis grisescens*	LE
Indiana bat	*Myotis sodalis*	LE
Plants		
Cumberland rosemary	*Conradina verticillata*	LT
Fleshy-fruit gladecress	*Leavenworthia crassa*	C
Green pitcher plant	*Sarracenia oreophila*	LE
Large-flowered skullcap	*Scutellaria montana*	LT
Monkey-face orchid	*Platanthera integrilabia*	C
Morefield's leather-flower	*Clematis morefieldii*	LE
Price's potato-bean	*Apios priceana*	LT
Ruth's golden aster	*Pityopsis ruthii*	LE
Shorts bladderpod	*Lesquerella globosa*	C
Small whorled pogonia	*Isotria medeoloides*	LT
Virginia spiraea	*Spiraea virginiana*	LT

Federal status abbreviations: C=Candidate; LE=Endangered; LT=Threatened; PROT=Protected under the Bald and Golden Eagle Protection Act

Bald eagles are largely distributed throughout the region with the largest aggregations noted in the central and western ecoregions. TVA reservoirs and surrounding lands provide high quality habitat for this species and both breeding and wintering populations regularly occur on TVA lands (see Appendix J). Breeding pairs are especially prevalent on lands surrounding Kentucky and Guntersville reservoirs.

Bald eagles nest in a variety of habitats throughout the region. Some pairs select large solitary trees, often a loblolly pine, in open fields, while others select more hidden sites in pines or hardwoods on forested hillsides. They typically forage on fish, turtles, semiaquatic mammals, ducks, and herons. TVA biologists have observed remnants of these food items at eagles' nests throughout the Valley during routine monitoring activities.

Historically, the distribution of eagles was spotty throughout the Valley; however, results of recent surveys performed by TVA and others show that bald eagles have expanded their breeding range throughout much of the Valley. Population numbers have largely rebounded since DDT was banned from agricultural use. An intensive reintroduction program (hacking) initiated collectively by federal and state conservation agencies was also

instrumental in increasing the number of bald eagles in the Valley. TVA provided bald eagle hacking localities during this program in north Alabama and other sites along the Tennessee River.

Although the bald eagle was removed from the federal list of endangered and threatened species in 2007, it remains protected under the Bald and Golden Eagle Protection Act. TVA incorporates recommendations from the National Bald Eagle Management Guidelines (USFWS 2007) during planning and stewardship activities.

Gray bats are widely distributed throughout the region (see Appendix J); largest concentrations occur in central and eastern ecoregions. This species hibernates in cold caves (usually deep pits) and forms large maternity colonies in warmer caves during summer. Many significant maternity caves are found adjacent to TVA reservoirs. In the early 1990s, TVA partnered with the USACE and Auburn University to study gray bats on Guntersville Reservoir (Thomas and Best 2000; Best et al. 1995). This endangered species was found to routinely forage along TVA lands and adjacent to power generation properties throughout north Alabama. TVA routinely monitors and protects all known gray bat populations on TVA lands. Subsequent monitoring by the USFS, TVA, USFWS, state conservation agencies, and other universities has documented the species throughout the TVA region.

Interior least terns are largely associated with the Mississippi Alluvial Plains. They nest in colonies on exposed sandbars at numerous sites in the Mississippi River during summer months. There are a few records of them nesting on more mainland sites along the Mississippi River, including recently at the TVA Allen Fossil Plant. After breeding, least terns often disperse along adjacent tributaries and are occasionally observed on Kentucky Reservoir. Least terns are not known to nest on the Tennessee River.

Piping plovers are transient fall migrants in the interior Southeast during late July (females) and late September (males and juveniles). There are few reports of observations during spring migration. Piping plovers use exposed mudflats on the Mississippi, Ohio, Cumberland, and Tennessee rivers as stopover sites during migration. They are more prevalent along the Mississippi River than the Tennessee River. Solitary piping plovers are observed sporadically on Kentucky and Douglas reservoirs. Isolated observations have been reported on Chatuge and Nottely reservoirs in northern Georgia and Boone Reservoir in northeast Tennessee. Piping plovers have also been observed at Colbert and Kingston fossil plants.

Indiana bats are rare throughout the region; most recent records of this species are reported from areas in the Blue Ridge Province (i.e., Cherokee National Forest). They hibernate in caves and forms summer roosts usually in dead trees that are largely covered with exfoliating bark. Indiana bats typically roost in multiple trees having varying exposure to sunlight (Miller et al. 2002). Historic records of this species are reported from caves on TVA lands. TVA's Nickajack Cave is the type of locality for the species although it has not been observed there in recent years. Indiana bats have also been reported from TVA's Little Bayou Creek Ridge HPA at Shawnee Fossil Plant. A small maternity population occurs on USFS land near a TVA tract adjacent to Tellico Reservoir. The species has also been found recently at sites near Fontana Reservoir lands and in the Cherokee and Bankhead national forests.

TVA has routinely surveyed for Indiana bats while evaluating resource stewardship activities, land plans, and power-related projects. With one exception, no Indiana bats have been captured during these surveys. Recently, Indiana bats were captured along a transmission line corridor in middle Tennessee and Kentucky. Any forested habitat throughout the Valley with mature forest, a high density of snags, and open midstories could be suitable habitat for this species (Menzel et al. 2001; Romme et al. 1995). TVA surveys for Indiana bats when medium- or high-quality habitat is identified during field surveys.

Approximately 701 state-listed or state-ranked terrestrial animal species occur in the TVA region (Appendix J). The list is comprised of a diverse array of birds (28 percent), mammals (16 percent), reptiles (11 percent), and amphibians (14 percent). Over 31 percent of the list is comprised of invertebrates, mostly cave-dwelling species. Most species are found in the Blue Ridge, Southwestern Appalachians, and Interior Plateau ecoregions. Many species have widespread distributions; examples include osprey, southeastern shrew, and green treefrog. However, some species are endemic to specific ecoregions, states, or localities, especially cave-dwelling species. Although many of these species have no legal status, they are considered very rare and are often associated with very fragile habitats.

Many of the species listed in Appendix J occur on TVA lands and are considered during the TVA's stewardship and reservoir lands planning processes. For example, during lands planning efforts on Guntersville and Upper Bear Creek reservoirs, biologists located extensive sandstone outcrops, which is habitat used by green salamanders. Although common on these reservoir lands, this habitat is very limited on a regional scale, restricted largely to very narrow bands along portions of the Valley. TVA designated many sandstone outcrops at Upper Bear and Guntersville reservoirs as natural areas to protect recently discovered populations of green salamanders and other species that occur in these areas.

Trends of Listed Terrestrial Animals

Populations of several listed species have improved since the ESA was enacted. Results of surveys performed by TVA and others show that bald eagles and gray bats appear to have increasing or stable numbers in the TVA region. Numbers of some other species, such as Indiana bats, continue to decline or remain low despite protective measures implemented by various federal and state agencies. Recent discovery of a highly virulent disease (white-nose syndrome) impacting cave-dwelling bats could result in serious declines in numbers of gray and Indiana bats. Therefore, an initial move to downgrade the listing status of gray bats from endangered to threatened has been dropped, and both gray and Indiana bats are being monitored closely to see how they cope with this new threat. White-nose syndrome has spread throughout many states in the eastern U.S. and portions of Canada. It has recently been discovered in bat populations in Virginia, Kentucky, North Carolina and Tennessee. TVA has closed the caves on its lands to public access, as requested by the USFWS, in an effort to control the spread of this disease; and works with several conservation agencies to monitor the spread of the disease through the region.

Conservation efforts have stabilized or slowed the declines of the remaining listed species. However, little is known about the population trends of cave invertebrates in the region. If white-nose syndrome results in substantial reductions in populations of cave-dwelling bats, subsequent reductions in many cave invertebrates dependent on cave-dwelling bats are likely.

4.7.3. Plants

Forty-four plant species listed as endangered or threatened under the Endangered Species Act, 6 candidate plant species for such listing, and 996 state-listed plant species are known to occur within the TVA region. A complete listing of the federally and state-listed plant species reported from each ecoregion within the TVA region can be found in Appendix J.

Federally Listed Plants

Over 80 percent of the federally listed species occur within four of the nine ecoregions: Blue Ridge with 27 percent, Southwestern Appalachians with 18 percent, Interior Plateau with 18 percent, and Ridge and Valley with 17 percent. Figure 4-5 depicts a graph representing the percentage of federally listed species found in each ecoregion. Of the 44 federally listed plant species, 11 have the potential to be impacted by TVA actions associated with the NRP (Table 4-9). These species are discussed below.

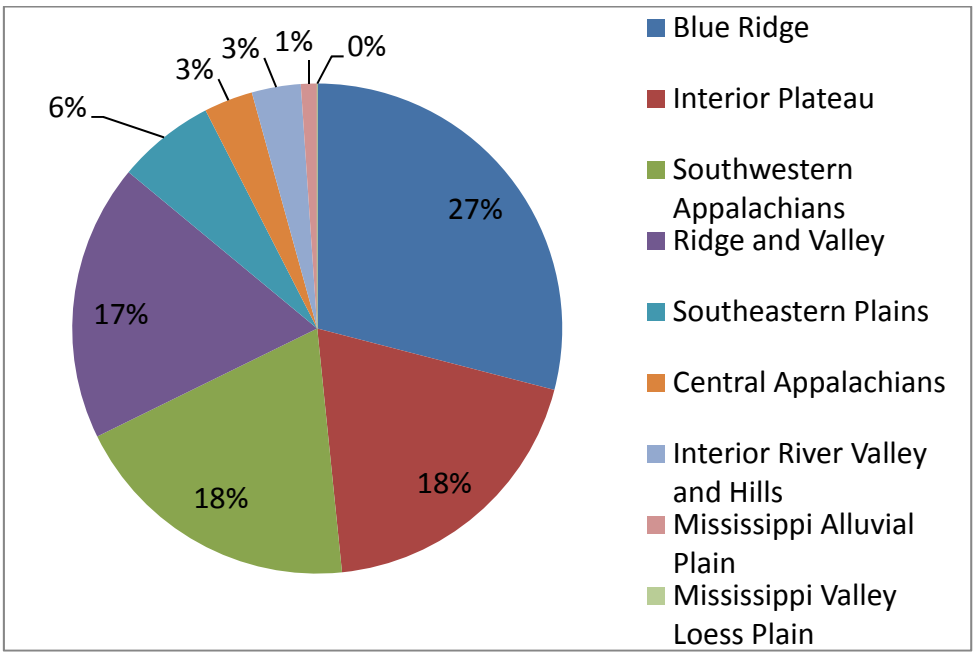


Figure 4-5. Percentage of Federally Listed Endangered, Threatened, and Candidate Species per Ecoregion

Cumberland rosemary, a member of the mint family, is a perennial evergreen shrub federally listed as threatened. Populations are restricted to boulder/cobble/gravel bars, sand bars and islands, sandy riverbanks, floodplains in river gorges, and similar sunny riparian areas where seasonal flooding minimizes competition and creates new gravel-bar habitats for colonization. Threats to this species include habitat destruction due to dam construction and water pollution from nearby coal mining. Intensive recreational use also poses a threat (NatureServe 2009).

Fleshy-fruit gladecress is endemic to Lawrence and Morgan counties in Alabama. It is locally abundant, but only a few localities are known. Highway construction and residential

development are major threats to this species, which NatureServe (2009) states is likely one of the most imperiled plant species in the Southeast and is in need of urgent protection.

Green pitcher plant is a carnivorous plant restricted to acidic seepage bogs and boggy stream edges in northeast Alabama, northeast Georgia, and southwest North Carolina. Threats include degradation of habitat by residential and road construction, encroachment of woody vegetation due to fire suppression, drainage from agricultural practices, flooding and streambank changes due to human disturbances, and commercial/amateur collection of live plants (NatureServe 2009). The populations on Chatuge Reservoir are monitored by the Georgia and North Carolina Nature Conservancy aided by TVA staff.

Large-flowered skullcap is a member of the mint family commonly encountered on wooded slopes with rocky outcrops within the Tennessee River Gorge in southeast Tennessee and northwest Georgia. Numerous occurrences are known from TVA lands along Chickamauga and Nickajack Reservoirs, on the Raccoon Mountain Pumped Storage Plant Reservation, and in close proximity to Sequoyah Nuclear Plant.

The monkey-face orchid grows in swamp forests and sandy stream margins. Even though this species is known to occur in most southern states, these plants are not commonly encountered. Major threats to the species are a result of habitat loss from development, canopy closure, improper timber harvest techniques, and the encroachment of exotic invasive plants such as Chinese privet and Japanese stiltgrass. This species has been reported to occur on TVA lands adjacent to Yellow Creek, but the population is now thought to have been extirpated.

Morefield's leather-flower is restricted to rocky limestone bluffs and boulder fields. Smoke tree is an indicator species. In several locations throughout the Valley, Morefield's leather-flower and Price's potato bean have been found growing together. Threats to the species include development and encroachment of invasive species.

Price's potato bean prefers disturbed portions of rocky limestone areas in forest openings, wood edges, and regions where bluffs descend to streams. Threats to the species include development and encroachment of invasive species.

Ruth's golden aster has a limited range and specific habitat. This rare member of the sunflower family can be found in cracks or crevices of phylite or greywacke boulders along the banks or within the Hiwassee and Ocoee rivers in Polk County, Tennessee (Kral 1983; USFWS 1990; NatureServe 2009). The construction of the dams on these rivers may have reduced the range of this species, and remaining populations are threatened by habitat changes resulting from postimpoundment river flows.

Short's bladderpod, a member of the mustard family, is endemic to the Interior Low Plateau from middle Tennessee through north central Kentucky and into southern Indiana. According to NatureServe (2009), this species exhibits wide population changes from year to year due to variable germination and seedling survival levels in its arid microhabitat. Road construction and maintenance activities such as herbicide use, grading of road shoulders, mowing during the growing season, and encroachment of exotic species continue to threaten many of the populations. Some sites adjacent to rivers are threatened by water-level manipulation.

Small whorled pogonia occurs in a variety of habitats throughout its range. It is typically found on acidic soils, in dry to mesic second-growth, deciduous or deciduous-coniferous forests. In addition, the plants prefer habitats that have light to moderate leaf litter, an open herb layer (occasionally dense ferns), moderate to light shrub layer, and relatively open canopy (NatureServe 2009; USFWS 2008). The main threats to this species are habitat destruction and excessive collecting. It is known from the vicinity of five mountain reservoirs (Apalachia, Blue Ridge, Chatuge, Hiwassee, and Nottely) but has not been reported as occurring on TVA lands.

Virginia spiraea is a shrub growing on rocky flood-scoured riverbanks and gravel bars in gorges or canyons in the central and southern Appalachian Mountains. It is often found growing with Cumberland rosemary on the Cumberland Plateau. Populations have been extirpated by impoundments, and other threats include riverbank development, habitat changes resulting from altered river flows and the encroachment of exotic invasive species. Sexual reproduction is uncommon, and plants rely almost completely on vegetative reproduction, which could also account for the declining health of known populations.

State-Listed Plants

More than 10,000 occurrences of 996 state-listed plant species are known from the TVA region (Appendix J). Thirty-two (4.1 percent) of these species are known to occur within a mile of TVA facilities (Table 4-10). The Yellow Creek site, on Pickwick Reservoir in Mississippi, has the most state-listed species (13) occurring within or directly adjacent to the reservation, followed by Melton Hill Dam with six species. TVA land surrounding the Raccoon Mountain Pumped Storage Plant not only is home to the federally listed large-flowered skullcap but also harbors five state-listed species.

Table 4-10. State-Listed Plant Species Found Within 1 Mile of TVA Facilities

Common Name	Scientific Name	State Rank	State Status	Facility
American ginseng	*Panax quinquefolius*	S3S4	S-CE	Melton Hill Dam, Raccoon Mountain
American pillwort	*Pilularia americana*	S1S2	SPCO	Dogwood Reservation Dam
Appalachian bugbane	*Cimicifuga rubifolia*	S3	THR	Norris Dam
Big shellbark hickory	*Carya laciniosa*	S2S3 (MS)	SLNS (MS)	Yellow Creek
Butternut	*Juglans cinerea*	S3	THR	Melton Hill Dam
Canada lily	*Lilium canadense*	S3	THR	Bull Run Fossil Plant
Crested fringed orchid	*Platanthera cristata*	S3 (MS)	SLNS (MS)	Yellow Creek
Dutchman's breeches	*Dicentra cucullaria*	S2 (AL)	SLNS (AL)	Wilson Dam
Dwarf larkspur	*Delphinium tricorne*	S2 (MS)	SLNS (MS)	Yellow Creek
Fame-flower	*Talinum mengesii*	S2	THR	Raccoon Mountain
Fetter-bush	*Leucothoe racemosa*	S2	THR	Kingston Fossil

Common Name	Scientific Name	State Rank	State Status	Facility
				Plant
Green violet	*Hybanthus concolor*	S2 (MS)	SLNS (MS)	Yellow Creek
Heavy-fruited sedge	*Carex gravida*	S1	SPCO	Melton Hill Dam; Tellico Dam
Horsesugar	*Symplocos tinctoria*	S2	SPCO	Ocoee 3 Dam
Meehania mint	*Meehania cordata*	S2	THR	Norris Dam
Mountain bush-honeysuckle	*Diervilla sessilifolia var rivularis*	S2	THR	Raccoon Mountain
Northern white cedar	*Thuja occidentalis*	S3	SPCO	Bull Run Fossil Plant
Purple cliff-brake fern	*Pellaea atropurpurea*	S1S2 (MS)	SLNS (MS)	Yellow Creek
Pursh's wild-petunia	*Ruellia purshiana*	S1S2	SPCO	Melton Hill Dam
Round-leaf serviceberry	*Amelanchier sanguinea*	S2	THR	Raccoon Mountain
Sedge	*Carex stricta*	S2 (MS)	SLNS (MS)	Yellow Creek
Shooting star	*Dodecantheon meadia*	S2 (MS)	SLNS (MS)	Yellow Creek
Slender toothwort	*Dentaria heterophylla*	S2S3 (MS)	SLNS (MS)	Yellow Creek
Spotted wintergreen	*Chimaphila maculata*	S2 (MS)	SLNS (MS)	Yellow Creek
Spreading false-foxglove	*Aureolaria patula*	S3	SPCO	Kingston Fossil Plant, Bull Run Fossil Plant,
				Melton Hill Dam
Stonecrop	*Sedum ternatum*	S2 (MS)	SLNS (MS)	Yellow Creek
Sullivantia	*Sullivantia sullivantii*	S1	END	Norris Dam
Tall larkspur	*Delphinium exaltatum*	S2	END	Bull Run Fossil Plant
Three-parted violet	*Viola tripartata*	S2S3	SPCO	Raccoon Mountain, Melton Hill Dam
Virginia pine	*Pinus virginiana*	S2 (MS)	SLNS (MS)	Yellow Creek
Wild hyacinth	*Camassia scilloides*	S2S3 (MS)	SLNS (MS)	Yellow Creek
Yellow trout-lily	*Erythronium rostratum*	S2S3 (MS)	SLNS (MS)	Yellow Creek

Rank abbreviations: S1 = Critically imperiled with five or fewer occurrences; S2 = Imperiled with six to 20 occurrences; S3 = Rare or uncommon with 21 to 100 occurrences; S4 = Widespread, abundant, and apparently secure with more than 101 occurrences; S#S# = Occurrence numbers are uncertain.
Status abbreviations: END = Endangered; S-CE = Special concern, commercially exploited; SPCO = Special Concern; THR = Threatened; SLNS = State listed, no status
State abbreviations: AL = Alabama; MS = Mississippi

TVA has surveyed many of its reservoir lands during the development of reservoir land management plans and for other purposes. These lands have relatively few plant species of conservation concern as compared to the many state-listed species known to occur within the vicinity of these reservoirs. For example, 109 state-listed plant species occur in the counties surrounding Guntersville Reservoir while 15 state-listed plants have been observed on the reservoir lands (TVA 2001). Three state-listed plants were observed on TVA lands included in the Northeastern Tributary Reservoirs land plan (TVA 2010) while 30 species have been reported within 5 miles of these reservoirs. Fourteen state-listed plant species have been found on reservoir lands included in the Mountain Lakes Reservoirs land plan (TVA 2009) while 67 species have been reported within 5 miles of these reservoirs. Many of the endangered and threatened plants on TVA lands are located on tracts allocated for Sensitive Resource Management or Natural Resource Conservation (see Section 4.2 on TVA Natural Areas).

Within the TVA region, 75 percent of the state-listed plant species are found in the Interior Plateau, the Blue Ridge, the and Southwestern Appalachians ecoregions (Figure 4-6). The three ecoregions with high numbers of state-listed plants also contain a large proportion of the rare plant associations known from the TVA region.

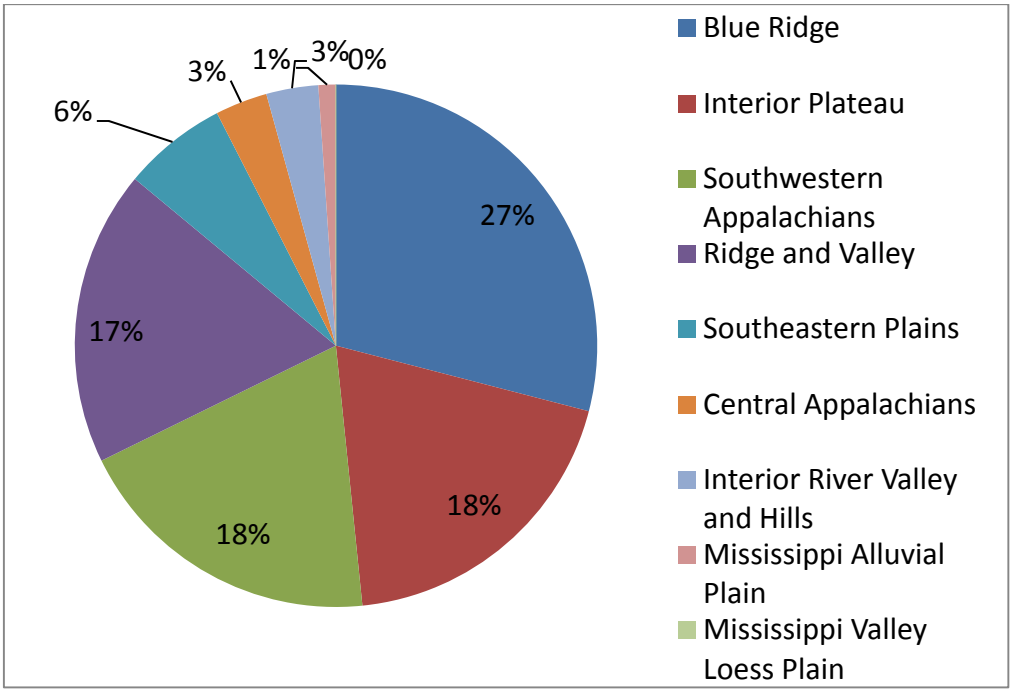


Figure 4-6. Percentage of State-Listed Plant Species per Ecoregion

Status of Endangered and Threatened Plants on TVA Lands

Three of the 46 TVA reservoirs, Chatuge, Chickamauga and Nickajack have known populations of federally listed plants along their shorelines. Green pitcher plant is managed on lands owned by the Georgia and North Carolina Nature Conservancy, and large-flowered skullcap occurs on private and public lands on Chickamauga and Nickajack Reservoirs in Tennessee and Georgia. The Ocoee and Hiwassee rivers, where river flow is

controlled by TVA (Ocoee 2 and Apalachia, respectively), both have populations of Ruth's golden aster growing on boulders in and adjacent to the rivers. TVA annually monitors populations of large-flowered skullcap in May, green pitcher plant in June, and Ruth's golden aster in September.

Raccoon Mountain Pumped Storage Plant and Sequoyah Nuclear Plant are the only TVA power plants with known records of federally listed plant species occurring within or in the immediate vicinity of their reservations. Recent field surveys have reported more than 30 records of large-flowered skullcap growing on the Cumberland escarpment of Raccoon Mountain.

Despite continued threats from invasive species and residential and commercial development within the TVA region, there are success stories about endangered and threatened plants being removed from the Endangered Species List or being proposed for removal. Previously unknown populations of other species have recently been discovered. One success story is Eggert's sunflower which when listed as threatened in 1997 was known from 34 populations in Kentucky and Tennessee. Due to conservation efforts on federal lands and surveys additional of additional, nearly 300 populations were known in three states by 2005. The newly discovered populations included several on TVA reservoir lands in northwest Alabama, and TVA has zoned several of these areas for Sensitive Resource Management. In 2006, Eggert's sunflower was removed from listing under the Endangered Species Act. A similar story is emerging for the Tennessee coneflower, listed as Endangered in 1979. After 30 years of conservation management, the USFWS considers this species as no longer in need of protection by the ESA. New populations have also recently been discovered for Braun's rock-cress, large-flowered skullcap, Morefield's leather-flower, and purple prairie clover.

Unfortunately there are also listed plant species in decline due to environmental and economic development stresses. These species include the green pitcher plant, Pyne's ground plum, small whorled pogonia, and Virginia spiraea.

Conservation efforts lead by TVA for spreading false foxglove contributed to its downlisting from Endangered to Species of Special Concern in Tennessee. Because insufficient population data are known for many state-listed plants, field surveys conducted by TVA staff have added to the distributional data for many of these species and aided in the reassessment of listing status by states within the TVA region.

4.8. Cultural Resources

TVA is obligated to protect the many historic properties under its stewardship or affected by TVA projects pursuant to several federal laws and regulations. These projects range from the management and construction of power plants to the issuance of approval under Section 26a of the TVA Act. Historic properties include historic sites, buildings, structures, and objects, and archaeological resources important to prehistory or history. These resources are collectively referred to here as cultural resources. Congress has recognized that cultural resources are important to the nation's heritage and that the government should act as a facilitator to the preservation of these important resources.

4.8.1. Archaeology

Archaeological investigations in the TVA region began in the 19th century with the explorations of Cyrus Thomas, C. B. Moore, and the Smithsonian Institution (Guthe 1952).

These early investigations focused on larger sites such as mound complexes and laid the foundation for the future role of archaeology in the U.S. The cultural history that was written as a result of these investigations along with other research that has been conducted in the Valley has been summarized elsewhere (TVA 1998; TVA 2004).

TVA's stewardship of archaeological resources began at its inception with the archaeological surveys conducted in the Norris, Wheeler, Pickwick, Guntersville, Hiwassee, Chickamauga, Gilbertsville (Kentucky), and Watts Bar basins through the efforts of local universities (Olinger and Howard 2009). Archaeological surveys conducted on TVA lands from 1940-1960 were sporadic until the NHPA was passed by Congress in 1966.

Following the passage of NHPA, numerous large-scale excavations were conducted as a result of agency undertakings that supported over 40 research volumes published by TVA and local universities. In 1983, TVA initiated an experimental archaeological stabilization program that explored various methodologies for the protection of archaeological sites eroding along the banks of its reservoirs. In addition, TVA conducted experiments on the placement of protective signage near sensitive archaeological sites being exposed to illegal looting.

As large-scale undertakings and excavations have been reduced in the recent decades and with the growing awareness of the sensitive nature of these nonrenewable resources, TVA has moved toward a preservation focus to protect those archaeological resources remaining under its management.

Pursuant to Section 110 of the NHPA, TVA is responsible for the identification, evaluation, and nomination of archaeological sites (in addition to other historic properties) to the NRHP. Toward that goal, TVA conducts identification surveys each year on its managed lands.

TVA manages approximately 293,000 acres surrounding TVA reservoirs and 470,000 acres of inundated land totaling over 763,000 acres of public lands subject to the laws and regulations protecting archaeological resources. Archaeological survey of lands inundated by TVA reservoirs varies across the Valley, and over 4,144 archaeological sites have been recorded below normal summer pool elevation (Table 4-11). Because survey coverage below normal summer pool elevation is inconsistent and due to the lack of comprehensive data on survey coverage throughout TVA's history, it is not possible to estimate the percentage of TVA lands that have been systematically surveyed within this 470,000-acre area. Many additional archaeological sites are likely present that have not been recorded as a result of the limited surveys conducted prior to construction of most TVA reservoirs. TVA often conducts identification surveys during temporary drawdown periods to identify those sites not normally exposed in regular reservoir operations.

Table 4-11. Approximate Number of Archaeological Sites Identified on and Percent of TVA Lands Systematically Surveyed

Location	Percent of Land Systematically Surveyed	Number of Inundated Sites	Number of Sites Above Normal Summer Pool	Total Number of Sites Recorded*
TVA Reservoir Lands				
Apalachia	16	14	2	16
Bear Creek Project	75	152	454	606
Beaver Creek	2	0	1	1

Location	Percent of Land Systematically Surveyed	Number of Inundated Sites	Number of Sites Above Normal Summer Pool	Total Number of Sites Recorded*
Blue Ridge	51	111	7	118
Boone	0	36	20	56
Chatuge	40	185	158	343
Cherokee	16	599	164	763
Chickamauga	8	103	455	558
Clear Creek	0	0	0	0
Douglas	Unknown	103	12	115
Fontana	Unknown	146	11	157
Fort Loudoun	0	65	31	96
Fort Patrick Henry	Unknown	35	37	72
Great Falls	0	0	0	0
Guntersville	<1	219	776	995
Hiwassee	40	248	16	264
Kentucky	1	500	1,335	1,835
Melton Hill	44	14	104	118
Nickajack	15	38	72	110
Nolichucky	0	0	0	0
Normandy	Unknown	0	43	43
Norris	Unknown	314	738	1,052
Nottely	12	168	56	224
Ocoee #1	10	20	1	21
Ocoee #2	0	0	0	0
Ocoee #3	0	0	0	0
Pickwick	29	222	596	818
South Holston	54	17	87	104
Tellico	7	285	368	653
Tims Ford	36	39	78	117
Watauga	Unknown	106	37	143
Watts Bar	41	151	477	628
Wheeler	8	254	1,077	1,331
Wilbur	0	0	0	0
Wilson	0	0	0	0
Fossil Plants				
Allen	0	N/A	0	0
Bull Run	<1	N/A	4	4
Colbert	10	N/A	11	11
Cumberland	8	N/A	4	4
Gallatin	37	N/A	1	1
John Sevier	18	N/A	3	3
Johnsonville	10	N/A	0	0
Kingston	27	N/A	0	0
Paradise	<1	N/A	0	0
Saltillo	0	N/A	15	15
Shawnee	17	N/A	17	17

Location	Percent of Land Systematically Surveyed	Number of Inundated Sites	Number of Sites Above Normal Summer Pool	Total Number of Sites Recorded*
Watts Bar	15	N/A	1	1
Widows Creek	0	N/A	2	2
Nuclear Plants				
Bellefonte	38	N/A	5	5
Browns Ferry	23	N/A	6	6
Sequoyah	100	N/A	1	1
Watts Bar	0	N/A	4	4
Other Properties				
Raccoon Mountain	27	N/A	8	8
Hartsville	27	N/A	14	14
Total	**--**	**4,144**	**7,309**	**11,453**

*Most of these totals are approximate due to lack of consolidated data across the Valley at the time of this publication.

In the last 30 years, over 40 large-scale archaeological surveys have been conducted by TVA using varying levels of intensity. Over the last few decades, archaeological survey techniques have improved due to scientific and technological advancements, and as a result, archaeological survey coverage and site documentation on TVA lands varies across the Valley. To date, TVA has documented approximately 11,500 archaeological sites on its lands. While the number of resources is quite large, less than 25 percent of these sites have been assessed for eligibility for the NRHP. These data are approximate due to a lack of consolidated data across the Valley.

TVA manages a number of significant archaeological sites that have had an important contribution to the understanding of prehistory in the Southeast. These include the Seven Mile Island Archaeological District (listed in the NRHP) and Dust Cave in Alabama, Hiwassee Island and Ledbetter sites in Tennessee, Jonathon Creek site in Kentucky, and Yellow Creek in Mississippi, as well as hundreds of other sites that have been the subject of academic research since the inception of TVA. TVA manages 22 historic properties listed in the NRHP. These include the pre-TVA dams (Ocoee #1 and #2, Blue Ridge, Wilson, Great Falls, and Wilbur), Seven Mile Island, numerous iron furnace sites across the Valley, and several archaeological sites excavated and inundated on Tellico Reservoir.

Humans have prehistorically and historically tended to settle near main river channels in order to be to close the necessary resources for survival (i.e., food and water). TVA lands are primarily located along the Tennessee River and its tributaries and consequently contain numerous archaeological sites. While the total acreage of TVA land is small in comparison with many other Federal agencies, the archaeological resources are dense and their vulnerability to various threats significant (most being easily accessible by water and land and exposed to substantial annual erosion). With only about 30 percent of its lands systematically surveyed, TVA must make prudent choices in its annual inventory allowance while making a good-faith effort to meet its responsibilities under the laws and regulations protecting these resources.

Current conditions of archaeological sites on TVA lands vary according to their location within the TVA system. Inundated site conditions vary depending on local erosion or siltation. TVA has limited data on the condition of sites that are normally inundated

throughout the year. In a recent survey conducted during an unusually deep drawdown of Bear Creek Reservoir, a large percentage normally inundated sites had been destroyed by heavy erosion. This situation may not be typical of other TVA reservoirs.

Archaeological sites located within the normal drawdown zones or on shorelines are subject to a different level of disturbance. These sites are easily accessible to looting and vulnerable to erosion from reservoir fluctuations, discharges from dams, and wave action from boat traffic. With limited funding available to monitor and protect these resources annually, there has been an overall deterioration of archaeological resources.

4.8.2. Historic Structures

Approximately 5,320 historic structures have been recorded on or near TVA lands (Table 4-12). Examples of these structures include gristmills, dams, powerhouses associated with the dams, diversion flumes, fossil plants, homes, bridges, and cemeteries. Approximately 230 of the 5,320 historic structures are considered either eligible or potentially eligible for listing in the NRHP and 85 historic structures are currently listed in the NRHP. Nine NRHP historic districts are on TVA lands; these include districts at Little Bear, Normandy, Pickwick, Tims Ford, and Wheeler reservoirs, and four districts at Wilson Reservoir. In addition, Wilson Dam is listed as a national historic landmark. This is the only such designated TVA property, as well as the only such property within the study area. The study area is described in Section 1.5.

The majority of the historic structure data came from individual county surveys on file at State Historic Preservation Offices and from past TVA surveys, primarily associated with TVA's reservoir lands planning efforts. Many of these surveys are incomplete or out of date. Comprehensive work at South Holston, Douglas, Chatuge, Normandy, and Tims Ford reservoirs and partial coverage at Boone, Fort Patrick Henry, and Norris reservoirs supplemented these surveys.

The number of historic structures varies substantially among the reservoirs (Table 4-12). This reflects a wide variation in the availability of information about these structures. Some areas have been surveyed more than other areas, and NRHP eligibility has not been assessed for many structures. More comprehensive surveys and structure assessments would likely result in a more equal distribution of structures and NRHP-eligible structures at each reservoir. Consequently, the variation in the distribution of historic structures was not a major consideration in the impact analysis.

TVA's fossil plants are potentially eligible for listing in the NRHP like all other TVA power-generating facilities. These plants have not been systematically surveyed. Historical resource surveys of the fossil plants and associated contiguous lands are conducted on a case-by-case basis as TVA proposes projects.

Table 4-12. Numbers of Historic Structures Surveyed

Reservoir and Location	Recorded Historic Structures	NRHP-Eligible or Potentially Eligible Historic Structures	NRHP-Listed Historic Structures/Districts
Mainstem Reservoirs			
Kentucky, KY/TN	438	1	12
Pickwick, AL/MS/TN	151	2	1
Wilson, AL	21	1	4
Wheeler, AL	546	1	7
Guntersville, AL/TN	1,223	64	6
Nickajack, TN	50	1	0
Chickamauga, TN	138	1	10
Watts Bar, TN	91	1	10
Fort Loudoun, TN	139	1	2
Total Mainstem	**2,797**	**73**	**52**
Tributary Reservoirs			
Norris, TN	421	22	0
Melton Hill, TN	19	1	5
Douglas, TN	413	47	4
South Holston, TN/VA	184	17	1
Boone, TN	89	4	5
Fort Patrick Henry, TN	73	1	0
Cherokee, TN	362	12	8
Watauga, TN	67	1	0
Wilbur, TN	0	1	0
Fontana, NC	28	1	3
Tellico, TN	269	6	3
Chatuge, NC	25	4	2
Nottely, GA	23	5	2
Hiwassee, NC	25	1	2
Apalachia, NC	1	1	0
Blue Ridge, GA	38	1	0
Ocoee #1, TN	1	2	0
Ocoee #2, TN	0	1	0
Ocoee #3, TN	1	1	0
Tims Ford, TN	158	3	1
Normandy, TN	93	1	4
Great Falls, TN	111	1	0
Upper Bear Creek, AL	63	2	0
Bear Creek, AL	2	2	1
Little Bear Creek, AL	14	1	1
Cedar Creek, AL	45	21	0
Total Tributary	**2,525**	**160**	**42**
Total Reservoirs	**5,322**	**233**	**94**

Current conditions of the historic structures on TVA lands vary and limited inventory data is available to fully describe the current state of most of them. In general, TVA has conducted little maintenance or management of the historic structures under its control. Those historic structures that are currently occupied are in good condition. TVA's dams and power facilities are maintained for general safety and, as a result, are mostly in good condition. Others, such as those located in remote locations or those that are unoccupied have fallen into a state of disrepair.

4.9. Land Use

The Tennessee River watershed includes approximately 40,913 square miles. This area lies mostly in the state of Tennessee, with portions in six other states—Alabama, Georgia, Kentucky, Mississippi, North Carolina, and Virginia. The TVA power service includes a total of 76,738 square miles, with 44,783 square miles extending outside the Tennessee River watershed. TVA lands adjacent to reservoirs include approximately 293,000 acres (458 square miles) encompassing parts of the seven Valley states.

TVA manages land around most of the reservoirs it operates. In all, approximately 293,000 acres of TVA land is associated with 46 dams and reservoirs. This land is managed for project operations, sensitive resource management, natural resource conservation, industrial, developed recreation, and shoreline access. Nearly all of this land is in a band adjacent to the 11,000 miles of reservoir shoreline. In addition, TVA manages approximately 9,100 acres of land located adjacent to TVA's power facilities throughout the region.

Land use and land cover on TVA reservoir lands, as well as on a 0.25-mile surrounding area of influence, was quantified from 2008 and 2009 aerial photography from the USDA's National Agricultural Imagery Program and GIS mappings. The current land cover on TVA reservoir lands is dominated by "natural" habitats, with 81 percent of TVA lands forested (Figure 4-7a). Compared to adjacent non-TVA lands (Figure 4-7b), TVA lands are more heavily forested, have lower proportions of pasture and cropland, and are less developed.

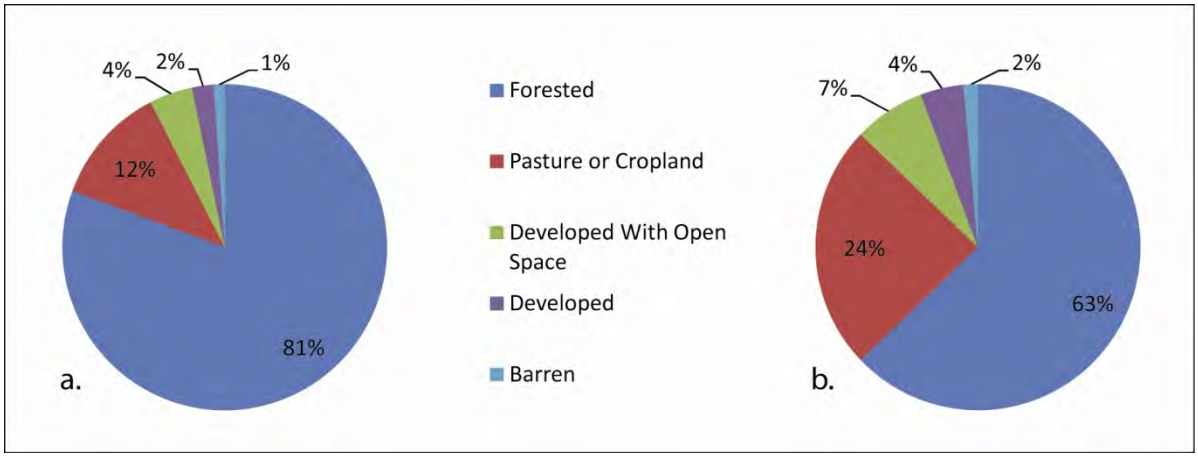


Figure 4-7. Land Use/Land Cover of TVA Reservoir Lands (a) and Non-TVA Lands within 0.25 Mile of TVA Reservoir Lands (b).

Across the TVA reservoir system, approximately 38 percent of the total shoreline is available for residential development, and a third of that shoreline had been developed by

the mid-1990s (TVA 1998). SMI identified three times as many miles of residentially developed shoreline as all other developed uses combined (TVA 1998). Shoreline residential development is ongoing and would continue at some rate until complete buildout (the point at which the available shoreline property has been consumed by residential development). SMI anticipated that buildout would occur by 2023.

4.10. Prime Farmland

Prime farmland is defined by the USDA as land that has the best combination of chemical and physical soil characteristics for meeting the nation's short- and long-range needs for food and fiber. Prime farmland can consist of cultivated land, pastureland, or forestland, but it is not urban land, built-up land, or land covered by water. The FPPA requires that all federal agencies evaluate impacts to farmland prior to converting such land permanently to nonagricultural land use.

The States of Georgia, Kentucky, North Carolina, and Tennessee and the Commonwealth of Virginia have designated additional land as farmland of statewide and/or local importance. Generally, state agencies have identified these additional farmlands as those areas that economically produce high yields of crops when treated and managed according to acceptable farming practices. Some may produce as high a yield as prime farmland if conditions are favorable. In some states, additional farmlands of statewide or local importance may include tracts of land that have been designated for agriculture by state law. Consideration for protection under the FPPA extends to farmland of statewide and local importance.

To evaluate any possible effects to prime farmland, farmland of statewide and local importance, TVA identifies soil classifications using the USDA NRCS *Web Soil Survey* (NRCS 2010). The FPPA encourages federal agencies, with assistance from the NRCS, to complete Form AD 1006 (*Farmland Conservation Impact Rating*) before an action is taken.

In the TVA region, approximately 17,360,515 acres are designated as prime farmland, farmland of statewide importance, or farmland of local importance (Table 4-13). On average, this represents 33.2 percent of the total area farmed within the seven-state power service area.

Table 4-13 Acreage of Prime/Unique Farmland and Farming Trends in the Seven States Comprising the TVA Power Service Area

State	Percent of Total Area in Farms	Acres Protected by FPPA	Percent of Farmland Protected by FPPA	Percent Change From 1987 to 2007*		
				Number of Farms	Land in Farms (Acres)	Average Size of Farms (Acres)
Alabama	39.9	2,105,732	33	25.6	8.5	-12.7
Georgia	18.8	864,307	30	17.4	-6.2	-20
Kentucky	64.9	2,389,406	50	6.9	13.3	6.6
Mississippi	41.7	4,470,380	49	24.7	15.2	-6.8
North Carolina	12.2	852,691	28	-3.5	-17.8	-12.3
Tennessee	42.0	6,050,627	22	2	-6.2	-5.6
Virginia	39.4	627,372	21	4.8	9.5	5.9

*USDA, Agriculture Census, http://agcensus.mannlib.cornell.edu/

Agricultural census data show that during the 20 years between 1987 and 2007, the number of farms in six of the seven states that make up the TVA power service area increased between 2 to 25 percent. During the same period, the average size of farms within these same states decreased. These data suggest that larger family-owned and -operated farms are being sold or subdivided into smaller farms, possibly through inheritance. This practice may place added pressure on prime farmlands by reducing the "connectivity" of adjoining farmland and promoting the expansion of utilities, which may lead to further nonfarm uses. North Carolina had the greatest decline in the number of farms and the land area committed to farming, and Alabama and North Carolina both had large declines in the average size of farms (Table 4-13).

Prime farmland and farmland of statewide or local importance make up about 12 percent of TVA reservoir lands. For those reservoirs with available soil survey data, the proportion of this farmland ranges from 0 to 48 percent (Table 4-14).

Table 4-14. Area of Prime/Unique Farmland Surrounding TVA Reservoirs

Reservoir	Total Area (acres)	Percent of Farmland Protected by FPPA	Prime Farmland (acres)	Farmland of Statewide Importance (acres)	Farmland of Local Importance (acres)
Apalachia	897	12.0	107.3	0	0
Beaver Creek	290	47.6	18.2	120	0
Beech River Project	5,218	*			
Big Bear Creek	2,295	*			
Blue Ridge	470	2.2	10.7	0	0
Boone	880	6.6	58.5	0	0
Cedar Creek	2,747	*			
Chatuge	1,765	7.4	132.1	0	0
Cherokee	8,187	3.1	254.1	0	0
Chickamauga	15,947	*			
Clear Creek	14	17.8	0	2.5	0
Douglas	2,055	11.9	244.5	0	0
Fontana	931	0.0	0	0	0
Fort Loudoun	1,574	*			
Fort Patrick Henry	283	17.5	49.6	0	0
Great Falls	362	*			
Guntersville	37,282	6.7	2,498.5	0	0
Hiwassee	1,007	10.4	105.6	0	0
Kentucky	75,216	11.4	8,297.0	276.2	0
Little Bear Creek	1,181	*			
Melton Hill	2,579	*			
Nickajack	3,573	26.6	952.4	0	0
Nolichucky	1,132	17.0	193	0	0
Normandy	4,795	*			
Norris	27,928	1.5	433.5	0	0

Reservoir	Total Area (acres)	Percent of Farmland Protected by FPPA	Prime Farmland (acres)	Farmland of Statewide Importance (acres)	Farmland of Local Importance (acres)
Nottely	829	0.0	0	0	0
Ocoees	375	5.2	19.6	0	0
Pickwick	19,238	*		0	
South Holston	2,270	14.8	291.6	44.6	0
Tellico	12,644	16.6	2,102.1	0	0
Tims Ford	4,414**	11.7	518	0	0
Upper Bear Creek	2,955	*			
Watauga	1,137	1.0	12.4	0	0
Watts Bar	13,240	21.6	2871	0	0
Wheeler	36,178	8.3	2,994.4	0	0
Wilbur	58	0.0	0	0	0
Wilson	119	*			

***** Data unavailable; ** Includes TVA lands allocated for conservation partnerships

Many of TVA's non-hydroelectric generating facilities were established 40 to 50 years ago and have experienced considerable changes to the soil and the surface hydrology during construction and operation. If prime farmland were present, these disturbances and the absence of active farming during this extended period would negate any negative impacts that conversion to nonagricultural land use might have on the farm service sector and surrounding farmland. Any land conversion activities within the existing boundaries of these sites would fall under the FPPA's exclusionary clause dealing with land already under (urban) development.

4.11. Visual Resources

Overview

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

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

The evaluation of the extent and magnitude of potential changes in the visual environment that could result from a proposed action is typically based on:

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

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

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

- Scenic attractiveness is the measure of outstanding natural features, scenic variety, seasonal change, and strategic location. It is based on the intrinsic beauty of landforms, rock outcrops, water bodies, and vegetation. Attractiveness is ranked in one of three classifications from distinctive to minimal.
- Scenic integrity is the measure of visual unity and wholeness of the natural landscape character. It is based on the degree of disturbance in natural patterns, the presence of disruptive or discordant elements, and the relative harmony of human alterations. Integrity is ranked in one of four classifications from high to very low.
- Human sensitivity is the expressed concern of people for the scenic qualities of the project area. Sensitivity includes considerations such as the type and number of viewers, frequency, and duration of views, and viewer context of adjacent scenery. Concerns are also derived or confirmed by public input. Sensitivity is ranked in one of three classifications from high to low.
- Viewing distance is the measure of how far an area can be seen by observers and the degree of visible detail. It is ranked in one of three classifications from foreground to background.
- Foreground is 0 to 0.5 mile from the observer where details of objects are clearly seen. Details are most distinct in the immediate foreground of 0 to 300 feet.
- Middleground is 0.5 to 4 miles where single objects or groups tend to merge into larger patterns with less distinguishable details. When viewed in this broader context, alterations may contrast strongly with larger natural patterns and make some middleground views more sensitive than the foreground.
- Background is 4 miles to the horizon where objects are seen as broad outline patterns and forms. Details and colors are not normally discernible unless they are quite large, stand alone, or provide strong contrast.

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

Visual absorption capacity is also considered when determining scenic value of a landscape. Absorption capacity indicates the relative ability of a landscape to accept

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

Overall, scenic value is determined by evaluating the combined levels of the four attributes, along with absorption capacity. It is ranked in one of four classes ranging from excellent to poor.

Visual Characteristics of TVA Lands

TVA lands and areas of jurisdiction include power plants, dam reservations, reservoirs, and tracts of land adjacent to the reservoirs that range in size from tenths of an acre to several hundred acres. Because the scenic features of the landscape are not limited by land boundaries, the attractive landscape character extends across TVA lands and other public and private lands alike. The natural elements together with the communities and other cultural development often provide a scenic, rural countryside.

Land uses adjacent to the reservoirs include residential development, public parks, commercial development, and sporadic industrial facilities. The reservoirs offer abundant water-recreation opportunities along with a variety of scenery. Most embayments are broadly open at the mouth, and some wind over a mile to their headwaters.

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

As noted in the ROS (TVA 2004), lower winter pool levels often result in the exposure of reservoir bottoms and flats. This visual change in reservoir character is created in shallower portions of the reservoir and becomes most evident in the headwater and embayment areas. Headwater areas often revert to characteristics of the original river environment, including wide, barren shorelines and discolored rock bluffs along the former river channel. Exposure of reservoir bottom areas is common to both tributary and mainstem reservoirs.

The visual effect for mainstem reservoirs from lower winter pool levels can range from the occurrence of sandbars and small islands to extensive flat areas that are dry with exposed ground. Many of these large, exposed flat areas are associated with wildlife management areas or other areas that exhibit wetland characteristics. Consequently, their appearance tends to blend in an acceptable degree with the surrounding landscape. In other cases, the flats are a notable part of residential viewsheds, where the change in landscape character is not as acceptable and is interpreted as creating a lower level of scenic integrity.

Each reservoir exhibits its own combination and degree of visual effects with respect to its operating plan. Its existing character and level of scenic attractiveness is maintained throughout the year. The same can be said for reservoirs classified as run-of-river projects. Reservoirs with similar landscape characteristics display a combination of effects related to

both shoreline rings and exposed reservoir bottoms. These combinations create lower levels of scenic integrity.

Exposed shorelines or reservoir bottoms alone do not create the lowest level of scenic integrity, but rather exposure of other visible elements from lower water levels. Woody debris, trash, riprap, underwater structures such as tires used for fish habitat, and floating structures sitting on the bottom add unattractive visual contrast to the area viewed.

It is also important to note that, for some of the mainstem reservoirs, flood conditions create shoreline conditions that do not appear natural. For example, vegetated areas, normally above water, are covered; shoreline structures float higher than their moorings; and parking lots or other recreational facilities are submerged in water.

Various combinations of development and land use patterns that are present in the viewed landscapes along the shorelines contribute to the overall visual character of the project area. These can range from the more urban and industrial developments often associated with the mainstem reservoirs to residential developments that are common to both mainstem and tributary reservoirs. Urban and industrial developments generally create a lower level of scenic integrity. Residential areas and water-related facilities that include docks, boathouses, stairways, and shoreline protection structures are becoming more common. The presence of these facilities in the landscape reduces scenic integrity.

Islands are another significant feature that provide scenic accents and visual reference points throughout the reservoirs and serve as visual buffers for less desirable views. They also provide a pleasing foreground frame for the distant shoreline or background.

Other important scenic features include the secluded coves and steep, wooded ridges that occur around the reservoirs. The isolated coves with wooded shoreline provide relatively private locations for dispersed recreation activities. Significant elevation changes along some stretches of shoreline provide a dramatic contrast to the surrounding reservoir and gently sloping countryside, particularly when they are viewed from background distances. Most shorelines upstream of the dams appear natural. Slopes and ridgelines seen from the reservoirs are generally heavily vegetated with mature hardwood and evergreen trees and provide positive visual contrast to the reservoirs. There is usually little development in the foreground distances.

TVA's dam reservations contrast visually with the lands that border them. The dam reservations appear predominately industrial near the dams and switchyards. Most buildings are broadly horizontal and can be seen in the foreground. Transmission structures, including towers and lines, and fossil and nuclear plant structures generally can be seen up to middleground distances depending upon topography and viewer position. The most significant focal point in the landscape is generally the smokestacks and cooling towers, which can be up to 800 feet in height. Farther away, closer to the borders on all sides, the landscape becomes natural appearing with slight human alterations. Residents and motorists along local roads would have views up to middleground distances of the dam reservations depending upon seasonal variations of vegetation and atmospheric conditions.

4.12. Floodplains

As stated in the TVA Act, one of the primary reasons that TVA was established was to "control the destructive floodwater in the Tennessee River and the Mississippi River Basins." A series of dams and reservoirs was constructed to make flood control a reality.

The operation of the integrated reservoir system provides substantial protection against flooding in the Valley and in the Ohio River and Mississippi River basins.

A common misconception about dams is that they prevent flooding. Floods cannot be prevented, but the operation of the TVA reservoir system can reduce damages. Efforts are made to reduce the peak flood elevations that would occur naturally without the dams. This is done by holding backwater upstream in the storage tributary reservoirs until the rains have subsided and then gradually releasing water until normal reservoir operations can be resumed. These actions substantially reduce the peak water elevations that would occur without the reservoir system.

Even with the system of dams, there is a floodplain adjacent to the reservoir. A floodplain is that relatively level land area along a stream, river, or reservoir that is subjected to periodic flooding. The 100-year floodplain is defined as that area inundated by the 100-year flood. The 100-year flood is the level of flooding that has a 1 percent chance of being equaled or exceeded in any given year and does not indicate a time period of 100 years between floods of this magnitude. Floodplain areas along reservoir shorelines normally encompass TVA lands and other lands where TVA owns flowage easements.

Floodplains provide and support many natural resources and functions of considerable economic, social, and environmental value. These values and benefits include wetlands and wildlife habitat, improved water quality, storm water management, recreational opportunities, and aesthetics.

As a federal agency, TVA is subject to the requirements of EO 11988 (Floodplain Management). The objective of EO 11988 is "to avoid to the extent possible the long- and short-term adverse impacts associated with the occupancy and modification of floodplains and to avoid direct and indirect support of floodplain development wherever there is a practicable alternative" (43 *Federal Register* 6030 [10 February 1978]). The EO is not intended to prohibit floodplain development in all cases, but rather to create a consistent government policy against such development under most circumstances. The EO requires that agencies avoid development in the 100-year floodplain unless there is no practicable alternative.

4.13. Socioeconomics and Environmental Justice

The NRP has the potential for social and economic impacts to virtually any area within the TVA region. Therefore, this analysis includes the 201 counties within these areas, plus Muhlenberg County, Kentucky, site of Paradise Fossil Plant, and DeSoto County, Mississippi, site of Southaven Combined-Cycle Plant. The 203-county area is further noted as the study area.

Population

The total population of the TVA region is about 10.7 million, as reported by the 2010 Census (U.S. Bureau of the Census, http://factfinder2.census.gov/faces/nav/jsf/pages/index.xhtml). Appendix K includes a table showing historical and projected population for the counties in the region.

The total population of the TVA region increased by 10.9 percent from 2000 to 2010. This was a slower growth rate than the 15.5 percent increase from 1990 to 2000. Nevertheless, these growth rates exceeded the national rates of 9.7 percent from 2000 to 2010 and 13.2

percent from 1990 to 2000. If recent trends continue, the region will have a total population of about 11.6 million in 2020 and 12.5 million in 2030 (Table 4-15).

Table 4-15. Resident Population, Tennessee Valley States

Area	Census Results		Projected Population	
	2000	2010	2020	2030
TVA Region	9,674,255	10,732,758	11,586,384	12,548,086
Alabama	4,447,100	4,779,736	5,088,401	5,410,837
Georgia	8,186,453	9,687,653	10,756,852	12,048,802
Kentucky	4,041,769	4,339,367	4,575,877	4,838,109
Mississippi	2,844,658	2,967,297	3,171,981	3,354,460
North Carolina	8,049,313	9,535,483	10,357,770	11,465,210
Tennessee	5,689,283	6,346,105	6,868,376	7,462,676
Virginia	7,078,515	8,001,024	8,783,469	9,627,145
United States	281,421,906	308,745,538	333,510,007	360,104,340

Source: Historical data from http://factfinder2.census.gov/faces/nav/jsf/pages/index.xhtml.
Projections are trends based on 1970 to 2010 Census of Population data.

The larger population concentrations in the region tend to be located along the corridors of the Tennessee, French Broad, Cumberland, and Tennessee rivers (Figure A-13, Appendix A). The areas of upper east Tennessee through Knoxville and Chattanooga, Tennessee, and North Alabama are situated along the Tennessee River and its tributaries. The Asheville, North Carolina, area is located along the French Broad River. The Nashville and Memphis, Tennessee, areas are located along the Cumberland and Mississippi rivers, respectively.

About 6.7 million people live in the 16 metropolitan areas located within the study area (Table 4-16; see Figures A-13 and A-14, Appendix A). Notable clusters of counties with relatively low populations are located on the Cumberland Plateau in Tennessee, along the Tennessee River in western Tennessee, and in Mississippi and western North Carolina.

Table 4-16. Metropolitan Area Population, 2009

Metropolitan Area	Total Population	Population Within Study Area	Population Outside Study Area
Memphis, Tennessee	1,316,100	1,254,420	61,680
Jackson, Tennessee	115,425	115,425	
Florence-Muscle Shoals, Alabama	147,137	147,137	
Decatur, Alabama	153,829	153,829	
Huntsville, Alabama	417,593	417,593	
Chattanooga, Tennessee-Georgia	528,143	528,143	
Dalton, Georgia	142,227	142,227	
Cleveland, Tennessee	115,788	115,788	
Knoxville, Tennessee	698,030	698,030	
Morristown, Tennessee	136,608	136,608	

Metropolitan Area	Total Population	Population Within Study Area	Population Outside Study Area
Kingsport-Bristol-Bristol, Tennessee-Virginia	309,544	309,544	
Johnson City, Tennessee	198,716	198,716	
Bowling Green, Kentucky	125,953	125,953	
Clarksville, Tennessee-Kentucky	273,949	273,949	
Nashville-Davidson-Murfreesboro, Tennessee	1,589,934	1,589,934	
Asheville, North Carolina	424,858	424,858	
Total	**6,693,834**	**6,632,154**	**61,680**

Source: http://factfinder2.census.gov/faces/nav/jsf/pages/index.xhtml.
Note: Metropolitan and Micropolitan Statistical Areas are defined by the U. S. Office of Management and Budget. Such areas have a high degree of social and economic integration with an urban core (http://www.whitehouse.gov/sites/default/files/omb/assets/bulletins/b10-02.pdf).

Employment

In 2009, the total employment for the TVA region was 5.74 million (http://www.bea.gov/regional/reis/). Regionally, manufacturing accounted for approximately 10.4 percent of all employment, somewhat higher than the national average of 7.1 percent. Manufacturing accounts for a substantial share of employment in many rural areas of the region (see Figure A-15, Appendix A) and exceeds 20 percent of all employment in some counties.

However, the level of employment in manufacturing has been declining, both regionally and nationally, for a number of years. As of 2009, the estimated manufacturing employment in the region was about 596,000. This figure is a sharp decrease from about 852,000 a decade ago. This decline is a national phenomenon, with a similar decline at the national level. The mix of manufacturing in the region has been gradually shifting to relatively more durable goods, including items such as automobiles. The durable goods share of total employment in manufacturing has increased from about 48 percent of the total to more than 55 percent. This trend is expected to continue. Manufacturing is an important source of employment, and its importance is expected to continue, although its share of total employment is likely to continue to decline.

Farming accounted for 2.8 percent of total employment in the study area, also higher than the national average of approximately 1.5 percent (see Figure A-16, Appendix A). Much farming in the study area is part time and not a primary source of income. Earnings from farming account for less than 1 percent of all earnings in the study area. In 2007, the average farm in Tennessee was 138 acres, and half of all farms were 58 acres or less. Average reported sales per farm in Tennessee were $33,015, and the average net cash farm income was reported to be $3,075 per farm (USDA 2007c). In comparison, the national average farm was 418 acres, and the net cash farm income per farm nationwide was $33,827, more than 10 times the Tennessee average.

Income

In 2009, the per capita personal income for the study area was $32,643, about 82 percent of the national average of $39,635 (http://www.bea.gov/regional/reis/). However, the 2009 average income levels vary widely across the study area. For example, the average income for Williamson County, Tennessee, was 135 percent of the national average at

$53,392, and Hancock County, Tennessee, was 48 percent of the national average at $19,186 (see Figure A-17, Appendix A).

Most counties with relatively high per capita income levels are in metropolitan or metropolitan areas. Economic and social ties with urban centers often provide greater opportunities and easier access to many goods and services. However, these areas also are likely to have somewhat higher costs of living, especially for housing.

Minority Populations
Minorities constitute 22.2 percent of the population within the study area, well below the national average of 36.3 percent (http://factfinder.census.gov/home/saff/aff_transition.html). However, the distribution within the region is very uneven (see Figure A-18, Appendix A). Minorities are a relatively large share of the total population in most counties located in the western portion of the study area. In the rest of the region, with some exceptions, minority shares are low except in or around metropolitan areas. In particular, the Mississippi portion and most of Tennessee west of the Tennessee River as it flows north to Kentucky has a larger share of minorities than the regional average. Most other counties with large minority shares are located in metropolitan areas.

Poverty
In 2009, the poverty level for the study area is estimated to be 17.4 percent, higher than the national average of 14.3 percent (Figure A-19, Appendix A) (http://www.census.gov/did/www/saipe/). County poverty levels are higher than the regional average more frequently in the western part of the region and in counties along or near the Tennessee-Kentucky border. Relatively low poverty levels occur most often in metropolitan areas.

4.14. Navigation

The TVA Act authorized the construction and operation of dams and reservoirs in the Tennessee River and its tributaries to promote navigation and provide flood control. Development of the Tennessee River navigation channel was essentially completed in 1945 with the construction of a series of 10 dams and navigation locks, extending commercial navigation from Knoxville, Tennessee, to Paducah, Kentucky, a distance of 652 miles (see Table 4-17). The Tennessee River waterway is an integral part of the interconnected, 12,000-mile National Inland Waterway System.

Table 4-17. Navigation Locks on the Tennessee River Waterway

Lock	River Mile
Kentucky	Tennessee River Mile 22.4
Pickwick (Main and Auxiliary)	Tennessee River Mile 206.7
Wilson (Main and Auxiliary)	Tennessee River Mile 259.4
Wheeler (Main and Auxiliary)	Tennessee River Mile 274.9
Guntersville (Main and Auxiliary)	Tennessee River Mile 349.0
Nickajack	Tennessee River Mile 424.7
Chickamauga	Tennessee River Mile 471.0
Watts Bar	Tennessee River Mile 529.9
Fort Loudoun	Tennessee River Mile 602.3
Melton Hill	Clinch River Mile 23.1

The Tennessee River provides a year-round minimum depth of 11 feet, sufficient for 9-foot-draft vessels while allowing for 2 feet of overdepth. The minimum channel width in the dredged cuts is 300 feet with some widening on bends.

There are about 374 miles of secondary navigation channels in the Tennessee River system. On average, secondary channels provide at least 3 feet of depth at minimum pool levels and have a minimum width of approximately 50 feet.

Commercial Navigation

There are 187 commercial waterfront terminals located on the Tennessee River waterway. In 2007, the most recent year for which detailed data are available, waterborne commerce on the Tennessee River system totaled 49.6 million tons. Coal comprised 38 percent of all traffic, 18.9 million tons, much of which was delivered to TVA fossil plants. According to USACE (2007), other commodities moved on the system in 2007 included aggregates (12.5 million tons); grains (3.4 million tons); chemicals (3.4 million tons); iron and steel (3.3 million tons); ores and minerals (2.4 million tons); petroleum fuels (1.7 million tons); and all others (4.0 million tons).

It is estimated that shippers save about $461 million per year by using the waterway over other modes of transportation. In addition, shippers benefit from a competitive advantage provided by the availability of the waterway as a transportation option. This advantage is known as the water-compelled rate effect and provides an additional savings of about $486 million. For 2008, total navigation benefits for the Valley were estimated to be about $950 million (TVA data).

Navigation Aids

On the Tennessee River system, the United States Coast Guard (USCG) is responsible for installing and maintaining navigation aids marking the commercial navigation channel, including channel buoys and daymarkers. TVA is responsible for those navigation aids marking secondary or recreational navigation channels. Responsibilities for navigation aids on the Tennessee River and its tributaries are described in a 1982 memorandum of agreement between the USCG and TVA.

TVA maintains approximately 2,500 navigation aids, marking 374 miles of secondary navigation channels on mainstem reservoirs. Secondary channel navigation aids help boaters avoid underwater obstructions, while accessing marinas, waterfront recreational areas, public launching ramps, and residential property. The majority of the secondary channels lead off the commercial channel into large creeks and embayments. Secondary navigation aids include buoys, dayboards, pipes, hazard buoys, direct-read elevation gages, directional signs, and overhead power line buoys.

On TVA's tributary reservoirs, where there can be a large fluctuation between summer and winter pool levels, it would be impossible to install channel buoys that would be functional year-round. Instead, TVA installs and maintains hazard (danger) buoys to warn boaters of most isolated underwater hazards on the "main channel," as well as numbered dayboards placed at various locations around the reservoir. Tributary reservoirs with navigation aids include Apalachia, Bear Creek, Blue Ridge, Boone, Chatuge, Cherokee, Douglas, Fontana, Fort Patrick Henry, Hiwassee, Normandy, Norris, Nottely, Ocoee No. 1, South Holston, Tims Ford, and Watauga.

Safety Harbors and Safety Landings
On the Tennessee River, there are designated shoreline areas called safety harbors and safety landings where commercial traffic can tie off during fog and other inclement weather, equipment malfunctions, and emergencies. These safety harbors greatly minimize the risk of damage to private property. Over 160 safety harbors and landings are maintained along the mainstem reservoirs and two tributary reservoirs (Tellico and Melton Hill).

4.15. Air Quality

Air quality is a valuable environmental resource. Poor air quality can affect our health, ecosystem health, forest and crop productivity, economic development, as well as our enjoyment of scenic views. Through its passage of the Clean Air Act, Congress has mandated the protection and enhancement of our nation's air quality resources. NAAQS establish concentration limits in the ambient air for the following criteria pollutants to protect the public health and welfare:

- Sulfur dioxide
- Ozone
- Nitrogen dioxide
- Particulate matter whose particles are $\leq$ 10 micrometers
- Particulate matter whose particles are $\leq$ 2.5 micrometers
- Carbon monoxide
- Lead

The primary NAAQS were promulgated to protect the public health, and the secondary NAAQS were promulgated to protect the public welfare from any known or anticipated adverse effects associated with the presence of pollutants in the ambient air. Ambient air monitors measure concentrations of these pollutants to determine attainment with these standards. Areas in violation of the NAAQS are designated as nonattainment areas, and new sources to be located in or near these areas may be subject to air permitting requirements that are more stringent. Figure A-20 (Appendix A) shows the current nonattainment areas for particles less than 2.5 microns. Figure A-21 (Appendix A) shows the areas that are currently nonattainment for ozone, as well as the areas that are expected to be designated nonattainment for the revised ozone standard. The USEPA promulgated new, more restrictive standards for particulate matter in 2006 and for ozone in 2008. There are currently no nonattainment areas for carbon monoxide, lead, nitrogen dioxide, sulfur dioxide, and particles less than 10 microns in the TVA region. However, USEPA adopted a more stringent lead standard in 2008, and nonattainment areas have not yet been designated for this standard. Consequently, there may be nonattainment areas for lead in the TVA region in the future. In 2009, the USEPA proposed new air quality standards for GHGs such as carbon dioxide. These regulations for GHGs have not yet been implemented. In 2010, USEPA adopted a 1-hour nitrogen dioxide standard. A listing of the NAAQS is presented in Table 4-18. National standards, other than annual standards, are not to be exceeded more than once per year (except where noted).

Table 4-18. National Ambient Air Quality Standards

Pollutant	Primary Standards[a]		Secondary Standards[b]	
	Level	Averaging Time	Level	Averaging Time
Carbon Monoxide	9 ppm (10,000 µg/m^3)	8-hour (1)	None	
	35 ppm (40,000 µg/m^3)	1-hour (1)		
Lead	0.15 µg/m^3 (2)	Rolling 3-Month Average	Same as Primary	
	1.5 µg/m^3	Quarterly Average	Same as Primary	
Nitrogen Dioxide	0.053 ppm (100 µg/m^3)	Annual (Arithmetic Mean)	Same as Primary	
	100 ppb	1-hour(3)	None	
Particulate Matter (PM_{10})	150 µg/m^3	24-hour (4)	Same as Primary	
Particulate Matter ($PM_{2.5}$)	15.0 µg/m^3	Annual (5) (Arithmetic Mean)	Same as Primary	
	35 µg/m^3	24-hour (6)	Same as Primary	
Ozone	0.075 ppm (2008 standard)	8-hour (7)	Same as Primary	
	0.08 ppm (1997 standard)	8-hour (8)	Same as Primary	
	0.12 ppm	1-hour (9) (Applies only in limited areas)	Same as Primary	
Sulfur Dioxide	0.03 ppm (80 µg/m^3)	Annual (Arithmetic Mean)	0.5 ppm (1300 µg/m^3)	3-hour (1)
	0.14 ppm (365 µg/m^3)	24-hour (1)		
	75 ppb (10)	1-hour	None	

Source: 40 CFR 50 (USEPA 2008a)

Abbreviations: ppb = parts per billion ppm = parts per million µg/m^3 = micrograms per cubic meter

(a) Standards set to protect public health

(b) Standards set to protect public welfare

(1) Not to be exceeded more than once per year

(2) Final rule signed October 15, 2008

(3) To attain this standard, the three-year average of the 98th percentile of the daily maximum 1-hour average at each monitor within an area must not exceed 100 ppb (effective January 22, 2010)

(4) Not to be exceeded more than once per year on average over three years

(5) To attain this standard, the three-year average of the weighted annual mean $PM_{2.5}$ concentrations from single or multiple community-oriented monitors must not exceed 15.0 µg/m

(6) To attain this standard, the three-year average of the 98th percentile of 24-hour concentrations at each population-oriented monitor within an area must not exceed 35 µg/m^3 (effective December 17, 2006)

(7) To attain this standard, the three-year average of the fourth-highest daily maximum 8-hour average ozone concentrations measured at each monitor within an area over each year must not exceed 0.075 ppm (effective May 27, 2008)

(8) (a) To attain this standard, the three-year average of the fourth-highest daily maximum 8-hour average ozone concentrations measured at each monitor within an area over each year must not exceed 0.08 ppm (b) The 1997 standard—and the implementation rules for that standard—will remain in place for implementation purposes as USEPA undertakes rulemaking to address the transition from the 1997 ozone standard to the 2008 ozone standard

(9) (a) USEPA revoked the 1-hour ozone standard in all areas, although some areas have continuing obligations under that standard ("anti-backsliding").

(b) The standard is attained when the expected number of days per calendar year with maximum hourly average concentrations above 0.12 ppm is $\leq$1.

(10) Final rule signed June 2, 2010. To attain this standard, the 3-year average of the 99th percentile of the daily maximum 1-hour average at each monitor within an area must not exceed 75 ppb.

The implementation of some NRP activities may be affected by several air quality considerations. One of the factors is regulatory status or attainment of air quality standards. Sources locating in clean air areas are subject to the Prevention of Significant Deterioration (PSD) New Source Review (NSR) rules, whereas those locating in or affecting areas failing to attain air quality standards must comply with nonattainment NSR. An overriding constraint in both NSR programs is that no source may cause or significantly contribute to a violation of an ambient air quality standard.

PSD regulations restrict the increment by which ambient pollutant levels may increase due to emissions from major new sources, or the modification of existing sources, and require the use of best available control technology on such sources. A memorandum listing pollutants currently subject to PSD review was published in the *Federal Register* (USEPA 1992).

PSD regulations include protection of national parks and wilderness areas that are designated as PSD Class I air quality areas. A new or expanding major air pollutant source is required to estimate the potential impact of its emissions on the air quality of any nearby Class I area, as specified by the state or local air regulatory agency, with input from the federal land manager(s) having jurisdiction over the given Class I area(s). There are eight PSD Class I areas in the vicinity of the TVA region: the Great Smoky Mountains and Mammoth Cave national parks and the Joyce Kilmer, Shining Rock, Linville Gorge, Cohutta, Sipsey, and Upper Buffalo wilderness areas. The location of these Class I areas are shown in Figure A-22, Appendix A. Generally, dispersion modeling is required to demonstrate that pollution levels do not increase beyond the allowable increments. Ambient air quality data necessary for PSD analysis purposes are available for the region.

In 1999, USEPA established the Regional Haze Rule to improve visibility in Class I areas. This regulation requires states to develop long-term strategies to improve visibility with the ultimate goal of restoring natural background visibility conditions by 2064.

The air quality in the Valley and across the country has greatly improved. Some clean air standards, by which we judge progress, are much tougher now. The regulatory “bar” has been raised. Recent record low emission levels are due in part to manageable operations, as well as uncontrollable variables. TVA is undertaking one of the largest emission-reduction programs in the nation. Sulfur dioxide emissions have been reduced by 91 percent since the peak in 1977. Annual nitrogen oxide emissions have been reduced by 89 percent, and ozone season nitrogen oxide emissions have been reduced by 90 percent from the peak in 1995.

4.16. Climate

The TVA region spans the transition between a humid continental climate to the north and a humid subtropical climate to the south. This provides the region with generally mild temperatures (i.e., a limited number of days with temperature extremes), ample rainfall for agriculture and water resources, vegetation-killing freezes from midautumn through early spring, occasional severe thunderstorms, infrequent snow, and infrequent impacts—primarily in the form of heavy rainfall—from tropical storms. The seasonal climate variation induces a dual peak in annual power demand, one for winter heating and a second for summer cooling. Rainfall does not fall evenly throughout the year, but tends to peak in late winter/early spring and again in midsummer. Winds over the region are generally strongest during winter and early spring and lightest in late summer and early autumn. Solar radiation (insolation) varies seasonally with the maximum sun elevation above the horizon

and longest-day length in summer. However, insolation is moderated by frequent periods of cloud cover typical of a humid climate.

Prediction of the future trends in climate change is not an exact science. Global climate change and its relationship to GHGs are items of intense study and are important to TVA. In common usage, "global warming" often refers to the warming of the earth that may occur as a result of emissions of GHG in the atmosphere. Global warming may occur from a variety of both natural and anthropogenic causes. "Climate change" refers to any substantive change in measures of climate, such as temperature, precipitation, or wind. The two terms are often used interchangeably, but the climate change is broader as it conveys that there are other changes in addition to rising atmospheric temperature.

It is believed that certain substances present in the atmosphere act like the glass in a greenhouse to retain a portion of the heat that is radiated from the surface of the earth. The common term for this phenomenon is the "greenhouse effect," and it is essential for sustaining life on earth. Water vapor and, to a lesser extent, water droplets in the atmosphere are responsible for 90 to 95 percent of the greenhouse effect. The most abundant long-lived GHGs are CO_2, methane, and nitrous oxide. Both man-made and natural processes produce GHG. According to some sources, increases in the earth's average surface temperatures are linked in part to increasing concentrations of GHG, particularly CO_2, in the atmosphere. This has been a cause for concern among scientists and policymakers. This phenomenon has been studied internationally since 1992 by the United Nations Framework Convention on Climate Change, Intergovernmental Panel on Climate Change (IPCC).

The global carbon cycle is made up of large carbon sources and sinks. Billions of tons of carbon in the form of CO_2 are absorbed by oceans and living biomass (i.e., sinks) and are emitted to the atmosphere annually through natural and man-made processes (i.e., sources). When in equilibrium, carbon fluxes among these various reservoirs are roughly balanced. According to the IPCC (2007), since the Industrial Revolution (i.e., about 1750), global CO_2 atmospheric concentrations have risen about 36 percent, principally due to fossil fuel use.

The remainder of this section describes the current climate and recent climate trends of the TVA region in more detail. Identifying recent trends in regional climate parameters such as temperature and precipitation is a complex problem because year-to-year variation may be larger than the multidecadal change in a climate variable. Climate is frequently described in terms of the climate "normal," the 30-year average for a climate parameter (National Climatic Data Center 2008). The climate normals described in the following sections are for the 1971-2000 period. Earlier and more recent data are also presented, where available. The primary sources of these data are National Weather Service (NWS) records and records from the rain gauge network maintained by TVA in support of its reservoir operations. NWS records, unless stated otherwise, are for Memphis, Nashville, Chattanooga, Knoxville, and Tri-Cities, Tennessee, and Huntsville, Alabama.

Temperature

1971-2000 Climate Normals — Average monthly temperatures for the TVA region during 1971-2000 ranged from 38.4°F in January to 79.1°F in July (Table 4-19).

Table 4-19. Monthly, Seasonal, and Annual Temperature Averages for Six National Weather Service Stations in the TVA Region for 1971-2000

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
°F	38.4	42.6	50.9	59.2	67.5	75.3	79.1	78.0	71.7	60.3	50.1	41.7
°C	3.5	5.9	10.5	15.1	19.7	24.1	26.2	25.6	22.1	15.7	10.0	53.9

	Winter	Spring	Summer	Autumn	Annual
°F	40.9	59.2	77.5	60.7	59.6
°C	5.0	15.1	25.3	16.0	15.3

Recent Trends — There is significant year-to-year variability in temperature. As suggested by the plot in Figure 4-8, annual temperature in the TVA region appears to have increased approximately 1°F (0.56°C) over the 30-year period between 1970 and 2000 (this is equivalent to a change of about 0.19°C per decade). This increase is most prominent in the winter and summer seasons. Spring and autumn experienced little change in temperatures. However, the overall annual change in temperature for the longer 1958-2008 period was not statistically significant (runs test [Bendat and Piersol 1986], $r^2 = 0.0994$, $p>0.05$). This implies that average temperature during the 50-year period was within the expected range of variability, and the long-term trend could not be distinguished from random variation.

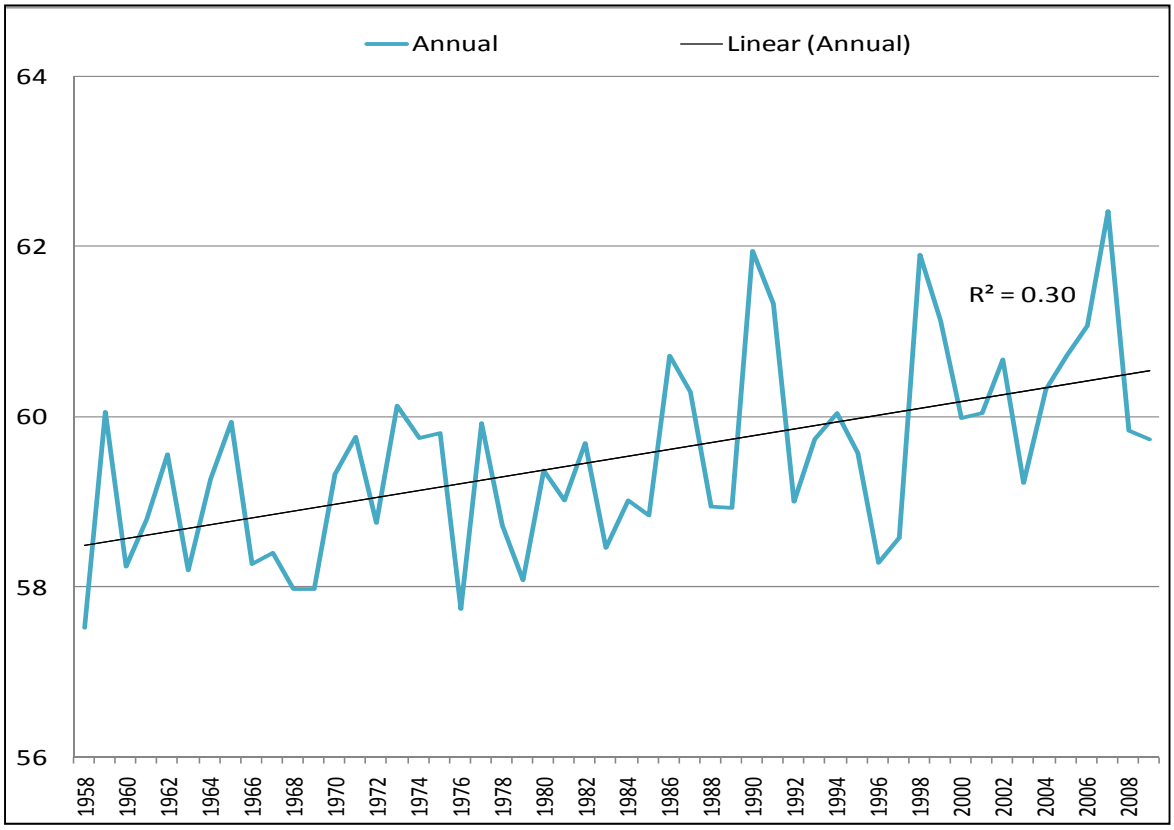


Figure 4-8. 1971-2000 TVA Region Annual Average Temperature (°F) Based on Data from Six National Weather Service Stations

There are some inconsistencies with these observations. For example, the number of days during the year with temperatures at or above 90°F increased by about 12 days during 1971-2000. However, the number of days experiencing 90+°F decreased during both 1958-2004 (by six days) and 1979-2004 (by 10 days). For 1958-2009, the number of days essentially remained unchanged.

The U.S. Climate Change Science Program (Lanzante et al. 2006) reports that global surface temperature through 2004 has increased at a rate of about 0.12°C per decade since 1958 and about 0.16°C per decade since 1979. Regional differences from the global trends are expected. In the tropics, for example, the observed surface temperature trends have increased about 0.11°C per decade since 1958 and about 0.13°C per decade since 1979. These rates represent an acceleration of temperature changes that during the entire 20th century were estimated by the IPCC as being in the range of 0.06 to 0.09°C per decade (Trenberth et al. 2007).

For the southeastern U.S., Trenberth et al. (2007) indicate that temperature change during the 20th century (through 2005) was slightly negative with a mean cooling rate of about 0.2-0.3°C per decade in the vicinity of the TVA region. Their data indicate a warming rate of 0.3-0.4°C per decade for 1979-2005 for the TVA region, greater than the global average trend. The lack of significant temperature change (i.e., +0.19°C per decade) during 1958-2008 for the TVA region is consistent with these published findings.

Precipitation

1971-2000 Climate Normals — The average annual precipitation in the Tennessee River watershed during 1971-2000 was 49.92 inches; monthly averages ranged from 3.04 inches in October to 5.42 inches in March (Table 4-20).

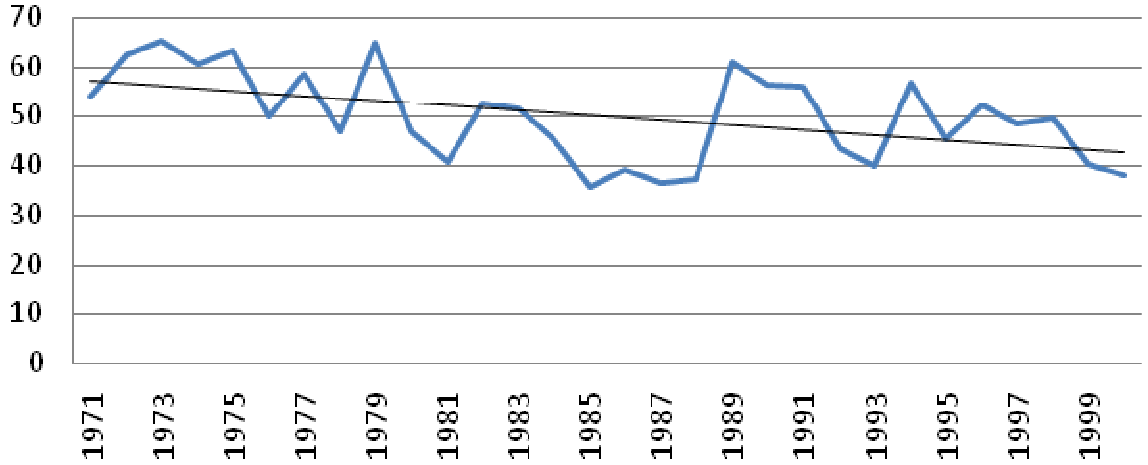
Table 4-20. Monthly, Seasonal, and Annual Precipitation Averages in the Tennessee River Watershed for 1971-2000

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Inches	4.87	4.31	5.42	3.97	4.52	3.84	3.97	3.24	3.59	3.04	4.32	4.85
Centimeters	12.4	10.9	13.8	10.1	11.5	9.8	10.1	8.2	9.1	7.7	11.0	12.3

	Winter	Spring	Summer	Autumn	Annual
Inches	14.03	13.91	11.04	10.95	49.92
Centimeters	35.6	35.3	28.0	27.8	126.8

Source: TVA rain gage network data

Recent Trends — Although there is significant year-to-year variability, there appears to be a decrease in precipitation during the approximately 30-year period (Figure 4-9). The overall annual change in precipitation was deemed not statistically significant (with 95 percent confidence) based on results from a standard statistical test (Bendat and Piersol 1986) applied to the annual mean precipitation over the period of 1958-2008. This implies that average precipitation during the 50-year period was within the expected range of variability, and the long-term change could not be assumed anything other than random variation in the data. Note that precipitation information is highly variable and contradictory. Data for 1958-2004 indicate that annual precipitation is decreasing. However, data for 1979-2004 indicate that precipitation is increasing.



Source: TVA rain gauge network data
Note: Straight line represents the mean change in annual precipitation for the period.

Figure 4-9. Annual Average Precipitation (Inches) for the Tennessee River Basin

Recent changes in precipitation around the world are more variable than changes in temperature. Such behavior is expected as changes in atmospheric circulation (wind patterns) and temperature combine differently in different regions to influence the basic physical processes that control precipitation. The IPCC 2007 climate assessment reported that a few regions in North America, southern South America, Eurasia, and Australia experienced precipitation increases during the 1901-2005 period (Trenberth et al. 2007). However, changes since 1979 have been less pronounced except in Australia. Over the southeastern U.S., precipitation since 1901 has shown a small increase of generally less than 10 percent overall, and since 1979 the changes have been near zero. These results are consistent with a U.S. Global Change Research Program summary of recent and projected climate change in the Southeast (Karl et al. 2009), which shows small precipitation increases across Tennessee during the 20th century offset by decreases over Alabama, Georgia, and North Carolina. Hoerling et al. (2008), in describing the 1951-2006 interval, state "The spatial variations and seasonal differences in precipitation change are *unlikely* [sic] to be the result of anthropogenic greenhouse forcings alone." On a related issue, they further state "It is *unlikely* [sic] that a systematic change has occurred in either the frequency or area coverage of severe drought over the contiguous United States from the mid-twentieth century to the present." This does not mean that anthropogenic warming of the climate has not exacerbated the effects of drought. To the contrary, Hoerling et al. (2008) concluded that an anthropogenic link to worsening drought effects (through the enhanced drying effects of warming) is likely.

Wind

1971-2000 Climate Normals — Wind speed and direction are important indicators of weather patterns and dispersion of air pollutants. Wind speed is also a factor in determining the potential of an area for wind energy development. Average surface wind speeds (measured 33 feet [10 meters] above the ground) for nine NWS stations in the TVA region for 1973-2000[2] are relatively light with higher speeds in winter and spring and lower speeds in summer and autumn (Table 4-21). In general, wind speeds at higher elevations

[2] Data for 1971 and 1972 are not available from the National Climatic Data Center.

are greater than those shown in the table. Average wind speeds in winter, spring, and autumn were slightly less than the 1961-1990 seasonal norms. A similar decrease is also shown in the maximum, minimum, and annual average wind speeds. The months of occurrence for the maximum and minimum wind speed remain unchanged, with highest wind recorded in March and lowest wind in August.

Table 4-21. Monthly, Seasonal, and Annual Wind Speed Averages for Nine Sites in the TVA Region for 1973-2000

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Miles/Hour	8.3	8.4	8.9	8.4	7.1	6.3	5.8	5.4	5.8	6.2	7.3	7.9
Meters/Second	3.7	3.7	3.9	3.7	3.1	2.8	2.6	2.4	2.6	2.8	3.2	3.5

	Winter	Spring	Summer	Autumn	Annual
Miles/Hour	8.2	8.1	5.8	6.4	7.1
Meters/Second	3.6	3.6	2.6	2.7	3.2

Surface wind directions in the TVA region for the same period are shown in the wind rose diagram (Figure 4-10). A wind rose is a diagram with spokes representing directions (e.g., north, north-northeast, northeast). The frequency with which the measured wind blows from a given direction is illustrated by the distance between the point where a heavy line crosses a spoke and the center of the diagram. The most frequent wind directions are from the south and north sectors. This occurs at Memphis, Tennessee; Tupelo, Mississippi; Paducah, Kentucky; Nashville, Tennessee; Chattanooga, Tennessee; and Asheville, North Carolina. Prevailing wind directions at Knoxville, Tennessee, and Tri-Cities, Tennessee, are from northeast and/or southwest sectors, which reflect the down-valley and up-valley flow pattern seen in the area. Wind directions at Huntsville, Alabama, are more variable than at other sites. Overall, the prevailing wind directions in the TVA region during 1973-2000 are nearly identical to those during 1961-1990.

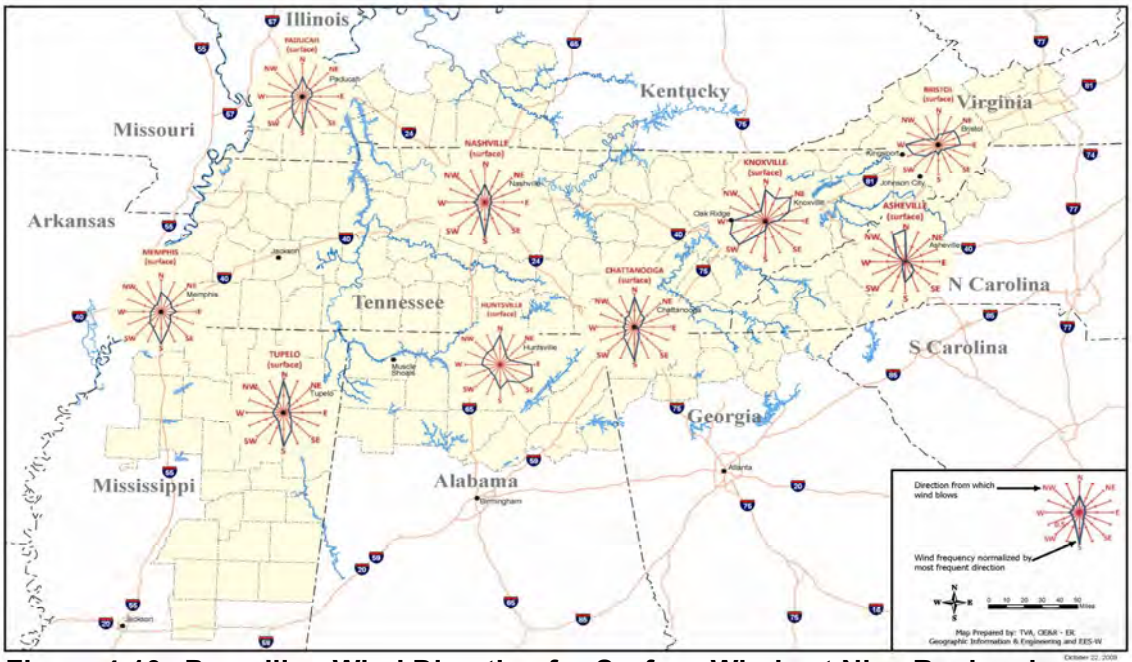


Figure 4-10. Prevailing Wind Direction for Surface Winds at Nine Regional Airports, 1973-2000

Solar Radiation

1971-2000 Climate Normals — Solar radiation (insolation) received at the earth's surface is a function of two factors—cloud cover and atmospheric particles (aerosols). Clouds generally decrease insolation by scattering and reflecting incoming solar radiation back into space. Aerosols scatter and absorb solar radiation. Absorbed radiation tends to be reradiated by aerosols in longer wavelengths with some of the energy reaching the earth surface, some warming the atmosphere, and some going back into space.

Solar radiation is measured at few NWS weather stations, and most of the data in the National Solar Radiation database produced by the National Renewable Energy Laboratory are based on modeling rather than original measurements. Cloud cover, however, is measured at all NWS weather stations and ranges from zero (totally clear sky) to 100 percent (completely covered by clouds). Table 4-22 shows mean cloud cover for nine sites in the TVA region during 1973-2000. The nine sites are Asheville, North Carolina; Tri-Cities, Knoxville, Chattanooga, Nashville, and Memphis, Tennessee; Huntsville, Alabama; Tupelo, Mississippi; and Paducah, Kentucky.

Table 4-22. Monthly, Seasonal, and Annual Cloud Cover Averages for Nine Sites in the TVA Region for 1973-2000

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Percent (%)	66	64	63	57	59	56	53	51	53	49	59	63

	Winter	Spring	Summer	Autumn	Annual
Percent (%)	65	60	53	53	58

TVA has monitored solar radiation at Sequoyah Nuclear Plant and Browns Ferry Nuclear Plant since the 1970s. Figure 4-11 shows these monitoring results as well as cloud cover measurements at the Chattanooga airport (about 15 miles from Sequoyah) and at the Huntsville airport (about 21 miles from Browns Ferry). Cloud cover at the Chattanooga airport was negatively correlated (correlation coefficient of -0.35) with solar radiation at Sequoyah, and cloud cover at Huntsville airport was negatively correlated (correlation coefficient of -0.38) with solar radiation at Browns Ferry. The decreasing trends in cloud cover at both Chattanooga and Huntsville are significantly different ($p \leq 0.05$) from random variability. However, no trend is detected in solar radiation at the two plants at the same level of significance. Due to this weak relationship between measured solar radiation and cloud cover, cloud cover is, at best, a weak proxy for solar radiation at specific sites in the TVA region.

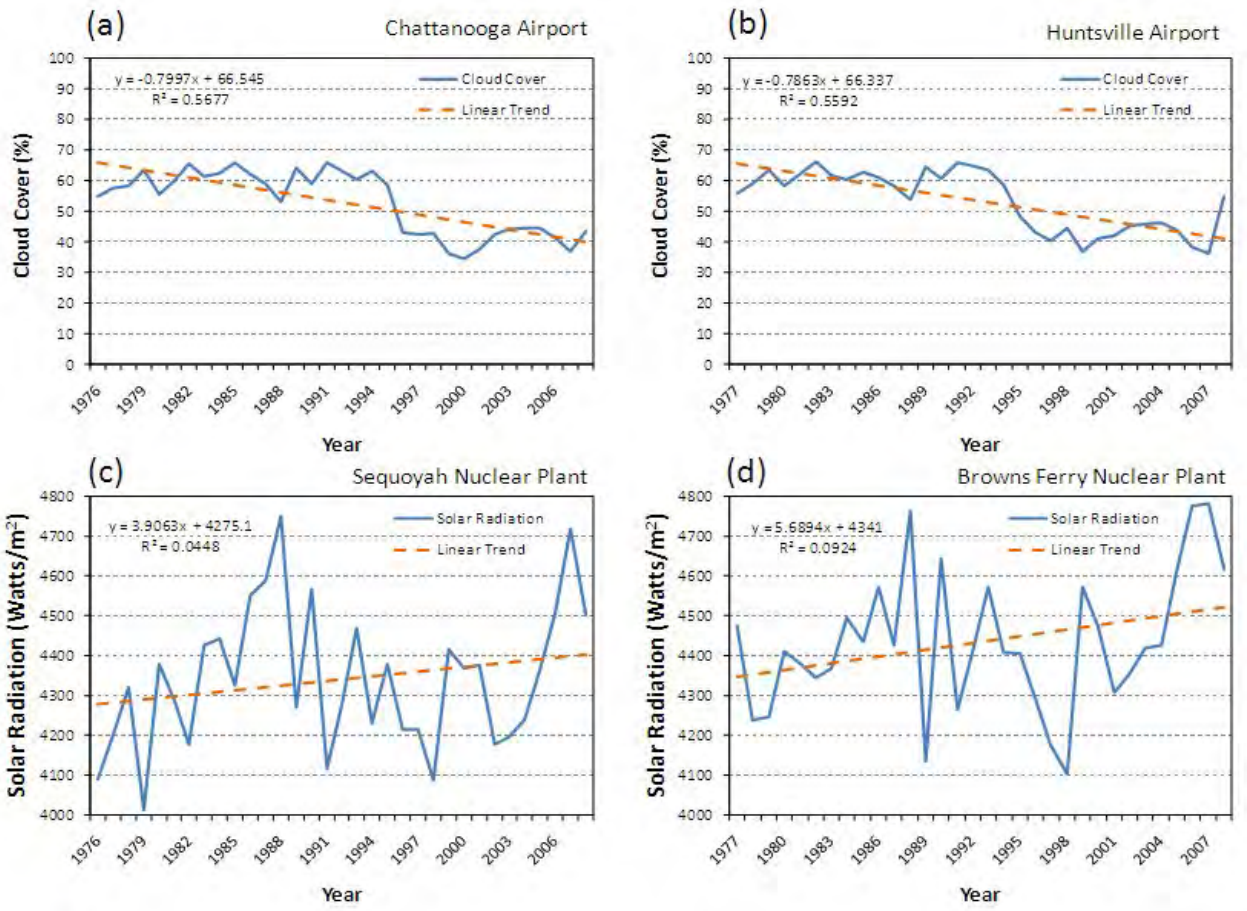


Figure 4-11. Annual Observations and Fitted Trend Lines for Cloud Cover at Selected Airports (a and b) and Solar Radiation at Selected Nuclear Plants (c and d) for 1976/1977-2008

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CHAPTER 5 - ENVIRONMENTAL CONSEQUENCES

This chapter addresses the potential direct, indirect, and cumulative effects of adopting and implementing Alternatives A, B, C, and D. A direct impact is an effect caused by the action and occurring at the same time and place. An indirect impact is an effect caused by the action but removed in time or distance. A cumulative impact results from the incremental or collective effect of the action when combined with other past, present, and reasonably foreseeable future actions. Cumulative effects were examined within the TVA region over the next 20 years in the context of gradually increasing population and land development in that area. When determining the potential direct, indirect, and cumulative impacts to the environment, all programs and activities described under the alternatives were taken into consideration.

The remainder of this section addresses cumulative impacts of implementing the NRP programs when added to regional trends and anticipated future conditions. Consistent with the broad geographic scope of the NRP, cumulative effects were examined throughout the TVA region (Figure 1-2). Within the TVA region, in addition to TVA land, land is owned and managed by private individuals, NGOs (for example, The Nature Conservancy), and state and federal agencies. Similar to TVA, the USFS and National Park Service manage land in the region with goals for conservation, public access, and recreational opportunities. Because of the 20-year time frame and the geographic scope of the evaluation, predicting future resource conditions involves substantial uncertainty. Future cumulative impacts can result not only from possible actions of TVA, but also from those of other agencies and the public.

Past and present activities in the TVA region have resulted in a region shaped, in part, by TVA's successful achievement of the purpose and goals set by Congress to improve navigation, reduce flood damage, provide for the proper use of marginal lands, support industrial development, and provide affordable power, all for the general purpose of fostering the physical, economic, and social development of the region.

Existing conditions of the TVA region are described in Section 1.3 and throughout Chapter 4. The TVA region covers a total of 76,738 square miles with 44,783 square miles extending outside the Valley watershed. TVA reservoir lands total approximately 293,000 acres (458 square miles) encompassing parts of the seven Valley states. In addition, TVA manages approximately 9,100 acres of land at its power facilities throughout the region. Historically, TVA has made approximately 485,300 acres of land available for resource conservation purposes, including recreational developments (Table 1-1). Today, TVA manages between 5 and 10 percent of the recreation facilities in the region (Section 4.1.1, Table 4-1). As described in Figure 4-7, approximately 6 percent of TVA reservoir lands are developed, 12 percent are pasture or cropland, and 81 percent are forested. These figures are in significant contrast to the approximately 11 percent developed, 24 percent pasture or cropland, and 63 percent forested on the surrounding lands within 0.25 mile of TVA lands. In comparison, SMI reported that this same area of influence was approximately 67 percent forested, and forest covered 55 percent of the area of the counties adjoining TVA reservoirs.

The NRP is designed to be implemented over 20 years. Over this period, existing conditions in the TVA region are expected to change. The following general trends are anticipated over the next two decades:

- Increasing human population
- Increasing proportion of residents in metropolitan areas
- Increasing demand for public recreation opportunities associated with population growth
- Increasing development of natural habitat in rural and suburban areas

Foreseeable future actions in the TVA region have been described in long-range and regional planning documents such as TVA's IRP (TVA 2011). Other future activities generally include:

- Continued development of shoreline properties in private ownership.
- State agency efforts to conserve natural resources and provide dispersed and developed recreation opportunities in state parks, gamelands, and state forests.
- State agency efforts to reduce regional impacts to water quality through the total maximum daily load, water quality certifications, and other programs.
- Federal agency conservation and recreation efforts with a trend toward improving biodiversity, recreation, and less timber harvest.
- Regional coalitions producing conservation plans geared toward reducing impacts to water and forest resources. An example of this type of effort is the Cumberland Habitat Conservation Plan (http://www.cumberlandhcp.org/default.html).
- Local efforts generated by various levels of governmental and nongovernmental agencies. For example, the Southeast Watershed Forum is working with local city-county leaders, resource organizations, and TWRA staff to integrate comprehensive plans with preserving priority habitat and shaping growth away from natural. Other local efforts can be found at http://wcs.conservationregistry.org/.

These past, present, and projected conditions provide the context for determining potential cumulative impacts of TVA's proposed natural resource management programs.

The management programs proposed in the NRP are designed to improve and benefit natural resources and recreation opportunities. At minimum, TVA would maintain compliance with applicable laws, regulations, guidance, and policies designed to reduce impacts to sensitive biological and cultural resources. Under the Flagship Management or Blended Management alternatives, TVA would implement additional projects designed to benefit biological and cultural resources and improve recreational opportunities. Some temporary and minor impacts of management projects could occur, as described in Section 5.1 below. However, those minor impacts are expected to be outweighed by overall benefits to natural resources (see Table 3-9).

Reservoir lands planning provides a basis for allocating lands available to various management and recreation projects. Lands planning, by itself, does not result in environmental impacts. Impacts are the result of projects or activities implemented according to the allocated land uses. The impacts of TVA projects are described in Sections 5.2 through 5.17 below. However, two aspects of the lands planning program influence the natural environment. The program: (1) establishes conservation of lands where sensitive resources exist and (2) determines the proportion of TVA lands available for various uses. In many cases, the allocation is determined by an existing use, easement, or agreement of the land, and the use allocation generally is fixed. In recent RLMPs, land use allocations changed very little. Using RLMP and RLA data and projecting maximum

changes to allocations (Table 2-9), TVA estimated that system-wide percentages of land in Zones 2, 3, 5, and 7 would change very little. The potential for change is greater in Zones 4 and 6. Therefore, on a regional basis, future reservoir land planning efforts would primarily affect the amount of land allocated to natural resource conservation (Zone 4) or developed recreation (Zone 6). Because TVA manages a finite body of land, an increase in Zone 6 allocations normally results in a decrease in Zone 4 allocations and vice versa.

Under all alternatives, TVA would continue to allocate most lands containing sensitive resources (archaeological and historic properties, wetlands, rare species, and natural areas) to the most protective zone. Other federal and state agencies in the region would, be expected to conserve sensitive resources on their lands, pursuant to federal and state regulations. Other regional efforts such as land trusts and programs operated by The Nature Conservancy and other non-governmental organizations support identification and conservation of sensitive resources on private lands in the region. These conservation efforts would combine to beneficially offset impacts to sensitive resources on private lands subject to development. Overall, the systematic protection of sensitive resources under the land planning process would contribute beneficially to regional conservation of wetlands, rare species, and cultural resources.

As described above, maximum projected changes in land uses would either emphasize developed recreation uses or natural resource conservation. Should a trend of increasing recreation uses occur, natural habitat lacking sensitive resources could be converted to developed recreation facilities. This would contribute to the regional trend of diminishing undeveloped shoreline. On a Valleywide basis, because much of the land is forest (Section 4.9), a decrease of Zone 4 lands would result in minor regional changes in undeveloped lands. Similarly, should the proportion of TVA lands allocated to conservation purposes increase, the area of undeveloped TVA lands would remain relatively stable. The proportion of the system-wide reservoir shoreline that is undeveloped, however, would continue to decrease due primarily to the development of residential shoreline. The changes on TVA lands would not result in regionally significant cumulative effects. However, on an individual reservoir, depending upon existing shoreline development, conversion of undeveloped lands to developed recreation facilities could be noticeable. Furthermore, conversion of shoreline forests and other habitats may have important local impacts to aquatic and riparian zones, which may not be abundant regionally.

TVA's proposed recreation management strategies range from slightly reduced recreation opportunities (Alternative B) to expanded programs at existing facilities and additional land allocated to recreation during lands planning (Alternatives C and D). Currently, TVA provides between 5 and 10 percent of the public recreation facilities in the region (Section 4.1). However, the reservoir- and shoreline-associated recreation opportunities on TVA lands are somewhat unique in the region. As regional population increases, the need for recreational facilities is expected to increase. TVA, together with other federal, state, and local agencies, would strive to meet that demand to avoid excessive use pressure on existing facilities.

Expansion of recreation programs and facilities would beneficially contribute to the cumulative total recreation opportunities in the TVA region. Likewise, reduction of TVA recreation programs and facilities, as proposed under Alternative B, would negatively affect the cumulative total of recreation opportunities in the TVA region. However, given that other entities provide between 90 and 95 percent of those opportunities, changes in recreation opportunities on TVA lands would not result in significant cumulative impacts.

As stated in Section 5.6, regional water quality is influenced by the aggregate actions of all landowners in the Tennessee River watershed. Because TVA lands account for a small portion of the watershed, actions on TVA land influence water quality on a local basis. TVA's proposed efforts to improve water quality under Alternatives A-D may result in important local improvements, but would not result in significant cumulative benefits. In the Tennessee River watershed, the efforts of federal and state water quality regulators, municipal/local programs, and others including TVA combine in an effort to offset threats to water quality from increased economic growth and development. TVA's contribution to beneficial cumulative impacts is greatest under Alternatives C and D, due to the increased participation in water quality outreach and programs.

5.1. Overview of Potential Environmental Impacts by Resource Management Programs

Prior to implementing activities associated with the resource management programs described in Chapter 2, TVA would conduct a site-specific environmental review for a proposed action, as appropriate. However, the typical impacts associated with these programs are described below.

5.1.1. Biological Resources Management

The biological resource management programs would mostly be implemented on the 231,000 acres of TVA lands allocated for natural resource conservation and sensitive resource management. These programs are expected to enhance the quality of targeted natural resources and to be beneficial overall. Such beneficial effects or impacts are described in the context of the program descriptions in Chapter 2. However, programs could have collateral adverse environmental impacts. The risk and severity of such collateral impacts would be mitigated by a variety of measure and activities. These include the replacement of nonnative vegetation with native plants; use of construction activity BMPs to avoid or reduce potential impacts to wetlands, aquatic life, and water quality; and the incorporation of design features to lessen the impact on visual integrity when appropriate. Site-specific review processes also would identify actions to avoid or reduce potential adverse impacts. These processes include the ESA Section 7 consultation process to address potential impacts on threatened and endangered species, the NHPA Section 106 consultation process to address potential impacts on cultural resources; and the NEPA review process itself that would identify measures to mitigate, reduce, or avoid potential impacts on wetlands, floodplains, and other important natural resources.

The remainder of this sub-section describes the typical impacts resulting from implementing specific biological resources programs and activities.

Dispersed Recreation — The types of dispersed recreation activities seen most often on TVA lands are picnicking, primitive camping, hiking, bank fishing, hunting, and kayaking/canoeing. The impacts associated with these activities include increased litter, vegetation removal, and an increase in disturbed land areas. Section 2.1.2 discusses options for TVA to increase dispersed recreation management efforts and to offset these impacts. Actions to rehabilitate the areas would result in some minor, short-term impacts such as sedimentation from soil disturbances associated with site grading and revegetation. Solid waste resulting from removal of debris and litter would be disposed of in approved landfills.

Land Stewardship Assessment Tools — The use of land stewardship assessment tools aids in the management of public lands and results in implementing actions that benefit the environment long-term. The implementing actions associated with boundary maintenance and other management activities may result in short-term minor impacts such as clearing of nonnative vegetation; increased sedimentation from improving access roads, installing shoreline stabilization, and creating wildlife habitat areas; and minor fugitive air emissions from the mechanical equipment needed to complete the project. By using the TVA Natural Heritage Database and the TVA Wetlands Database, the resulting actions can be modified to avoid or mitigate potential impacts to sensitive resources.

Public Outreach — The implementation of public outreach programs, themselves, would not directly impact the environment. However, public outreach programs would have indirect environmental effects through implementing some of the programs and activities described elsewhere in this section.

Sensitive Resources Management — The impacts associated with the management of sensitive resources are intended to be solely beneficial. By monitoring endangered and threatened species, the overall knowledge base surrounding the species is increased. This increased knowledge leads to better land management and conservation planning decisions. Projects would also be implemented to reduce invasive plant species from natural areas with sensitive plant and animal species; conversion to native plant and wildlife habitat; and enhancement of user access for education and enjoyment purposes. The potential for adverse impacts is small; these impacts could include sedimentation from grading and revegetation activities, localized reductions of nontarget species, and localized closure of areas to public access.

Terrestrial Habitat Management — The impacts from terrestrial habitat management range from increases in dispersed recreation in a defined area to changes in overall forest structure. Maintaining agricultural and open lands; improving dewatering areas; implementing wildlife habitat management and Wildlife Habitat Council (WHC) projects may result in an increase in dispersed recreation within those improved areas. Some short-term minor impacts associated with terrestrial habitat management include clearing of nonnative vegetation; increased sedimentation from improving access roads, installing shoreline stabilization, and creating wildlife habitat areas and riparian buffers; and minor fugitive air emissions from the mechanical equipment needed to complete a specific project and from prescribed burning. Dependent upon the types of forest management projects implemented, the resulting impacts may lead to changes in the overall forest structure and benefits to the type of herbaceous and woody vegetation present.

5.1.2. Cultural Resources Management

The cultural resource management programs would be implemented on all TVA lands, including power plant reservations. The typical activities associated with managing cultural resources as described in Section 2.2 include the identification of cultural resource locations, protection of eroding archaeological sites and rehabilitation/reuse or documentation of historic buildings. When protecting eroding archaeological sites, TVA may install riprap along the shoreline. The impacts associated with shoreline stabilization result in a short-term and localized increase in sedimentation and alteration of stream bank and lake-bottom aquatic habitat and visual effects. When rehabilitating historic buildings, there could be generation of solid waste with the potential for asbestos and lead paint waste streams needing special handling and disposal. Most other cultural resource management activities include site inspection, evaluation, and monitoring activities, various

consultations, and public outreach activities with little potential for direct environmental impacts.

5.1.3. Recreation Management

The recreation management programs would be implemented at those recreation facilities and stream access sites managed by TVA both on and off TVA reservoirs. The various alternatives focus on the operation and maintenance of these existing facilities and the remainder of this sub-section describes the typical impacts associated with the different program areas.

Campground Management — The types of impacts associated with campground management result from the use of and improvements to campgrounds. Increases in litter, vegetation removal, and disturbed land areas are impacts associated with the general use of a campground. Actions to rehabilitate the areas would result in minor, short-term adverse impacts such as sedimentation from soil disturbances associated with site grading and revegetation. Solid waste resulting from removal of debris and litter and from replacement of equipment and materials would be recycled or disposed of in approved landfills. Improvements to campgrounds, as proposed in the NRP, relate to upgrades consistent with ADA guidelines, incorporation of innovative designs, and installation of measures to increase reduce power and water consumption and waste generation. These upgrades and installations may require limited excavation, removal of existing vegetation, and minor fugitive air emissions from the mechanical equipment needed to complete a specific project. The installation of construction related BMPs would offset any potential short-term impacts. Overall, campground improvements, as described in the NRP, would result in long-term beneficial impacts to the environment.

Day Use Areas Management — Similar to campgrounds, the types of impacts associated with day use area management result from the use of and improvements to day use areas. Increases in litter, vegetation removal, and disturbed land areas, along with the potential increase in recreational boating traffic within a defined area are some expected impacts associated with the general use of a day use area. Actions to rehabilitate the land-based areas would result in minor, short-term adverse impacts such as sedimentation from soil disturbances associated with site grading and revegetation. Solid waste resulting from removal of debris and litter and from equipment and materials replacement would be recycled or disposed of in approved landfills. Improvements to day use areas include upgrades similar to those described above for campgrounds. The development of additional greenways and reservoir and stream access sites would result in the construction of access roads and parking areas, trails and any associated foot bridges, and boat launching ramps or other facilities. The typical impacts associated with improvements to day use areas are typical to those of a developed recreation project. In addition, there would be minor fugitive air emissions from the mechanical equipment needed to complete the project.

Public Outreach Programs — The implementation of recreation public outreach programs, themselves, would not directly impact the environment. Programs and activities promoted by such outreach efforts could have minor adverse impacts that are addressed in the context of those programs.

Recreation Assessment and Design Tools — The use of recreation assessments and design tools aids in the management of recreation areas and results in implementing actions that benefit the environment long-term.

5.1.4. Reservoir Lands Planning

The methodology which drives reservoir lands planning would not directly impact the environment. The proposed Comprehensive Valleywide Land Plan (CVLP) would establish a range in land use zone allocations (Table 2-9). This sub-section describes the typical impacts resulting from the ranges in allocations associated with the specific land use zones. The types of development that can occur on TVA lands for each land use zone is defined in Appendix F. Prior to approving any proposal to use TVA land, TVA would conduct an appropriate site-specific environmental review.

Zone 2 (Project Operations) — Between five and seven percent of TVA lands would be allocated for project operations. Currently, seven percent of TVA lands are allocated to this use across the reservoir system, the upper limit of the CVLP range. Consequently, there would be no increase in potential impacts from allocating lands to Zone 2. The largest potential change would result in a 29 percent reduction in the land available for project operations. Land removed from Zone 2 would most likely be allocated to Zone 4 - Natural Resource Conservation or Zone 6 - Developed Recreation. Allocation to Zone 4 would result in minimal environmental impact. Allocation to Zone 6 would likely result in the development of recreation facilities and the resulting impacts from site clearing and grading, establishment of lawns, and the construction of access roads, parking areas, boat launching areas, restrooms and other buildings. These impacts can include increases in runoff, altered wildlife habitats, and localized increases in vehicle and boat traffic. Typical activities associated with project operations on Zone 2 lands include lawn mowing and landscaping and building maintenance. Some TVA lands allocated for project operations also contain day use areas. The impacts associated with operation and maintenance of day use areas have been described above.

Zone 3 (Sensitive Resource Management) — The 17 percent of lands allocated to sensitive resource management could decrease to 16 percent or increase to 18 percent. This is the equivalent of about a 6 percent decrease or increase in land area in Zone 3. The typical types of projects implemented within Zone 3 lands result from biological and cultural resource management programs. The impacts associated with implementing these types of programs have been described above. Lands removed from Zone 3 would likely be allocated to Zone 4 - Natural Resource Conservation or to Zone 6 - Developed Recreation. The impacts of these allocations would be similar to those described above for allocating lands from Zone 2 to Zones 4 and 6.

Zone 4 (Natural Resource Conservation) — Sixty-one percent of TVA lands are presently allocated to natural resource conservation; this allocation could change to between 58 and 65 percent. The potential change would vary from a 5 percent reduction to a 7 percent increase. The typical types of projects implemented within Zone 4 lands are biological and cultural resource management activities. The impacts associated with implementing these have been described above. Lands removed from Zone 4 would likely be allocated to Zone 3 - Sensitive Resource Management or to Zone 6 - Developed Recreation. Allocation to Zone 3 would result in minimal environmental impact. The impacts of allocating lands from Zone 4 to Zone 6 would be similar to those described above for allocating lands from Zone 2 to Zone 6.

Zone 5 (Industrial) — Between one and two percent of TVA lands would be allocated for industrial use. Therefore, the land allocated for industrial use could be reduced by half, with a corresponding reduction in many of the impacts associated with industrial development, but a loss of the potential economic benefits associated with such use. Lands removed

from Zone 5 would likely be allocated to Zone 4 - Natural Resource Conservation or to Zone 6 - Developed Recreation. Most of the lands that would be removed from Zone 5 are likely undeveloped, and thus allocating them to Zone 4 would likely result in minimal environmental impact. The impacts of allocating them to Zone 6 would be similar to those described above for allocating lands from Zone 2 to Zone 6. Typical impacts of industrial development result from site clearing and grading, construction of access roads, parking areas, and utility connections, and construction of buildings. Depending on the type of industry, there could also be air emissions, discharges of water pollutants, and production of solid waste. Under Alternatives B, C, and D, the restriction of industrial development on Zone 5 lands to "light industrial" would be removed (see Section 2.4.1 and Appendix F). This would allow for a broader range of industrial development and potentially greater environmental impacts. Because of applicable regulatory and permitting requirements, the likelihood of these impacts being significant is low.

The impacts of recreational development of reallocated Zone 5 lands would likely be less than those resulting from industrial development.

Zone 6 (Developed Recreation) — Eight percent of TVA lands are currently allocated for developed recreation purposes. This allocation could increase to 10 percent for a 25 percent increase in Zone 6 land area. Most of this land would likely be reallocated Zone 4 - Natural Resource Conservation lands, and it would eventually be developed to accommodate the forecasted increase in demand for recreation resulting from population increases and changing leisure activities. The typical impacts associated with the development of recreation facilities result from site clearing and grading, establishment of lawns, and the construction of access roads, parking areas, boat launching areas, restrooms and other buildings. These impacts can include increases in runoff, altered wildlife habitats, and localized increases in vehicle and boat traffic. Depending on the location of the new facilities, there could be unavoidable impacts to wetlands which would be mitigated by wetland enhancement or the purchase of mitigation credits.

Zone 7 (Shoreline Access) — Approximately 5 percent of TVA lands is allocated for shoreline access purposes; this proportion is expected to remain unchanged. The direct, indirect, and cumulative impacts associated with residential shoreline development have been evaluated in the SMI EIS (TVA 1998). According to SMI, this 5 percent of TVA lands is equal to approximately 1,847 miles of shoreline. In these areas, the adjoining private property owner can access the reservoir across TVA–managed land. The future allocations for shoreline access are guided by TVA's Land Policy.

5.1.5. Water Resource Management

The water resource management programs have been limited to those programs and activities implemented by TVA to improve reservoir and watershed water quality proactively. These programs would be implemented across the entire Tennessee River watershed. The typical impacts associated with water resource management projects include short-term increases in sedimentation and very localized alterations of shoreline and stream-bottom habitats. BMPs specific to water resource management projects (Section 2.4.6) would be implemented during construction, as appropriate. The remainder of this sub-section describes the typical impacts resulting from implementation associated with the specific program categories.

Aquatic Monitoring and Management — The impacts associated with aquatic ecology management would most likely result from habitat protection and enhancement projects

along with efforts to reduce the spread of invasive species. Sedimentation from the installation of aquatic habitat enhancements such as fish attractors would be short-term and minor. These same types of impacts would also occur when installing temporary barriers to protect specific aquatic habitats. Construction related BMPs and timing of project implementation during low flow conditions would occur to further reduce potential impacts.

Partnership Programs — The implementation of partnership programs, themselves, would not directly impact the environment.

Public Outreach Programs — Projects resulting from the Clean Marina and water resource outreach campaigns directly benefit the environment. The implementation of the QGP and water efficiency program would not directly impact the environment. Clean Marina certification requires proper BMPs to address potential impacts for shoreline erosion, fuel spills, on-site septic systems and marina sewage disposal. Water resource outreach campaigns could include demonstration projects from any aspect of water resource management. The indirect beneficial impacts may include localized improvements in water quality due to the implementation of non-point pollution best practices and promotion of water conservation.

Water Resource Improvement Programs — The beneficial impacts from water resource improvement programs range from sediment reductions in tributary streams to nutrient reductions in TVA reservoirs. Some short-term minor impacts associated with water resource improvement programs include clearing of nonnative vegetation; increased sedimentation from installing shoreline stabilization and creating riparian buffers; and minor fugitive air emissions from the mechanical equipment needed to complete a specific project. Most water resource improvement programs include implementing a variety of water resource improvement tools. The additional impacts associated with these tools are discussed below.

5.1.6. Public Engagement

The proposed volunteer program and the foundation and trust fund would, respectively, increase TVA's use of volunteer labor and provide a source of funding for natural resource management projects. These programs have little potential for adverse impacts.

5.2. Recreation

5.2.1. Developed Recreation

Under all of the alternatives, TVA proposes to maintain and/or upgrade varying numbers of its existing campgrounds, day use areas, and stream access sites. TVA would assist in the development of greenways and stream access sites under Alternative C, and would develop blueway access sites under Alternatives A and C. New recreation facilities on TVA reservoirs would primarily be provided by other public and private agencies, either on land they control or on TVA lands zoned for developed recreation. TVA would be involved in the development of these facilities through the Section 26a approval process for shoreline facilities and in providing the rights for the use of any TVA land.

Alternative A — No Action Alternative

Under this alternative, TVA would continue recreation management activities at current levels. While this would provide continued "status quo" operation of TVA recreation facilities and maintain existing partnerships and outreach programs, this level would not be sufficient to keep pace with projected increases in population and recreation needs over the

next 20 years. In general, this alternative would generate a higher level of public recreation benefits and opportunities than Alternative B, a lower level than what would be achieved under Alternative C, and a slightly lower level than Alternative D.

TVA would continue to manage eight campgrounds on dam or power plant reservations and four campgrounds on TVA reservoir lands thus ensuring these areas continue to provide public recreation benefits. TVA would operate 30 day use areas on dam reservations and 33 areas located off dam reservations. Facility upgrades and modifications needed to meet accessibility standards and increase resource sustainability would be undertaken as capital funds become available, resulting in these areas being more accessible to the physically disabled and addressing some of the continued deterioration of high use sites. However, progress in meeting both sustainability objectives and accessibility standards would be slower compared to Alternatives C and D.

TVA would continue to provide limited assistance to partners and stakeholder groups in trail, greenway, and blueway development. However, TVA would not proactively participate in the development of additional blueway, trail, and greenway corridors and would contribute little to meeting the growth in future needs within the region. TVA would continue to provide for basic management of all of its 31 stream access sites plus a portion of the 50 TVA-owned sites no longer under viable third-party management agreements. However, efforts to enhance sustainability of resources at some sites would not be undertaken under this alternative and ongoing environmental degradation would not be as effectively addressed.

This alternative would maintain public outreach projects at current levels. Initiatives aimed at increasing public awareness of environmentally responsible camping and other outdoor recreation practices would not be undertaken, thus reducing TVA's capability to positively influence the level of environmental impacts associated with expected future increases in recreational development and use of TVA lands.

TVA would continue to update its reservoir recreation facility inventory data on a three-year rotation. However, inability to track changes in recreation services and facilities on a biannual or annual basis as proposed under Alternatives D and C, respectively, reduces the accuracy of the inventory data available.

Cumulative impacts would include a growing gap in water-based recreation facilities/services needs (as outlined in Section 4.1) relative to available supply, increased use pressure on existing public or commercial recreation areas, and increased use of undeveloped TVA lands leading to sanitary and safety concerns. The extent of these cumulative impacts would likely be small.

Alternative B — Custodial Management Alternative
Under this alternative, TVA would discontinue and/or scale back selected programs and focus on meeting minimum regulatory and policy requirements. This alternative would significantly reduce TVA's ability to respond proactively to existing as well as future outdoor recreation needs within the TVA region and could also result in the closure of some campgrounds, day use areas, boat launching ramps, and other facilities at a time when demand for these facilities are expected to increase. In addition, environmental conditions at unmaintained and closed facilities could increasingly deteriorate over time.

Under this alternative, three of the four campgrounds and the 33 day use areas located off dam or power plant reservations would be transitioned to other operators or would be closed. The resulting impacts would depend on the level of success achieved in transition efforts. Areas successfully transitioned to other operators would continue to provide camping, picnicking, boat launching, swimming and related facilities and services at those areas. However, changes in management policies by outside operators could have some impact on future use of these areas. For example, changes in length of stay policies could reduce campsite availability to transient campers. Operators could also charge fees for use of swimming areas, trails, boat ramps, and picnic facilities, traditionally available free of charge under TVA management. The closure of Mallard Creek, Loyston Point, or Barton Springs would significantly reduce opportunities for camping and related day use activities on Wheeler, Norris, and Normandy reservoirs. Closure of Loyston Point could also result in restricting access to the trail at Hemlock Bluff Small Wild Area. The closure of Foster Falls Recreation Area would virtually eliminate the existing access to the Foster Falls Natural Area.

Depending on the number of campgrounds and day use areas closed, negative impacts could range from small (only a few relatively remote and lightly used areas closed) to significant (large number of heavily used areas closed). Negative impacts resulting from area closings include:

- Loss of existing accommodations for camping and related activities.
- Loss of existing accommodations for water-based recreation activities including boat launching, picnicking, and swimming on TVA lands.
- Disproportional impact on lower-income users.
- Continued informal use of closed areas resulting in garbage accumulation, misuse or vandalism, and environmental degradation.

Some of the 50 stream access sites currently managed under cooperative agreements would be closed to the public if existing cooperative agreements expire or are canceled. In general, closure of any of these existing areas would adversely impact public use of the affected stream. In many cases, these sites represent the only means of safe, legal public access to these waterways, and closure would significantly restrict public use opportunities.

Under this alternative, potential impacts associated with public outreach and recreation assessments and design tools to the environment would be similar to the No Action Alternative.

This alternative would result in the closure of some recreation areas and stream access sites, and would reduce TVA's outreach programs. Therefore, it is more likely to be a growing gap between recreation needs and supply under this alternative. Cumulative impacts would likely include reduced public access to the region's reservoirs and streams, adverse impacts to local economies in part dependent on tourism and outdoor recreation, increased use of undeveloped lands and continued use of some closed areas resulting in environmental degradation and safety concerns, increased pressure on other public and/or commercial recreation operations, and some shift in recreation users to areas outside the region. The extent of these cumulative impacts would be moderate.

Alternative C — Flagship Management Alternative
Under this alternative, TVA would establish new recreation initiatives and intensify selected existing programs to keep pace with cutting edge trends in outdoor recreation resource

management and to maintain a strong TVA role in meeting regional recreation needs over the next 20 years. Implementation of this alternative would result in TVA displaying a stronger presence in recreation management compared to Alternatives A, B, and D. Overall, this alternative would result in an increase in the quality and quantity of recreation opportunities available in the TVA region. These programs would keep pace with anticipated increases in outdoor recreation needs, result in more environmentally sensitive development and management of recreation areas on TVA lands and reservoirs, and increase public awareness and adoption of more responsible and sustainable recreation use practices.

Under this alternative, TVA would accelerate upgrades at eight dam or power plant campgrounds and four campgrounds located on other reservoir properties to meet accessibility standards. These upgrades ensure the campground facilities are available and accessible to a wide range of existing and potential users including the disabled.

Under this alternative, TVA would upgrade four areas annually to meet accessibility standards. In addition, TVA would undertake additional resource conservation and sustainability measures to reduce the environmental impacts of its recreation areas. Increased partnership agreements to develop additional trails, greenways, blueways, and stream access facilities would also be undertaken. In combination, these initiatives would contribute significantly to meeting natural resource-based outdoor recreation needs within the TVA region over the next 20 years and increase recreation opportunities for a wide range of users including the disabled.

Under this alternative, TVA would increase current outreach efforts including the LNT Program and would also establish new outreach initiatives to promote sustainable, responsible recreation development and use of TVA land. Expansion of the LNT Program could result in recreation users changing their habits to reduce their impacts.

New outreach initiatives that would be implemented include annual tours, the Camp-Right Campground Program, and a Resource Ranger Program. The annual tours program would result in greater media and public awareness of TVA efforts and would increase the potential for similar technologies to be applied elsewhere in the TVA region and nation. Camp-Right would result in a reduction in the environmental footprint of developed commercial and public campgrounds. The establishment of the Resource Ranger Program could result in increased compliance with recreation regulations and/or guidelines, reduced criminal activity, and increased public security and safety at developed and undeveloped recreation areas.

Additional actions under recreation assessments and design tools would include implementation of two reservoir boating assessments annually, update of TVA's recreation inventory on an annual schedule, increased emphasis on recreation area signage and interpretation upgrades, and implementation of recreation area visitor surveys.

The completion of boating assessments would enable TVA, in partnership with state agencies and other stakeholders, to proactively develop and apply strategies and policies to address boating capacity limits and boating safety. An annual update of TVA's recreation inventory data would ensure that recreation supply data would be based on accurate, up-to-date data. Improved signage, on-site interpretation, and map products would increase public awareness of recreation opportunities on TVA projects. An enhanced visitor survey program would result in a better understanding of customer needs and

expectations and would provide a firmer foundation for identifying emerging trends and preparing development and/or management options for addressing trends and expectations.

Alternative D — Blended Management Alternative
This alternative includes elements of Alternatives A, B, and C. Overall, the implementation of this alternative would provide noticeably greater public recreation benefits than Alternative B, a somewhat greater level of benefits than Alternative A, and fewer benefits than Alternative C.

The campgrounds located on dam or power plant reservations would be upgraded to meet accessibility standards, resulting in the same benefits as those outlined under Alternative C. The potential impacts related to the remaining campgrounds would be the same as those described under Alternative B.

Annual implementation of two sustainable initiatives and two upgrades to meet accessibility standards at day use areas, while less aggressive than Alternative C, would result in improved environmental conditions at selected areas and increased water-oriented recreation opportunities for the disabled. The impacts associated with potential closure of stream access sites currently managed under cooperative agreements would be the same as Alternative B.

Compared to Alternatives A and B, this alternative would emphasize public outreach efforts by increasing annual public tours. However, this alternative would be less effective than the broader range of outreach initiatives implemented under Alternative C.

Updating recreation inventory data on a two-year cycle would result in more accurate and up-to-date information on existing reservoir recreation areas. Therefore, this information would assist in supporting the planning efforts of TVA, other agencies, and stakeholders.

Under this alternative, the cumulative impacts would be similar to Alternative A.

Relative Beneficial Impacts of the Alternatives
The relative beneficial impacts to developed recreation under the four alternatives are shown in Figure 5-1.

Figure 5-1. Relative Beneficial Impacts of the Alternatives on Developed Recreation

5.2.2. Dispersed Recreation

Alternative A — No Action Alternative

Under this alternative, TVA would continue its current dispersed recreation management activities. This level of management would likely not keep up with the increase in use and impacts associated with dispersed recreation activities in the Valley. TVA would continue to collect data associated with dispersed use/impacts and implement management efforts on these areas on a limited basis. This level of management would result in a direct negative impact to dispersed recreation as public use affects limited natural resources.

Data collection would be conducted on 70 dispersed recreation areas annually. While this process is robust from the dispersed recreation perspective, it fails to make vital linkages between dispersed recreation and other pressures that could potentially impact the management and user experience of an area. A holistic management approach is preferred to maximize the existing and potential benefits dispersed recreation areas are able to sustain and offer. Data collection in conjunction with the existing LCA process is a more holistic approach, which would benefit the overall management objectives for TVA land as it takes into account multiple dimensions of impacts.

TVA would implement one key opportunity associated with dispersed recreation annually. This effort is specifically designed to meet current and latent demand for dispersed recreation opportunities. This level of effort would not keep pace with the existing or future demand for dispersed recreation on TVA lands.

One heavily impacted dispersed recreation area would be mitigated annually. Based on available data, there are over 800 existing dispersed recreation areas on TVA lands. An estimated 108 areas are known to have significant impacts from use. Improving one area would result in management action on less than 1 percent of known areas. This level of effort would not be suitable for TVA to achieve management of dispersed recreation impacts in an ecofriendly manner.

TVA would continue to manage its existing 100 miles of trails. Improvements or management efforts would be restricted to known needs identified through the LCA processes with focus on current prioritization of public safety. This strategy captures some existing needs but fails to take into consideration specific strategies for trails management or development.

Potential cumulative effects to dispersed recreation may result in management objectives for dispersed recreation not being met as well as management levels below that intended by the Environmental Policy.

Alternative B — Custodial Management Alternative

Under Alternative B, TVA would engage in active management and outreach at a minimal level to comply with regulations and meet policy objectives. This alternative would be an increase in effort from Alternative A. However, it would focus only on existing impacts and issues as currently known and provide little flexibility to adapt to emerging issues during the life of the NRP.

The process of collecting data on dispersed recreation areas would be modified to align with the LCA methodology. Only areas that receive a score of “poor” for the metric of dispersed recreation under the LCA would be further evaluated with the Dispersed Recreation Analysis methodology. This would streamline the data collection process and

ensure further data are only collected on those areas needing management attention. This change would result in less robust data being collected on dispersed recreation, but the data would be more in line with the future overall stewardship objectives and needs.

TVA would implement five key opportunities associated with dispersed recreation annually. This minimal level of effort is specifically designed to meet current and latent demand for dispersed recreation opportunities. This level of effort would give TVA the ability to implement the minimal amount of projects Valleywide benefiting a moderate variety of stakeholders needs. In addition, this effort would allow TVA to have a Valleywide presence on a limited basis of key projects on an annual basis.

Implementation of a dispersed recreation educational campaign would be present under this alternative. TVA lands are often spatially noncontiguous in nature. This phenomenon presents a challenge to people seeking dispersed opportunities as no central information port exists to educate people on where TVA lands are located and what recreation opportunities they provide. In addition, TVA currently does not educate the public on preferred practices that would reduce the amount of ecological damage in established dispersed areas. The need for an educational campaign grows as more people move to the region who are unfamiliar with TVA lands or the appropriate use of these areas. The implementation of this campaign would help TVA meet its management objectives by providing users with information to be better stewards of TVA lands.

Five heavily impacted dispersed recreation areas would be improved annually. Based on past data collection, there are an estimated 108 heavily impacted dispersed recreation areas on TVA lands. Improving five areas annually would result in all known areas within the next 20 years and result in long-term benefits to the users of these sites, and to adjacent land and reservoir areas.

TVA would continue to manage its existing 100 miles of trails and would correct potential safety hazards to the public. Trails facilitate many ecofriendly dispersed recreation activities (i.e., hiking, bird watching, nature observation). The minimal management of existing dispersed recreation trails is correction of hazards to public safety. TVA would not construct new trails which would likely result in the demand for trails exceeding the supply.

Potential cumulative effects to dispersed recreation would be positive compared to Alternative A due to increased efforts of management and the implementation of an educational campaign designed to help the public assist TVA with meeting its management objectives. This alternative would allow TVA to meet the minimum objectives for managing dispersed recreation impacts and meet future needs of the recreating public.

Alternative C — Flagship Management Alternative

Under this alternative, activities currently associated with dispersed recreation management would be enhanced as described under Alternative B. In addition, many new activities designed to enhance the management of dispersed recreation would be added.

The process of collecting data on dispersed recreation areas would be modified to align with the LCA methodology. That is, only areas that receive a score of “poor” for the metric of dispersed recreation under the LCA would be further evaluated with the Dispersed Recreation Analysis methodology. This would streamline the data collection process and ensure further data are only collected on those areas that would need management attention. This change would result in less robust data being collected on dispersed

recreation, but these data would be more in line with the future overall stewardship objectives and needs.

Under this alternative, TVA would develop and implement multiyear dispersed recreation plans. These plans would be a holistic view of all the dispersed recreation needs and the associated availability of opportunities on a Valleywide basis. This would allow TVA to best meet current dispersed recreation needs and plan activities well into the future as demands and activities change with time and technology. In addition, these plans would result in an interdisciplinary approach to the management of public use on TVA lands. To aid in this effort, TVA would distribute and analyze 600 dispersed recreation surveys annually to fully understand the types of uses and relative demands that are occurring on TVA lands.

TVA would implement 20 key dispersed recreation opportunities annually. This effort is specifically designed to meet current and projected future demand for dispersed recreation opportunities. This expanded level of effort would give TVA the ability to fully meet the present and future needs of a wide variety of stakeholders annually and realize maximum benefit. In addition, this effort would allow TVA to have an expanded Valleywide presence of key projects on an annual basis as compared to Alternative B.

Implementation of a dispersed recreation educational campaign would be present under this alternative. The need for an educational campaign grows as more people move to the Valley who are unfamiliar with TVA lands or the appropriate use of these areas. The implementation of this campaign would help TVA meet its management objectives by empowering users with information to be better stewards of TVA lands. The level of effort for this educational campaign would be greater than under Alternative B. In addition to basic information on TVA lands and opportunities, the results of the dispersed recreation survey data as well as the information associated with multiyear plans would be added. Future information additions would be made to this effort as more is learned about the users of TVA lands and their associated needs.

Twenty-five heavily impacted dispersed recreation areas would be improved annually. This would result in all of the estimated 108 heavily impacted areas being improved within five years. This level of effort would go above and beyond the minimum stewardship effort and would meet management objectives sooner than outlined in the other alternatives.

This alternative also includes the development and implementation of formal regulations on recreational use of TV lands. The enforcement of these regulations would be a vital component in reducing abuse by providing a meaningful deterrent to actions that degrade the integrity of TVA lands. In addition, this deterrent would aid in management efforts of bringing undeveloped lands into desirable conditions.

TVA would conduct 100 outdoor skills clinics. These clinics would be provided to members of the general public and designed to remove skills barriers from participation in outdoor recreation. These clinics would allow a greater participation in outdoor activities as well as incorporate low-impact practices specific to the activity.

TVA would continue to manage its existing 100 miles of trails. These trails would be incorporated into a holistic trails establishment and maintenance program. This program would establish annual monitoring plans to ensure maintenance needs are met in a timely fashion. It would formally inventory existing trails and monitor population/demand to ensure that existing and future trails are effectively meeting the needs of trail users. The addition

of 20 miles of new trails per year would greatly expand the TVA trails system. These additions are taking into account the most popular of trail activities including hiking, bird watching, and nature observation. This expansion from Alternatives A, B and D would allow the full utilization of all dispersed activities that are facilitated by trails maintenance and development.

The change in reservoir lands planning to the CVLP under Alternative C could result in a change in the land area allocated to Sensitive Resource Management and Natural Resource Conservation, where a large proportion of dispersed recreational activities occur. The potential reduction in lands allocated to these zones is relatively small and adverse impacts to dispersed recreation opportunities would likely be at a local rather than regional scale.

Potential cumulative impacts of Alternative C are the most positive of all the alternatives. Alternative C results in holistic management and proactive stewardship of all dispersed recreation resources. Under the Flagship Alternative, TVA would devote significant resources to the management of dispersed resources and would actively participate in activities to engage the public in outdoor recreation.

Alternative D — Blended Management Alternative
Impacts to dispersed recreation under Alternative D would be less beneficial than Alternative C and more beneficial than Alternatives A and B. Many programs outlined under Alternative C would be implemented on a more limited basis; however, some actions would be omitted. Activities outlined under Alternative C would meet current and future demand for dispersed recreation activities at a higher-than-minimal level.

The process of collecting data on dispersed recreation areas would be modified to be in alignment with the LCA methodology. The level of effort and associated impacts for this activity is similar across Alternatives B, C, and D.

TVA would implement 10 key opportunities associated with dispersed recreation annually. This effort is specifically designed to meet current and latent demand for dispersed recreation opportunities. This level of effort would give TVA the ability to annually implement enough projects Valleywide to benefit a wide variety of stakeholders needs. The impacts of this alternative are less beneficial than Alternative C and more beneficial than Alternatives A or B.

Under Alternative D, TVA would implement the same dispersed recreation educational programs and develop and implement formal regulations as under Alternative C. TVA would not conduct the user surveys included in Alternative C, which would result in less available information about dispersed recreational uses of TVA lands. TVA would develop and implement multiyear dispersed recreation plans but would have less user information available during the planning process.

Fifteen heavily impacted dispersed recreation areas would be mitigated annually. Based on past data collection, there are over 800 existing dispersed recreation areas on TVA lands. An estimated 108 areas are known to have significant impacts from use. Improving 15 areas annually would allow TVA to actively improve approximately 15 percent of its known heavily impacted areas yearly or all known areas within seven years.

The impacts to trails would be similar to those under Alternatives A and B. TVA would continue to manage its existing 100 miles of trails and correct potential public safety hazards. TVA would not construct new trails which would likely result in the demand for trails exceeding the supply.

The change in reservoir lands planning to the CVLP under Alternative D would be the same as under Alternative C. The potential reduction in lands allocated to Sensitive Resource Management and Natural Resource Conservation is relatively small and adverse impacts to dispersed recreation opportunities would likely be at a local rather than regional scale.

Potential cumulative impacts of Alternative D would be more positive than those outlined in Alternatives A and B by meeting a wide array of stakeholder needs as well as allowing for multiyear planning efforts, which approach dispersed recreation management from an interdisciplinary approach. However, the opportunity of engaging stakeholders through user surveys and skills clinics would be greater in Alternative C than Alternative D.

Relative Beneficial Impacts of the Alternatives
The relative beneficial impacts to dispersed recreation under the four alternatives are shown in Figure 5-2.

Figure 5-2. Relative Beneficial Impacts of the Alternatives on Dispersed Recreation

5.3. Natural Areas

Alternative A — No Action Alternative
Under the No Action Alternative, TVA natural areas preservation and management would continue to deteriorate. Currently, TVA does not actively manage all of its natural areas and most of them do not have an area-specific management plan. This alternative has the greatest potential to result in continued degradation of natural areas because of the lack of active management. Eventually, some or all of TVA's natural areas would no longer have the scenic, aesthetic, and exemplary biological values that define them. TVA natural areas designated for low-impact recreational use may no longer meet safety standards for public use, which would result in their closure.

Annual monitoring of eight TVA natural areas allows for assessments of their condition and inventories of plant and animal communities. Because only a few HPAs benefit are currently monitored, the information about the condition of the remaining TVA natural areas would remain haphazard and inconsistent; this would adversely affect their maintenance.

The process of designating new natural areas or removal of current natural areas from the program via the reservoir lands planning process would continue. Biologists survey TVA lands as part of routine land use reviews and an ongoing reservoir lands planning process. Data derived from these activities would serve as the basis for recommendations on additional natural areas. No potential impacts to existing TVA natural areas are anticipated as a result of designation and removal through the reservoir lands planning process.

However, opportunities to designate new natural areas may be limited due to the low frequency at which the RLMPs are updated.

Implementing maintenance needs on natural areas as opportunistically identified would ensure that natural areas identified through limited monitoring or during the environmental review process would be assessed. Only a small number of natural areas are assessed on a limited basis and in a random manner with this opportunistic method. Other natural areas may be directly impacted due to limited, inadequate, or nonexistent assessments.

The TVA Natural Heritage database would continue to be utilized to add new information to, update, and maintain natural areas records in support of environmental reviews and planning purposes. Data sharing through formal exchanges with other federal and state resource agencies would continue under this alternative. The management of natural areas would continue to benefit from the use of the database.

Potential cumulative effects to natural areas may result in management objectives for these natural areas not being met resulting in the loss of the values and qualities that characterize these natural areas. Specifically, these cumulative impacts would be due to the minimal assessments of natural areas, other than HPAs, and an opportunistic approach to implementing maintenance needs.

Alternative B **— Custodial Management Alternative**
Under Alternative B, the preservation and management of TVA natural areas would be adversely impacted due to lack of both active management and management plans specific to each area. Monitoring of TVA natural areas would continue under Alternative B, with one-third monitored annually. Alternative B would result in slightly less adverse effects to natural areas than Alternative A due to increased monitoring and assessment of management needs.

Under Alternative B, the duration of reservoir land planning efforts would be reduced. This would benefit natural areas because RLMPs would be completed in a shorter amount of time compared to Alternative A. Therefore, opportunities for designation of new natural areas would potentially occur more frequently.

Alternative C **— Flagship Management Alternative**
Alternative C would result in the greatest beneficial impacts to TVA natural areas. The major differences between this alternative and Alternatives A and B are the inclusion of the development and implementation of comprehensive management plans for about 33 natural areas per year and the establishment of new criteria for designating new natural areas and removing existing natural areas. Other activities currently associated with natural areas management and protection would continue as described under Alternatives A and B.

Developing and implementing area specific monitoring and management plans would result in more opportunities to identify issues and implement maintenance needs to ensure management objectives are met on a larger number of natural areas. These actions would have a positive effect on the natural areas program.

The process of designating new natural areas or removal of current natural areas from the program via the reservoir lands planning process would continue. However, the option for designating natural areas outside of the reservoir lands planning process based on the

establishment of evaluation criteria would also be available. The opportunities for designation of new natural areas would occur more frequently due to the evaluation of 5,000 acres of high-priority areas annually for potential inclusion in the program. This would have a positive impact on the natural areas program by allowing ecologically significant areas meeting the evaluation criteria to be designated as a TVA natural area within a shorter time period. Non-TVA natural areas occurring on TVA lands would be affected similar to Alternative A.

Establishment of a public outreach and volunteer program paired with the promotion of the natural areas program locally, regionally, and nationally would be beneficial to the natural areas program. There would be several opportunities to interact with and inform the public about the importance of preserving all TVA natural areas; to encourage and support research; to conduct environmental education activities; and to promote the appropriate use of TVA SWAs. The TVA natural areas program would potentially provide an effective platform to promote environmental stewardship and actively involve the public.

Promotion of the SWAs is intended to encourage interaction with and education of the public about the importance of resource conservation and preserving these areas and provide appropriate public access and recreation opportunities while minimizing potential impacts. While promotion of the SWAs may potentially increase the frequency of use by visitors and lead to increased usage of trails and campsites and even inappropriate uses by some (e.g., vandalism and all-terrain vehicle use), the benefits associated with stewardship opportunities from promotion of these SWAs (e.g., cooperative management partnerships, volunteer and educational programs) is expected to outweigh any negative impacts.

The proposed increased monitoring of natural areas would improve TVA's ability to detect and respond to management needs resulting from various factors, including the impacts of anticipated increased future demand for dispersed recreation use (both authorized and unauthorized activities).

The key to the preservation of TVA natural areas is effective management, and the components outlined in the Flagship Management Alternative would support that. Potential effects to natural areas would be beneficial and more beneficial compared to Alternatives A, B, and C.

Alternative D **— Blended Management Alternative**
Under Alternative C, the impacts to TVA natural areas would be similar to those of Alternative C. The major difference would be that under Alternative D about 15 natural area plans would annually be developed and implemented, less than the 33 under Alternative C. Under Alternative D, activities currently associated with natural areas management and protection would continue as described under Alternatives A and B, but a programmatic guideline for natural areas and the establishment of management plans, specific to each natural area similar to Alternative C would also be implemented. These measures would result in beneficial impacts to natural areas compared to Alternative A and B that do not support development of and implementation of management plans.

The process of designating new natural areas under Alternative D would be the same as under Alternative C and result in the same beneficial impacts. The establishment of a public outreach and volunteer program paired with the promotion of the natural areas program locally, regionally, and nationally would be beneficial to the natural areas program under Alternative D, similar to that of Alternative C.

Potential effects to natural areas would be more beneficial under Alternative D than Alternatives A and B due to the combined approach that would help to promote more effective management and support the goal of preserving the values and qualities that characterize these natural areas. However, the opportunity to develop and implement fewer management plans specific to each natural area would result in somewhat less beneficial impacts than under Alternative C.

Relative Beneficial Impacts of the Alternatives
The relative beneficial impacts to natural areas under the four alternatives are shown in Figure 5-3.

Figure 5-3. Relative Beneficial Impacts of the Alternatives on Natural Areas

5.4. Terrestrial Ecology

5.4.1. Vegetation

Alternative A **— No Action Alternative**
Under the No Action Alternative, TVA would continue implementing the current land management programs and activities. TVA would continue to address invasive plant encroachment into natural areas consistent with EO 13112 and actively participate in the Cooperative Weed Management Areas established in Mississippi, Georgia, and Tennessee. At least 38,000 acres of the 220,000 acres of Zone 3 and Zone 4 reservoir lands are likely infested with invasive plants (see Section 4.3.1). Outside of TVA natural areas, the relatively small of area on which invasive plants would be managed would likely not be sufficient to significantly reduce the infested area or reverse the spread of invasive plants, resulting in adverse impacts to both rare and more common native plant communities. Globally rare plant communities identified on reservoir lands would remain allocated in areas of sensitive resource management and natural resource conservation in RLMPs.

Cumulative impacts are expected to the terrestrial communities and biodiversity of the TVA region as a result of uncontrolled invasive plants and animals as well as deforestation. Deforestation is due to development activities and population growth causing a loss in habitat. Habitat loss, in turn, causes a reduction in biodiversity.

Alternative B **— Custodial Management Alternative**
Under the Custodial Management Alternative, TVA would continue some of the current land management strategies. Globally rare plant communities identified on reservoir lands would remain allocated in areas of sensitive resource management and natural resource conservation in RLMPs.

Where practical, TVA would continue to address invasive plant encroachments into those areas with existing environmental commitments and/or sensitive resources while following EO 13112. TVA would develop the appropriate plans to ensure consistency with EO

13112. These plans would aid in preventing the inadvertent movement of invasive plants within the aquatic and terrestrial environment that can occur during routine operations. TVA would also increase the area on which invasive plants are managed from the 600 acres/year under Alternative A to 1,000 acres/year; given the large area of TVA lands infested with invasive plants, this area may not be sufficient to prevent adverse impacts to native plant communities.

Direct, indirect, and cumulative impacts to plant communities would be similar to those described under Alternative A. The plans associated with EO 13112 compliance would have a somewhat more direct positive impact to prevent the introduction and spread of invasive plants within the TVA region.

Alternative C **— Flagship Management Alternative**
Under the Flagship Management Alternative, TVA would create and implement new reservoir lands planning strategies and a CVLP. Globally rare plant communities identified on reservoir lands would remain allocated in areas of sensitive resource management and natural resource conservation in RLMPs. Unplanned tracts would be surveyed for rare communities and listed species, and habitat protection areas containing rare communities and species would be resurveyed in order to determine their viability. In addition, TVA would work cooperatively with other federal and state agencies to develop a more comprehensive land condition assessment.

TVA would expand invasive species control measures, enhancing consistency with EO 13112. TVA would develop work plans to aid in preventing the inadvertent movement of invasive species within the aquatic and terrestrial environment that can occur during routine operations. In cooperation with the state Cooperative Weed Management Areas, TVA would develop an Early Detection and Rapid Response Management Plan to identify and ultimately control invasive species on TVA lands. Educational programs would be implemented across the Valley to make stakeholders aware of the issues surrounding invasive species and methods by which they can avoid transporting them to other areas in the TVA region. The goal of managing invasive plants on 40,000 acres/year would likely result in their control and the rehabilitation of much of the infested area.

Direct, indirect, and cumulative impacts to plant communities would be similar to those described under Alternative A. The plans associated with EO 13112 would have a direct positive impact to prevent the introduction and spread of invasive species within the TVA region.

Alternative D **— Blended Management Alternative**
Globally rare plant communities identified on TVA lands located adjacent to reservoirs would remain allocated in areas of sensitive resource management and natural resource conservation. The programs associated with globally rare plant communities and invasive plants would continue as described in Alternative B. Direct, indirect, and cumulative adverse impacts to plant communities would be comparable to those of Alternative B and less than those of Alternative C.

Relative Beneficial Impacts of the Alternatives
The relative beneficial impacts to vegetation under the four alternatives are shown in Figure 5-4.

Figure 5-4. Relative Beneficial Impacts of the Alternatives on Vegetation

5.4.2. Wildlife

Alternative A **— No Action Alternative**
Under the No Action Alternative, TVA would continue to manage resources using existing stewardship practices that benefit wildlife resources while providing opportunities for dispersed recreation. TVA would incorporate stewardship actions as described in unit plans at specific sites throughout the TVA region.

TVA would also address wildlife resource issues on a case-by-case basis as they arise. For instance, TVA would continue to entertain partnerships to address collective resource needs in the future. Likewise, TVA would manage nuisance wildlife in cooperation with other regulatory agencies on a project basis. Under this alternative, TVA would continue its involvement with regional conservation initiatives.

Under Alternative A, TVA's stewardship activities would lack a holistic management approach, which may result in overlooking immediate threats to wildlife, including those from encroachments or invasive species. Any potential threats would ultimately be identified during LCAs or during routine maintenance. Appropriate resource management responses to these threats would be developed at that time. Adoption of this alternative would not result in adverse direct, indirect, or cumulative impacts to wildlife or their habitats.

Alternative B — Custodial Management Alternative
Under the Custodial Management Alternative, TVA would focus on meeting regulatory and policy requirements and maintenance needs of existing assets and would address public safety issues. Stewardship activities would benefit wildlife and their habitats. Continued management of dewatering projects and habitat enhancement partnerships would benefit wildlife, especially waterfowl and nongame species found at dewatering projects and habitat enhancement sites. TVA would develop an MOU with the USFWS to define TVA's approach to implementing EO 13186 (Responsibilities of Federal Agencies to Protect Migratory Birds). This would result in a programmatic approach to managing migratory bird populations on TVA lands. The increased role in forestry, although minimal under this alternative, and GHG demonstration projects would also benefit wildlife.

A reduction in nondiscretionary conservation planning would reduce TVA's involvement in regional conservation plans. Currently, this involvement benefits TVA, other agencies, and biological resources throughout the TVA region. Renewal of WHC third-party certifications would maintain the benefits to wildlife that these arrangements provide.

The closure of day use areas located off dam reservations and stream access sites not currently managed under contractual agreements could result in decreased opportunity for wildlife-associated recreation, but these closures would likely result in less disturbance to wildlife in these areas.

Under Alternative B, TVA would develop a more comprehensive strategy for nuisance animal control. This strategy would result in a more systematic application of control measures and potentially result in increased use of nonlethal measures. Adoption of the Custodial Management Alternative would result overall in fewer wildlife-oriented stewardship projects compared to the No Action Alternative. However, adoption of this alternative would not result in adverse direct, indirect, or cumulative impacts to wildlife or their habitats.

Alternative C — Flagship Management Alternative
Under Flagship Management, several high-profile projects would be selected in addition to current stewardship activities. Improved assessment tools and methodologies driving the prioritization of stewardship activities would greatly benefit wildlife resources. Increased emphasis on demonstration projects would benefit migratory birds. Improved management of dewatering projects would benefit multiple species of wildlife and would provide better recreational opportunities. Incorporating goals and objectives in the *North American Waterfowl Management Plan* (USFWS 2009a) and state wildlife action plans would also benefit migratory species on a regional scale.

An improved trails program would have minimal impact to wildlife, other than potential increased disturbance to some species located near the trails. Outdoor educational clinics would promote outdoor ethics, perhaps minimizing increased disturbance to wildlife. A holistic approach to land protection and boundary marking would better protect wildlife and other sensitive resources.

The adoption of the Flagship Management Alternative would result in improved communication between TVA and conservation partners. Programs under this alternative would facilitate further collaboration with the public and would result in benefits to natural resources on TVA lands and the region. Cumulative impacts would also be beneficial at a regional scale.

Alternative D **— Blended Management Alternative**
The Blended Management Alternative meets TVA's regulatory and policy objectives while allowing flexibility to implement additional programs. This alternative includes actions described in Alternative B, including management of dewatering units, an increased role in forestry, and habitat enhancement partnerships in addition to other activities that benefit wildlife. TVA's increased surveillance of its natural areas would also benefit the resources that these areas protect.

This alternative includes an increased focus on wildlife habitat enhancement partnerships, regional landscape conservation initiatives, and invasive plant-control activities, and WHC certification would also benefit these resources. These cooperative partnerships would benefit wildlife on and adjacent to TVA lands and provide opportunities for TVA to collaborate with other agencies to address regional conservation issues in an efficient manner.

TVA's increase in dispersed recreation activities, developed recreation improvements, and increased shoreline stabilization could result in localized adverse impacts to wildlife from alterations of wildlife habitat and increased levels of human disturbance. These potential impacts are considered minor as any impacts could be greatly reduced by proposed public outreach initiatives and through mitigation measures incorporated during development of specific projects.

The Blended Management Alternative would provide a more holistic and collaborative approach to managing wildlife resources on TVA properties, and provide flexibility regarding the implementation of management options as resource needs are identified. Benefits of this alternative would range between those described in Custodial and Flagship Management alternatives. Adoption of the Blended Management Alternative would not result in significant adverse direct, indirect, or cumulative impacts to wildlife or their habitats.

Relative Beneficial Impacts of the Alternatives
The relative beneficial impacts to wildlife under the four alternatives are shown in Figure 5-5.

Figure 5-5. Relative Beneficial Impacts of the Alternatives on Wildlife

5.5. Wetlands

This section analyzes impacts to wetlands that are associated with the four alternatives, including direct, indirect, and cumulative impacts.

Direct impacts result from disturbances that occur within the wetland. Common direct impacts to wetlands include filling, grading, removal of vegetation, building construction, and changes in water levels and drainage patterns. Most disturbances that result in direct impacts to wetlands are controlled by federal and state wetland regulatory programs.

Indirect impacts result from disturbances that occur in areas outside of the wetland, such as uplands, other wetlands, or waterways. Common indirect impacts include influx of surface water and sediments, fragmentation of a wetland from a contiguous wetland complex, loss of recharge area, or changes in local drainage patterns. Most indirect impacts are beyond the authority of federal and state wetland regulatory programs.

Cumulative impacts reflect a net loss of wetland area and functions as the result of the incremental direct and indirect impacts of human activities.

Alternative A **— No Action Alternative**
Under the No Action Alternative, TVA would continue to implement the existing stewardship programs and tools for wetland identification and protection. Under this alternative, wetlands are typically identified using the TVA wetlands database. The wetlands database also uses SMI data, and for project-specific analysis, field surveys are used to identify and map wetlands. No process exists for adding wetlands identified in the field for current projects to the existing wetlands database.

This alternative would continue to apply the existing methodology when planning lands along TVA reservoirs. TVA lands that include wetlands are typically designated as either sensitive resource management or natural resource management. In cases where high-

quality or unique wetland habitats are identified on TVA lands, these parcels may be designated as natural areas and managed appropriately.

Under the No Action Alternative, there would be no significant direct wetland impacts. TVA would continue to comply with CWA, applicable state wetland protection regulations, and EO 11990 (Protection of Wetlands) through its environmental review process. Where direct wetland impacts are unavoidable, impacts would be assessed and mitigated via existing regulatory mechanisms.

Indirect wetland impacts associated with the No Action Alternative are due to activities or disturbances that occur outside the wetland. Regionally, indirect and cumulative adverse effects on wetlands would be related to the indirect effect of increased demand for shoreline access and regional growth.

The current management issues identified in Section 4.4 would continue; some site-specific impacts to wetlands would be addressed when identified during land condition assessments (e.g., ATV access to wetlands blocked if identified as high priority), but in general, there would be negligible gains in wetland condition associated with this alternative.

Alternative B **— Custodial Management Alternative**
Under this alternative, wetland impacts would be similar to the No Action Alternative.

Alternative C **— Flagship Management Alternative**
Under this alternative, TVA would explore, pilot/test, and implement new strategies for enhancing wetland stewardship. This would include development and implementation of a wetland management policy that includes a proactive program for wetland identification, management, and protection on TVA lands.

TVA would conduct additional activities in support of database development, maintenance, and use. Activities would consist of an information-gathering effort on TVA lands for assessment of wetland resources. TVA would modify its existing wetland impact analysis tool, used in siting TVA projects, to support planning on TVA lands. This process utilizes soils data, NWI mapping data, and aerial photography. Wetlands indentified during these surveys would be incorporated into the database. This would also include the identification and mapping of globally rare wetland communities as indicated by NatureServe. These communities would also be added to the TVA Natural Heritage database.

Field surveys, mapping, and assessment of wetland resources would allow the identification of opportunities to improve these resources, where appropriate. Improvement activities would include invasive species removal, restoration of hydrologic functions, and restoration of native wetland species. These activities would address some of the specific management issues and problems identified in Section 4.4.

This alternative would include a change to the CVLP methodology for planning TVA reservoir lands. The CVLP identifies target ranges for allocations to each land use zone for the Valley as a whole (Table 2-9); this could result in an increase in lands allocated to developed recreation, and a decrease in lands allocated to conservation (Zones 3 and 4). Despite this change, the CVLP would continue to allocate TVA lands including wetlands to either sensitive resource management or natural resource management. In cases where high-quality or unique wetland habitats are identified on TVA lands, these parcels may be designated as natural areas and managed appropriately.

Under this alternative, TVA would expand its role in large-scale wetland conservation efforts across the region via partnerships with other federal and state agencies, academics, and NGOs. Planning efforts would address individual species associated with wetlands and communities of species or could operate on a larger scale (e.g., regional or ecoregional planning and landscape conservation cooperatives).

Implementation of this alternative would result in a positive effect on wetlands on TVA lands, and no direct or indirect adverse wetland impacts would result from this alternative. TVA would continue to comply with CWA and EO 11990 (Protection of Wetlands) through its environmental review process. Where wetland impacts are unavoidable due to operational-associated projects, impacts would be assessed and mitigated via existing regulatory mechanisms.

Cumulative actions would have a long-term, moderate, beneficial cumulative effect on wetlands within the Valley due to wetland identification, protection, and restoration efforts. These benefits would provide moderate increases in wetland function (wildlife habitat, increased ability to trap sediment and pollutants, invasive species removal, and increased species diversity) as the result of wetland restoration, rehabilitation, and ecosystem management efforts. Regionally, cumulative adverse effects on wetlands would be related to the indirect effect of increased demand for shoreline access and regional growth.

Alternative D **— Blended Management Alternative**
Under this alternative, TVA mixes portions of the programs and activities as described under Alternatives B and C. The direct, indirect, and cumulative impacts on wetlands would be similar to those described under the Flagship Management Alternative. As strategic partnerships and resources become available, TVA would enhance management of both the in-house wetland database and wetlands on its lands.

Relative Beneficial Impacts of the Alternatives
The relative beneficial impacts to wetlands under the four alternatives are shown in Figure 5-6.

Figure 5-6. Relative Beneficial Impacts of the Alternatives on Wetlands

5.6. Water Quality

Alternative A — No Action Alternative
Improving water quality is the primary focus of the current and proposed Water Resources Management programs. Many of the current and proposed Biological, Cultural, and Recreation programs (including dispersed recreation management) would also likely result in net improvements to water quality. The practices and levels of active management are generally adequate to comply with regulations and to control pollutants in runoff from TVA land. Shoreline erosion contributes some sediment and associated pollutants in many areas and is an ongoing slight adverse impact. Small amounts of sediment and slight adverse impacts may be generated by heavily used informal recreation areas and trails.

Access controls, land protection, and road and parking area maintenance generally control runoff and erosion from these facilities. Inadequate maintenance or access controls may occasionally allow accelerated erosion, generate pollutant loading, and cause slight adverse impacts to water quality. Shoreline erosion generates much larger amounts of sediment, but this is still a slight impact compared to other background sources.

TVA land under contractual agreements for agriculture, especially areas that allow grazing or row crops, can generate pollutants such as sediment, nutrients, bacteria, and pesticides. These areas total about 10,000 acres. For several years, TVA has been working with the licensees to reduce in impacts of the agricultural operations; these efforts would continue and the continued grassland and agricultural land management activities are not likely to result n significant environmental impacts.

Management of sensitive biological resources and terrestrial habitat generally improves vegetative cover of soil and thereby provides slightly beneficial water quality impacts in the long term. During the process of improving habitat, bare soil and herbicide use may generate pollutants, but any impacts would be minor and short term.

Dewatering areas support agriculture during the summer and are flooded during the winter to provide winter habitat for large populations of waterfowl. Water discharged from dewatering areas can contain nutrients and sediment. These pollutants come from the seasonally flooded agricultural areas within the dewatering areas, waste from waterfowl, and other pollutants from the watersheds upstream of the dewatering areas. The quantity of pollution discharged is usually small, resulting in slight adverse water quality impacts. However, adverse impacts are associated with the West Sandy dewatering area, where Tennessee lists the downstream West Sandy embayment as not supporting designated uses due to nutrients and low DO.

Erosion of shoreline archaeological sites, as well as the illegal exploration and excavation of artifacts on TVA land can generate sediment and associated pollutants. Shoreline erosion generates much larger amounts of sediment and sometimes impacts cultural resources. These sources create a slight impact compared to other background sources. Active protection of archaeological sites and enforcement of laws that protect cultural resources decrease these impacts.

The scope of current Recreation Management actions is on the maintenance and upgrading of developed recreation facilities; therefore, these activities are less likely to have any measurable effect on water quality than the biological and cultural resources management activities. Water quality is not a primary focus of the recreation programs but the practices are generally adequate to comply with regulations and control potential runoff pollutants from TVA lands developed for recreation, although some pollutants reach adjacent water bodies in storm water runoff. However, good design, construction, and maintenance practices would make any impacts very slight. Waste treatment facilities would continue to be operated in compliance with local and state regulations.

If policies are followed consistently, reservoir lands planning would have no impact on water quality.

Water Resource Management programs are intended to improve water quality throughout the Tennessee River watershed and create public support for water quality and water resources improvement.

The Stream and Tailwater Monitoring Program assesses water quality and ecological condition of streams throughout the Valley. The information generated by this program is used to target and track TWI projects and is used by other water quality agencies in the Valley to support their assessment and water quality improvement efforts. The quality and accessibility of data influences the accuracy of needs assessment and thereby the effectiveness of management actions. Vital Signs and Fixed Station monitoring provides data for running the reservoir system, evaluating environmental impacts of any change to system operations, and for water quality improvement and protection activities.

Partnerships and relationships with state and federal agencies and non-governmental organizations that are concerned with water quality are important in water quality improvement and protection activities. TVA would continue to maintain these relationships.

The TVCMI Program provides education material to the public and certifies those marinas that take efforts to improve and protect water quality. The WEP promotes water provides educational workshops with the goal of reducing water use. The QGP targets segments of the public to make them more aware of water resource issues and the value of clean water while encouraging them to act to protect and improve water quality.

The TWI Program has measurable beneficial impacts to water quality. During construction, there can be minor and temporary slight adverse impacts, but these would be minimized by appropriate BMPs. The TWI produces long-term decreases in pollutant quantities and measurable improvement of water quality in targeted water bodies and makes the public more aware of water resource issues and the value of clean water while enabling them to act to protect and improve water quality.

In summary, TVA lands are mostly a narrow band around reservoirs. Because these lands account for only a small portion of the watershed of a given reservoir or perennial stream and none of the uses of TVA lands generate substantial amounts of pollutants, activities on these lands are unlikely to have any measurable effect on water quality other than locally. TVA's management practices create opportunities for leadership by example, and management practices used by TVA can influence attitudes and expectations among visitors.

Management practices are generally adequate to comply with regulations and to control pollutants in runoff from TVA lands. However, some pollutants do reach water bodies from sources such as runoff from developed areas, eroding reservoir shoreline, land leased for agricultural uses, and dewatering areas. Overall impacts are slightly adverse compared to pristine conditions.

Water Resource Management programs have a direct connection to water quality and a greater geographic scope than programs that are focused on management of TVA land, and therefore, potentially have a much greater impact. The TWI program is intended to reduce pollutant loadings to water bodies and target these reductions in a manner that creates improvements measureable by biological monitoring and/or state use-support status. Stream and Tailwater Monitoring directly supports this effort. The QGP and TVCMI programs have slight beneficial impacts, and enhance the TWI program. Overall, the benefits of the Water Resource Management programs outweigh the slightly adverse impacts of the land management programs and this alternative is beneficial.

Alternative B — Custodial Management Alternative
Under this alternative, there would be many changes to biological, cultural, and recreation management programs, but only a few of these would affect water quality. The removal of the restriction to "light industry" on Zone 5 — Industrial lands and the subsequent potential development of heavy industry could also affect water quality due to increased requirements for process water and increased discharges. TVA would review the potential impacts of proposed industrial developments on its lands and the facilities would be subject to NPDES discharge limits and other regulations and permitting requirements. These reviews and requirements would reduce the potential for significant impacts to water quality.

Increased management of sensitive biological resources and terrestrial habitat generally improves vegetative cover and thereby provides slightly beneficial water quality impacts in the long term. During the process of improving habitat, bare soil and herbicide use may generate pollutants, but any negative impacts would be minor and short term. An increase in the number of heavily-impacted dispersed recreation sites repaired would also create a slight water quality benefit.

The small increase in shoreline stabilization of archaeological sites would create a slight water quality benefit. Although there is some potential for slight water quality impacts during construction, these impacts would be brief and would be minimized by appropriate management practices. TVA would close day use areas located off dam reservations. This would most likely have no impact on water quality, but aggressive conservation management by a new manager or reversion to forest if the facilities were closed may have a slight beneficial impact; poor management by a new manager or continued heavy recreation use after closing would have a slight adverse impact.

Water Resource Management programs have a direct connection to water quality and changes to these programs can therefore be expected to affect water quality. There would be several changes under this alternative.

Creation of the new Aquatic Ecology Management outreach and implementation program would target a watershed that is already in good shape for protection and enhancement. This would create a net water quality benefit, but the amount of water quality benefit would be difficult to predict because goals and activities would be specific to a particular project.

Stream assessments would be continued at the same rate, which would maintain the availability of current stream-condition data for decision-making. An aquatic monitoring program to evaluate climate change would be initiated under this alternative. This program would not provide direct water quality benefits but would provide information for any future mitigation activities.

Strategic Partnership planning would be continued, as would the TVCMP. The WEP and the QGP would be discontinued, but the Water Resource Outreach Campaign Program would be initiated. The WRICP would operate at a smaller scale than WEP and QGP combined, but would have more flexibility in terms of the water resource issues chosen for outreach activities.

The TWI Program would be eliminated. This program is intended to create significant measureable water quality improvement within the watershed-level project areas. Any water quality improvements generated by this program would also be eliminated.

The Nutrient Source Watershed Identification and Improvement Program would be initiated. This program would reduce the pollutant loading to water bodies by a greater amount than the TWI Program it would replace. If effectively targeted, this program could create more water quality benefit than TWI at its current scale of operation.

The net direct impact of Alternative B would be slightly beneficial for the biological, cultural and recreation programs. The changes to the water resource programs would also likely create a positive impact, but the lack of water quality condition goals in addition to the currently undefined goals for some new programs makes it difficult to compare this alternative directly with the No Action alternative.

There are numerous federal, state, local, and NGO efforts to improve water quality throughout the Valley. TVA's activities are consistent with these efforts, but cumulative impacts of TVA actions on water quality are limited to the potential that TVA activities would encourage others to participate in similar projects. TVA water resource management programs seek to partner directly with some existing efforts, generate new initiatives, provide resource condition data, and encourage those efforts in which TVA cannot directly participate; these programs would result in positive cumulative impacts. The cumulative impacts are implicit in the water resource management activities and would be approximately proportional to TVA's activity level. The creation of the Aquatic Ecology Management, Climate Change Sentinel Monitoring, Nutrient Source Watershed Identification and Improvement Program, and Water Resource Improvement Campaign program, and the continuation of Strategic Partnership Planning and TVCMP would compensate for the elimination of the WEP, QGP and TWI programs. The cumulative impact of this alternative would be diffuse and difficult to quantify, but would result in greater water resource improvements than under the No Action Alternative, assuming greater total resource investment from TVA.

Alternative C — Flagship Management Alternative
Under this alternative, there would be additional changes to biological, cultural, and recreation management programs that would affect water quality. Probably the largest change would be the conversion of all current agricultural lease land to grassland or other appropriate wildlife habitat. After very slight potential negative water quality impacts during establishment of the new cover, this would be a slight long-term benefit to water quality. As with Alternative B, the proposed change to the reservoir lands planning Zone 5 definition could increase the potential for water quality impacts.

Refurbishment of dewatering areas would likely cause some short-term generation of pollutants, especially sediment, during construction, which would be minimized by use of appropriate construction management practices. This would not change the long-term negative water quality impacts of operating these areas.

Compared to the other alternatives, there would be a largest increase in acreage of terrestrial habitat improved. This generally improves vegetative cover of soil and thereby provides slightly beneficial water quality impacts in the long term. During the process of improving habitat, bare soil and herbicide use may generate pollutants, but any negative impacts would be minor and short term. An increase in the number of heavily-impacted dispersed recreation sites repaired would also create a slight water quality benefit.

A goal of 20 miles of trails would be constructed per year under this alternative; no trail construction is proposed for the other three alternatives. The construction and use of

unsurfaced trails have the potential to create slight water quality impacts from erosion. However, good design, construction, and maintenance practices would make these impacts very slight. There would also be a large increase in the number of heavily impacted dispersed recreation areas repaired. This would generate a slight water quality benefit.

This alternative would result in the greatest increase in shoreline stabilization for both archaeological site protection and erosion control. Although the benefits would be fairly localized and small on a regional basis, they would be greater than those of the other alternatives. Although there is some potential for slight water quality impacts during construction, these impacts would be brief and would be minimized by appropriate management practices.

Water Resource Management programs have a direct connection to water quality and changes to these programs can therefore be expected to affect water quality. There would be several changes under this alternative.

The new Aquatic Ecology Management outreach and implementation program would be larger than in Alternative B, expanding to three watersheds. This would create a net water quality benefit, but the amount of water quality benefit would be difficult to predict because goals and activities would be specific to a particular project.

Stream assessments would be expanded, which would improve the availability of current stream-condition data for decision-making. An aquatic monitoring program to evaluate climate change would be initiated under this alternative, and would have an expanded scope compared to Alternative B. This program would not provide direct water quality benefits but would provide important information for any future mitigation activities.

A new Case Study/Research Initiative Program would be initiated. This program would likely contribute information that could lead to additional water quality benefits; whether it directly results in water quality improvement would depend on the particular studies and initiatives.

Strategic Partnership planning would be expanded compared to Alternatives A and B. The TVCMP would also be expanded, with new education efforts and a net increase in the number of certified marinas. The WEP and the QGP would be discontinued, but the Water Resource Outreach Campaign Program would be initiated and expanded relative to Alternative B. Under this alternative, the WRICP would operate at a scale comparable to WEP and QGP combined, and would have more flexibility in terms of the water resource issues chosen for outreach activities.

A new grant program would be initiated to support water quality projects managed by other entities; this program is proposed only for this alternative. Impacts would depend on selection criteria and the effectiveness of the organizations receiving the grants. The benefits of this program would be spread across the Valley, so it is unlikely to produce significant water quality improvement at any location. The program would likely generate slight beneficial impacts, depending on the particular project.

The TWI Program would be eliminated. This program is intended to create significant measurable water quality improvement within the watershed-level project areas. It would be replaced by the new Nutrient Source Watershed Identification and Improvement Program. Under Alternative C, this new program would be expanded to three reservoirs

and include sufficient resources to address point sources of pollution, compared to one reservoir and non-point source only for Alternative B. This program would reduce the pollutant loading to each water body by a greater amount than the TWI Program. If effectively targeted, this program could create more water quality benefit than the current TWI Program.

The Northern Gulf of Mexico / Mississippi River Basin Nutrient Load Reductions program would be initiated under this alternative. This program would study sources and transport of nutrients within the Valley that have the potential to impact the Gulf of Mexico and explore strategies for reducing the export of these nutrients from the Valley. Because of the scale of the Gulf hypoxia issue, this program is unlikely to have a measurable impact on water quality, but it would contribute to the knowledge base that is necessary to make progress on the issue.

The changes to the water resources programs under this alternative likely would create a positive impact compared to either preceding alternative, but the lack of water quality condition goals in addition to loading goals for the new programs makes it difficult to compare this alternative directly with the No Action alternative.

There are numerous federal, state, local, and NGO efforts to improve water quality throughout the Valley. TVA's activities are consistent with these efforts, but cumulative impacts of TVCA's actions on water quality are limited to the potential that TVA activities would encourage others to participate in similar projects. TVA water resource management programs seek to partner directly with some existing efforts, generate new initiatives, provide resource condition data, and encourage those efforts in which TVA cannot directly participate; these programs, along with planning, assessment, and outreach programs in the biological, cultural, and recreation management programs, would result in positive cumulative impacts. The cumulative impacts are implicit in the water resource management activities and would be approximately proportional to TVA's activity level. The creation of the Aquatic Ecology Management, Climate Change Sentinel Monitoring, Case Study/Research Initiative Program, Water Resource Grant Program, Nutrient Source Watershed Identification and Improvement Program, and Water Resource Improvement Campaign program, and the expansion of Strategic Partnership Planning and TVCMP would compensate for the elimination of the WEP, QGP and TWI programs. The cumulative impact of this alternative would be greater water resource improvements than under both Alternatives A and B.

Alternative D — Blended Management Alternative

Most of the new programs and activities in Alternative C that would affect water quality are also present in Alternative D, although many of them would be implemented at a smaller scale. As with Alternative B, the proposed change to the reservoir lands planning Zone 5 definition could increase the potential for water quality impacts.

As under Alternatives A and B and unlike Alternative C, TVA would continue to lease land for agricultural uses, so this minor source of pollutants would continue. As in Alternative C, refurbishment of dewatering areas would likely cause some short-term generation of pollutants, especially sediment, during construction, which would be minimized by use of appropriate construction management practices. This would not change the long-term negative water quality impacts of operating these areas.

The acreage of terrestrial habitat improved under this alternative would be greater than in Alternative A, the same as in Alternative B, and much less than in Alternative C. This generally improves vegetative cover of soil and thereby provides slightly beneficial water quality impacts over the long term. During the process of improving habitat, bare soil and herbicide use may generate pollutants, but any negative impacts would be minor and short term. There would be an increase in the number of heavily impacted dispersed recreation areas repaired over Alternatives A and B, but a reduction compared to Alternative C. Water quality benefit would be proportional to the number of sites repaired.

Shoreline stabilization activity for archaeological site protection and erosion control would be greater than in Alternatives A and B and less than in Alternative C, and water quality benefits would be proportional to the amount of shoreline stabilized. Although there is some potential for slight water quality impacts during construction, these impacts would be brief and would be minimized by appropriate management practices.

Water resource management programs have a direct connection to water quality and any changes to these programs can therefore be expected to have greater water quality impacts than the other programs evaluated. There would be several changes under this alternative.

The new Aquatic Ecology Management outreach and implementation program would be larger than in Alternative B, expanding to three watersheds, as in Alternative C. This would create a net water quality benefit, but the amount of water quality benefit would be difficult to predict because goals and activities would be specific to a particular project.

Stream assessments would be expanded over Alternatives A and B, though not as much as in Alternative C. This would improve the availability of current stream-condition data for decision-making compared to Alternatives A and B, but reduce the availability compared to Alternative C.

An aquatic monitoring program to evaluate climate change would be initiated under this alternative, and would have a larger scope compared to Alternative B but smaller compared to Alternative C. This program would not provide direct water quality benefits but would provide information for any future mitigation activities.

As in Alternative C, Strategic Partnership planning would be expanded compared to Alternatives A and B. The TVCMP would also be expanded, with new education efforts and a net increase in the number of certified marinas. The WEP and the QGP would be discontinued, but the Water Resource Outreach Campaign Program would be initiated and expanded over Alternative B. Under this alternative, the WRICP would operate at a scale smaller than Alternative C and somewhat smaller than the current scope of WEP and QGP combined, and would have more flexibility in terms of the water resource issues chosen for outreach activities.

The TWI Program would be eliminated. This program is intended to create significant measurable water quality improvement within the watershed-level project areas. It would be replaced by the Nutrient Source Watershed Identification and Improvement Program which would be implemented at a scale greater than Alternative B but less than Alternative C. The program under this alternative would address two reservoirs with sufficient resources to address point sources of pollution. If effectively targeted, this program could create more water quality benefit than TWI.

The Northern Gulf of Mexico / Mississippi River Basin Nutrient Load Reductions program would be initiated under this alternative and Alternative C, but would be scaled back compared to Alternative C . This program would study sources and transport of nutrient sources within the Valley that have the potential to impact the Gulf of Mexico. In this alternative, activities would limited to studying, monitoring, and planning, with no on-the-ground component. This program would have no direct water quality impact, but it would contribute to the knowledge base that is necessary to make progress on the issue.

The net direct impact of Alternative D to water resources likely would create a positive impact compared to Alternatives A, more positive impact than Alternative B but less than Alternative C. The lack of water quality condition goals in addition to sediment and nutrient loading goals for the new programs makes it difficult to compare this alternative directly with the No Action alternative.

There are numerous federal, state, local, and NGO efforts to improve water quality throughout the Valley. TVA's activities are consistent with these efforts, but cumulative impacts of TVA's actions on water quality are limited to the potential that TVA activities would encourage others to participate in similar projects. TVA water resource management programs seek to partner directly with some existing efforts, generate new initiatives, provide resource condition data, and encourage those efforts in which TVA cannot directly participate; these programs, along with planning, assessment, and outreach programs in the biological, cultural, and recreation management programs, would result in positive cumulative impacts. The cumulative impacts are implicit in the water resource management activities and would be approximately proportional to TVA's activity level. The creation of the Aquatic Ecology Management, Climate Change Sentinel Monitoring, Nutrient Source Watershed Identification and Improvement Program, and Water Resource Improvement Campaign, and the expansion of Strategic Partnership Planning and TVCMP would compensate for the elimination of the WEP, QGP and TWI programs. The cumulative impact of this alternative would be greater water resource improvements than under Alternatives A and B, but since these programs would be at a smaller scale than Alternative C, the benefits would be less than under Alternative C.

Relative Beneficial Impacts of the Alternatives
The relative beneficial impacts to water quality under the four alternatives are shown in Figure 5-7.

Figure 5-7. Relative Beneficial Impacts of the Alternatives on Water Quality

5.7. Aquatic Ecology

This section analyzes impacts to aquatic life that are associated with the four alternatives, including direct, indirect, and cumulative impacts.

Direct impacts result from disturbances that occur within aquatic environments. Common direct impacts to aquatic habitats include dredging, placement of fill in streams or other

water features (including placement of riprap and other stabilization structures) and changes in water levels and drainage patterns. They may also include the introduction of pollutants (other than sediment) into streams. Most disturbances that result in direct impacts to aquatic life are controlled by federal and state regulatory programs including approvals under Section 26 of the TVA Act.

Indirect impacts result from disturbances that occur in areas outside of the water body in upland areas. Common indirect impacts include influx of surface water and sediments, loss of wetland function in areas along the water body, loss of recharge area, or changes in local drainage patterns. Most disturbances that result in indirect impacts to aquatic life are controlled by federal and state regulatory programs often including approvals under Section 26a of the TVA Act.

Cumulative impacts are those impacts resulting from combined direct and indirect impacts to the stream, water quality, or instream habitats over time.

Alternative A — No Action Alternative
Under the No Action Alternative, TVA would continue to implement the existing stewardship programs and tools. Because the majority of the actions discussed as part of biological, cultural, and recreation management programs, as well as reservoir lands planning occur on TVA lands and not in aquatic environments, these activities rarely result in direct impacts to aquatic resources. Some of the activities associated with these programs would reduce sediment runoff, which would benefit aquatic resources.

Water resource management programs are designed to improve riparian areas, water quality and instream habitat throughout the Valley. Because of the large geographic scope of water resource management programs, these programs have a much higher potential to affect aquatic resources. Activities performed as a part of water resource improvement programs occur within or immediately adjacent to streams, wetlands, ponds, and other aquatic environments. Disturbance associated with water resource improvement programs may have a minor short-term, direct adverse effect on instream water quality and habitats. Project planning and appropriate implementation of BMPs would be utilized to minimize these effects.

The goal of these programs is to benefit aquatic and riparian conditions in the watersheds where they are applied. There is potential for some activities (particularly bank stabilization activities associated with both cultural and water resource management) to directly affect aquatic habitats and communities. These activities would be carefully planned and implemented to minimize adverse impacts and would result in long-term beneficial, although fairly localized, impacts.

This alternative would continue to apply the existing methodology when planning lands along TVA reservoirs. Lands that include important aquatic resources (primarily caves and springs) are typically designated as either sensitive resource management or natural resource conservation. In cases where high-quality or unique habitats are identified on TVA land, the specific tract of land may be designated as a natural area and managed appropriately.

Under the No Action Alternative, it is not anticipated that there would be large, unavoidable impacts to aquatic resources. Long-term effects on aquatic resources from TVA's resource

management activities are expected to be beneficial to aquatic habitat conditions and aquatic communities.

Alternative B — Custodial Management Alternative
Under this alternative, aquatic impacts would be essentially similar to the No Action Alternative. Scaling back some activities under Alternative B would result in fewer recreation development, biological and cultural resources management, or water resource improvement programs. The reduction of some beneficial programs (particularly water resource improvement programs) may reduce some of the short-term impacts of implementing these programs. However, there would be fewer beneficial projects for natural resources realized under this option, and some adverse cumulative impacts to water quality and aquatic communities could result. Implementation of the Aquatic Ecology Management program in one healthy, high biological diversity watershed in the Tennessee River system would result in direct benefits to aquatic resources located within this watershed.

No significant adverse direct, indirect, or cumulative impacts to aquatic communities are expected to occur from implementation of Alternative B. However, many of the beneficial effects on water quality and aquatic communities that would result from Alternatives C and D would not be realized by Alternative B.

Alternative C — Flagship Management Alternative
Under this alternative, TVA would explore, pilot/test, and implement new strategies for enhancing environmentally sustainable recreation, resource stewardship, water resource improvements, and reservoir lands planning. The potential impacts associated with reservoir lands planning and the associated ranges in land use zone allocations would be the same as those described under Alternative A. Direct, positive, beneficial changes in aquatic ecology due to the implementation of water resource improvement programs would be realized across the Valley. An inventory of resources on TVA lands would help inform TVA (and partners) of opportunities to protect or enhance aquatic resources found on or adjacent to those lands. Field surveys, mapping, and assessment of resources would allow identification of opportunities to improve these resources where appropriate. Implementation of the Aquatic Ecology Management program in three healthy, high biological diversity watersheds in the Tennessee River system would result in direct benefits to aquatic resources located within this watershed.

Under this alternative, TVA would expand its role in large-scale conservation efforts across the region via partnerships with other federal and state agencies, academics, and NGOs. Planning efforts would address individual species that are state- or federally listed and communities of rare and common species or would operate on a larger scale (e.g., regional or ecoregional planning; landscape conservation cooperatives). These conservation efforts should have measurable benefits to aquatic resources across the region.

Implementation of water resource improvement programs under the Flagship Management Alternative would likely provide direct, beneficial effects on aquatic life within the Valley. These benefits would result from direct improvements in water quality and aquatic habitat conditions in watersheds targeted under water resource improvement programs.

Under Alternative C, indirect, beneficial impacts to water quality and aquatic habitats are likely to be realized as upland conditions improve (i.e., better practices would be

implemented during upland development, resulting in the increased ability of riparian areas to trap sediment and pollutants).

Implementation of the proposed Alternative C is expected to result in a long-term positive effect on aquatic life in the TVA region. No long-term direct or indirect adverse impacts to aquatic habitats or communities are expected to result from this alternative.

Alternative D — Blended Management Alternative
Implementation of the proposed Blended Management Alternative is expected to result in a positive effect on aquatic life in the TVA region. No long-term direct or indirect adverse impacts to aquatic habitats or communities are expected to result from this option. Several of the programs associated with water quality improvements would be implemented at a higher level of effort than identified Alternatives A and B. Additional water quality and wildlife habitat improvements would be realized under this alternative when compared to Alternatives A and B. Implementation of the Aquatic Ecology Management program in three healthy, high biological diversity watersheds in the Tennessee River system would result in direct benefits to aquatic resources located within this watershed. These improvements would have a net long-term benefit to aquatic communities in the TVA region.

Relative Beneficial Impacts of the Alternatives
The relative beneficial impacts to aquatic ecology under the four alternatives are shown in Figure 5-8.

Figure 5-8. Relative Beneficial Impacts of the Alternatives on Aquatic Ecology

5.8. Endangered and Threatened Species

The ESA requires TVA to ensure that its actions do not jeopardize the continued existance of any species listed as threatened or endangered or adversely modify critical habitat. It applies to all actions authorized, funded, or carried out by TVA. If an action has the potential to affect listed species or their habitats, TVA must consult with the USFWS. USFWS has regulations that establish this consultation process and TVA has established a process for consultation with USFWS; see Appendix I for a summary of this process. The ESA also requires federal agencies, including TVA, to carry out programs for the conservation of endangered and threatened species. Under all alternatives, TVA will continue to comply with these ESA requirements. TVA will also continue its current monitoring of populations of endangered and threatened species and its cave protection activities on TVA lands, and continue to maintain its Natural Heritage database and honor agreements to share this data with other state and federal resource agencies. TVA will also continue to comply with the CWA, state regulations, EO 13112 (Invasive Species), and other applicable federal and state regulations through its environmental review process.

5.8.1. Aquatic Animals

Alternative A — No Action Alternative
Under the No Action Alternative, TVA would continue the current stewardship activities designed to protect and enhance populations of protected, listed, or rare species and their habitats while providing recreational opportunities. As described in Section 4.7.1, no listed aquatic species are known to occur on lands that would be directly managed by TVA as part of the NRP. However, federally and state-listed species do occur throughout the TVA region. TVA's natural resource management programs currently incorporate a variety of stewardship programs benefiting rare species and meeting regulatory responsibilities for protecting listed species and their habitats on the lands and waters within the TVA region.

While short-term direct and indirect impacts may occur as a result of the implementation of specific projects under this alternative, any direct, indirect, or cumulative impacts to aquatic resources (including listed species) would be assessed, avoided, and/or minimized via existing regulatory mechanisms (particularly ESA and NEPA). It is anticipated that only beneficial long-term changes to aquatic resources including listed aquatic species from TVA's resource management activities would occur.

Adoption of this alternative would not result in direct, indirect, or cumulative adverse impacts to federally or state-listed aquatic species or their habitats.

Alternative B — Custodial Management Alternative
Stewardship activities described under the Custodial Management Alternative would benefit listed species and their habitats. Impacts to listed species differ little from those described in the No Action Alternative. Implementation of the Aquatic Ecology Management program in one healthy, high biological diversity watershed in the Tennessee River system would result in direct benefits to aquatic resources (including endangered and threatened species) within this watershed. Because one of the criteria for choosing the targeted watershed is the presence of federally listed species, adoption of Alternative B is likely to have more direct benefit to endangered and threatened aquatic animals than the No Action Alternative.

The transfer of day use areas located off dam reservations and stream access sites not currently managed under contractual agreements could potentially result in impacts to listed species near these resources if operation of these sites is transferred to external operators. TVA would inform future operators of potential conflicts with listed species and provide information on how to avoid impacts to these resources. Any potential direct, indirect, or cumulative impacts to aquatic resources would be assessed during planning of NRP implementation projects. As part of the planning process, these impacts would be avoided, and/or minimized via existing regulatory mechanisms (particularly NEPA and ESA). Adoption of the Custodial Management Alternative would have similar levels of regulatory compliance as the No Action Alternative. Adoption of this alternative would have no direct, indirect, or cumulative adverse impacts to federally or state-listed aquatic species or their habitats.

Alternative C — Flagship Management Alternative
Implementation of the proposed Flagship Management Alternative is expected to result in net positive improvements to water quality and aquatic life in the TVA region (including listed aquatic species). No long-term direct or indirect adverse impacts to aquatic habitats or communities are expected to result from this alternative. Implementation of endangered and threatened species monitoring and management activities and water quality

improvement programs at the highest proposed level of effort is expected to result in measurable improvements to water quality and aquatic habitats in the TVA region.

Implementation of the Aquatic Ecology Management program in three healthy, high biological diversity watersheds in the Tennessee River system would result in direct benefits to aquatic resources (including endangered and threatened species) within these systems. Because one of the criteria for choosing targeted watersheds is the presence of federally listed species, adoption of Alternative C is likely to directly benefit endangered and threatened aquatic animals. Because up to three watersheds would be addressed by this program, the benefits to endangered and threatened aquatic species would be greater than either the No Action Alternative, or Alternative B.

Due to the number of additional programs addressing endangered species management, conservation planning, and water quality and the level of effort proposed under the Flagship program alternatives, Alternative C would result in the most benefit to endangered and threatened aquatic animals.

Alternative D — Blended Management Alternative
Implementation of the Blended Management Alternative is expected to result in a positive effect listed aquatic species) in the TVA region. No long-term direct or indirect adverse impacts to aquatic habitats or communities are expected to result from this alternative.

Implementation of the Aquatic Ecology Management program in three healthy, high biological diversity watersheds in the Tennessee River system would result in direct benefits to endangered and threatened aquatic species within these systems. Because one of the criteria for choosing targeted watersheds is the presence of federally listed species, adoption of Alternative D is likely to directly benefit endangered and threatened aquatic animals. Several of the programs associated with endangered and threatened species monitoring, and water quality improvements would be implemented at a higher level of effort than identified in the No Action Alternative, or Alternative B. Adoption of Alternative D would result in fewer benefits to endangered and threatened aquatic species than Alternative C.

Relative Beneficial Impacts of the Alternatives
The relative beneficial impacts to listed aquatic species under the four alternatives are shown in Figure 5-9.

Figure 5-9. Relative Beneficial Impacts of the Alternatives on Listed Aquatic Species

5.8.2. Terrestrial Animals and Plants

Alternative A — No Action Alternative
Under the No Action Alternative, TVA would continue current stewardship activities designed to protect and enhance populations of endangered and threatened terrestrial

animals and plants and their habitats while providing recreational opportunities. TVA currently implements a variety of stewardship programs benefiting these species and meeting regulatory responsibilities for protecting them and their habitats. These programs mostly focus on federally listed species. Adoption of this alternative would not result in direct, indirect, or cumulative adverse impacts to federally listed species or their habitats. Adverse impacts to some state-listed species, particularly plants, could occur due to the likely continued spread of invasive species on TVA and adjacent lands. Reservoir lands planning would continue as it is currently implemented and most tracts containing listed terrestrial animals and plants, particularly federally listed species, would continue to be allocated to Sensitive Resource Management.

Alternative B — Custodial Management Alternative
Stewardship activities described under the Custodial Management Alternative would benefit listed species and their habitats. Impacts to federally listed species would differ little from those described in the No Action Alternative, and TVA would continue to allocate most tracts of TVA reservoir lands containing listed terrestrial animals and plants to Sensitive Resource Management. The increase in the area of invasive plant management efforts from 600 acres under Alternative A to 1,000 acres annually would be beneficial to listed plants and animals.

The transfer to other operators of day use areas located off dam reservations and stream access sites not currently managed under contractual agreements would potentially result in impacts to listed species near these areas. TVA would inform future operators of potential conflicts with listed species and provide information on how to avoid impacts to these resources.

Adoption of this alternative would have no direct or indirect adverse impacts to listed terrestrial animals and plants or their habitats. Adverse cumulative impacts could occur, particularly to state-listed species which receive a lower level of legal protection, from the continued development of other lands in the TVA region.

Alternative C — Flagship Management Alternative
Adoption of the Flagship Management Alternative would result in the highest level of beneficial impacts to endangered and threatened terrestrial animals and plants and their habitats. TVA would greatly increase its lands and natural area assessment and management activities, and increase its annual invasive plant management from 1,000 acres under Alternatives B and D to 40,000 acres. These activities would have a large direct beneficial effect on listed species and allow TVA to more rapidly identify and respond to threats to them, such as could result from encroachments, new invasive species introductions, and changes resulting from climate change. The change in reservoir lands planning methodology could result in a small decrease or increase in the area allocated to Sensitive Resource Management. Allocation of lands to this zone that contain sensitive resources, including endangered and threatened species, would continue to be a high priority during reservoir lands planning and any change in the area allocated would not likely result in a reduced level of protection for sensitive resources. Under Alternative C, TVA would increase its monitoring and management of listed species on TVA lands as well as its involvement in landscape-level conservation planning efforts over those of the other alternatives; these efforts would benefit many listed animals and plants.

Adoption of this alternative would have no direct or indirect adverse impacts to listed terrestrial animals and plants or their habitats. Adverse cumulative impacts could occur,

particularly to state-listed species which receive a lower level of legal protection, from the continued development of other lands in the TVA region.

Alternative D — Blended Management Alternative
Adoption of the Blended Management Alternative would result in a level of beneficial impacts somewhat greater than those resulting from Alternatives A and B, but noticeably less than those of Alternative C. The reservoir lands planning approach would be the same as Alternative C, with the same potential impacts to the amount of land allocated to Sensitive Resource Management. TVA's natural area management efforts, which would benefit several listed species, would increase over those of Alternatives A and B. Invasive plant control efforts would be similar to those under Alternative B.

Adoption of this alternative would have no direct or indirect adverse impacts to listed terrestrial animals and plants or their habitats. Adverse cumulative impacts could occur, particularly to state-listed species which receive a lower level of legal protection, from the continued development of other lands in the TVA region.

Relative Beneficial Impacts of the Alternatives
The relative beneficial impacts to listed terrestrial species under the four alternatives are shown in Figure 5-10.

Figure 5-10. Relative Beneficial Impacts of the Alternatives on Listed Terrestrial Species

5.9. Cultural Resources

The alternatives under consideration propose several programs designed to protect, preserve, enhance, and minimize adverse effects to historic properties located on TVA land. The level at which these programs would be implemented varies among the different alternatives. It is important to note that under each alternative except the No Action Alternative, planning for the management of cultural resources would be integrated with planning for other natural resource programs so that a balance may be achieved among potentially competing goals.

Consultation under Section 106 of the NHPA with the Advisory Council on Historic Preservation, the seven Valley SHPOs, 18 federally recognized Indian tribes, and other consulting parties on the effects that the NRP actions may have on historic properties is and would be ongoing. A programmatic agreement (PA) is being developed that addresses potential adverse effects and stipulates a process for phased compliance under Section 106 of the NHPA to identify and evaluate historic properties that may be impacted as a result of the alternatives proposed in this undertaking. In addition, the PA stipulates that TVA will prepare a Cultural Resource Management Plan within 3 years of the approval of the NRP in order to set specific long term cultural resource management goals for each of programs that are implemented under the NRP. This PA will be executed prior to the TVA Board's decision on the NRP.

Alternative A — No Action Alternative
Under the No Action Alternative**,** TVA would continue to manage its historic properties as it currently functions. Management is conducted pursuant to the relative laws and regulations discussed in Chapter 2. Resource management is conducted to meet the basic requirements of these laws and regulations with most stewardship conducted around responsibilities and mitigation related to NHPA Section 106 compliance for TVA-related projects. A notable exception is the employment of dedicated ARPA investigators to provide greater protection of archaeological resources from looting and vandalism as discussed below.

With the current state of deteriorating cultural resources under TVA management, this alternative would have the greatest overall negative impact on historic properties with the exception of the ARPA Program. TVA would continue to meet the minimum requirements of the relevant laws and regulations and would take measures to ensure compliance with those requirements not currently being met.

As part of TVA's ARPA Program, two police investigators are dedicated to ARPA violation enforcement. While not a requirement under ARPA or its associated regulations, TVA took this proactive approach to the extensive looting and vandalism problem. By having these investigators on staff, TVA has been able to better protect numerous sites and deter vandals and looters. TVA manages approximately 11,500 recorded archaeological sites, and many sites are vulnerable to both looting and erosion due to their location along TVA's reservoirs. As a result, many archaeological sites on TVA lands have been extensively damaged. The ARPA investigators have been invaluable in deterring looting and vandalism of historic properties on TVA reservoirs and their work has resulted in several convictions. Continuation of this program would be very beneficial to archaeological sites on TVA lands.

The looting problem must be combated with public outreach and education as well as with violation enforcement. While the investigators have succeeded in bringing forth numerous successful convictions, TVA has followed stakeholders' suggestions to improve its public outreach efforts to complement the enforcement of the law. TVA is currently posting ARPA signs at launching ramps and other access areas to inform the public of the need for protecting these resources. In addition, TVA participates in one or two public outreach events per year on a "by invitation" basis. Continuation of this format would not likely result in a significant increase in public appreciation and knowledge of the need for archaeological site protection.

TVA's current Preservation Program (pursuant to Section 110 of the NHPA) includes the survey and identification of archaeological sites on about 2,000-3,000 acres of TVA lands annually. This focus has been limited to archaeological sites and does not include historic structures located on or within the viewshed of TVA lands. Evaluation of historic properties has been conducted through NHPA Section 106 for TVA-related undertakings and therefore have not been proactively focused on the most significant resources. Nominations to the NRHP have been limited to efforts by universities and community groups. At the current survey rate, it would take TVA over 60 years to complete its inventory of archaeological resources. However, this effort would be greater than the proposed inventory effort in the custodial alternative, which would increase this time to nearly 200 years. With a lack of historic structures data or inventory management, TVA buildings and structures eligible for listing in the NRHP would likely continue to deteriorate.

Records of historic properties managed by TVA are maintained through various data sources and TVAs lacks a centralized database. This lack of consolidated data creates a challenge in developing a comprehensive NHPA Section 110 plan to complete the identification, evaluation, and nomination of historic properties owned by TVA. Continuation of the current form of data management would result in errors in the management of historic properties and may lead to inadvertent adverse effects to historic properties. Consolidated data on the resources under TVA management would continue to be a "best guess" making long-term management goals difficult and far less efficient than with a comprehensive database.

TVA currently conducts its monitoring and archaeological site protection, typically through shoreline stabilization and other means such as gating caves, under Section 106 mitigation agreements on TVA-related projects rather than through needs systematic assessments. Under the current archaeological site protection program, TVA has stabilized an average of 0.2 miles of shoreline per year, less than 0.01 percent of the estimated amount of critically eroding archaeological shoreline. Many sites in need of stabilization have not been protected. Where stabilization does occur, TVA takes the appropriate steps to ensure that the process of protection does not further impact the resource. Stabilization measures include the placement of rock riprap built out to an appropriate angle rather than shaping the bank. This requires additional costs, but ensures that no additional damage is done to the already deteriorated resource.

TVA has recently begun evaluating historic buildings associated with the Muscle Shoals Reservation for potential adaptive reuse. This type of study is consistent with EO 13287 (Preserve America). As an asset manager of historic properties owned by the federal government, TVA is responsible for recognizing and managing historic properties in its ownership as assets that can support the Agency mission while contributing to the vitality and economic well-being of the public. However, other buildings that are potentially eligible for the NRHP and not needed for the Agency's mission have been neglected resulting in an adverse effect.

Pursuant to the stipulations of EO 13287, TVA submitted the required initial report on its NHPA Section 110 Program in 2004. Progress reports on its NHPA Section 110 improvements were not submitted in 2005 and 2008. TVA would meet the EO's requirement in the future regardless of which NRP alternative is chosen.

TVA would continue to review all projects and activities with a potential to affect historic properties. This review would be conducted pursuant to Section 106 of the NHPA and other relevant laws and regulations as well as through the stipulations defined in the PA being developed for this undertaking. Activities defined in the Action Alternatives include a process for greater integration with the management of other resources and their associated activities. Selection of Alternative A would mean this integrative approach would not likely occur.

Alternative B — Custodial Management Alternative

Under the Custodial Management Alternative, TVA would establish programs to heighten adherence to the basic stewardship requirements of all historic preservation laws, regulations, and EOs. Existing programs that would be improved include the NHPA Section 106 compliance and the Preservation Program. Additional programs would be established to ensure that each requirement is met. Proposed programs include public outreach, archaeological site monitoring and protection, and the Preserve America Program.

Overall, the adverse effects under Alternative B would be fewer than under Alternative A as more programs would be implemented to benefit the resources. With the exception of the reduced acreage surveyed annually for archaeological sites, the Preservation Program would improve under this alternative. With additional programs for the identification of historic structures and buildings as well as a plan for the evaluation and nomination of historic properties to the NRHP, TVA would be in line with all of the goals and responsibilities of Section 110 of the NHPA. With the development of a comprehensive database, TVA would improve its overall management of historic properties through improved efficiency and knowledge base.

The two TVA Police staff positions dedicated to ARPA enforcement would continue with approximately 1,000 security checks per year. While this effort continues to be minimal (11% of the overall sites recorded on the land), it is beneficial to maintain the dedicated investigators to build relationships with the U.S. Attorneys and other federal agencies with the same responsibilities. Funding would be included for archaeological support to assist in these cases, as well.

Although TVA nominally has a program to promote archaeological site protection (Thousand Eyes), this program has been limited in its efforts and has mainly functioned by invitation or has been opportunistically approached through appropriate NHPA Section 106 undertakings where archaeological resources are at risk of damage from looting.

By establishing a formal program with an annual budget, TVA would proactively plan activities each year to meet the needs of the resource. Public outreach would be focused in areas of greatest need, and programs would include public presentations, academic speakers, school programs, grants, and partnerships with universities and other interested groups to promote archaeological site protection awareness. In addition, TVA would partner in report publications and add interpretive signs at local historic sites through cooperative efforts with community groups.

Site looting is a significant problem on TVA lands, and this alternative would ensure that TVA is taking appropriate steps to share archaeological information with the public to build a greater appreciation for the need to protect these sensitive resources. In order to make a difference in public outreach, TVA would be proactive in these efforts and reach out to those communities with the greatest need. Public education offers the greatest long-term effects to the resources by providing the public with a greater understanding of the need for protection in order to reduce the on-going looting problem. This alternative would support these efforts.

Under Alternative B, TVA would enhance its Preservation Program by including additional activities. Those activities that would be included under this alternative are:

- Identification of Archaeological Sites – Under this alternative, there would be a reduction in the focus for the identification of archaeological sites. This reduced focus would delay TVA from systematically completing surveys regarding NHPA Section 110 inventory. This delay would push the completion of this inventory out to over 200 years vs. the 60 year plan currently being conducted. However, as the focus for archaeological identification is decreased, increased opportunities are available for other activities within the Preservation Program.
- Identification and Management of Historic Buildings and Structures – TVA would develop a plan for the identification, evaluation, and nomination of historic buildings

and structures on TVA lands to the NRHP. Under this alternative, historic structures on TVA lands would be enhanced through preservation and protection, reversing the deterioration rate of these resources. This alternative would be responsive to the public's expressed concern for TVA's cultural and historic resources. It would directly address preferences for more protection, maintenance, and greater access of these resources for public use and enjoyment.

- Evaluate and Nominate Sites to the NRHP – Pursuant to Section 110 of the NHPA, federal agencies are responsible for the identification, evaluation, and nomination to the NRHP. TVA identifies additional historic properties each year; however, evaluation and nomination of significant sites have not occurred. TVA proposes to develop goals for the evaluation and nomination of significant historic properties under its management which would reduce the risk of adverse effects to these properties as well as improve stakeholder relations with those groups concerned with the preservation of historic properties.
- Develop an Implementation Procedure – In order to improve the Preservation Program and facilitate a more efficient process for compliance with preservation laws, TVA would develop procedures for compliance processes required under these laws. By having a defined set of procedures, TVA would improve consistency in its management and compliance procedures.
- Comprehensive Database – Pursuant to Section 112 of the NHPA, federal agencies shall ensure that records and other data are permanently maintained in appropriate databases. TVA maintains numerous data sources relating to historic properties under its management. However, because no comprehensive database has ever been developed, these sources are fragmentary. As a result, TVA does not have consolidated data on the locations of its previous surveys, site location information, and other important data for the resources under its management. Development of a database would improve efficiency and the overall management of TVA's historic properties. A consolidated database would also provide long-term savings of time and money.

The inclusion of these activities in the Preservation Program would be beneficial in the long term as they would improve TVA's information base of historic properties. By doing so, it would improve the incorporation of cultural resources management in early project planning and reduce potential future mitigation costs.

Under this alternative, TVA would establish a database to monitor and manage ongoing mitigation measures to ensure compliance with NHPA Section 106 agreements and NEPA documents. This database would be very beneficial with the number of compliance agreement documents that are executed by TVA each year. By establishing a database system that would track these commitments and stipulations, TVA would ensure adherence to these agreements.

TVA would establish a program for archaeological site monitoring and protection. TVA would focus efforts on those areas with the greatest need (i.e., areas where our most significant archaeological sites are located and where threat of damage to these resources is the greatest). As a part of the cultural resource management plan specified in the PA being developed for the NRP, TVA would develop long term monitoring goals for approximately 150 shoreline miles per year and protect a specific number of sites from erosion and looting. The plan would help prioritize the resources in need of protection and

would be a great benefit to the resource. While limited in effort, it would demonstrate TVA's good faith effort to protect archaeological resources.

Under this alternative, TVA would complete an assessment of its NHPA Section 110 needs and prepare a report every three years on its improvement progress. This assessment is beneficial to the Agency because it meets the requirements under EO 13287 and allows the Agency to set long-term goals on its NHPA Section 110 responsibilities.

Many new natural resource programs proposed for Alternative B have a potential to adversely affect historic properties. Specifically, any activity which causes ground disturbance or alters the viewshed or other ambiance of a historic property has the potential to have an adverse effect. Those activities will be described in Appendix B of the PA being developed for the NRP. TVA would continue to review all projects and activities with a potential to affect historic properties. This review would be conducted pursuant to Section 106 of the NHPA and other relevant laws and regulations as well as through the stipulations defined in the PA for this undertaking.

Numerous programs are proposed that would encourage proactive management of TVA lands. Included in these activities is a more integrated approach to resource management where cultural resources would be considered in initial NRP project planning. Integration of these programs would be beneficial for cultural resources as well.

Alternative C — Flagship Management Alternative
Under the Flagship Management Alternative, TVA would initiate numerous programs that would focus on an increased effort toward stewardship of its resources. Of the different alternatives, this option would have the most beneficial effect to cultural resources. Some of the enhanced programs would include ARPA, public outreach, NHPA Section 106 compliance, historic preservation, archaeological site monitoring and protection, corporate history, tribal consultation, and Preserve America.

Overall, Alternative C would be the most beneficial for cultural resources managed by TVA. Cultural resources would be managed proactively to reduce adverse effects and promote the protection and preservation of resources in a manner that benefits the public. This option would result in the greatest improvement in the current state of cultural resources on TVA land.

Under Alternative C, TVA would expand its ARPA Program to include more resources for greater coverage across the Valley. Given TVA's high density of archaeological sites that are vulnerable to looting, ARPA enforcement is key to reducing this significant adverse effect to archaeological resources. This would be a great benefit to the archaeological resources and would improve our relationships with stakeholders, such as federally recognized Indian tribes, SHPOs, and other preservation groups that have an identified interest in these resources. This program would have a long-term beneficial effect on archaeological resources, as it would help reduce looting on TVA lands.

TVA would initiate a very progressive public outreach program that would include outreach events, and numerous partnerships, interactive Web sites, assistance in programs for school systems in the Valley, and the establishment of a formal site monitoring program. Coupled with an aggressive ARPA investigation program, the outreach program would ensure that TVA is reaching the largest audience possible on the need for archaeological site protection. The need for such outreach is great in the Valley, and expansion of this

program would be highly beneficial. Of all the management activities conducted by the Agency for archaeological resources, public outreach has the greatest long-term effects to making sure these resources are protected for future generations.

In addition, TVA would establish an environmental education program to include all biological and cultural resources managed by the Agency. This would allow for an integrated approach to sharing resources with the public while promoting the protection of those sensitive resources that are being affected on TVA lands. The outreach program would be expanded beyond archaeological resources and include public awareness of all historic properties (such as historic structures) and the need to protect and preserve them. This integrated approach would be highly beneficial to the historic properties under TVA's management.

In combination with the Preserve America Program, TVA would identify properties that are important to its heritage and provide public access to these areas. This would include providing information kiosks, self- or TVA-guided tours, or other methods to provide relevant information of the historic property. If the public were able to participate more in the protection and preservation of these resources, there would be a greater appreciation of the resources as well as the heritage associated with them.

TVA's NHPA Section 106 compliance would be detailed through the development of emergency procedures. Federal agencies are encouraged to develop procedures for taking historic properties into account during operations that respond to a disaster or emergency declared by the President, a tribal government, or the governor of a state or during situations that respond to other immediate threats to life or property. In addition, the program would benefit from the development and execution of PAs for compliance on requests for routine or repetitive actions. These agreements would streamline small projects that have no effects to historic properties and potentially reduce the number of recurring reviews conducted by TVA.

Alternative C includes a number of activities that would further expand TVA's Preservation Program. Additional resources would be available to increase the amount of surveys conducted each year to identify historic properties on TVA lands, as well as to evaluate and nominate sites to the NRHP and seek partners to identify traditional cultural places. By having a better knowledge base of the historic properties located on its lands, TVA would be able to more effectively manage these resources for the benefit of both the resource and the public.

A plan would be developed to identify historic cemeteries on TVA lands, as well as to provide a Web-based interactive cemetery database. These tools would be very beneficial because TVA receives numerous requests each year for this information.

The long-term effects of this program would be the increased efficiency and knowledge base of the resources under TVA's management. TVA would complete its Section 110 obligations under NHPA more quickly and be able to have more historic property information to incorporate into early project planning. This could reduce future compliance costs associated with NHPA Section 106 and result in fewer adverse effects on historic properties.

Under this alternative, TVA would expand its program to monitor and protect sensitive archaeological sites. With a larger program in place to assess these sites and identify

those that are in critical need for protection, fewer sites would be adversely affected each year due to erosion and looting. This would be highly beneficial to the archaeological resources under TVA's management. Since this activity has the greatest immediate effect on archaeological sites being adversely affected, the long-term effects of this program would be highly beneficial. Archaeological sites are being threatened on a daily basis from erosion and looting; the greater effort to save these resources each year would ensure that a greater number of them would be preserved for future generations.

TVA would establish a TVA History and Archaeology Museum showcasing TVA's significance on a regional, national, and international level. This museum would provide a location for improved curation and interpretation of TVA's historic collection. The creation of a museum would also be an excellent opportunity to develop partnerships with retirees, local communities, universities, federally recognized tribes, and with other stakeholders.

Consultation with federally recognized Indian tribes would be improved by having workshops more frequently with tribal representatives to talk about ways to improve management of those resources considered of religious or cultural importance. More frequent workshops would improve TVA's consultative relationship with Indian tribes and consequently would improve the Section 106 compliance process.

In addition to improving the Agency's NHPA Section 110 Program, TVA would seek partners to promote heritage tourism with communities and local governments. By seeking partners for heritage tourism, TVA would be supporting its mission to promote economic development by using historic properties in ways that benefit both the resource and the public. In general, this would assure that such properties are attended rather than neglected and would enhance the public's appreciation of such resources.

TVA proposes to develop a program to support publications pertaining to cultural resources in the Valley. Specifically, these publications would address both academic and nonacademic audiences and include topics on historic properties in the Valley. These publications would support TVA's public outreach programs in promoting the need for protection of sensitive resources. TVA participated in the publication of scientific reports many decades ago. These publications continue to be valued by the professional archaeological community today. Preservation laws were passed because Congress recognized these resources as being important to the American people. As such, TVA would share the importance of these resources with the public.

TVA would also participate in partnerships for the training of future archaeologists by providing locations or funding for archaeological field schools. These would be conducted when beneficial to TVA and would help enhance relationships with regional professional archaeologists and expand TVA's knowledge base of its own resources. Whereas field schools in the past have primarily focused on data recovery, new technology has made nondestructive data gathering possible through techniques such as geophysical testing (i.e., ground-penetrating radar, proton magnetometers). Data recovery field schools may be considered when sites are being adversely affected and other methods of protection or mitigation are not feasible. These partnership efforts would improve relationships with academic archaeologists and federally recognized tribes as well as with the public.

Under this alternative, other biological resource, recreation, and water resource management activities would be enhanced above other alternatives, and reservoir lands planning would create a CVLP. However, these activities have a potential to adversely

affect historic properties as described under Alternative B. TVA would continue to review all projects and activities with a potential to affect historic properties. This review would be conducted pursuant to Section 106 of the NHPA and other relevant laws and regulations as well as through the stipulations defined in the being developed for this undertaking.

Alternative C includes a number of integrated land management activities that would be highly beneficial to biological and cultural resources on TVA land. In particular, a larger human presence on TVA lands would support improved land conditions. Annual monitoring would allow TVA to develop long-term goals and identify problems before they arise rather than later.

Alternative D — Blended Management Alternative
Under this alternative, TVA would establish programs to meet the basic stewardship requirements of all historic preservation laws, regulations, and EOs. All cultural resource programs established in the custodial option would be included in this alternative. In addition, those programs that are considered essential stewardship functions for cultural resource management would be enhanced. Each of these programs is intended to avoid or reduce adverse effects on historic properties, whether by Agency action, neglect, or natural forces.

Overall, Alternative D would result in fewer adverse effects than Alternatives A and B and would provide greater benefit to those resources that are at greatest risk. This alternative would include the ARPA investigation program outlined in the Alternatives A and B. ARPA investigations curb adverse effects to archaeological sites resulting from illegal acts on TVA lands. Programs that would be enhanced under this alternative are the Archaeological Site Monitoring and Protection Program, Preservation Program, Corporate History Program, and the Archaeological Outreach Program. Other programs would be considered if resources become available.

As in Alternative B, TVA would have a formal Archaeological Outreach Program focusing on those geographic areas with the greatest need. More outreach activities including public presentations, school programs, and grants are beneficial to historic resources by raising the public's awareness of their importance.

Because of the significant looting problem on TVA lands, implementing this alternative would be more beneficial than Alternatives A and B. More events and partnerships enhance the public's appreciation for the need to protect these sensitive resources more rapidly.

Under this alternative, TVA would enhance its Preservation Program from the activities outlined in Alternative B. Those activities that would be enhanced in this alternative beyond the custodial level include the following:

- Identification of Archaeological Sites – The more rapidly TVA lands are inventoried for archaeological resources, the lower the risk of adverse effect. Under this alternative, the inventory would be completed three times.
- Evaluate and Nominate Sites to the NRHP –TVA would evaluate and nominate up to twice as many sites under this alternative as under the Custodial Management Alternative. TVA would evaluate and nominate twice as many sites under this alternative. The greater the effort to evaluate the significance of resources, the

greater the benefit is to those significant resources because protection and preservation efforts can be more focused on those significant resources.

In regards to NHPA Section 106 Compliance, the effects of this alternative would be the same as Alternative B.

The activities under the archaeological site monitoring and protection program provide the most immediate benefit toward the goal of preserving these significant resources. This alternative would include an enhanced archaeological site monitoring and protection program. In addition, the number of archaeological sites monitored and protected each year would double. By focusing efforts on those locations and resources with the greatest need, the benefits to those resources would be accomplished most efficiently.

With the establishment of a formal Corporate History Program, TVA would be able to actively promote awareness of its unique history through development of a Web site and public outreach programs on TVA history. Providing such information to the public raises the appreciation of TVA's role in the historical development of the Valley and of those historic resources associated with that development.

These efforts to promote TVA's history could provide an educational opportunity for the public and lead to a better understanding of TVA's past accomplishments and its future role in the history of the region and the nation. The oral history program would ensure that information is collected and retained that could otherwise be lost as older generations pass.

In regards to the preserve America program, the effects of this alternative would be the same as Alternative B. In regards to the ARPA Enforcement Program, the effects of this alternative would be the same as Alternative A.

Under this alternative, other biological resource, recreation, and water resource management activities would be enhanced above Alternative B, and reservoir lands planning would create a CVLP. However, these activities have a potential to adversely affect historic properties as described under Alternative B. TVA would continue to review all projects and activities with a potential to affect historic properties. This review would be conducted pursuant to Section 106 of the NHPA and other relevant laws and regulations as well as through the stipulations defined in the PA being developed for this undertaking.

As with Alternative B, this alternative proposes a more integrated approach to resource management. By interdisciplinary planning of resource management, it is anticipated that adverse effects on all types of resources would be minimized.

Relative Beneficial Impacts of the Alternatives
The relative beneficial impacts to cultural resources under the four alternatives are shown in Figure 5-11.

Figure 5-11. Relative Beneficial Impacts of the Alternatives on Cultural Resources

5.10. Land Use

Alternative A — No Action Alternative
Under the No Action Alternative activities currently associated with the management of TVA lands would not change. TVA would continue to plan its reservoir properties on an individual basis, and both the land use plans and subsequent implementing actions that result in changes in the use of particular tracts of land would be reviewed in accordance with TVA guidelines and policies and for compatibility with surrounding land uses. The most likely changes in the use of TVA lands would result from industrial development of Zone 5 lands and recreational development of Zone 6 lands. While the area allocated to Zone 5 is unlikely to increase, the future demand for developed recreation could result in an increase in the area allocated to Zone 6. These developments could result in adverse impacts to land use.

Alternative B — Custodial Management Alternative
The impacts to land use resulting from Alternative B would be somewhat greater than those of Alternative A. The differences result from the broadened definition of land use Zone 5 - Industrial that removes the light manufacturing restriction (see Section 3.2.2.4). While the impacts to land use resulting from the development of land allocated to Zone 5 - Industrial Development could increase, the total land area allocated to Zone 5 is unlikely to increase. The increased historic preservation efforts could also result in small beneficial impacts on land use.

Alternatives C — Flagship Management Alternative and D - Blended Management Alternative
These alternatives would have similar impacts to land use, although the impacts of Alternative D would likely be slightly greater than those of Alternative C. Under both alternatives, the same change in the land use Zone 5 definition described above for Alternative B would occur, resulting in the potential for industrial developments with greater land use impacts. The land area allocated to Zone 5 would not increase and could decrease, resulting in reduced land use impacts from industrial development. The land area allocated to Zone 6 - Developed Recreation would likely increase resulting in a reduction of land allocated to Zone 4 - Natural Resource Conservation with adverse impacts to the vegetation, wildlife, and the dispersed recreation use of these lands. Conversion of undeveloped area to developed recreation could adversely affect nearby land uses; these effects would be localized and TVA would assess them during the lands planning process and review of individual recreation developments. Many of the other programs and activities proposed under Alternatives C and D would reduce the impacts from current land uses.

Under all of the alternatives, residential and commercial development of privately owned lands adjacent to the TVA reservoirs would continue, as would the development of the TVA-managed residential access shorelands. As described in the SMI EIS (TVA 1996), this could result in adverse cumulative impacts to land use at some reservoirs.

Relative Beneficial Impacts of the Alternatives
The relative beneficial impacts to land use under the four alternatives are shown in Figure 5-12.

Figure 5-12. Relative Beneficial Impacts of the Alternatives on Land Use

5.11. Prime Farmland

Effects to prime and unique farmlands can occur when actual or designated land uses are changed to other uses or designations, such as industrial or recreational development, which preclude the property from being used for agricultural purposes. Generally, prime farmland on properties located in zones for sensitive resource management and natural resource conservation is not subject to adverse impacts because those properties would be retained in a relatively "natural" state and not be converted to other land uses, preserving any prime farmland. However, prime farmland on tracts allocated to other zoning designations is subject to potential adverse effects because land in these zones would be devoted to nonagricultural uses, such as industrial development, developed recreation, and water access. The largest change in zoning designation would likely be from Zone 4 - Natural Resource Management, which is generally compatible with prime farmland protection, to Zone 6 - Developed Recreation. Depending on the characteristics of the individual tracts being rezoned, the eventual recreational development could adversely affect prime farmland.

Under all of the alternatives, proposed actions that could affect prime farmland would be reviewed according to FPPA procedures, including the 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. For sites receiving scores greater than 160 points (out of a possible 260), TVA would consider alternative locations or other modifications to the proposed action in order to reduce or avoid impacts to prime farmland.

Alternative A — No Action Alternative

Under Alternative A, minor adverse impacts are expected as lands are converted to uses incompatible with agriculture. Positive impacts to prime and unique farmlands under this alternative are related primarily to the biological and cultural resources management programs. Shoreline stabilization activities not only protect archaeological and historic sites but indirectly may include prime farmland in some areas. More importantly, TVA manages approximately 5,600 acres of agricultural/open lands through the existing licensing program. These revocable licenses, which allow for the production of hay/forage or row crops, directly enhance soil quality and contribute to the success of local farm services. Included in these 5,600 acres are prime farmlands within TVA's dewatering projects on Kentucky and Wheeler reservoirs. These dewatered lands are some of the most productive agricultural lands in their respective regions.

Alternative B — Custodial Management Alternative

Under Alternative B, TVA would continue all current activities in order to meet the minimum requirements of the laws, regulations, and EOs related to the management and protection

of resources. Although the definition of reservoir land planning Zone 5 (Industrial) would be broadened, this is unlikely to increase potential impacts to prime farmland because the land area allocated to Zone 5 is unlikely to increase. Positive impacts to prime and unique farmlands under this alternative are related primarily to enhanced dewatering activities, continued forest management, invasive plant control, and increased public awareness of the importance of environmental stewardship.

Alternative C — Flagship Management Alternative
Under Alternative C, overall adverse impacts to prime farmland are expected to be minimal. TVA would not only continue all current activities in order to meet the minimum requirements of the laws, regulations, and EOs related to the management and protection of resources but would implement new strategies for enhancing stewardship programs. With an additional focus on enhancing recreational facilities, some minor adverse impacts are expected as lands are converted to uses incompatible with agriculture. As with Alternative B, the change in the definition of reservoir land planning Zone 5 (Industrial) is unlikely to increase potential impacts to prime farmland because the land area allocated to Zone 5 is unlikely to increase. The likely increase in Zone 6 - Developed Recreation land could affect prime farmland.

Positive impacts to prime and unique farmlands under this alternative would be related to both existing and new programs and activities:

- The continuation of TVA's agricultural/open lands licensing program would protect and enhance prime farmland, as well as supply support to existing local agricultural services.
- Since prime farmland can be forested, the proposed focus on forest management under this alternative can be beneficial to soil resources through protection and vegetation management (i.e., invasive plants).
- The terrestrial carbon sequestration initiative would promote long-term commitment to soil improvement and prime farmland preservation. Since lands would be prioritized according to their sequestration potential, prime farmland would receive added attention and protection.
- Indirect support to prime farmland may be provided by an increased focus on stewardship assets through the use of the land stewardship assessment tool and habitat enhancement partnerships.
- Under the EE Program, TVA would communicate to various audiences the successful techniques and methodologies for sound natural resource management. Protection of soil resources (whether on public or private land) has been a focus of TVA since its establishment.

Cumulative impacts under this alternative would likely be long term and beneficial.

Alternative D — Blended Management Alternative
Under Alternative D, TVA would continue to meet the minimum requirements of laws, regulations, and EOs relating to the management and protection of prime farmland resources. TVA's agricultural/open lands licensing program not only protects and enhances prime farmland, but it supports local and regional agricultural services. TVA's licensed property may also serve as corridors to adjacent farmland (under private ownership), and any discontinuances may result in fragmentation of existing farm units.

Positive impacts to prime and unique farmlands under this alternative would be related to existing programs and new directives:

- Indirect support to prime farmland may be provided by an increased focus on stewardship assets through the use of the land stewardship assessment tool and enhancement partnerships.
- Under the EE Program, TVA would communicate to various audiences the successful techniques and methodologies for sound natural resource management. Protection of soil resources (whether on public or private lands) has been a focus of TVA since its establishment.
- Since prime farmland can include forests, the proposed focus on forest management under this alternative can be beneficial to soil resources through protection and vegetation management.

Under this alternative, cumulative impacts would be similar to those described under Alternative C.

Relative Beneficial Impacts of the Alternatives
The relative beneficial impacts to prime farmlands under the four alternatives are shown in Figure 5-13.

Figure 5-13. Relative Beneficial Impacts of the Alternatives on Prime Farmlands

5.12. Visual Resources

Although the NRP alternatives do not include programs specifically designed to improve the scenic quality of TVA lands and adjacent areas, the implementation of many programs would affect scenic quality. Under all alternatives, TVA would manage its lands under one or more of the following objectives to address the public's concerns for scenic quality. These objectives are keyed to the values set forth for scenic value class and sensitivity levels (see Section 4.11). Except for preservation, each describes a different degree of acceptable alteration of the landscape based upon the importance of aesthetics. The degree of alteration is measured in terms of visual contrast with the surrounding natural landscape.

- Preservation – This objective allows low visual-impact activities. Low-impact recreational activities are generally prohibited. This objective applies to areas that have not been disturbed by human alteration.
- Retention – Under this objective, activities may only repeat form, line, color, and texture. This would include some low-impact forest activities such as select tree removal or reforestation.
- Partial Retention – Management activities under this objective would be visually subordinate to the characteristic landscape. Activities must repeat form, line, color, and texture, but changes of size, amount, intensity, and other factors would remain subordinate.

- Modification – Under this objective, proposed activities may visually dominate the original landscape character. Activities that would alter the landscape would borrow from naturally established form, line, color, or texture at a scale that would complement the surrounding area.
- Maximum Modification – Management activities of vegetative and landform alterations may dominate the landscape under this objective. However, when viewed from background distances, the visual characteristics would be similar to those that are naturally occurring in the area. When viewed in the middleground and foreground distances, they may not appear to borrow completely from existing form, line, color, or texture. Alterations may also be out of scale or not consistent with natural occurrences.

Two additional short-term management goals may be required. The first is used to upgrade landscapes containing visual impacts that do not meet the quality objectives set for a given area. The second is for landscapes that are more natural appearing. These are:

- Rehabilitation – A short-term management objective used to restore landscapes that have undesirable characteristics. This may include a number of measures: alterations to terrain, vegetation, or removal or concealment of structures.
- Enhancement – A management alternative used to achieve visual variety where little now exists. This option could be achieved through addition, subtraction, or alteration to vegetation or other physical features such as variety, form, color, texture, or patterns.

Under all alternatives, TVA would continue to evaluate visual resources on a case-by-case basis and during the development of reservoir land management plans. The protection of lands with outstanding visual quality would continue to be a criterion for allocating them to Zone 3 - Sensitive Resource Conservation. The gradual change in the appearance of reservoir shorelines due to residential and commercial development of private lands and residential development of TVA-managed residential access shoreland would also continue under all alternatives.

Alternative A — No Action Alternative
Under this alternative, TVA would continue to evaluate visual resources on a case-by-case basis and during the development of reservoir land management plans. This would include TVA lands possibly being subjected to various forms of development. A slow, but noticeable, decline in scenic resources, aesthetic quality, and visual landscape character would be expected as development demands continue to increase.

This and the other alternatives would likely result in the continued preservation of specific scenic areas through the reservoir lands planning process. A gradual loss of natural undisturbed areas would continue on some other lands. The cumulative effects of this alternative could reduce the scenic attractiveness of TVA lands over time, resulting in a negative impact on the visual landscape character and aesthetic sense of place.

Alternative B — Custodial Management Alternative
As with Alternative A, TVA would continue to evaluate visual resources on a case-by-case basis and during the development of reservoir land management plans. This would include TVA lands possibly being subjected to various forms of development. A slow, but noticeable, decline in scenic resources, aesthetic quality, and visual landscape character would be expected as development demands continue to increase.

Compared to Alternative A, Alternative B includes more programs that would result in localized improvements in the scenic quality of TVA lands. These include increased wildlife habitat enhancement partnerships, prioritized boundary maintenance, increased land condition assessment and maintenance activities, and increased efforts to repair heavily impacted dispersed recreation sites. The localized improvements in scenic quality, however, would likely not offset the continued decline in visual quality resulting from residential and commercial development and cumulative adverse impacts to visual resources would likely continue.

Alternative C — Flagship Management Alternative
The cumulative adverse impacts to visual resources resulting from residential and commercial development would likely continue. This alternative, however, would result in the implementation of the most programs and activities that would result in localized improvements in the scenic quality of TVA lands. These would include the implementation of the programs listed above for Alternative B at greatly increased levels, as well as increased upgrades to recreation facilities and increased shoreline stabilization. The various increased monitoring and assessment efforts would also allow TVA to respond more quickly to issues that degrade visual resources. As a result of these programs, Alternative C would result in the greatest beneficial impacts to visual resources.

Alternative D — Blended Management Alternative
Alternative D includes most of the programs included in Alternative C that would result in localized improvement in the scenic quality of TVA lands, but at lower levels of implementation. The beneficial impacts of this Alternative D would be greater that those of Alternatives A and B, but less than those of Alternative C. The cumulative adverse impacts to visual resources resulting from residential and commercial development would likely continue.

Relative Beneficial Impacts of the Alternatives
The relative beneficial impacts to visual resources under the four alternatives are shown in Figure 5-14.

Figure 5-14. Relative Beneficial Impacts of the Alternatives on Visual Resources

5.13. Floodplains

Under any of the alternatives, TVA would apply criteria contained in EO 11988 (Floodplain Management) during its review of all projects. EO 11988 directs federal agencies to use their authority to avoid (to the extent possible).

- Long-term and short-term adverse impacts associated with the occupancy and modification of floodplains.
- Direct and/or indirect support of floodplain development wherever there is a practicable alternative.

For activities involving TVA lands, a floodplain review is conducted to ensure that the proposed activity is consistent with EO 11988 and TVA's flood damage reduction objectives. Regardless of the alternative implemented, compliance with EO 11988 should limit increases in flood damage associated with new development and ensure that the reservoir system can be operated for flood-control benefits. Under EO 11988, actions with no practicable alternative can proceed provided adverse impacts are minimized. Adverse impacts to facilities would be minimized by designing and constructing these facilities to withstand flooding with minimum damage and by using the least amount of fill possible to complete the project. However, some types of shoreland development would negatively impact natural and beneficial floodplain values (i.e., water quality, wildlife and plant resources, cultural resources). The amount of shoreland made available for development would directly relate to the amount of potential impacts to natural and beneficial floodplain values. TVA would continue to require BMPs and other measures such as those described in the SMI EIS (1996) to minimize these impacts.

Without the implementation of appropriate BMPs, some shoreline/shoreland development could also result in increased sedimentation in the reservoirs, resulting in a loss of reservoir flood control and/or power storage capacity. One source of sediment would be from erosion occurring during construction. In many instances, however, sedimentation would be deposited in the reservoir below the lower limits of flood control and power storage. Therefore, the potential loss of flood control and power storage should be negligible under any of the alternatives.

Relative Beneficial Impacts of the Alternatives
The relative beneficial impacts to floodplains under the four alternatives are shown in Figure 5-15.

Figure 5-15. Relative Beneficial Impacts of the Alternatives on Floodplains

5.14. Socioeconomics and Environmental Justice

5.14.1. Socioeconomics

Alternative A — No Action Alternative
Under the No Action Alternative, current programs would continue to be implemented, and therefore, there would be no new impacts. However, there likely would be missed opportunities to improve quality and availability of recreation opportunities, to improve the stewardship of natural and water resources, and to increase overall benefits of the reservoir lands. Access to, and quality of, recreational experiences would suffer due to failure to keep pace with increases in population and recreational needs and expectations. This could result in slower growth in recreation expenditures, employment, and tax revenues that would otherwise occur. The overall adverse socioeconomic impacts on a regional basis, however, would be very small.

Alternative B — Custodial Management Alternative
Under this alternative, legal and policy requirements would be met. However, some existing programs would be discontinued, and there would be no additional projects to elevate TVA's stewardship programs. Reservoir lands planning would continue similar to current practice. The change in the Zone 5 land use definition could change the socioeconomic effects of the resulting industrial developments. Whether this would result in increased or decreased employment, personal income, and tax revenues is difficult to predict without knowing more details about the particular industries. Under this alternative, many recreation areas would be managed by third parties or closed. Third party management could result in user fees and thus increased costs to recreation users. Closure of areas would reduce recreation opportunities and cause recreation users to travel farther to alternative areas. Generally, this alternative is likely to have small localized negative socioeconomic impacts. Lost opportunities and, therefore, cumulative impacts likely would be similar to those of the No Action Alternative, although somewhat greater.

Alternative C — Flagship Management Alternative
This alternative includes positive changes to a variety of programs, including cultural resources, historic preservation, trails and dispersed recreation, land and natural heritage stewardship, wetlands, wildlife, and water resources. These programs would result in the greatest increase in the quality of visitors' experience on TVA lands and result in positive socioeconomic impacts. New lands planning strategies and ranges in land use zone allocations would be implemented, which could lead to significant changes that generate greater total benefits from TVA lands. While the potential increase in land zoned for developed recreation would directly result in socioeconomic effects, the resulting development of this land would result in local increases in employment, expenditures, and tax revenues. The change in the Zone 5 land use definition could change the socioeconomic effects of the resulting industrial developments. Whether this would result in increased or decreased employment, personal income, and tax revenues is difficult to predict without knowing more details about the particular industries.

Lost opportunities likely would be somewhat fewer than those of the No Action and Custodial Management alternatives since some programs would undergo positive changes. On the other hand, the increased pressure on available resources as population grows, could result in some cumulative impacts. However, adverse cumulative impacts would be least under this alternative.

Alternative D — Blended Management Alternative
At a minimum, this alternative would maintain the programs of the Custodial Management Alternative and would increase the emphasis on some programs. Therefore, some of the impacts would be similar to those of that alternative but likely would be somewhat better overall. Therefore, the socioeconomic impacts would be positive and similar to or slightly better than those of the Custodial Management Alternative but smaller than those of the Flagship Management Alternative. Over the longer term, if other programs are implemented, positive impacts would be greater but likely would still be smaller than those of the Flagship Management Alternative. The change in the Zone 5 land use definition could change the socioeconomic effects of the resulting industrial developments. Whether this would result in increased or decreased employment, personal income, and tax revenues is difficult to predict without knowing more details about the particular industries.

Relative Beneficial Impacts of the Alternatives
Overall, the Flagship Management Alternative would have the greatest positive impacts on the social and economic environment of the TVA region. Positive impacts would be next greatest under Alternative D. The Custodial Management Alternative would likely have the smallest positive impacts, at least somewhat smaller than those of the No Action Alternative.

The relative beneficial impacts to socioeconomics under the four alternatives are shown in Figure 5-16.

Figure 5-16. Relative Beneficial Impacts of the Alternatives on Socioeconomics

5.14.2. Environmental Justice

Alternative A — No Action Alternative
As discussed above in 5.13.1, access to and quality of recreational experiences on TVA sites would suffer over time. These negative impacts are likely to be greater for low-income populations because their ability to access and utilize alternatives would be less than for other users (see Section 5.1). Cumulative impacts could result if opportunities to better serve the public overall are lost. Alternative recreational opportunities likely would be located at greater distances and be more expensive. Although detailed information on users of TVA recreation areas is limited, any such negative cumulative impacts would be proportionately somewhat greater on low-income populations.

Alternative B — Custodial Management Alternative
The potential loss of accommodations for water-based recreation and loss of public access to streams with significant recreation use potential would result in disproportionate negative impacts to low-income populations due to the increased cost to access alternatives, either through imposition of fees or increased travel. This alternative likely would result in disproportionate negative impacts to low-income populations. Lost opportunities, and therefore, cumulative impacts likely would be similar to those of Alternative A, although somewhat greater.

Alternative C — Flagship Management Alternative
The changes in reservoir lands planning under both this alternative and Alternative D would likely have little to no disproportionate impact to disadvantaged populations. TVA would continue to operate and upgrade most campgrounds and day use areas. Overall, the impact on disadvantaged populations would be positive. Cumulative impacts would be least under this alternative. Such cumulative impacts would be disproportionate impacts to lower-income and other disadvantaged populations but less likely than under the other alternatives.

Alternative D — Blended Management Alternative
Under Alternative D, the programs and actions of TVA would be at least as beneficial to disadvantaged populations as those of Alternative B but fewer than under Alternative C.

Therefore, the positive impacts to environmental justice would be fewer than under Alternative C. Cumulative impacts would be similar to those of Alternative C and may be somewhat less beneficial. However, they likely would be fewer than under Alternatives A and B.

Relative Beneficial Impacts of the Alternatives
The beneficial relative impacts to socioeconomics under the four alternatives are shown in Figure 5-17.

Figure 5-17. Relative Beneficial Impacts of the Alternatives on Environmental Justice

5.15. Navigation

Protection of the waterway is provided for under Section 26a of the TVA Act. TVA conducts Section 26a reviews to ensure that construction of water use facilities does not encroach upon the commercial navigation channel or marked recreational channels. Consequently, there would be no direct impact on commercial navigation under any of the proposed alternatives.

For reservoir lands planning, revisions in land use zone definitions and ranges in land use zone allocations have the potential to affect navigation interests. It is essential that navigation assets, uses, and interests on the Tennessee River and its tributaries are considered and protected during the land planning process. Historically, TVA has taken steps to ensure that impacts to navigation uses are minimized to the extent possible. Under any of the proposed alternatives, the reservoir lands planning process would remain a systematic method of identifying and evaluating the most suitable use of lands along TVA reservoirs. In addition, any specific proposal on TVA land would be subject to a site-specific environmental review. Therefore, with future input from a navigation perspective, impacts to commercial navigation would be minimal under any alternative.

Relative Beneficial Impacts of the Alternatives
The relative beneficial impacts to navigation under the four alternatives are shown in Figure 5-18.

Figure 5-18. Relative Beneficial Impacts of the Alternatives on Navigation

5.16. Air Quality

Under all alternatives, adverse impacts to air quality would be small. Direct sources of emissions of air pollutants during the implementation of the alternatives are primarily from vehicles used in accessing TVA lands and from construction, farming, and forest management equipment. These emissions would have negligible effects on air quality. The proposed prescribed burns would also result in emissions of air pollutants. TVA would comply with local air quality regulations when planning any prescribed burns. The proposed change under Alternatives B, C, and D in the Zone 5 land use definition would allow a greater variety of industrial development on TVA land and the potential for increased industrial emissions of air pollutants. Any such industries would have to comply with applicable emissions requirements and are unlikely to result in significant adverse impacts to air quality.

Relative Beneficial Impacts of the Alternatives

The relative beneficial impacts to air quality under the four alternatives are shown in Figure 5-19.

Figure 5-19. Relative Beneficial Impacts of the Alternatives on Air Quality

5.17. Climate

In order to understand future climate scenarios in the TVA region better, TVA contracted with the Electric Power Research Institute (EPRI) to prepare a report on the impacts of global climate change on various resources throughout the Valley, including water resources, agriculture, forestlands, ecological resources, air quality, and recreation, which could be reasonably anticipated to occur over the 21st century (EPRI and TVA 2009). The report summarizes temperature and precipitation forecasts for the TVA region based on General Circulation Model results presented in the 2007 IPCC report (Christensen et al. 2007). These forecasts are based on the A1B scenario; GHG projections associated with this scenario are in the middle of the range of the scenarios analyzed by the IPCC. The potential effects and causes of climate change continue to be the subject of scientific debase and discussion.

The TVA region spans two model regions, the Central and Eastern North America region. Temperature forecasts for the TVA region are similar for the two model regions and predict an increase in annual mean temperatures in the TVA region of about 0.8°C (1.4°F) from 1990 to 2020 and up to 4.0°C (7.2°F) by 2100. Precipitation forecasts for the two model

regions are more variable. In the central region, winter precipitation is forecast to increase by 2.6 percent from 1990 to 2020 and by 3.6 percent by 2100. Central region summer precipitation is forecast to decrease by 6.1 percent from 1990 to 2020 and by 3 percent by 2100. In the eastern region, winter precipitation is forecast to increase by 11.3 percent from 1990 to 2020 and by 13 percent by 2100. No change in eastern region summer precipitation is forecast from 1990 to 2020 or by 2100. It is important to note that these forecasts are based on coarse-scale model results; more localized downscaled analyses are required to refine the forecasts (USCCSP 2008).

TVA received and reviewed comments on the 2009 EPRI report from Christy (2009). Christy presented two arguments regarding these estimates. First, based on historical climate records, a change of +0.8°C in 30 years is within the natural climate variations of the region. Second, the +4°C estimate is an "up to" result that is the least likely to occur.

The direct emissions of greenhouse gases from implementation of the various alternatives are likely to be less than the 25,000 metric tons of CO2-equivalent GHGs on an annual basis that CEQ (2010) proposes as an indicator of the need for a more detailed assessment. This guidance does not apply to federal land and resource management actions which are the primary actions considered in the NRP. The operation of fossil-fueled machinery to implement many of the actions would result in GHG emissions, as would prescribed burns and some forest management activities. Over the long term, some forest management activities, as well as efforts to improve the management of agricultural lands, could result in a net increase in the sequestration of GHGs. The overall increases in GHG emissions and any resulting impacts on climate change resulting from any of the alternatives are expected to be negligible.

Climate change effects forecasted for the TVA region would be relatively modest over the next decade and increase in magnitude by mid-century (EPRI and TVA 2009). Potential effects on water resources include increased water temperatures, increased stratification of reservoirs, reduced dissolved oxygen levels, and increased water demand for crop irrigation. Potential effects on agriculture include increased plant evapotranspiration, altered pest and pathogen regimes, and changes in the types of crops grown. Potential effects on forest resources include increased tree growth, altered disturbance regimes, changes in forest community composition with declines in species currently at the southern limit of their ranges, and expansion of the oak-hickory and oak-pine forest types. Potential effects on fish and wildlife include range retractions and expansions, altered community composition, loss of cool to cold aquatic habitats and associated species such as brook trout, and increased threats to many endangered and threatened species. Potential effects on recreation include lengthening the summer recreation season, reduced cold water fishing (i.e., trout) and increased warm water fishing. These potential effects are described in more detail in Appendix M.

Under Alternatives B, C, and D, TVA would increase its natural resource monitoring and assessment activities. These increases include a new Climate Change Sentinel Monitoring program that would target streams in the TVA area's major ecoregions. This program would be most fully implemented under Alternatives C and D. Under Alternatives C and D, TVA would also increase its ongoing stream and tailwater monitoring, and endangered and threatened species monitoring. The land condition assessment monitoring would increase under Alternatives B, C, and D, with the greatest increase under Alternative C. Under these three alternatives, TVA would also increase its forest monitoring efforts. These increased

monitoring efforts would allow TVA to better detect and respond to impacts to natural resources resulting from climate change, if appropriate.

The management activities that TVA proposes under the various alternatives are designed to be flexible and driven, in part, by the results of the monitoring and assessment activities. These should give TVA the ability to adapt them to changing conditions resulting from climate change, population changes, and other factors. TVA also proposes to regularly review and, as necessary, revise the NRP. This will also help it adapt to changing conditions.

Relative Beneficial Impacts of the Alternatives
The relative beneficial impacts to climate under the four alternatives are shown in Figure 5-20.

Figure 5-20. Relative Beneficial Impacts of the Alternatives on Climate

5.18. Unavoidable Adverse Effects

Continuing regional development trends, such as residential development on non-TVA lands, would likely continue to result in degradation of aquatic and terrestrial habitat regardless of the alternative selected. Because the NRP has been designed to improve the management of natural resources located on TVA lands, few, if any, unavoidable potential environmental effects would result under any of the four alternatives. Furthermore, implementation of any of the four alternatives is not expected to result in significant adverse cumulative effects to any resources.

5.19. Relationship of Short-Term Uses and Long-Term Productivity

NEPA requires consideration of the "relationship between short-term uses of man's environment and the maintenance and enhancement of long-term productivity" (40 CFR §1502.16). For the NRP, short-term uses generally are those that occur within the project's span of 20 years, and long-term refers to later decades. Productivity is the capability of the land to provide market and amenity outputs and values for future generations. The capability of the land to maintain productivity is one factor that influences the quality of life for future generations.

Generally, the NRP would result in very few actions that adversely affect long-term productivity. As described in this document, TVA manages public lands for multiple uses, including recreation, natural resources, and protection of sensitive resources, for the goal of protecting these values for the public.

5.20. Irreversible and Irretrievable Commitments of Resources

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

The construction of recreational facilities/structures, project operations, and industrial uses on TVA lands allocated during the reservoir lands planning processes would involve irreversible commitment of fuel, energy, and building material resources. Use of these resources would occur under all four alternatives, but have the greatest potential under Alternatives C and D. Under these alternatives, the ranges in land use zone allocations provided for in the CVLP facilitate the potential construction mentioned above by allocating more TVA lands to Developed Recreation than Alternatives A and B.

As shoreline is converted to residential, commercial, industrial, and some types of recreational use, the land is essentially permanently changed and is no longer available for agriculture, forestry, wildlife habitat, natural areas, or certain dispersed recreational activities for the foreseeable future. This is an irretrievable commitment of land that would occur under all alternatives. Over the long term, this type of irretrievable commitment would be greatest under Alternatives C and D due to the target ranges provided for in the CVLP described above. .

5.21. Energy Resources and Conservation Potential

Developing and implementing the NRP does not involve substantive use of energy resources, but there could be a small use of energy resources. Energy is used to fuel machines needed to maintain wildlife habitat areas, fields around recreation facilities, installation of shoreline stabilization, management of invasive plants and other activities described in Chapter 2.

Energy is consumed by campers, boaters, and other recreation users. TVA is encouraging campers who utilize developed recreation areas to reduce energy consumption and to conserve water resources. Under certain NRP programs, TVA would encourage energy conservation measures to be utilized at recreation areas that may be developed in the future. These practices could potentially reduce energy usage under all alternatives.

Finally, because each alternative contains TVA lands allocated for Industrial use, potential energy use associated with industrial activities would occur under each alternative. TVA actively promotes public education and outreach to encourage energy efficiency and green-energy offerings and promotes the integration of energy efficiency and water conservation into community planning and building construction. TVA would work with potential users of TVA lands to achieve energy savings and to implement conservation practices.

5.22. Summary of TVA Commitments and Proposed Mitigation Measures

Mitigation measures are actions that could be taken to avoid, minimize, rectify, offset, reduce, or compensate for adverse impacts to the environment. The following mitigation measure would be entered into TVA's electronic database and tracking system used to record NEPA reviews. This database tracks commitments and mitigation measures identified in EAs and EISs.

Under any of the alternatives, TVA would comply with all applicable federal, state, and local regulations. Likewise, prior to approving any proposal to use TVA land, TVA would conduct an appropriate environmental review to determine the potential site-specific environmental effects of the proposed use. In addition to the use of construction-related BMPs, the following nonroutine measure would reduce the potential for adverse environmental effects.

- TVA is consulting with the Valley SHPOs and federally recognized Indian tribes on a PA for the identification, evaluation, and treatment of all cultural resources adversely affected by future proposed uses of TVA lands subject to the NRP. All activities would be conducted in accordance with the stipulations defined in this PA.

CHAPTER 6 - LIST OF PREPARERS

6.1. TVA NEPA Project Management

Heather L. Montgomery

Role:	Lead NEPA Compliance and Document Preparation (DEIS)
Education:	B.S., Environmental Biology
Experience:	10 years in Planning and Managing Land and Environmental Impact Assessment

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6.2. ScottMadden Inc. Project Management

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6.3. Other TVA Contributors

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Education: Ph.D., Economics

Barbara Wyse
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Education: M.S., Environmental and Resource Economics

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CHAPTER 7 - FINAL ENVIRONMENTAL IMPACT STATEMENT RECIPIENTS

The following agencies, organizations, and individuals were either sent a copy of the Final EIS and NRP or notified of their availability.

6.5. Federal Agencies

Advisory Council on Historic Preservation
Chattahoochee-Oconee National Forests
Federal Highway Administration — North Carolina Division
George Washington and Jefferson National Forests
Great Smoky Mountains National Park
Mammoth Cave National Park
National Center for Environmental Health Centers for Disease Control and Prevention
National Forests in North Carolina
National Park Service — Appalachian National Scenic Trail
U.S. Environmental Protection Agency, Region IV
U.S. Army Corps of Engineers — Abingdon, Virginia; Asheville, North Carolina; Christiansburg, Virginia; Nashville, Tennessee; Norfolk, Virginia; Savannah, Georgia; Wytheville, Virginia
U.S. Department of Agriculture Natural Resource Conservation Service — Atlanta, Georgia; Auburn, Alabama; Jackson, Mississippi; Memphis, Tennessee; Nashville, Tennessee; Raleigh, North Carolina; Richmond, Virginia; Washington, D.C.
U.S. Fish and Wildlife Service — Abingdon, Virginia; Asheville, North Carolina; Athens, Georgia; Cookeville, Tennessee; Daphne, Alabama; Decatur, Alabama; Frankfort, Kentucky; Gloucester, Virginia

6.6. Federally Recognized Indian Tribes

Absentee Shawnee Tribe of Oklahoma
Alabama-Coushatta Tribe of Texas
Alabama Quassarte Tribal Town
Cherokee Nation
The Chickasaw Nation
Choctaw Nation of Oklahoma
Eastern Band of Cherokee Indians
Eastern Shawnee Tribe of Oklahoma
Jena Band of Choctaw Indians
Kialegee Tribal Town
Mississippi Band of Choctaw Indians
Muscogee (Creek) Nation of Oklahoma
Poarch Band of Creek Indians
Seminole Tribe of Florida
Seminole Nation of Oklahoma
Shawnee Tribe
Thlopthlocco Tribal Town
United Keetoowah Band of Cherokee Indians in Oklahoma

6.7. State Agencies

Alabama Department of Agriculture and Industries

Alabama Department of Conservation and Natural Resources — Boating Law Administrator; State Parks Division
Alabama Department of Economic and Community Affairs
Alabama Department of Environmental Management
Alabama Department of Transportation
Alabama Forestry Commission
Alabama Historical Commission
Alabama Tourism Department
Georgia Department of Economic Development
Georgia Department of Natural Resources — Fisheries Section; Historic Preservation Division; Northeast Region 2; State Parks and Historic Sites Division; Wildlife Resources Division
Georgia State Clearinghouse
Kentucky Department of Parks
Kentucky Energy and Environment Cabinet — Department of Environmental Protection
Kentucky Heritage Council
Kentucky Natural Resource Conservation Service
Kentucky State Nature Preserves Commission
Kentucky Tourism — Arts and Heritage Cabinet
Mississippi Department of Archives and History
Mississippi Department of Environmental Quality
Mississippi Department of Finance and Administration
Mississippi Department of Wildlife, Fisheries, and Parks
Mississippi Development Authority — Division of Tourism Development
North Carolina Department of Commerce
North Carolina Department of Environment and Natural Resources
North Carolina Division of Archives and History
North Carolina Division of Environmental Health
North Carolina Division of Parks and Recreation — Basinwide Unit, Planning Section
North Carolina Division of Water Quality — Asheville Regional Office; Basinwide Planner for the French Broad Basin
North Carolina State Environmental Review Clearinghouse
North Carolina Wildlife Resource Commission — Aquatic Wildlife Diversity, Western Region
Tennessee Department of Agriculture
Tennessee Department of Economic and Community Development
Tennessee Department of Environment and Conservation — Division of Air Pollution Control; Division of Archaeology; Division of Water Pollution Control; Division of Recreation Educational Services; Division of Natural Heritage; Historical Commission; Parks and Conservation Operations
Tennessee Department of Transportation — Environmental Planning and Permits Division
Tennessee Department of Tourism Development
Tennessee Wildlife Resources Agency — Environmental Services Division
Virginia Department of Conservation and Recreation
Virginia Department of Environmental Quality — Division of Environmental Enhancement
Virginia Department of Environmental Quality - Office of Environmental Impact Review
Virginia Department of Environmental Quality - Division of Water
Virginia Department of Game and Inland Fisheries
Virginia Department of Historic Resources
Virginia Department of Transportation

6.8. Regional and Local Agencies and Private Organizations

Advocates for the Oak Ridge Reservation
Alabama Elk River Development Agency
Bear Creek Development Authority
Beech River Watershed Development Authority
Blue Ridge Parkway
Boone Watershed Partnership
Bowling Green Municipal Utilities
East Tennessee Development District
Environmental Integrity Project
First Tennessee Development District
Foundation for Global Sustainability
French Broad Preservation Association
The Friends of Norris Lake
Greater Nashville Regional Council
Memphis Area Association of Governments
Memphis Aviation Services
Mount Rogers Planning District Commission
Newport (TN) Utilities
North Central Alabama Regional Council of Governments
Northeast Mississippi Planning and Development District
Northwest Alabama Council of Local Governments
Northwest Tennessee Development District
South Central Tennessee Development District
Southeast Tennessee Development District
Southwest Tennessee Development District
Solar Valley Coalition
Tellico Reservoir Development Agency
Tennessee Chamber of Commerce and Industry
Tennessee Citizens for Wilderness Planning
Tennessee Clean Water Network
Tennessee Duck River Development Agency
Tennessee Marina Association
Tombigbee River Valley Water Management District
Top of Alabama Regional Council of Governments
Upper Cumberland Development District
Upper Tennessee River Roundtable/Keep Southwest Virginia Beautiful
Virginia Tourism Corporation
Watershed Association of Tellico Reservoir

6.9. Individuals

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Black, Bill, Dandridge, TN
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Bourland, Donald E., Collierville, TN
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Dalton, Kathleen, Corinth, MS
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Heflin, Rob, Tuscaloosa, AL
Herald, Glen, Collierville, TN
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GLOSSARY

acre	A unit of measure of land area equal to 43,560 square feet
analysis framework	Evaluation of each program option based on a wide range of inputs and perspectives to provide an accurate comparison of potential implementation efforts
best management practices	Accepted construction practices designed to reduce environmental effects
biostabilization	Use of vegetative plants to control erosion
contiguous	Adjacent; touching
cultural resources	Archaeological and historic resources
danger tree	A tree located on TVA-managed land that could pose a threat to private property if allowed to fall
drawdown	Area of reservoirs exposed between full pool and winter pool levels during annual drawdown of the water level for flood control
ecoregion	A geographic area with characteristic, distinct assemblages of natural communities and species
embayment	A bay or arm of the reservoir
endangered species	A species in danger of extinction throughout all or a significant part of its range
Environmental Policy	A TVA Board-approved policy that communicates guiding principles to lead TVA successfully in the reduction of its environmental impact while continuing to provide reliable and competitively priced power to the Valley
geographic information system	A collection of computer hardware and software that efficiently captures, stores, updates, manipulates, analyzes, and displays information about the location of the Earth's natural, cultural, economic, and human resources, and the man-made environment. Location is normally shown on maps with associated textual and numeric information that describes the characteristics of those resources.
Land Policy	A TVA Board-approved policy that guides retention, disposal, and planning of interests in real property
mitigation	An action that either will result in avoidance of an effect or cause the results of an activity to be minor in significance
program options	Varying future levels of effort used to implement components of the Natural Resource Plan
population (related to species)	Population is an ecological term that refers to the entirety of a group of individuals of a certain species. One population can contain numerous occurrences. A population includes that there is the potential for exchange of genetic material between individuals.
qualitative	Analysis based on professional judgment of quality
recreation strategy	A TVA strategy to collaborate with regional partners to enhance existing recreation opportunities and address unmet recreation needs, while managing resources on and along the Tennessee River system

Regional Resource Stewardship Council	A group of diverse stakeholders established to advise TVA on its stewardship activities and the priorities among competing objectives and values
reservoir lands planning	The development of plans used to guide future decisions on TVA-managed lands adjacent to reservoirs
riparian	Related to or located on the banks of a river or stream
runoff	That portion of total rainfall that eventually enters a stream or river
scenario planning	Method for determining the expected benefit per dollar spent of each program within the Natural Resource Plan
shoreland	The surface of land lying between the minimum pool elevation of a TVA reservoir and the maximum shoreline contour or TVA back-lying property (whichever is further)
tailwater	The part of a river just downstream from a dam where the flow and quality of the water are substantially affected by the dam discharge
threatened species	A species likely to become endangered in the foreseeable future
water resource management	A grouping of programs that encourages and helps implement efforts that protect and improve water resources for human health, fishing, swimming, boating, drinking, agricultural use, aquatic habitat, and economic development.

INDEX

agricultural lands management 22, 27, 95, 120
Alternative A S-3, S-7-9, 91, 115, 116, 118, 119, 120, 131, 132, 133, 211, 215, 216, 217, 220, 221, 222, 223, 224, 225, 227, 229, 236, 238, 239, 241, 242, 243, 245, 246, 247, 253, 254, 255, 258, 259, 260, 262
Alternative B S-3, S-7-9, 90, 91, 115, 117, 118, 119, 125, 126, 127, 130, 131, 132, 205, 212, 215, 216, 217, 218, 221, 223, 224, 225, 226, 228, 232, 233, 234, 235, 236, 237, 239, 241, 242, 243, 244, 246, 247, 249, 252, 253, 254, 255, 256, 258, 259, 261, 262
Alternative C S-3, S-7-8, 90, 91, 120, 122, 125, 127, 129, 130, 131, 132, 133, 211, 212, 213, 215, 217, 219, 220, 221, 222, 223, 224, 226, 228, 233, 234, 235, 236, 237, 239, 240, 241, 242, 243, 244, 249, 250, 252, 254, 256, 257, 259, 261, 262, 265
Alternative D S-3, S-7-9, 15, 90, 91, 120, 124, 127, 128, 129, 132, 133, 212, 215, 219, 220, 222, 223, 224, 226, 229, 235, 237, 240, 242, 244, 252, 254, 256, 259, 261, 262
Appalachian Trail 54
aquatic ecology S-5, S-7, 8, 14, 67, 68, 109, 119, 126, 129, 132, 162, 210, 232, 233, 234, 235, 236, 237, 239, 240, 241, 242, 270, 273
aquatic resources 18, 162, 238, 239, 240, 241, 242
archaeological resource S-8, vii, 4, 19, 47, 48, 52, 102, 104, 117, 122, 123, 132, 174, 175, 177, 178, 245, 247, 249, 250, 251, 252, 274, 278, 289
Archaeological Resources Protection Act (ARPA) S-8, vii, 19, 47, 48, 51, 102, 122, 132, 245, 247, 249, 252, 253
best management practice (BMP) vii, 16, 27, 28, 29, 30, 31, 33, 35, 39, 41, 44, 72, 76, 77, 78, 81, 83, 84, 97, 110, 121, 206, 208, 210, 211, 231, 238, 260, 267, 295
biological resources 3, 21, 115, 120, 127, 206, 225, 230, 232
Blended Management S-3, S-7, 90, 91, 93, 102, 105, 109, 114, 127, 132, 204, 215, 219, 222, 224, 226, 227, 229, 235, 240, 242, 244, 252, 254, 256, 259, 261, 262
blueway 56, 57, 70, 106, 118, 124, 211, 212, 214
boundary maintenance 22, 40, 41, 99, 121, 128, 207, 259
campground S-2, S-4, 5, 6, 52, 53, 54, 55, 56, 57, 85, 105, 107, 108, 117, 124, 129, 136, 208, 211, 212, 213, 214, 215, 262
Camp-Right Campground Initiative 52, 57, 107, 124, 214
Clean Marina Program viii, 7, 67, 69, 70, 110, 126, 130, 211, 292
Clean Water Act (CWA) vii, 4, 13, 18, 153, 228, 229, 240, 283, 285, 286
Comprehensive Valleywide Land Plan vii, 63, 64, 65, 66, 88, 91, 125, 129, 209, 219, 220, 224, 228, 251, 253, 267
conservation planning 22, 23, 26, 94, 95, 120, 207, 225, 242, 243
Corporate History Program 47, 52, 104, 123, 252, 253
critical habitat 18, 139, 240
cultural resource S-2, S-5, S-7, S-8, 4, 9, 12, 19, 21, 22, 30, 43, 47, 49, 51, 58, 75, 87, 102, 103, 104, 115, 116, 117, 120, 122, 123, 127, 128, 130, 131, 132, 133, 174, 204, 205, 206, 207, 209, 230, 239, 244, 245, 248, 249, 250, 251, 252, 253, 255, 260, 261, 268, 270, 272, 274,295
Custodial Management S-3, S-7-9, 39, 87, 91, 93, 102, 105, 109, 114, 115, 116, 132, 212, 216, 221, 223, 225, 226, 228, 232, 239, 241, 243, 246, 252, 254, 255, 258, 261, 262
day use area S-2, S-4, 5, 52, 55, 56, 105, 106, 117, 124, 129, 208, 209, 211, 212, 213, 215, 225, 232, 241, 243, 262
dewatering projects 22, 28, 29, 38, 96, 120, 152, 154, 162, 207, 225, 226, 230, 231, 233, 235, 255, 256

dispersed recreation 2, 7, 8, 13, 22, 25, 41, 42, 43, 44, 45, 46, 52, 90, 100, 101, 107, 116, 122, 124, 128, 130, 132, 136, 137, 138, 186, 206, 207, 216, 217, 218, 219, 220, 222, 225, 226, 229, 232, 233, 234, 236, 254, 259, 261, 267, 271, 286
dissolved oxygen (DO) vii, 38, 158, 159, 160, 161, 162, 163, 230, 265
draft environmental impact statement 20
endangered species S-5, S-8, vii, 3, 13, 14, 18, 21, 22, 23, 24, 93, 132, 164, 166, 167, 169, 172, 173, 174, 206, 240, 242, 269, 270, 272, 273, 283, 287, 288, 293, 295
environmental assessment (EA) vii, 15, 16, 17, 62, 270, 291
environmental education vii, 85, 114, 256, 257, 273
environmental impact statement (EIS) S-2-3, S-5, vii, 1, 2, 7, 8, 11, 12, 13, 15, 16, 17, 19, 20, 28, 48, 62, 72, 77, 87, 88, 89, 90, 91, 118, 130, 131, 135, 141, 154, 155, 210, 254, 260, 277, 291, 292
Environmental Policy S-1-2, vii, 1, 3, 8, 9, 11, 17, 23, 62, 87, 115, 116, 119, 120, 126, 127, 128, 129, 130, 216, 295
Executive Order (EO) vii, 13, 14, 18, 19, 26, 48, 51, 68, 95, 146, 150, 153, 187, 223, 224, 225, 228, 229, 240, 246, 249, 259, 260, 285
farmland S-6-8, vii, 14, 19, 131, 133, 181, 182, 183, 255, 256, 257, 273
final environmental impact statement (FEIS) 3, 15, 16, 17, 20, 277, 291, 292
Flagship Management S-3, S-7, 88, 91, 93, 102, 105, 109, 114, 120, 132, 204, 213, 217, 221, 222, 224, 226, 227, 228, 229, 233, 239, 241, 243, 249, 254, 256, 259, 261, 262
flood S-5, S-6, S-8, 1, 6, 14, 18, 133, 153, 154, 157, 162, 171, 186, 187, 190, 203, 260, 295
floodplain S-4, S-7-8, 14, 18, 131, 133, 141, 145, 150, 153, 154, 169, 187, 206, 259, 260, 273, 285
forebay 158
forest resource management 3, 22, 29, 38, 96, 150, 164, 225, 226, 267, 271, 273, 278
greenhouse gas sequestration 22, 37, 38, 97, 98, 121, 130
greenway S-3, 52, 56, 106, 120, 124, 139, 208, 211, 212, 214
groundwater 78, 80, 144, 153, 154, 155, 272
invasive species S-8, 13, 19, 33, 35, 68, 85, 116, 121, 127, 140, 146, 149, 150, 157, 170, 171, 174, 211, 224, 225, 228, 229, 240, 243, 285
land condition assessment (LCA) vii, 22, 41, 42, 99, 100, 122, 140, 141, 149, 157, 216, 217, 219, 224, 228, 259, 265
land use S-3, S-4, S-7, 2, 5, 6, 7, 14, 23, 25, 27, 29, 30, 44, 46, 60, 61, 63, 65, 66, 68, 70, 84, 88, 107, 115, 118, 123, 125, 129, 131, 136, 140, 141, 143, 144, 145, 148, 154, 155, 156, 180, 181, 183, 185, 186, 204, 205, 209, 220, 228, 239, 254, 255, 261, 263, 264, 267, 283
Leave No Trace (LNT) vii, 22, 46, 57, 101, 214, 287
memorandum of agreement (MOA) 191
migratory birds 13, 19, 22, 26, 95, 150, 152, 225, 226
minimum flow 163
mitigation 20, 49, 102, 116, 157, 183, 210, 226, 232, 234, 236, 245, 246, 248, 251, 267, 295
mussel S-5, 68, 139, 162, 163, 165, 286, 287, 289, 290
National Environmental Policy Act (NEPA) S-3, vii, 3, 11, 17, 19, 20, 49, 67, 118, 206, 241, 248, 266, 267, 269, 270, 272, 284
National Historic Preservation Act (NHPA) vii, 4, 14, 17, 19, 20, 47, 48, 49, 50, 51, 102, 103, 104, 123, 175, 206, 244, 245, 246, 247, 248, 249, 250, 251, 252, 253
National Register of Historic Places (NRHP) vii, 4, 14, 49, 50, 103, 117, 122, 123, 128, 175, 177, 178, 179, 245, 246, 247, 248, 250, 252
National Wetlands Inventory (NWI) vii, 24, 154, 228
natural area S-4, S-7, 13, 14, 22, 24, 25, 26, 36, 54, 55, 94, 115, 116, 120, 127, 131, 132, 138, 139, 140, 141, 152, 168, 173, 205, 207, 213, 220, 221, 222, 223, 226, 228, 238, 243, 244, 267, 291, 292

No Action Alternative S-3, S-7-9, 21, 90, 91, 93, 105, 109, 114, 115, 132, 135, 211, 213, 216, 220, 223, 225, 226, 227, 228, 229, 233, 235, 237, 238, 239, 241, 242, 243, 244, 245, 254, 255, 258, 260, 261, 262

normal summer pool 162, 175

North American Grave Protection and Repatriation Act (NAGPRA) vii, 48, 49

Preferred Alternative S-3, S-7, 20, 89, 90, 91, 133

Preserve America 47, 51, 103, 104, 123, 246, 249, 250

prime farmland S-6, S-7-8, 14, 19, 131, 133, 181, 182, 183, 255, 256, 257, 273

recreation management 2, 3, 4, 9, 12, 22, 44, 45, 52, 53, 57, 75, 87, 100, 101, 105, 107, 116, 117, 120, 122, 124, 128, 129, 131, 138, 205, 206, 208, 211, 214, 216, 217, 220, 229, 230, 232, 233, 235, 237, 238, 271, 273

Regional Resource Stewardship Council (RRSC) viii, 11, 87, 88, 91, 296

reservoir lands planning S-2, 3, 4, 6, 8, 9, 12, 13, 21, 42, 44, 60, 61, 62, 65, 87, 88, 90, 91, 94, 115, 117, 118, 119, 124, 125, 129, 130, 131, 168, 178, 204, 205, 209, 219, 220, 221, 224, 230, 233, 235, 238, 239, 243, 244, 251, 253, 254, 256, 258, 261, 262, 263, 267, 270, 274, 296

Reservoir Operations Study (ROS) viii, 6, 15, 28, 68, 154, 162, 185, 291

scenario planning 88, 89, 296

sediment 7, 31, 71, 73, 74, 75, 77, 79, 85, 110, 112, 119, 120, 127, 130, 158, 159, 160, 161, 162, 211, 227, 229, 230, 233, 235, 237, 238, 240, 260, 283

sensitive biological resources 21, 22, 93, 94, 95, 115, 120, 127, 230, 232

Sport Fishing Index viii, 7, 164, 286

stream access site S-2, S-4, 5, 9, 52, 56, 57, 106, 118, 124, 135, 136, 208, 211, 212, 213, 215, 225, 241, 243

summer pool 154, 162, 175

tailwater viii, 7, 53, 54, 67, 68, 109, 126, 129, 154, 158, 163, 231, 265, 294, 296

threatened species S-5, S-7-8, 14, 18, 21, 24, 39, 65, 120, 131, 132, 164, 167, 207, 240, 241, 242, 243, 265, 296

trail S-3, 25, 30, 31, 34, 42, 46, 47, 53, 54, 55, 56, 85, 101, 120, 122, 135, 138, 139, 140, 148, 208, 212, 213, 214, 216, 217, 218, 220, 222, 226, 229, 233, 261, 277, 286, 294

U.S. Army Corps of Engineers (USCOE) viii, 12, 18, 167, 191, 277, 291

U.S. Environmental Protection Agency (USEPA) viii, 7, 15, 18, 34, 68, 70, 71, 75, 82, 192, 193, 194, 277, 283, 286

U.S. Fish and Wildlife Service (USFWS) viii, 3, 13, 18, 21, 22, 23, 24, 26, 28, 39, 40, 138, 139, 150, 151, 152, 154, 167, 168, 170, 171, 174, 225, 226, 240, 277, 291, 293

unit plan 17, 42, 43, 100, 121, 225

water resource management S-2, 4, 8, 9, 12, 51, 67, 75, 83, 84, 87, 119, 125, 129, 130, 131, 132, 210, 211, 230, 231, 232, 233, 234, 235, 236, 237, 238, 251, 253, 271, 274, 296

wetland S-4, S-7-8, vii, 4, 13, 18, 22, 23, 24, 28, 30, 34, 67, 80, 82, 93, 94, 120, 131, 132, 139, 140, 144, 145, 153, 154, 155, 156, 157, 185, 187, 205, 206, 207, 210, 227, 228, 229, 238, 261, 274, 284, 285, 286, 287, 289

wildlife S-2, S-4, S-7-8, viii, 1, 3, 5, 6, 8, 13, 21, 22, 25, 26, 27, 28, 29, 30, 32, 33, 36, 37, 38, 39, 40, 41, 42, 43, 44, 46, 53, 54, 56, 72, 96, 97, 98, 99, 116, 121, 127, 130, 131, 132, 137, 138, 139, 140, 146, 147, 149, 150, 151, 152, 153, 157, 185, 187, 207, 209, 210, 225, 226, 227, 229, 233, 240, 254, 259, 260, 261, 265, 266, 267, 269, 271, 272, 273, 277, 278, 284, 285, 286, 291, 292, 293, 294

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FINAL ENVIRONMENTAL IMPACT STATEMENT
VOLUME 2 - APPENDICES

NATURAL RESOURCE PLAN

Alabama, Georgia, Kentucky, Mississippi, North Carolina, Tennessee, and Virginia

PREPARED BY:
TENNESSEE VALLEY AUTHORITY

JULY 2011

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LIST OF APPENDICES

Appendix A – Maps 5
Appendix B – TVA's Recreation Chronology 9
Appendix C – Summary of NRP Scoping Results 15
Appendix D – Reservoir Lands Planning: Forecast System Designations 33
Appendix E – Reservoir Lands Planning: Multiple Use Tract Allocation Methodology 37
Appendix F – Reservoir Lands Planning: Land Use Zone Definitions 43
Appendix G – Reservoir Lands Planning: Single Use Parcel Allocation and Rapid Land Assessment Methodologies 53
Appendix H – Water Resource Pollutant Load Reduction Methodology 59
Appendix I – Overview of TVA's Endangered Species Act Consultation Procedure 63
Appendix J – Endangered and Threatened Species and Sensitive Ecosystems Within the TVA Region 69
Appendix K – Population Trend Data 71
Appendix L – Additional Climate Change Information 83
Appendix M – Comments on Draft EIS / Plan and Responses 89

Appendix A – Maps

Page intentionally blank

LIST OF FIGURES IN APPENDIX A:

Figure A-1a. Nationally Designated Trails East

Figure A-1b. Nationally Designated Trails West

Figure A-2. TVA Dewatering Projects

Figure A-3. TVA Campgrounds

Figure A-4a. TVA Day Use Areas East

Figure A-4b. TVA Day Use Areas West

Figure A-5. TVA Stream Access Sites

Figure A-6. Quality Growth Workshop Locations

Figure A-7. Certified Clean Marinas

Figure A-8. 2010 Targeted Watershed Initiatives

Figure A-9a. TVA Natural Areas East

Figure A-9b. TVA Natural Areas West

Figure A-10a. Non-TVA Natural Areas East

Figure A-10b. Non-TVA Natural Areas West

Figure A-11. TVA Area Ecoregions

Figure A-12. Tennessee River Watershed Hydrologic Unit Conditions

Figure A-13. Metropolitan Areas

Figure A-14. Population by County 2010

Figure A-15. Manufacturing Employment 2009

Figure A-16. Farm Employment 2009

Figure A-17. Per Capita Personal Income 2009

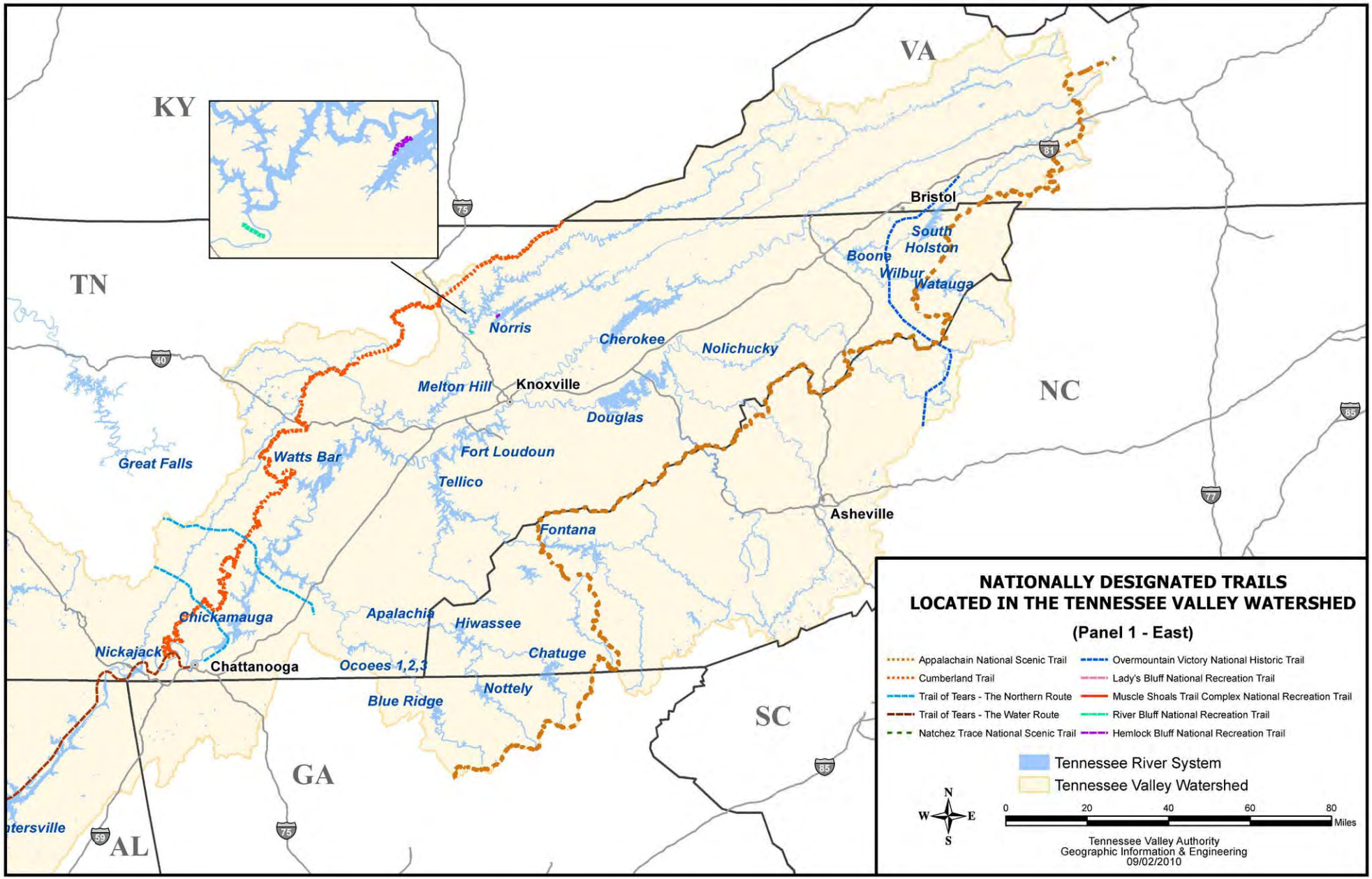
Figure A-18. Minority Population 2010

Figure A-19. Population Below Poverty Level 2009

Figure A-20. Fine Particulate Nonattainment Areas

Figure A-21. Ozone Nonattainment Areas

Figure A-22. Class I Air Quality Areas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Great Falls
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Fort Loudoun
Tellico
Asheville
Fontana
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Apalachia
Hiwassee
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Chattanooga
Ocoees 1,2,3
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Blue Ridge
NATIONALLY DESIGNATED TRAILS
LOCATED IN THE TENNESSEE VALLEY WATERSHED
(Panel 1 - East)
Appalachain National Scenic Trail
Cumberland Trail
Trail of Tears - The Northern Route
Trail of Tears - The Water Route
Natchez Trace National Scenic Trail
Overmountain Victory National Historic Trail
Lady's Bluff National Recreation Trail
Muscle Shoals Trail Complex National Recreation Trail
River Bluff National Recreation Trail
Hemlock Bluff National Recreation Trail
Tennessee River System
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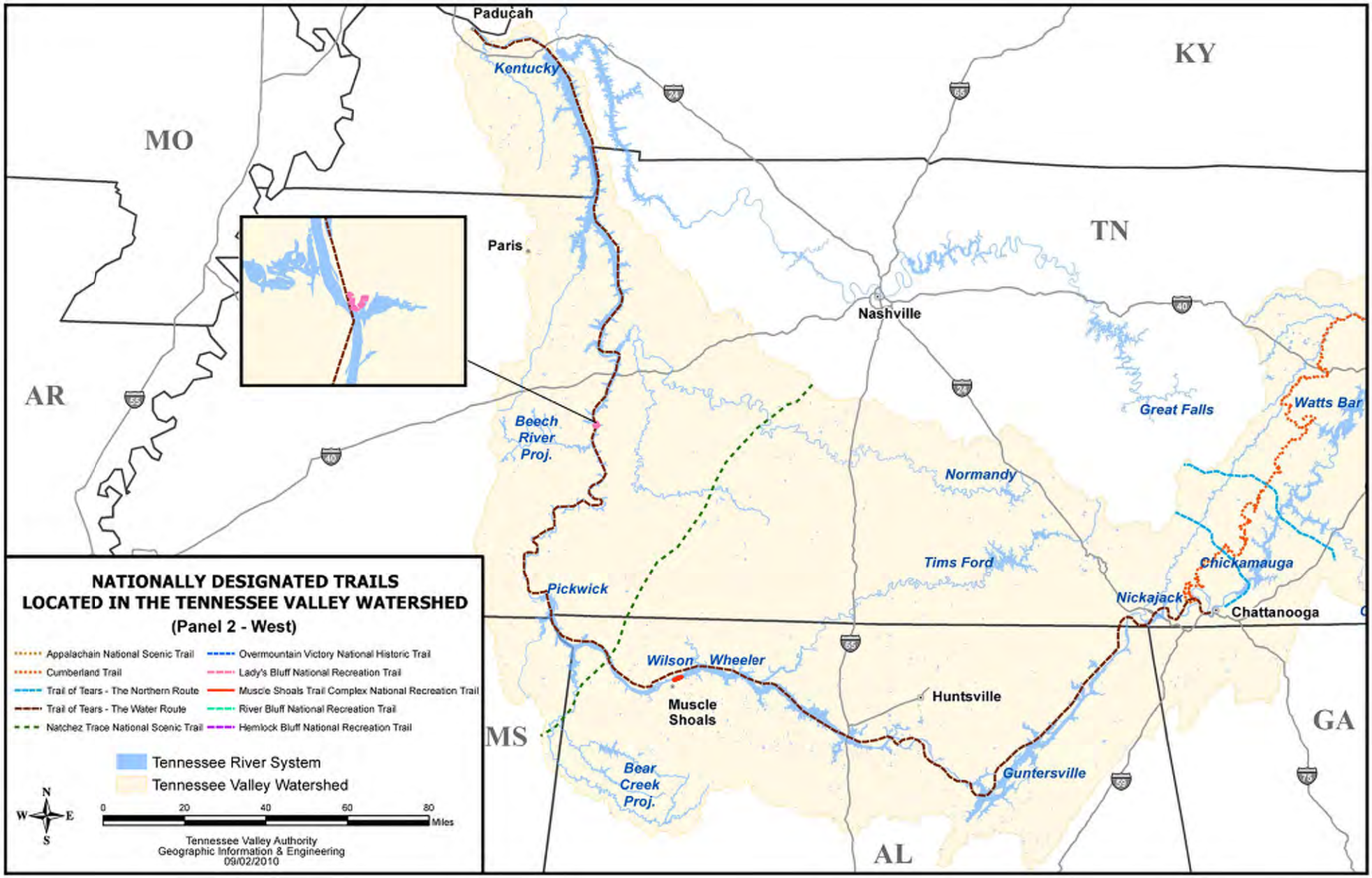
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Muscle Shoals
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Bear Creek Proj.
Guntersville
AL
NATIONALLY DESIGNATED TRAILS
LOCATED IN THE TENNESSEE VALLEY WATERSHED
(Panel 2 - West)
Appalachain National Scenic Trail
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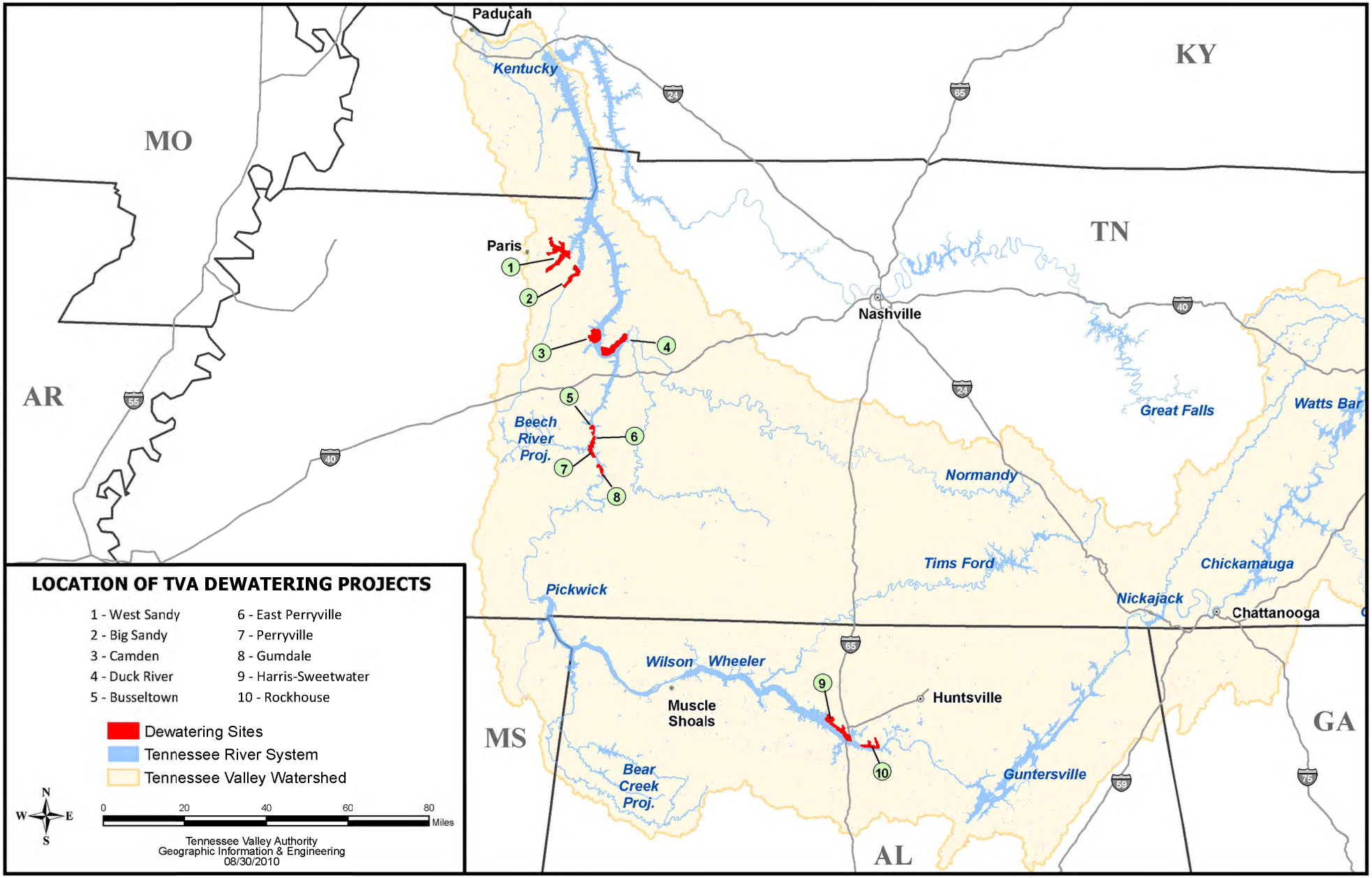
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Pickwick
Nickajack
Chattanooga
Wilson
Wheeler
Muscle Shoals
Huntsville
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AL
Bear Creek Proj.
Guntersville
LOCATION OF TVA DEWATERING PROJECTS
1 - West Sandy
2 - Big Sandy
3 - Camden
4 - Duck River
5 - Busseltown
6 - East Perryville
7 - Perryville
8 - Gumdale
9 - Harris-Sweetwater
10 - Rockhouse
Dewatering Sites
Tennessee River System
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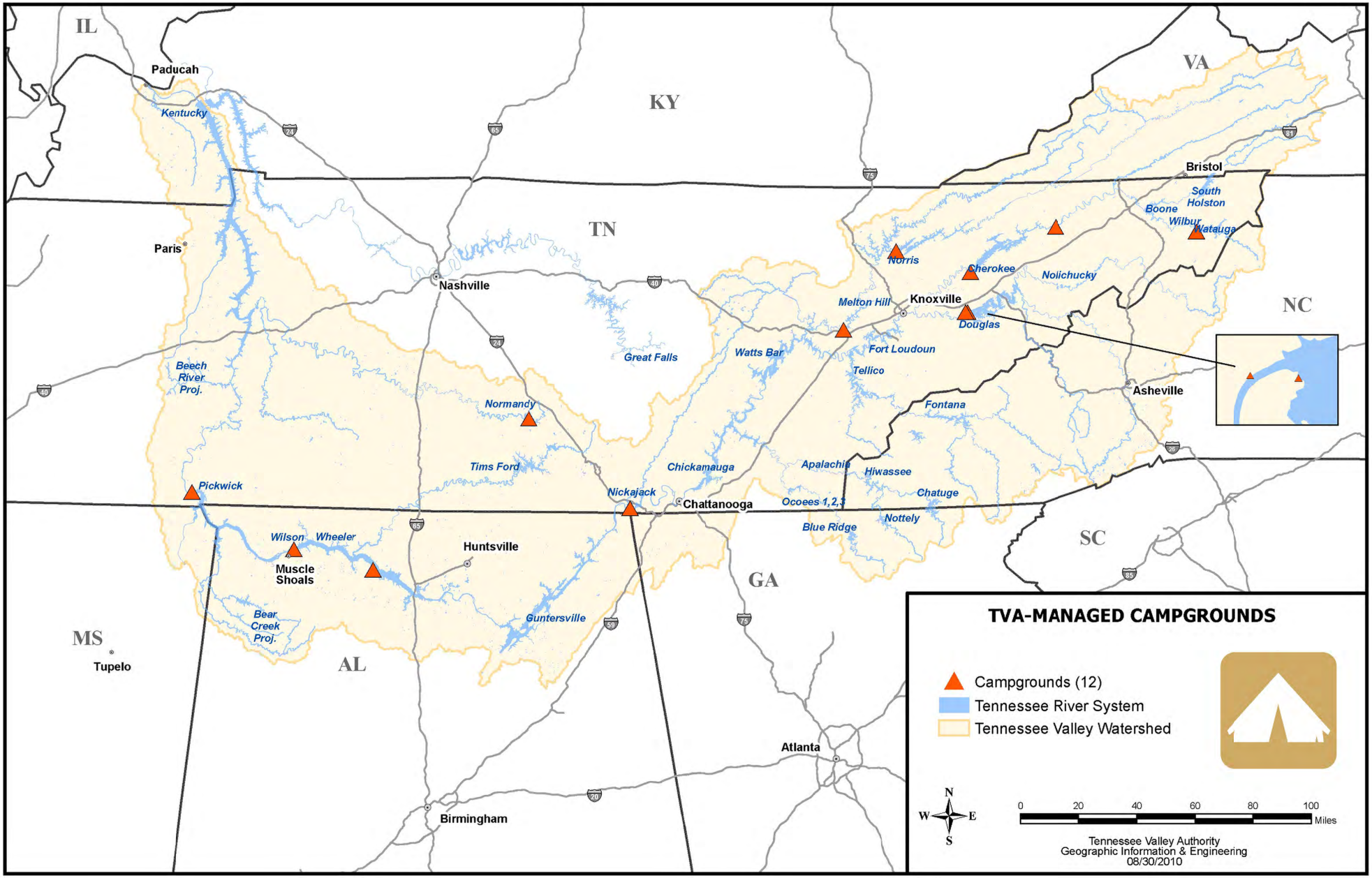
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Norris
Cherokee
Nolichucky
Melton Hill
Knoxville
Douglas
Great Falls
Watts Bar
Fort Loudoun
Tellico
Fontana
Asheville
Beech River Proj.
Normandy
Tims Ford
Chickamauga
Apalachia
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Chatuge
Ocoees 1,2,3
Nottely
Blue Ridge
Pickwick
Nickajack
Chattanooga
Wilson
Wheeler
Muscle Shoals
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TVA-MANAGED CAMPGROUNDS
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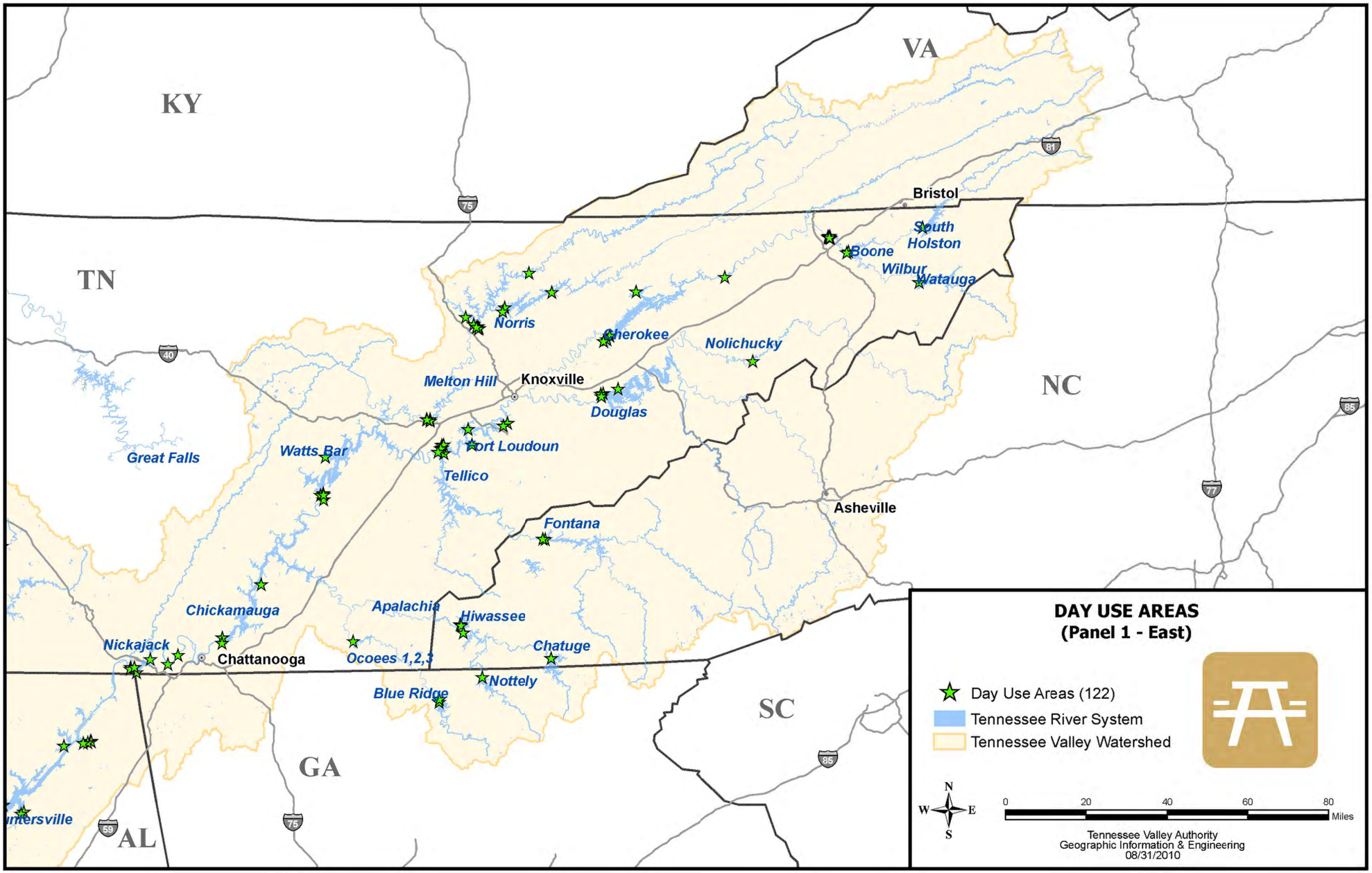
Tennessee Valley Authority
Geographic Information & Engineering
08/30/2010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DAY USE AREAS
(Panel 1 - East)
Day Use Areas (122)
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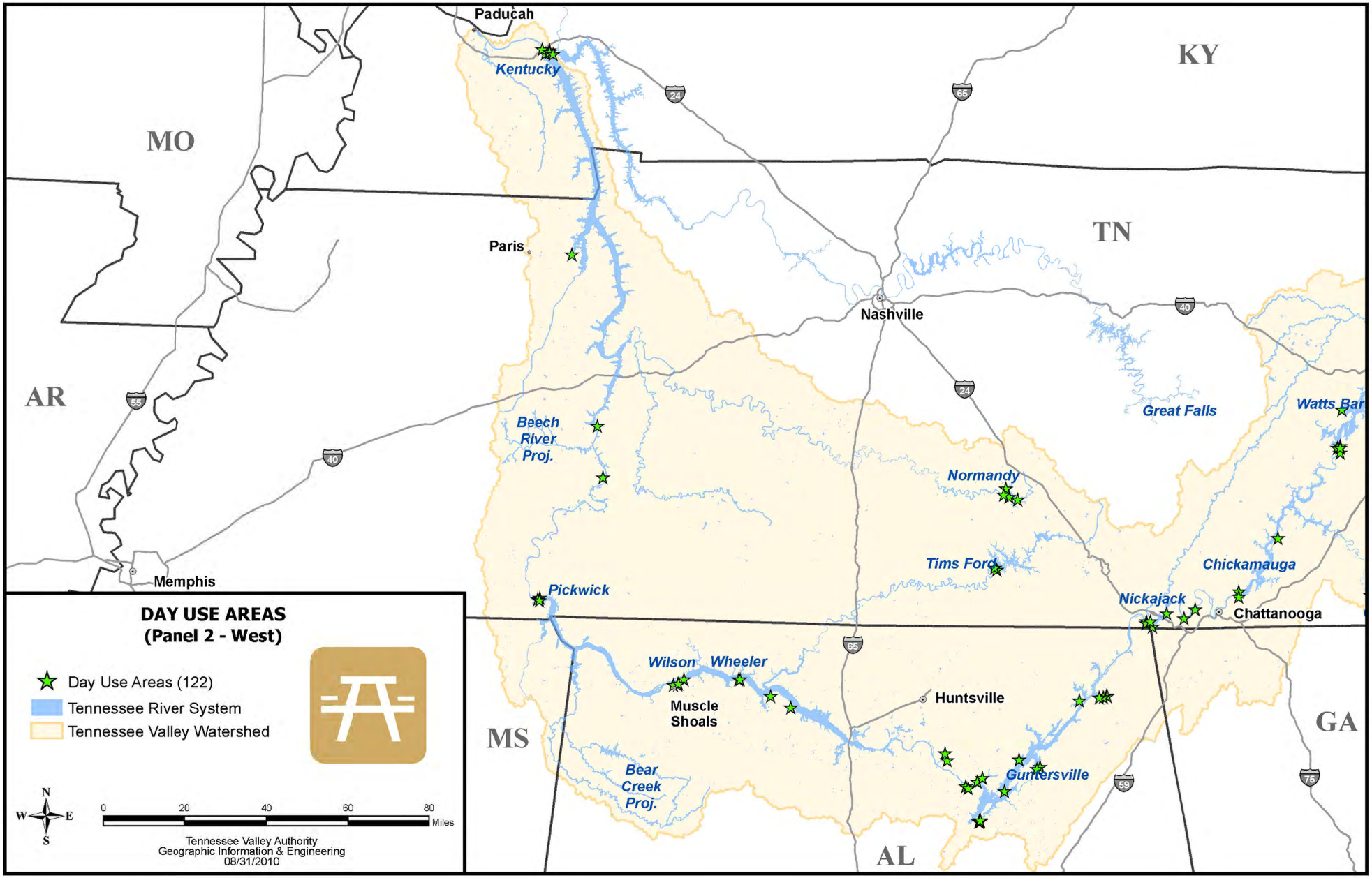
Geographic Information & Engineering
08/31/2010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DAY USE AREAS
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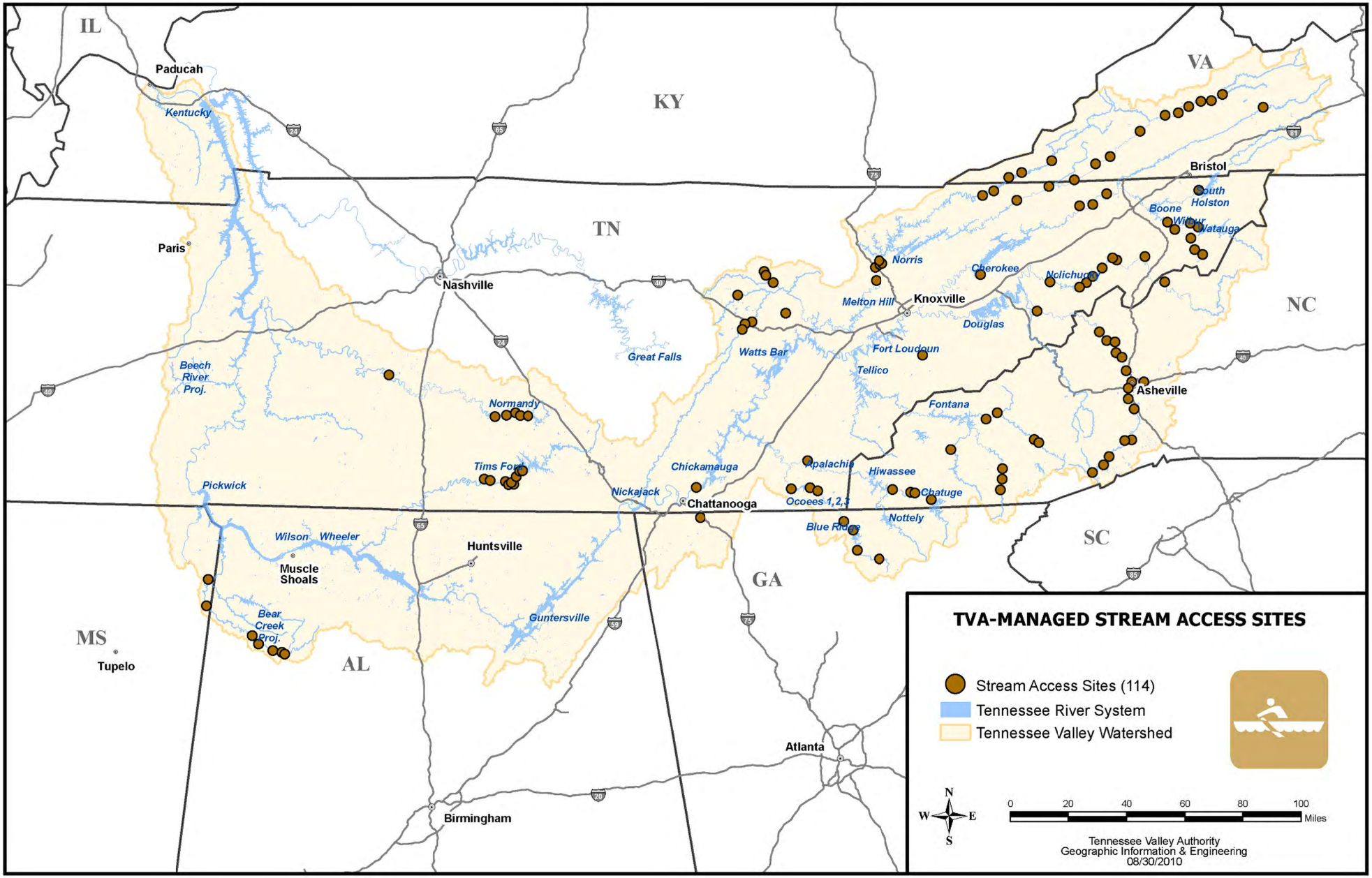
Geographic Information & Engineering
08/31/2010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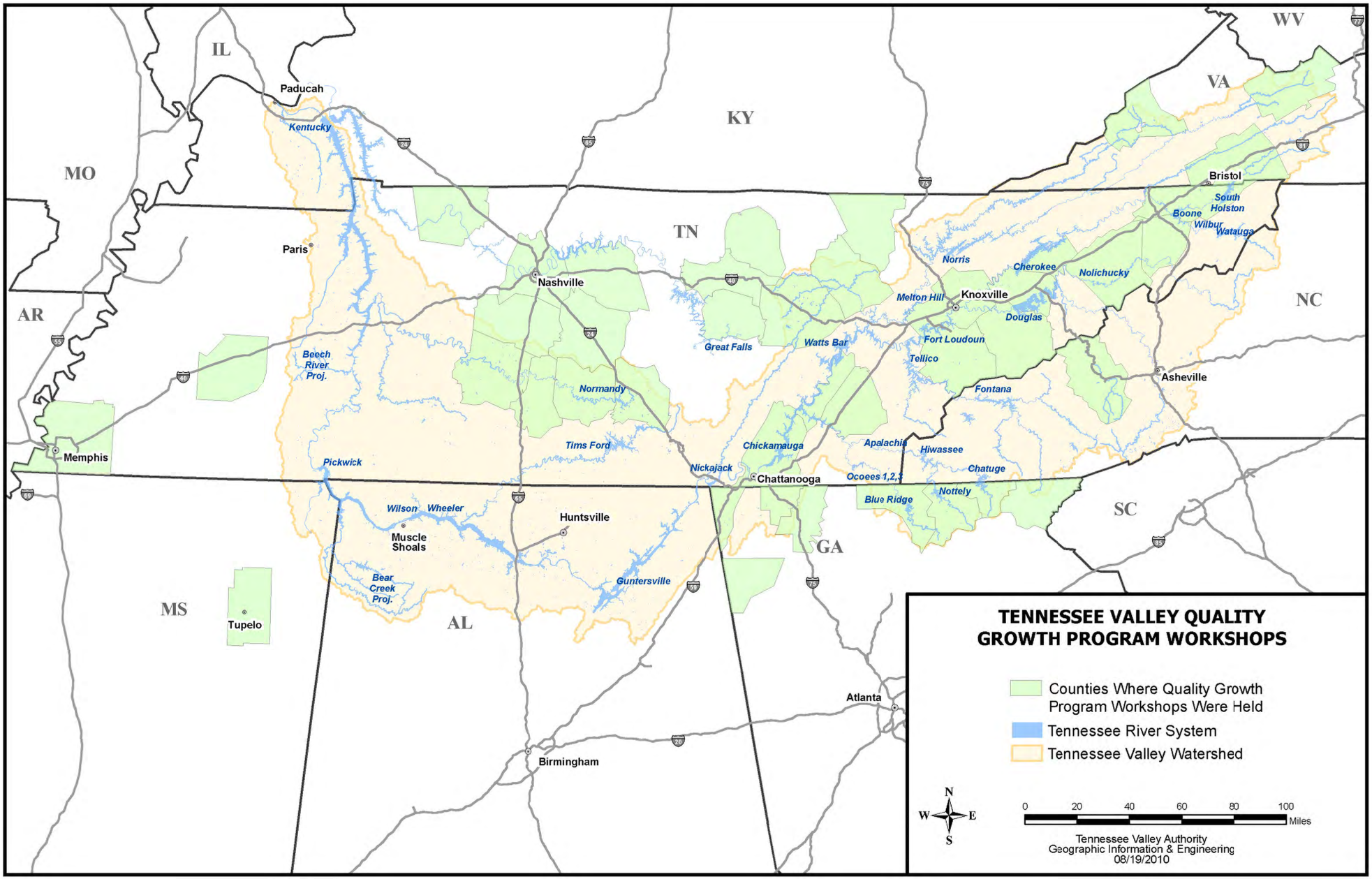
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TENNESSEE VALLEY QUALITY GROWTH PROGRAM WORKSHOPS
Counties Where Quality Growth Program Workshops Were Held
Tennessee River System
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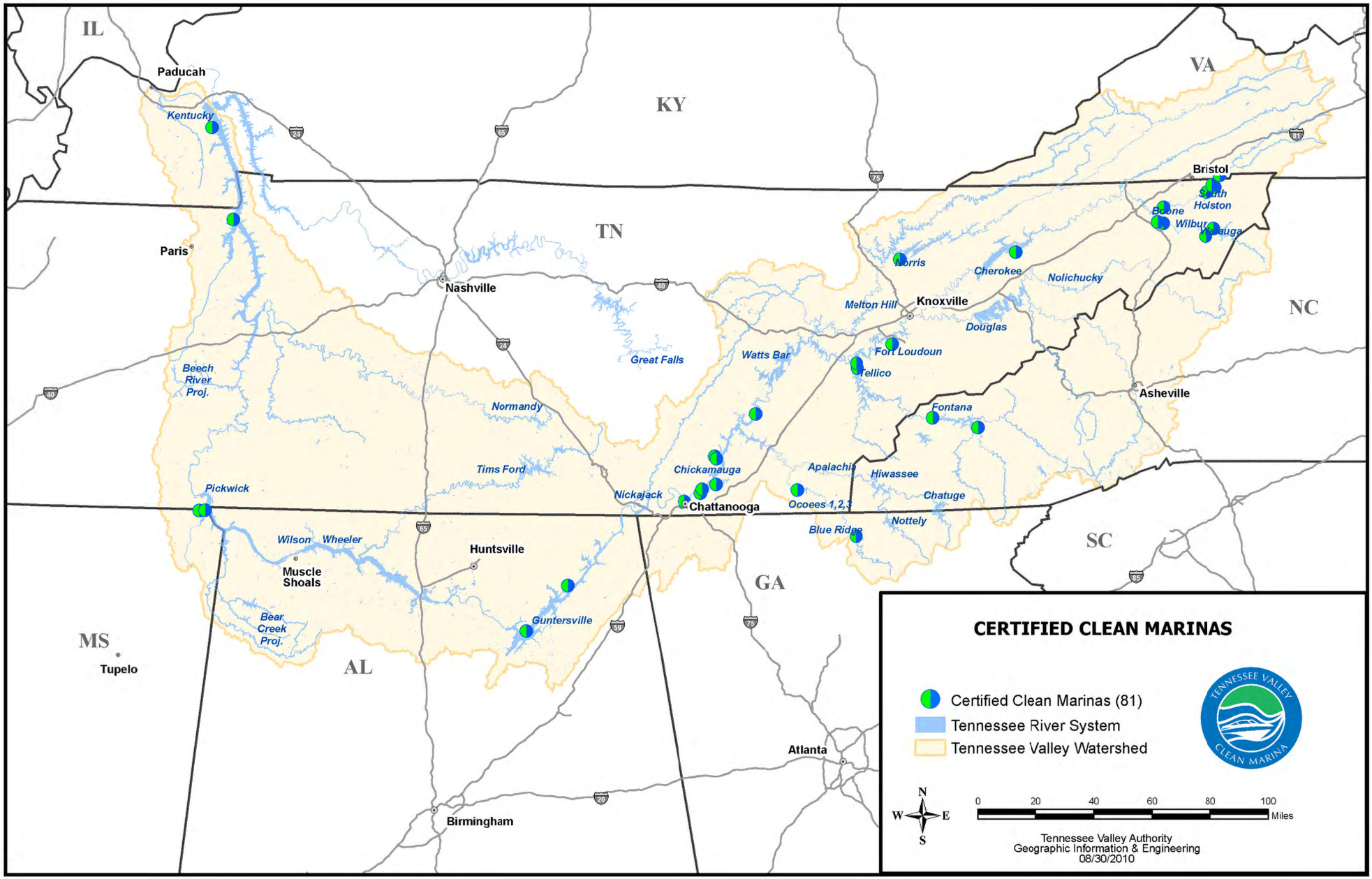
Geographic Information & Engineering
08/19/2010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Pickwick
Wilson
Wheeler
Muscle Shoals
Huntsville
Guntersville
Bear Creek Proj.
Tupelo
Atlanta
Birmingham
CERTIFIED CLEAN MARINAS
Certified Clean Marinas (81)
Tennessee River System
Tennessee Valley Watershed
TENNESSEE VALLEY CLEAN MARINA
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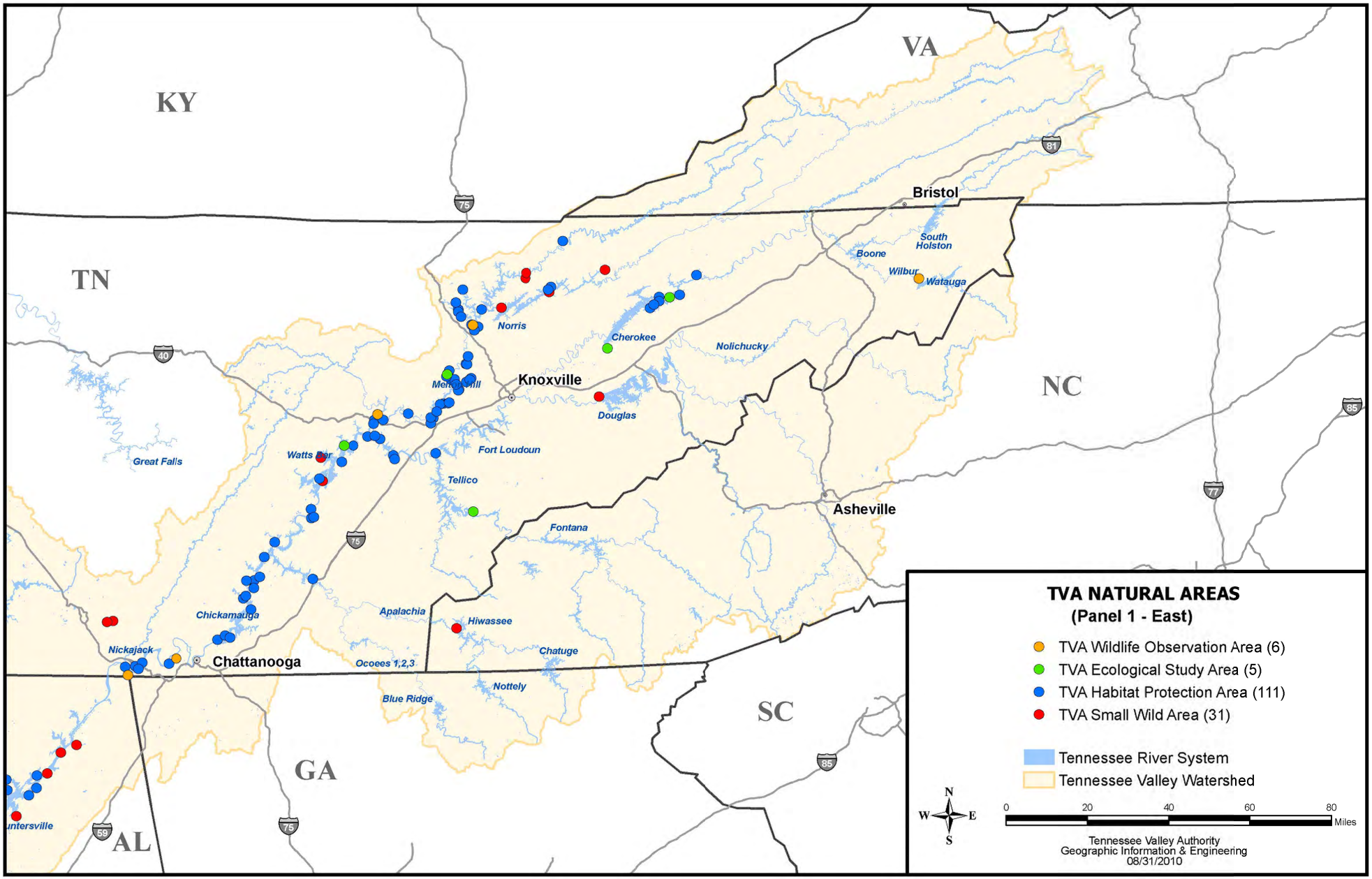
Geographic Information & Engineering
08/30/2010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TVA NATURAL AREAS
(Panel 1 - East)
TVA Wildlife Observation Area (6)
TVA Ecological Study Area (5)
TVA Habitat Protection Area (111)
TVA Small Wild Area (31)
Tennessee River System
Tennessee Valley Watershed
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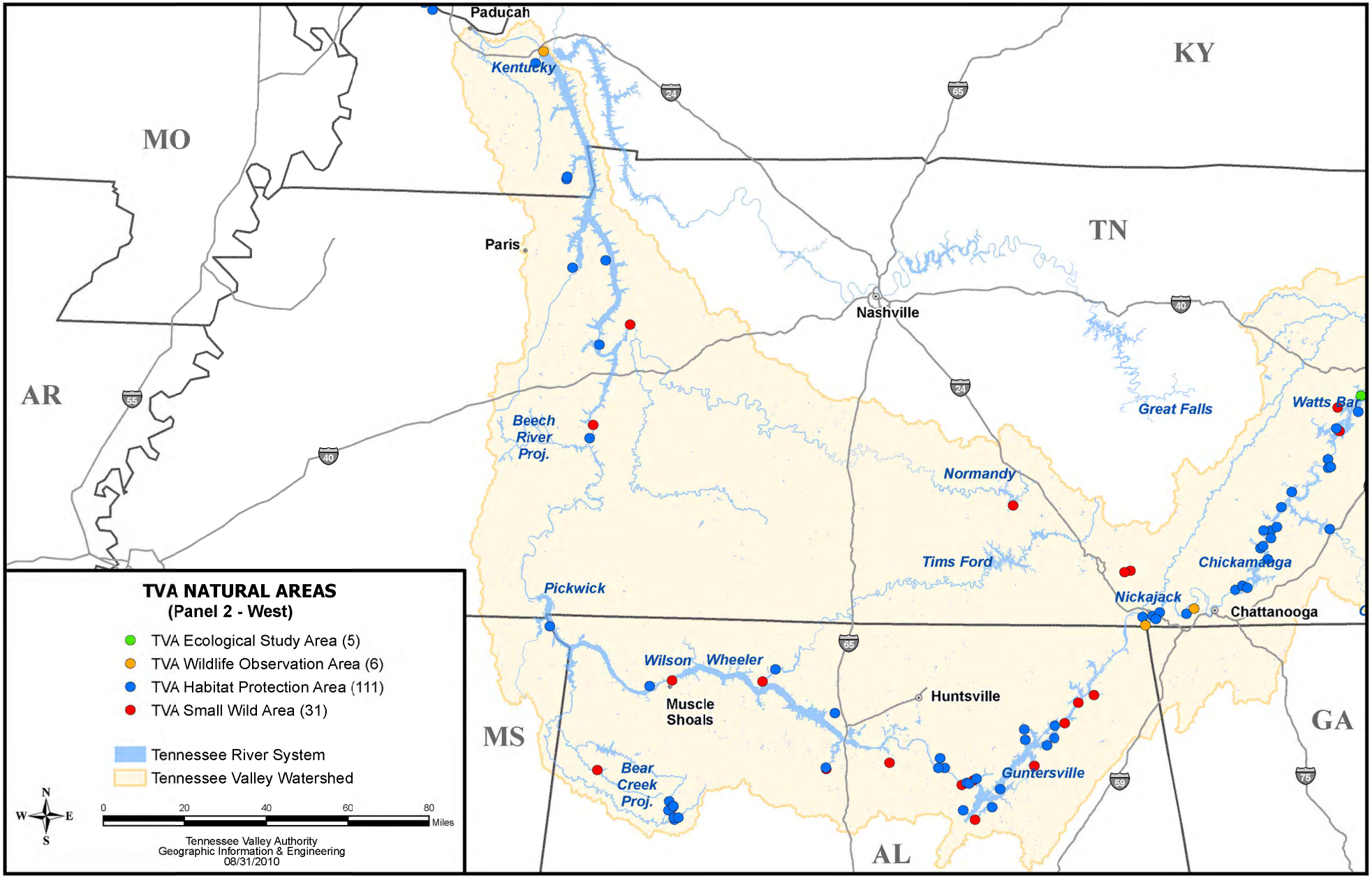
Miles
Tennessee Valley Authority
Geographic Information & Engineering
08/31/2010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TVA NATURAL AREAS
(Panel 2 - West)
TVA Ecological Study Area (5)
TVA Wildlife Observation Area (6)
TVA Habitat Protection Area (111)
TVA Small Wild Area (31)
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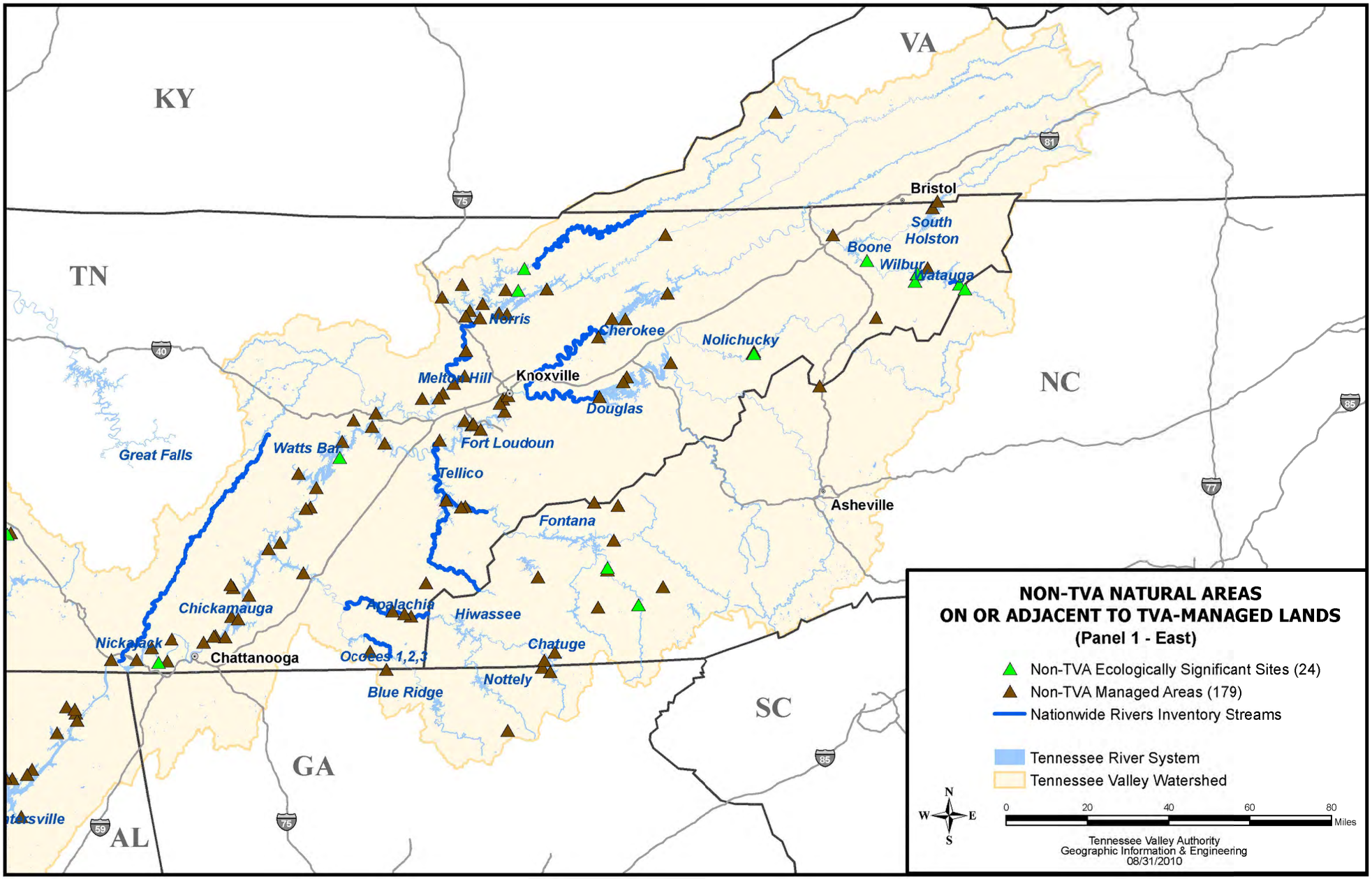
Geographic Information & Engineering
08/31/2010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NON-TVA NATURAL AREAS
ON OR ADJACENT TO TVA-MANAGED LANDS
(Panel 1 - East)
Non-TVA Ecologically Significant Sites (24)
Non-TVA Managed Areas (179)
Nationwide Rivers Inventory Streams
Tennessee River System
Tennessee Valley Watershed
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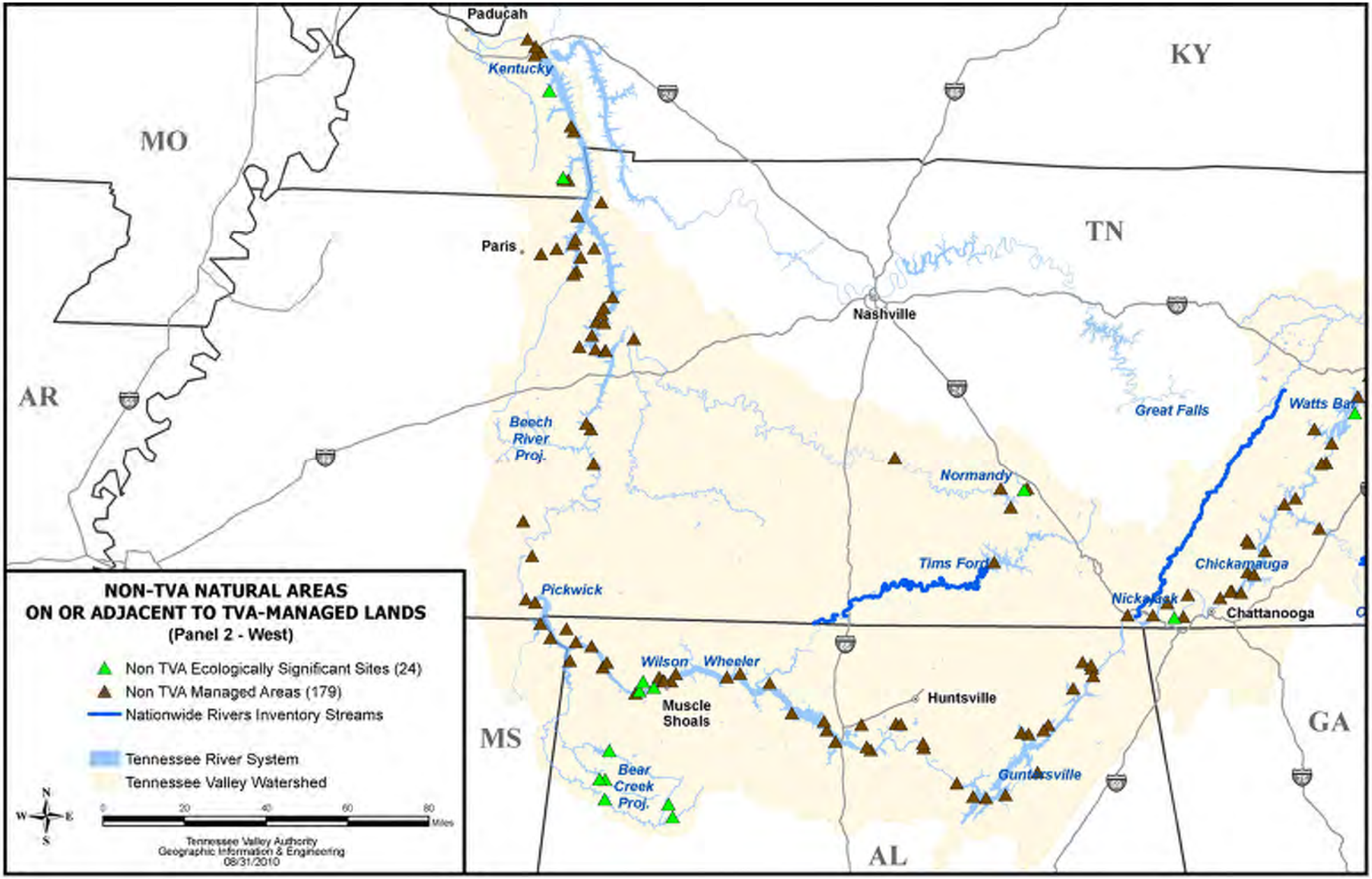
Geographic Information & Engineering
08/31/2010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NON-TVA NATURAL AREAS
ON OR ADJACENT TO TVA-MANAGED LANDS
(Panel 2 - West)
Non TVA Ecologically Significant Sites (24)
Non TVA Managed Areas (179)
Nationwide Rivers Inventory Streams
Tennessee River System
Tennessee Valley Watershed
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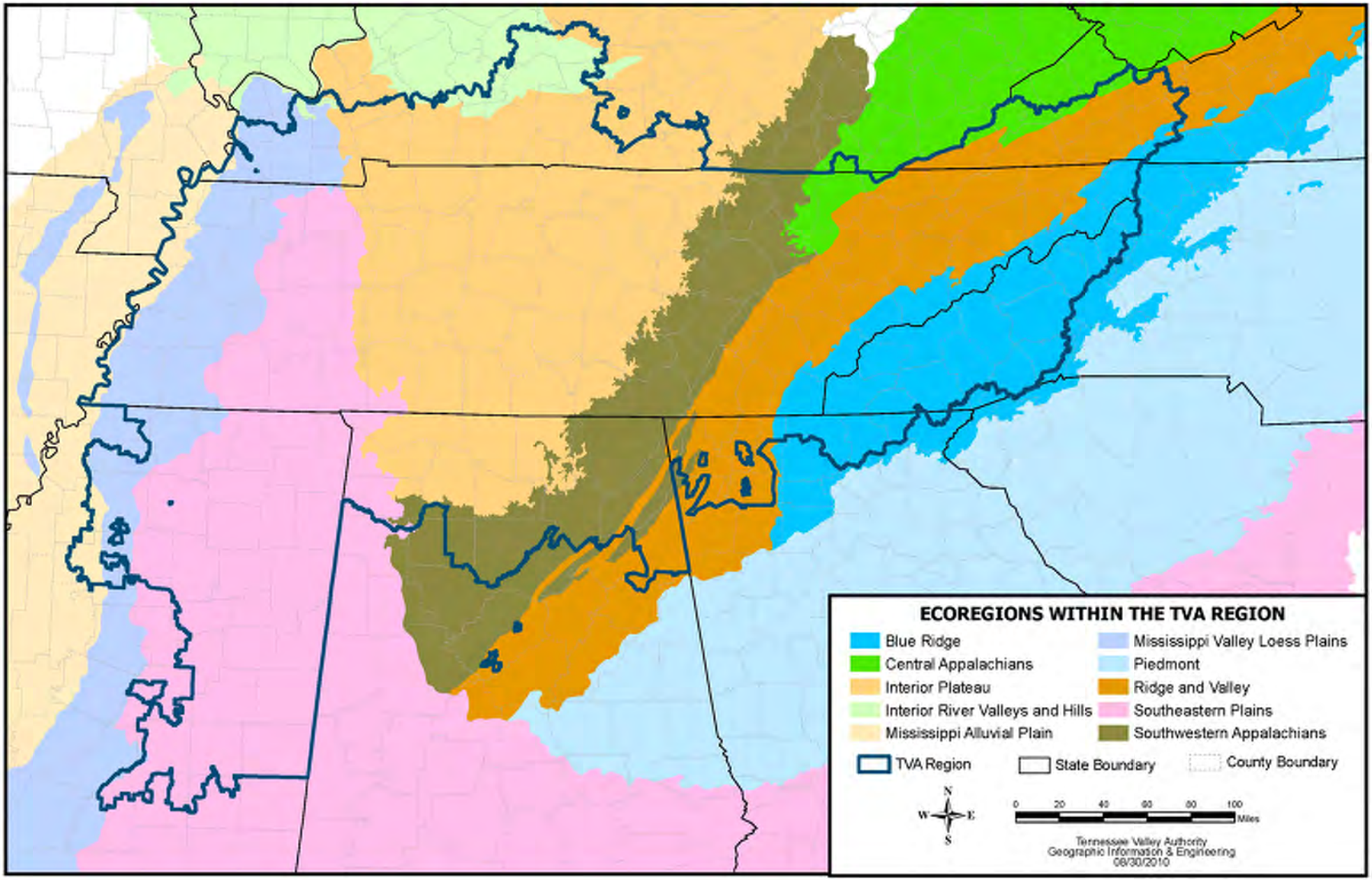
Geographic Information & Engineering
08/31/2010


ECOREGIONS WITHIN THE TVA REGION
Blue Ridge
Central Appalachians
Interior Plateau
Interior River Valleys and Hills
Mississippi Alluvial Plain
Mississippi Valley Loess Plains
Piedmont
Ridge and Valley
Southeastern Plains
Southwestern Appalachians
TVA Region
State Boundary
County Boundary
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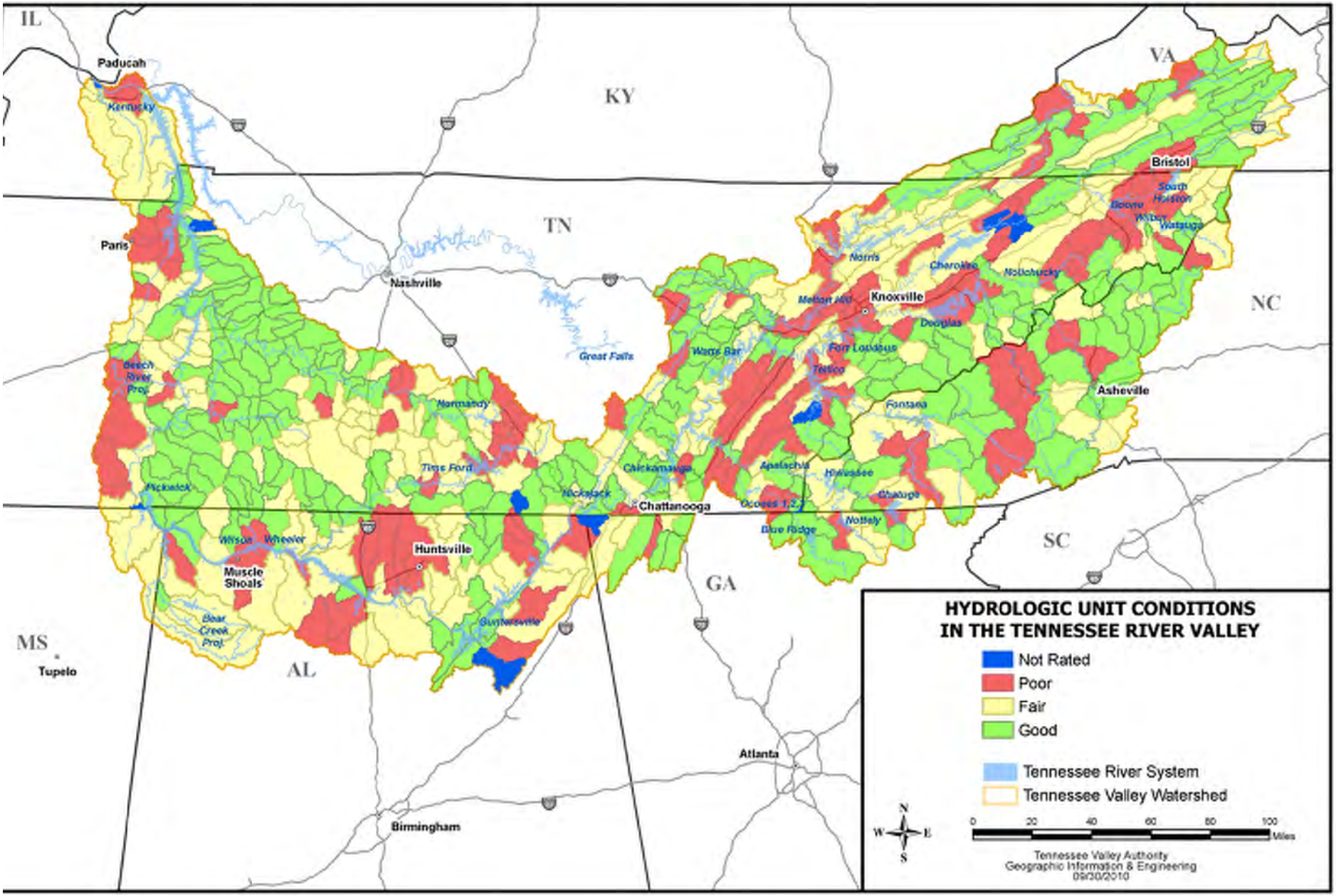
0 20 40 60 80 100
Miles
Tennessee Valley Authority
Geographic Information & Engineering
08/30/2010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Muscle Shoals
Huntsville
Guntersville
Bear Creek Proj.
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Atlanta
HYDROLOGIC UNIT CONDITIONS
IN THE TENNESSEE RIVER VALLEY
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Poor
Fair
Good
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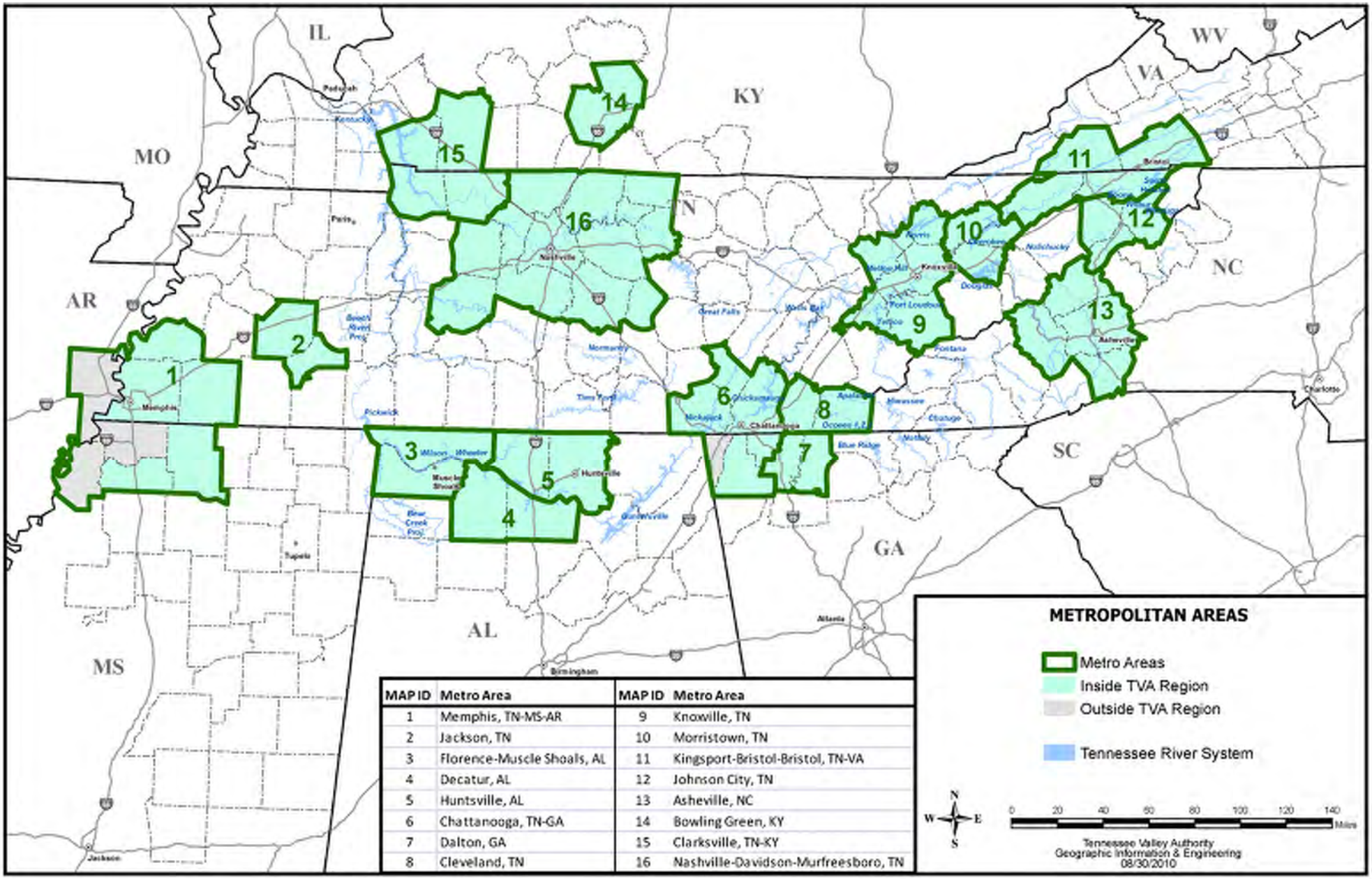
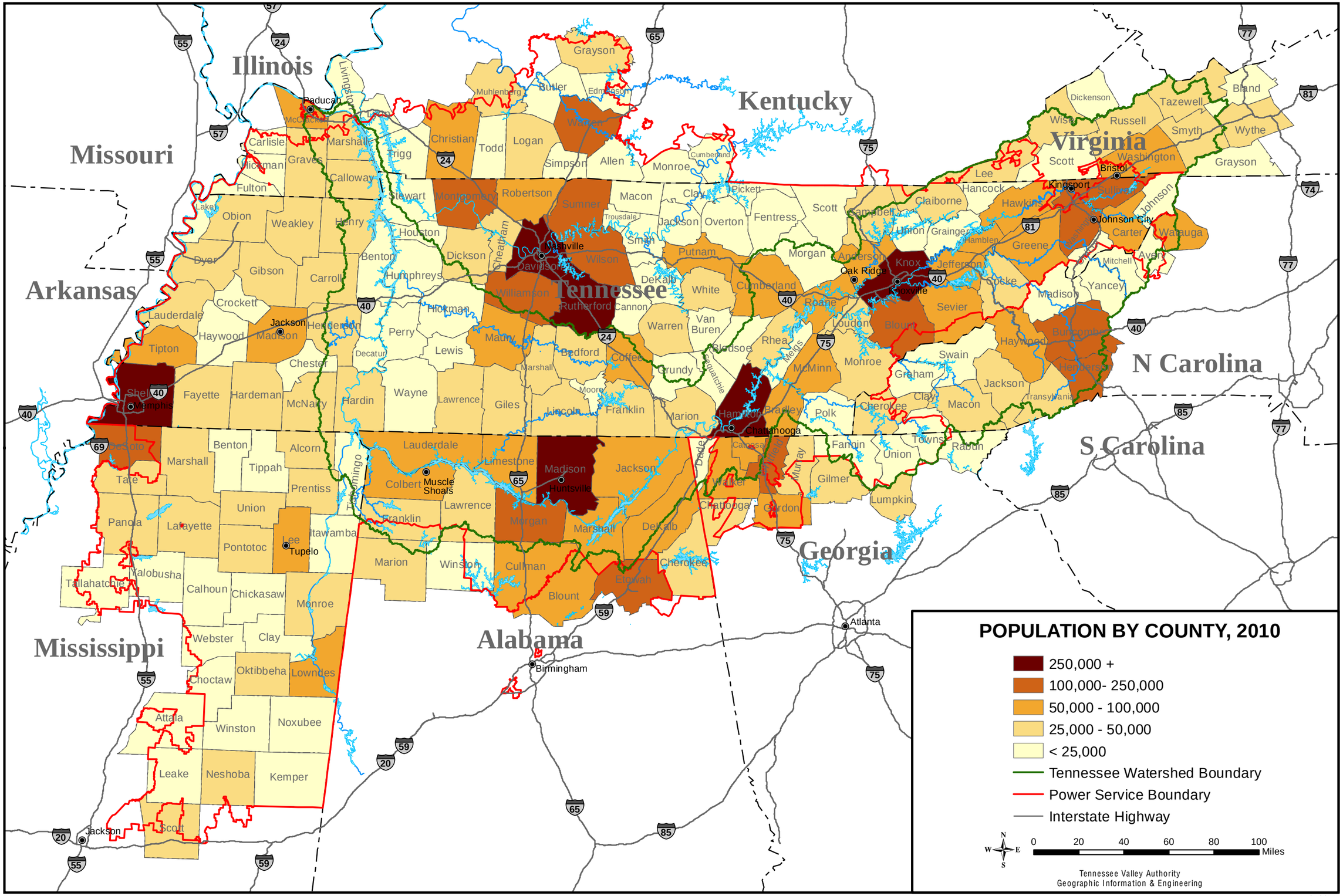
Geographic Information & Engineering
09/30/2010



MAP ID	Metro Area	MAP ID	Metro Area
1	Memphis, TN-MS-AR	9	Knoxville, TN
2	Jackson, TN	10	Morristown, TN
3	Florence-Muscle Shoals, AL	11	Kingsport-Bristol-Bristol, TN-VA
4	Decatur, AL	12	Johnson City, TN
5	Huntsville, AL	13	Asheville, NC
6	Chattanooga, TN-GA	14	Bowling Green, KY
7	Dalton, GA	15	Clarksville, TN-KY
8	Cleveland, TN	16	Nashville-Davidson-Murfreesboro, TN



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June 8, 2011

MANUFACTURING EMPLOYMENT, 2009
Percent of Total

Below Regional Average (10.4 %)
- Less than 5.0 %
- 5.0 to 10.4 %

Above Regional Average
- 10.4 to 20 %
- Greater than 20 %

- Tennessee Watershed Boundary
- Power Service Boundary
- Interstate Highway

0 20 40 60 80 100 Miles

Tennessee Valley Authority
Geographic Information & Engineering

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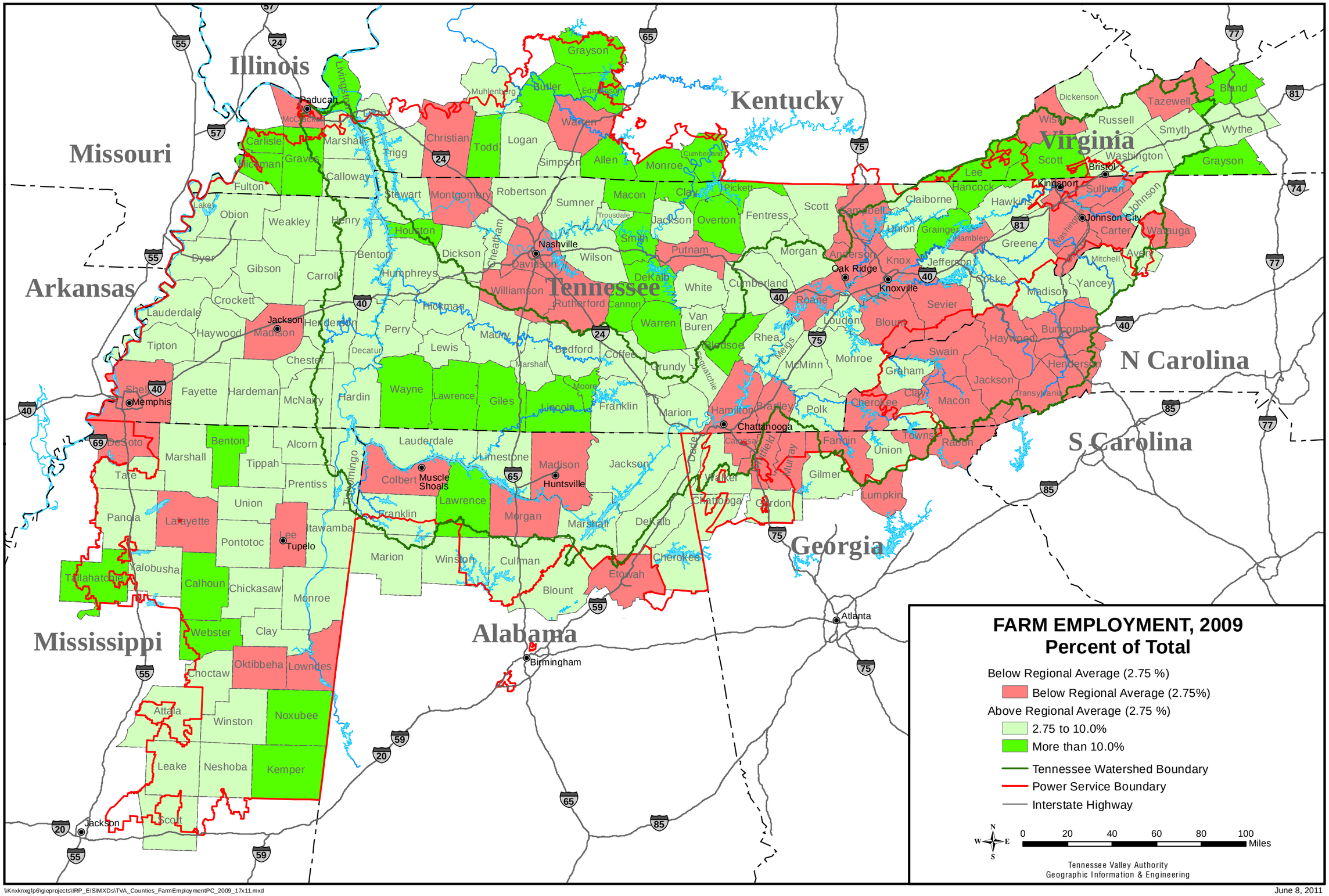
June 8, 2011



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June 8, 2011

PER CAPITA PERSONAL INCOME, 2009

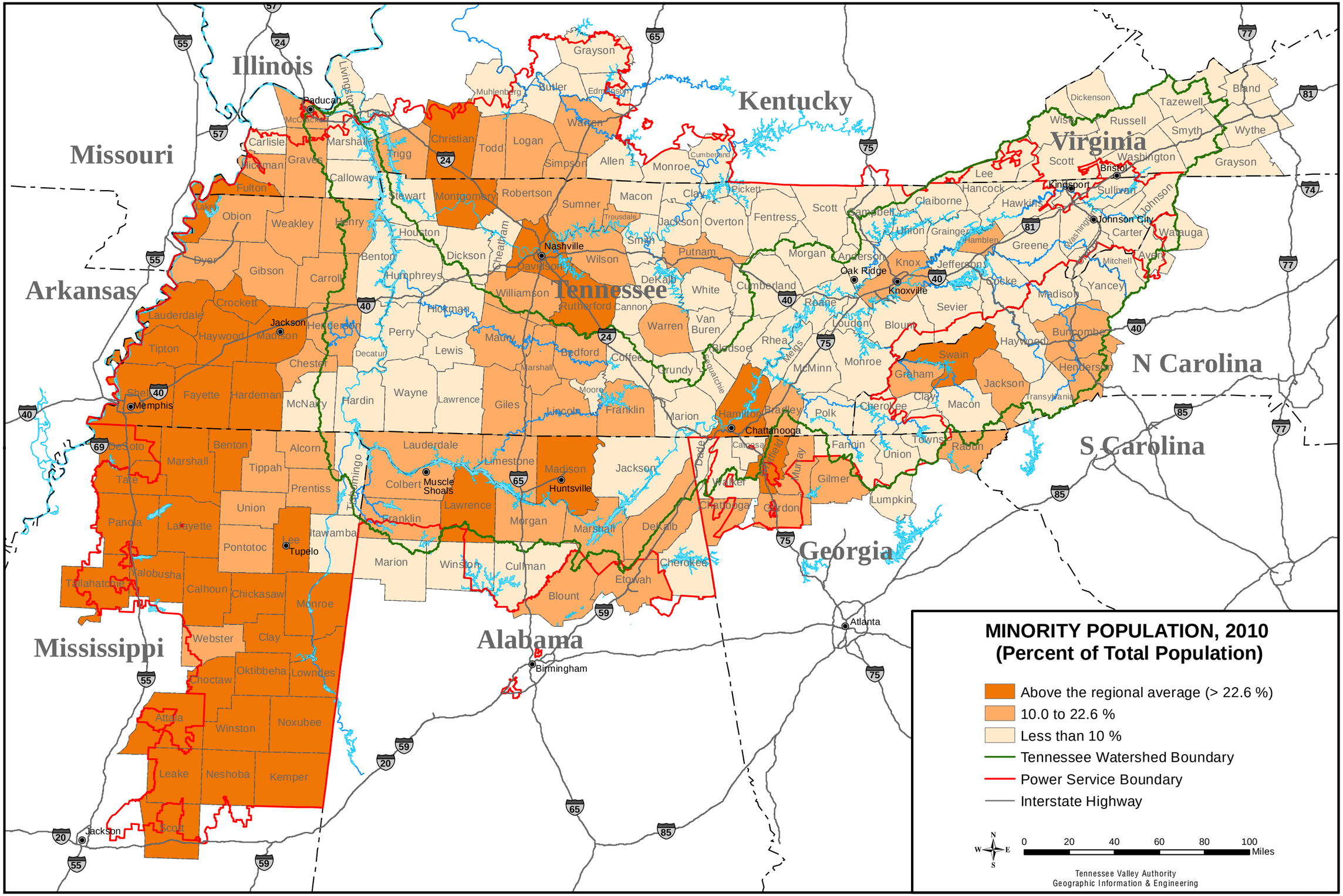
- Less than $25,000
- $25,000 to Regional Average ($32,643)
- Above Regional Average
- Tennessee Watershed Boundary
- Power Service Boundary
- Interstate Highway

0 20 40 60 80 100 Miles

Tennessee Valley Authority
Geographic Information & Engineering

\\Knxknxgfp6\gieprojects\IRP_EIS\MXDs\TVA_Counties_PerCapitaIncome_2009_17x11.mxd

June 8, 2011



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June 8, 2011

POPULATION BELOW POVERTY LEVEL, 2009

Greater than 20 %
17.4 to 20 %
Below regional average (17.4%)
Tennessee Watershed Boundary
Power Service Boundary
Interstate Highway

0 20 40 60 80 100 Miles

Tennessee Valley Authority
Geographic Information & Engineering

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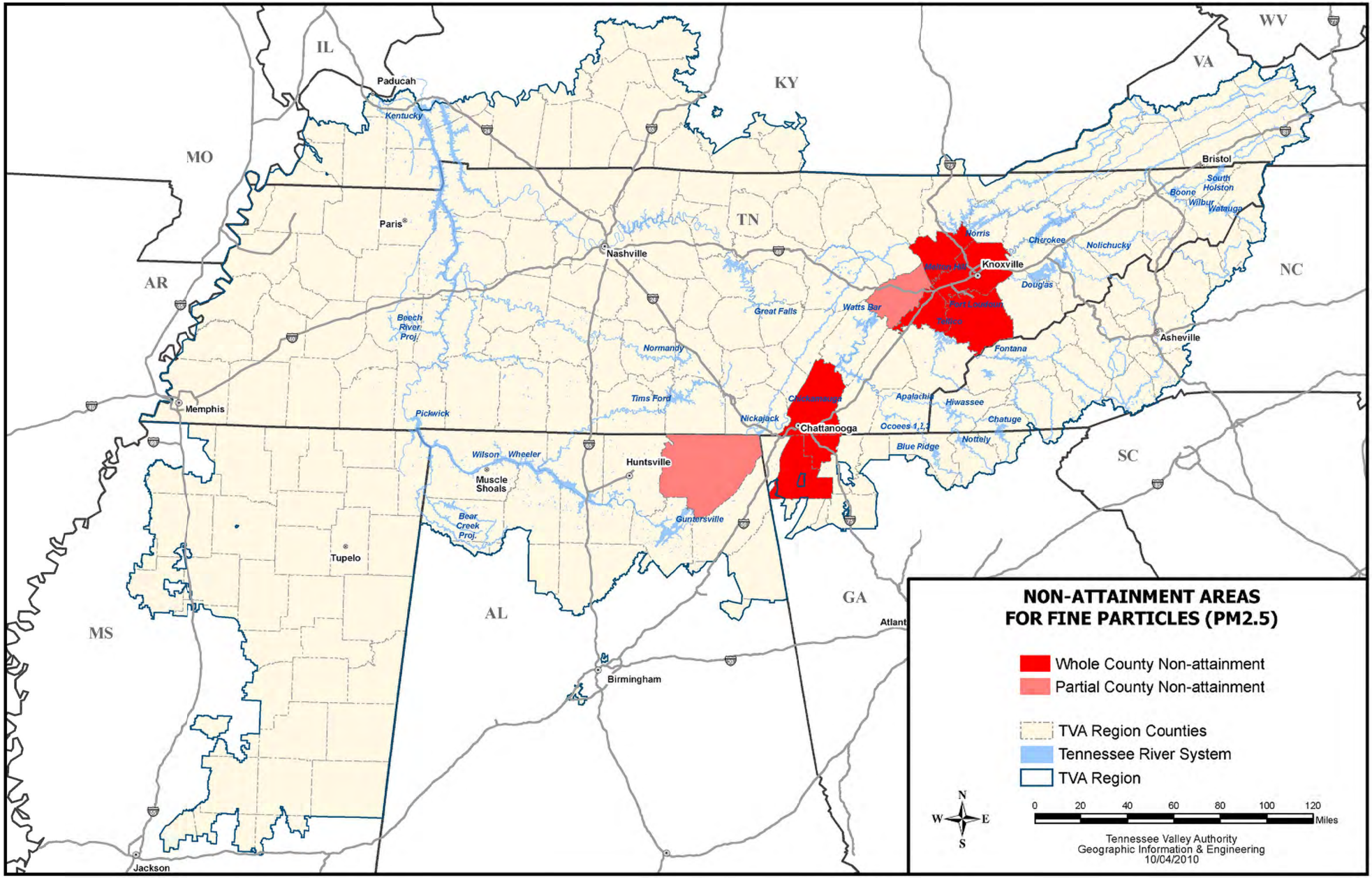
June 8, 2011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Huntsville
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Birmingham
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NON-ATTAINMENT AREAS
FOR FINE PARTICLES (PM2.5)
Whole County Non-attainment
Partial County Non-attainment
TVA Region Counties
Tennessee River System
TVA Region
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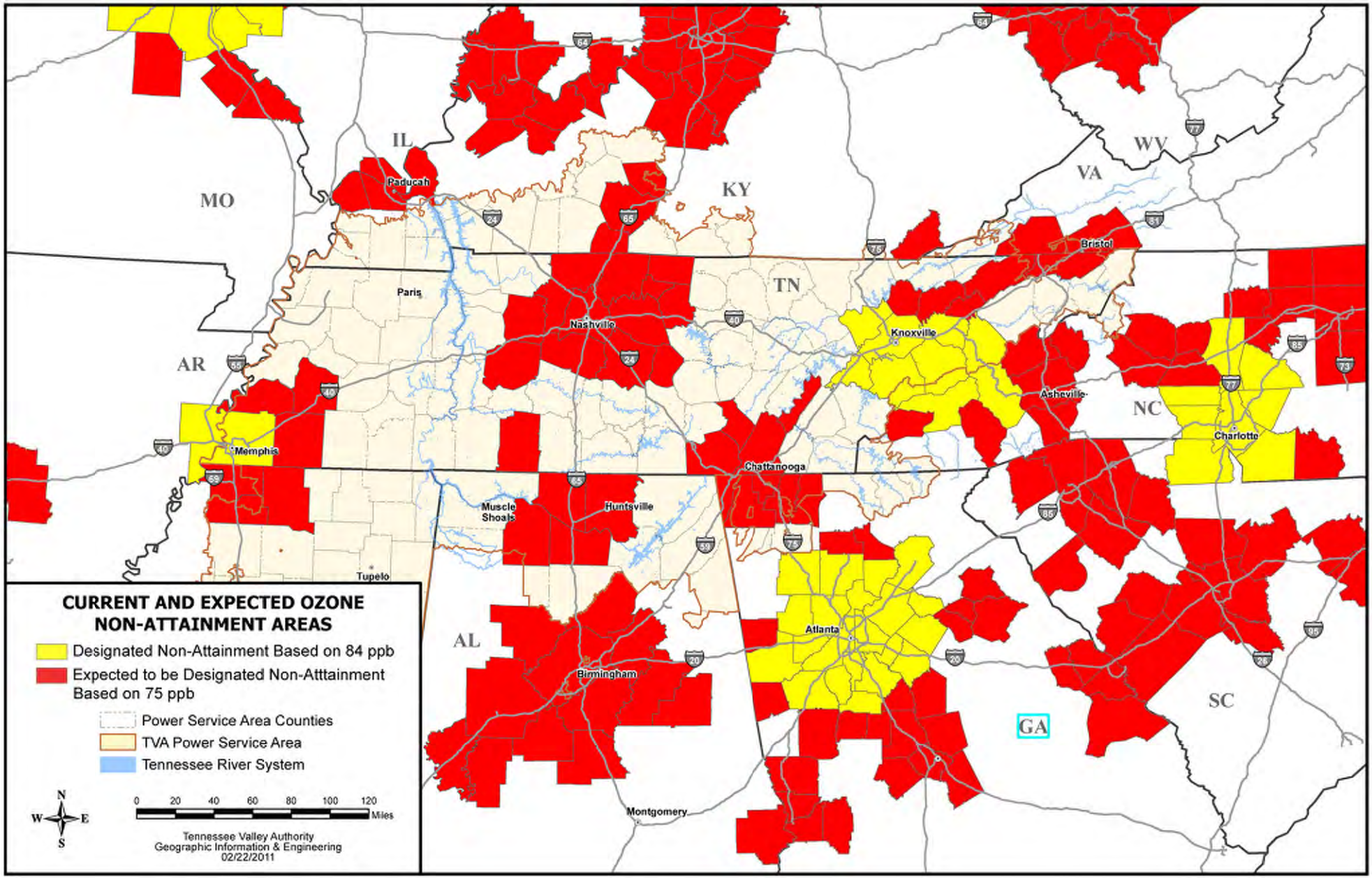
Tennessee Valley Authority
Geographic Information & Engineering
10/04/2010


CURRENT AND EXPECTED OZONE NON-ATTAINMENT AREAS
Designated Non-Attainment Based on 84 ppb
Expected to be Designated Non-Atttainment Based on 75 ppb
Power Service Area Counties
TVA Power Service Area
Tennessee River System
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Tennessee Valley Authority
Geographic Information & Engineering
02/22/2011
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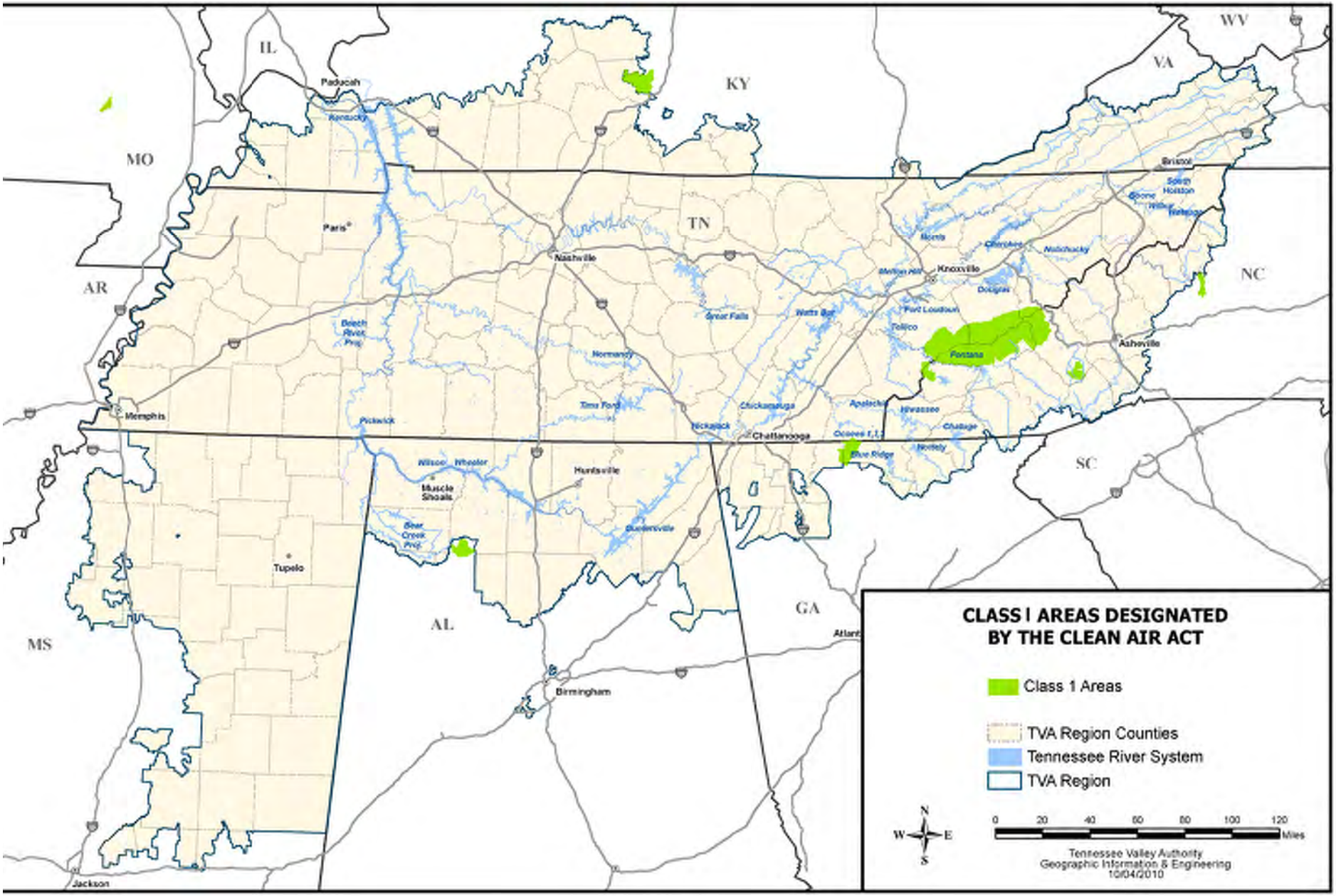
Montgomery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Beech River Proj
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River Creek Proj
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Nolichucky
Norris
Melton Hill
Fort Loudoun
Tellico
Ocoee #1,2
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Chatuge
Apalachia
Hiwassee
Chickamauga
Nickajack
Bluff City
Bluff City
CLASS I AREAS DESIGNATED
BY THE CLEAN AIR ACT
Class 1 Areas
TVA Region Counties
Tennessee River System
TVA Region
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Miles
Tennessee Valley Authority
Geographic Information & Engineering
10/04/2010

Appendix B – TVA's Recreation Chronology

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TVA'S RECREATION CHRONOLOGY

1934-37
Demonstration parks and a boat dock built in cooperation with National Park Service and Civilian Conservation Corps.

1937
First lease of reservoir land to a public agency for recreation development: State of Tennessee, Cove Lake State Park.

1938
Publication of *The Scenic Resources of the Tennessee Valley*, a descriptive and pictorial inventory. Focused attention on the wealth of scenic resources in the Tennessee Valley and the need to conserve and develop them.

1940
Pickwick Village licensed to the Pickwick Company, first of six former TVA construction villages to be converted to public or commercial recreation use.

Recreation Development of the Tennessee River System Report transmitted by President Roosevelt to Congress (H. Doc. 565, 76th Congress).

1942-43
Memorandums of agreement with conservation departments of Alabama, Kentucky, North Carolina, and Tennessee recording common objectives in field of recreation and cooperation in achieving them in the public interest.

1945
First transfer of reservoir land to a state for public recreation development: State of Tennessee, Paris Landing State Park.

1961
Began publication of recreation maps for individual TVA reservoirs.

1966
Recreation was recognized for the first time as a significant benefit (56 percent) in the economic justification of a TVA reservoir project: Tims Ford.

1967
Recreation Resources Program established by TVA.

1972
Apalachia powerhouse operated on special experimental schedule during summer to provide streamflows to benefit trout fishing and canoeing or floating on Hiwassee River.

1973
TVA Board of Directors approved policy for the identification and protection of areas of natural, scenic, and cultural significance.

TVA entered into an agreement with the State of Tennessee and three counties to develop the recreation resources of a 1,000-square-mile area in the Cumberland Plateau of southeast Tennessee on land owned by federal, state, and local agencies.

Program of trail development on TVA-owned land initiated. New trails will be tied in with existing state and national ones where feasible.

Began publication of navigation-recreation maps for TVA tributary reservoirs.

1973
First community recreation appraisal completed, offering assistance to municipal/county recreation departments and public agencies in developing comprehensive recreation programs.

1974
Eighteen sites on TVA land identified as Small Wild Areas to be preserved in natural state.

1975
A scenic riverway program developed as part of the Tennessee Valley Outdoor Recreation Plan.

1977
Conducted first community recreation demonstration.

1978
Community recreation was approved as a major component of TVA's socioeconomic mitigation program in areas affected by major TVA construction projects.

1979
TVA began providing organized summer recreation programs at selected reservoir recreation areas to serve special population day-camping groups, day users, and weekend users.

1981
TVA and the Tennessee Special Olympics Inc. cosponsored a Special Olympics outdoor recreation camp at Nickajack Dam Reservation. This was the first nonmilitary federal sponsorship of a sanctioned Special Olympics event.

Cooperative maintenance arrangements with local and private agencies sought to help maintain TVA recreation areas.

1982
A license agreement was developed for commercial river outfitters to operate on TVA-owned river access areas.

The Nature Conservancy, with financial assistance from TVA, established the Powell River Preserve in Claiborne County, Tennessee, to protect the only known population of the showy lady slipper orchid in the State of Tennessee or Tennessee Valley.

1983
TVA produced two Valleywide brochures showing available opportunities on TVA trails and scenic/recreational river resources.

Four TVA trails were designated as National Recreation Trails by the U.S. Department of the Interior bringing the total to nine trails with such designations.

TVA's emphasis on cooperative efforts to protect dispersed recreational and natural areas was exemplified through contracts with local, state, and federal agencies and private organizations. The agency entered into 11 agreements for stream access maintenance encompassing 35 sites; nine agreements for data exchange, management, protection, and/or identification of natural areas; and three maintenance agreements encompassing 17 trails.

1984
Fifteen local parks were developed on TVA lands with financial assistance through the Jobs Bill Program.

TVA published *The Tennessee Valley Outdoor Recreation Plan, Volume VII: Natural Areas,* which describes natural area identification and evaluation process, management, and site descriptions.

1985
TVA initiated public-private partnerships to provide commercial concession agreements to operate TVA developed campgrounds and day use areas, bringing the total number of areas operated under cooperative agreements to 12.

1989-90
Recession led to realignment of TVA's Recreation Program and resulted in reduced staff for inventory and data collection. Reimbursement was initiated for certain technical assistance activities.

1994-96
TVA land on the Ocoee River was used for Olympic Whitewater Center with initial events in 1996.

1996-98
Thirty-three TVA-developed campgrounds and day use areas were licensed and leased for concession operations, maintenance, and expansion (12 with public agencies and 21 with the private sector).

2002
TVA initiated the *Reservoir Operations Study* with a recreational component to determine increases or decreases in recreation values derived under certain operating conditions retaining various reservoir water levels.

TVA initiated inventory of reservoir recreation facilities.

2005
TVA developed a new *Recreation Strategy, Implementation Process and Guidelines* as a guide to TVA's future efforts in recreation. The plan was revised to incorporate advice from the Regional Resource Stewardship Council.

Initiated assessment of TVA's developed and dispersed recreation areas. Developed recreation site plans were updated to accommodate revisions of national standards for accessibility. "Limits of acceptable change" methodology was used to manage "high use" dispersed recreation areas.

2006
Ten-year workplan completed for recreation demand analysis, participation rates, needs review, areas assessments, compliance inspections, inventory updates, and information sharing.

2007
Reservoir Recreation Inventory Matrix first published on external website for public use.

Appendix C – Summary of NRP Scoping Results

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SUMMARY OF NRP SCOPING RESULTS

Part I – Integrated Resource Plan Questionnaire: Questions 2, 4, and 11

During the IRP scoping period, TVA solicited input from the public in the form of a questionnaire, in which three questions pertained to stewardship activities. All comments received during the IRP public comment period pertaining to stewardship have been included in the NRP project scoping. The responses have been organized by issue categories and quantified in the figures and tables below.

Question 2 asked the public to rank the public benefits (environmental protection, providing recreation, electricity production, economic development, research and technology development, protection of archaeological and historic sites, and management of natural resources) provided by TVA in terms of their importance to the responder on a scale of 1 (least important) to 5 (most important). Electricity production, environmental protection, and natural resource management were chosen as the most important by the commenters (Figure C-1). The public could also write in responses, and 13 write-in comments were received for Question 2 (Figure C-2).

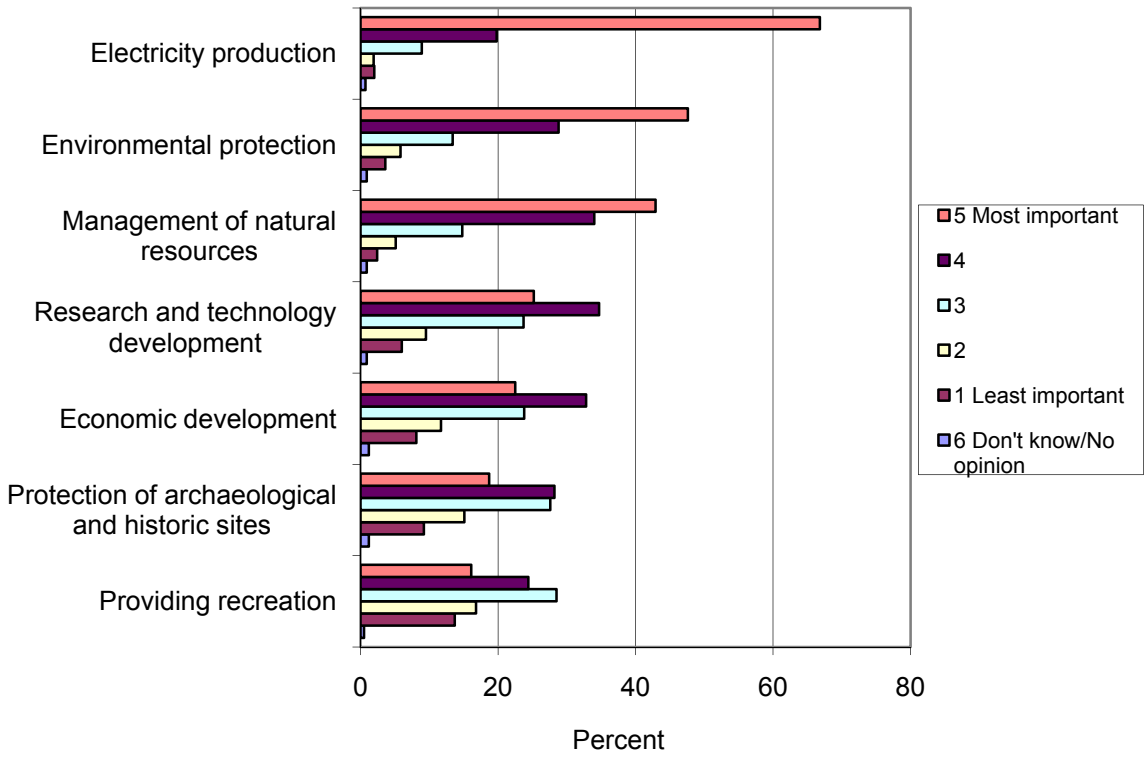

Figure C-1. Integrated Resource Plan Question 2 — Ranking of Public Benefits Provided by TVA

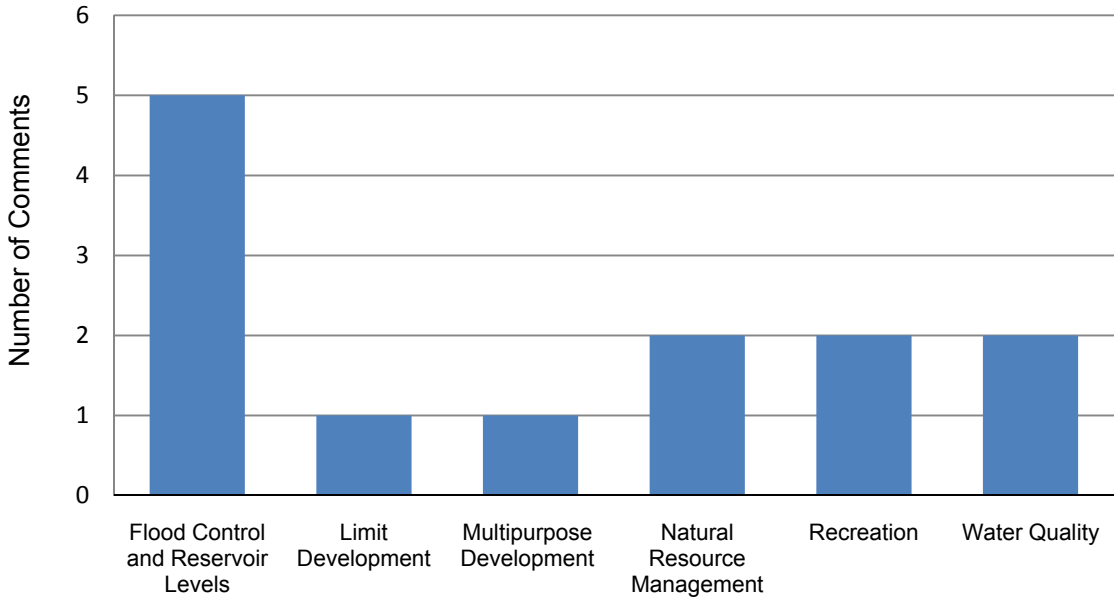

Figure C-2. Overview of Write-In Answers for Integrated Resource Plan Question 2 Organized by Issue Categories

Question 4 asked the public to rank the importance of the following activities: informal recreation, developed recreation, habitat management, and cultural resource management. Habitat management was chosen as the most important by the commenters (Figure B-3). The public could also write in responses, and 39 write-in comments were received for Question 4 (Figure C-4).

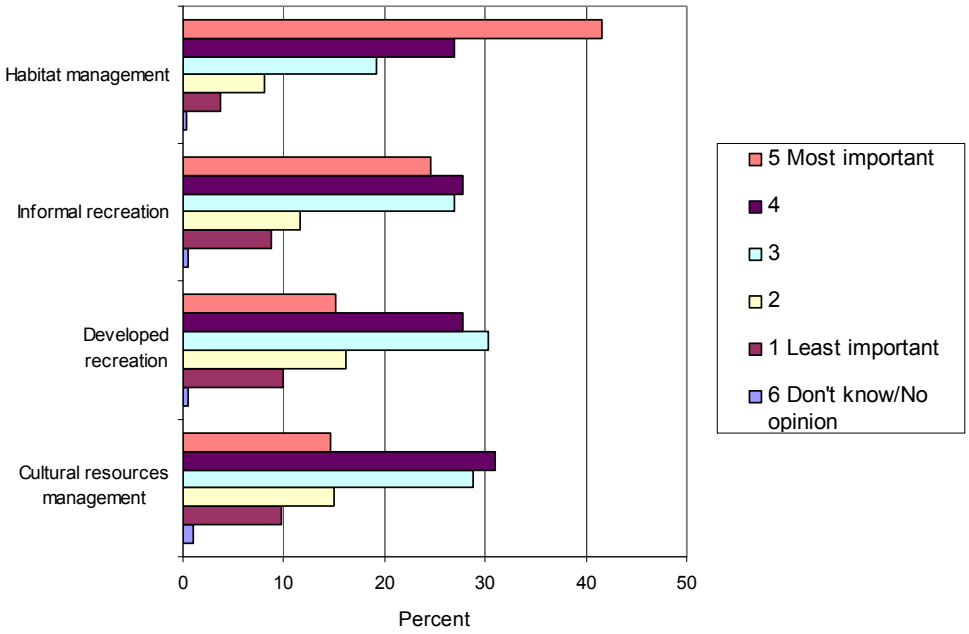

Figure C-3. Integrated Resource Plan Question 4 — Ranking of Natural Resource Management Activities

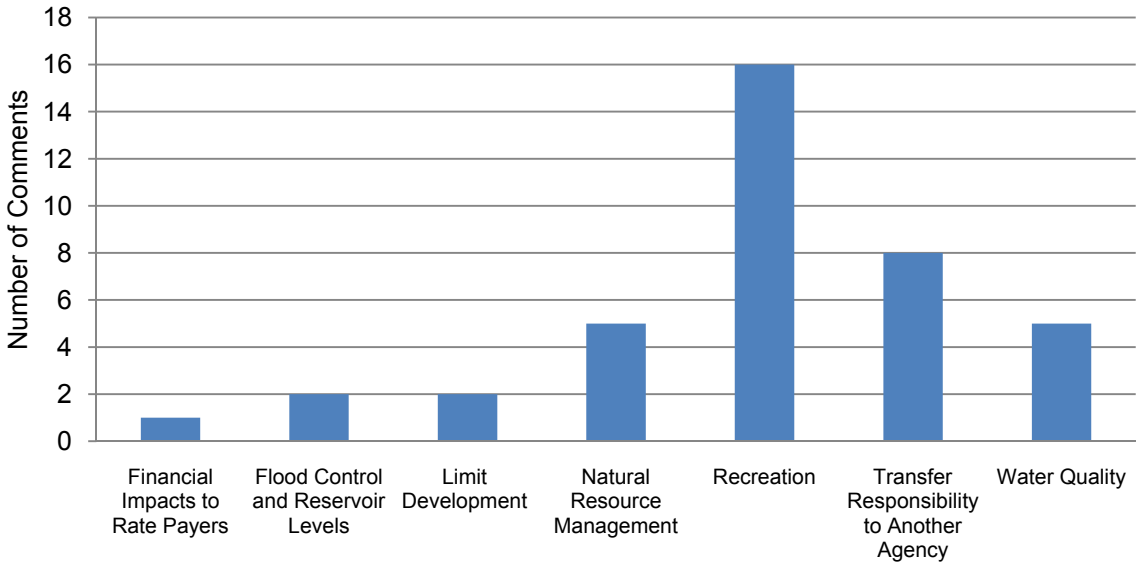

Figure C-4. Overview of Write-In Answers for Integrated Resource Plan Question 4 Organized by Issue Categories

Question 11 was a write-in question that asked the public "What do you value most about TVA-managed lands and reservoirs?" Of the 542 responses, the four most frequently mentioned concerns were recreation, multipurpose development, natural resource management, and limiting development (Table C-1).

Table C-1. Overview of Write-In Answers for Integrated Resource Plan Question 11 Organized by Issue Categories

Issue Category	Number of Comments
Accessibility of Public Lands	16
Fiscal Impacts	23
Flood Control and Reservoir Levels	20
Land Policy	1
Limiting Development	41
Multipurpose Development	95
Natural Resource and Wildlife Management	75
No Opinion of the use of TVA-managed lands	31
Recreation	199
Quality of Life	5
Visual Resources	22
Water Quality	14
Total comments received for Question 11	**542**

Part II – Integrated Resource Plan: Additional Comments from Agencies and Stakeholder Groups

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Table C-2. Integrated Resource Plan – Additional Comments Submitted by Agencies and Stakeholder Groups and Organized by Issue Categories

Issue Category	Comment
Natural Resource Management	
Forestry Management	We respect the roles and responsibilities of the Tennessee Valley Authority to safely and efficiently provide the needed energy, recreation, water, and jobs to the citizens and businesses of our state. The added responsibility of TVA being a landowner places your agency squarely in public view to demonstrate sound land management practices. Although TVA has divested itself of a large majority of the forested properties it once held, TVA continues to own and control a sizeable acreage of land. We believe these forests can and should supply a similar suite of benefits and services that the privately owned lands in Tennessee now provide. These include timber, recreation, wildlife, hunting, clean water, and aesthetics.
	Forested areas should be managed to maximize the potential for carbon sequestration. TVA should consider the role that forests can play in carbon sequestration and carbon markets. Renewable energy production should be pursued if it is economical and environmentally sound to do so. Wood and fiber sources can certainly play a role in the production of renewable energy.
	Educate the general public and stakeholders, regarding sustainable logging practices, and implement sustainable logging practices on TVA lands to prevent tree over-harvest and associated greenhouse gas emissions and to reduce threats to listed species.
Habitat Management	Enhance and increase habitat to boost production of rapidly diminishing native pollinators by establishing a diversity of native flowering plants across the spring, summer, and fall seasons within TVA rights-of-way areas and resource lands. Pollinator habitat increases will also provide additional habitat for wildlife and birds and assist in offsetting carbon dioxide emissions.
Management of Listed Species	Management plans for ecological resources, particularly aquatic and terrestrial wildlife should be designed to monitor the status of populations and to determine the impacts of TVA operations including the effects of waste generation and water quality and quantity on these populations. Priority should be given to species that are federally listed as threatened and endangered.
Native Plants	Manage new and existing TVA resource lands and rights-of-way for recovery and protection of native vegetation with special emphasis placed upon threatened and endangered plant species.
Recreation	
Nonmotorized Recreation	TVA should consider the public value of natural resources for more than energy production, in a manner that offers high levels of protection and restoration of natural ecosystems and the public recreation that such ecosystems support. Encouraging citizens and children in particular to engage in nonmotorized outdoor recreation is a major priority for all public land management agencies.
Recreation-Water Based	Recreational resources are important for the citizens of the Valley; TVA fortunately has many of these assets. They should continue to be an important part of the mission going forward. Continued cooperation with the boating community should be a priority in the future.

Issue Category	Comment
Reservoir Lands Planning	
Land Policy	TVA's land use policy has been a bright spot and those measures that have been effective need to be continued. TVA should not allow mountaintop removal of mined coal to be used in its boilers. TVA needs to develop a biofuels extraction policy that is sustainable.
Water Resources	
Water Quality	Water quality needs to be included in all scenarios at the highest priority. We can no longer accept the degradation of our waters as an acceptable by-product of human activities. A healthy aquatic biota in all of our tributaries, streams, rivers, and lakes is a crucial part of our Tennessee way of life and should be a baseline assumption of the IRP. Best management forestry and land practices are essential for the maintenance of those biologic systems. These allow for the fullest use of our water resources.
Water Conservation	Research and implement water-saving measures at existing and new facilities, through public education, such as when reviewing and commenting on 26a permit applications and promoting financial incentives to homeowners who purchase and install water-saving appliances. As the region's water demands have increased, permit applications to withdraw water from streams and rivers are continuing to increase at an unprecedented rate. These uses, combined with anticipated aquifer and surface water losses attributed to climate change, will negatively impact future water resources available to the human population, fish and aquatic organisms, and terrestrial plants and animals.
Organization of Document	
Separation from IRP	We do not agree that any "integrated' plan should be developed separate from natural resource stewardship. We encourage you to develop this IRP to include natural resource stewardship on TVA land, water, and areas affected by the energy portfolio as integral to the way TVA meets the energy needs of the Tennessee Valley.
Issues Outside the Scope of The NRP	
Aquatic Plant Management	TVA should continue to provide aquatic vegetation management along residential shorelines and public access facilities and provide boat lanes to access channel areas.

Part III – Natural Resource Plan: Comments from Agencies, Stakeholder Groups, and Individuals

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Table C-3. Overview of Comments Submitted for the Natural Resource Plan and Organized by Issue Categories

Issue Category	Number of Comments
Air Quality and Noise	2
Appreciation of NRP	5
Cultural and Visual Resources	2
Economy and Transportation	6
Fiscal Impacts	6
Forest and Land Management	6
Land Planning and Land Policy	3
Maintain Natural Areas and Sensitive Species Management	8
Mineral Rights	2
Navigation and Recreational Boating Traffic	9
NEPA and Alternatives	25
Oppose Development	3
Other	4
Outside Scope of the Natural Resource Plan	11
Public Involvement	21
Public Lands and Stewardship	5
Recreation	27
Vegetation	4
Water Quality and Shoreline Conditions	5
Wetlands, Wildlife, and Conservation	3

Table C-4. Natural Resource Plan – Summary of Comments Submitted by Agencies and Stakeholder Groups and Organized by Issue Categories

Issue Category	Summary of Comments
Air Quality and Noise	
Air Quality	Environmental stewardship applies not only to TVA's management of its lands and waters, but also to what TVA emits into the atmosphere, which has a huge potential of affecting the environment of this region and, indeed, of the world. As the largest public power producer in a nation that has until now contributed disproportionably to the atmospheric gases that are causing the Earth to warm dangerously (and with potentially catastrophic effects), TVA must now take a leadership position in reversing this trend. TVA must be a leader in promoting energy efficiency and the clean production of energy.
Noise	The growing number of nonmuffled boats operating on our lake is causing several problems. The noise pollution is very disturbing for lake residents, especially when experienced late at night or early in the morning. This noise is also disturbing to nearby wildlife. The growing number of water sport enthusiasts is creating a serious conflict on our lake. Nonmotorized boating enthusiasts (paddle boating, kayaking, canoeing, and sailing) and persons wanting to swim in the lake are being placed in a dangerous situation due to the many jet skis, power boats and speed boats operating on the lake.
Appreciation of Developing a Natural Resource Plan	
Appreciation	Thank you for the opportunity to provide scoping comments for the NRP. We look forward to the next opportunity for public involvement in the plan's development.
Cultural Resources	
Cultural Resources	We look forward to receiving Section 106 compliance documentation from you when it becomes available.
Economy	
Economy	The economic health of the region is not sustainable without proactive protection of our natural resources. Outdoor recreational opportunities and natural beauty support sustainable economic growth and increase the attractiveness of our region to employers and residents.
Forest and Land Management	
Forest Management	TVA should get back into active timber management and allowing things such as timber salvage after storms. TVA should also look for more cooperative agreements with other land management agencies such as state conservation agencies. Sharing resources and looking at management of public lands in a more cooperative manner will create a win-win situation for TVA and the residents of the Tennessee Valley.
Land Management	At TVA's beginning and throughout much of its history TVA lands and developments were examples to the locals, to the nation, and to the world of the best possible design. This was a deliberate programmatic effort managed by skillful architects and landscape architects with the same kind of seriousness that is applied within our national parks. It didn't happen by chance or just by the collective efforts of well-meaning engineers or nondesign professionals. As TVA manages and develops its public land going forward it should be with unapologetic high standards for excellence in the design arts. That will provide the public

Issue Category	Summary of Comments
	a rich return on its land investments through TVA.
Land Planning and Land Policy	
Land Planning	Land planning should look at land as contiguous tracts of land for natural resource protection instead of thinking of the land as divided by use. This will help with prevention of habitat fragmentation. Any past contracts or agreements should be reviewed to bring them into compliance, and efforts should be made to create shorter-term agreements so that management of the land is flexible.
Land Policy	TVA's current land policy has a tremendously positive impact on the quality of life in the Tennessee Valley.
Maintain Natural Areas	
Maintenance	Maintain necessary controls to assure natural resources are maintained and improved.
Protection	It is especially critical that TVA continue to provide ample protection of natural lands, such as small wild areas, through correct classification and management.
Navigation and Recreational Boating Traffic	
Recreational Boating Traffic	TVA must conduct boat capacity and boat traffic studies whenever a new or additional commercial marina or public boat ramp is being considered. Boat traffic should be studied around the specific location of the new or additional marina/boat ramp, not in a large area of the reservoir. Studies should be conducted during the peak traffic times (summer weekends), not during the week and in the off-season. TVA knows the boat count during the week and off-season is low and should not design studies during those times to "prove" there is boat capacity in a particular area. The busiest times should be studied so as to see the true impact on safety and the boating public.
NEPA and Alternatives	
NEPA	TVA should solicit feedback from every agency and individual who responds during a public comment period and/or attends a public meeting whenever any modification is being made to an environmental assessment (EA) or environmental impact statement (EIS). Modifications should not be made in secret with only TVA employees reviewing and approving changes to mitigation measures, which the public and outside agencies have previously been assured will be in enforced.
	Commercial development should not be allowed when the majority of the existing property owners object. Just because TVA can declare a FONSI does not mean that a commercial development should be allowed. Alternatives to a development including moving a development to a less congested site and reducing the size of the project should be considered and suggested by TVA.
	The language TVA uses in its EAs and EISs must be clear, absolute, enforceable, and easily understood by the public.
	The NRP should indicate whether the plan will be strictly adhered to or whether the plan can be adjusted.
Oppose Development	
Leave Areas Natural	My request for the NRP is to leave as many of the lands that TVA controls unspoiled, and available for use by the public. I recognize the need for environmental stewardship and planning via logging, agriculture, etc., but TVA provides opportunities to many hikers, hunters, fishermen, and outdoorsmen in general that would not otherwise be possible. Public access to recreation land is slowly dwindling, but the use of public land for hunting is rapidly diminishing.

Issue Category	Summary of Comments
Other – Fiscal Impacts	
Fiscal Impacts to Ratepayers	Please conduct a full economic analysis for impacts associated with TVA decisions and/or restrictions for use of publicly held lands. The current Land Policy adopted by TVA did not account for economic impacts. Additionally the NRP should clearly specify the actions being proposed by TVA and their associated costs/benefits to power customers resulting from the NRP and its implementation.
Project-Specific Financial Reviews	TVA must ensure that all developers have the financial means to complete a proposed project before it is approved and will not leave a project site in a disturbed and/or unfinished state. More thorough and in-depth financial reviews of developers must be conducted by TVA.
TVA Funding	All programs that protect and restore our waterways should be enhanced and funded.
Public Involvement	
Education Efforts	I would like to see more education efforts for protection of natural resources, more signs posted, more effort for closing abused areas, more TVA Police patrol (hiring of 'resource officers').
Public Involvement	Our experience, unfortunately, has been that TVA uses it power unilaterally and discounts the input and voice of the public, affected property owners, and wildlife agencies/organizations.
Public Involvement	Solicit feedback from property owners within a 5-mile radius, and local, state, and federal wildlife agencies whenever a commercial or industrial development is being proposed and whenever a change in land use is being considered. Publication in a local paper of limited circulation (many times rural) is an inadequate form of communication. TVA should prominently publish notices in regional newspapers, post notices on the affected site(s), and actively encourage public comment rather than treat public input as an obstacle to overcome.
Public Lands and Stewardship	
Long-Term Management	TVA's policies and actions related to its land and waters have tremendous impact on the quality of life in our region. While balancing the needs of many sectors, TVA must manage these natural resources in a way that protects their value in perpetuity. Long-term values must not be sacrificed for short-term solutions.
Proactive Management	Finally, we urge adoption of a more prudent policy toward environmental costs. Policies and actions should incorporate a “fix it now” attitude that marks TVA and the valley as a leader in taking proactive steps to protect our natural resources.
Stewardship	TVA must keep public lands in public ownership and provide careful stewardship of both lands and waters to meet the needs of current and future generations.
Recreation	
Campgrounds	TVA campgrounds should be upgraded to handle both small and large recreational vehicles. The campgrounds need upgrades, i.e., sewer, 50-ampere boxes, and clearances to accommodate large rigs and slides. A good example is De Soto Falls State Park Campground in Alabama. They have done a great job in bringing the facility up to date.
Commercial Recreation	Marinas should not be built on shorelines that are popular fishing areas and/or locations already popular with the boating public. Replacing fishing and boating areas with a marina is not offering new recreational opportunities.

Issue Category	Summary of Comments
Commercial Recreation	TVA should not allow popular fishing areas and boating areas to be eliminated by marinas and other shoreline development if opposed by the public. Replacing existing recreation with a marina should not be justified by saying it is providing new recreational opportunities. TVA should not approve commercial marinas in areas already served by large marinas regardless of the demand. If additional commercial marinas are needed, then TVA should identify appropriate locations spread out from one another.
Partnerships	TVA should actively work with the public and wildlife agencies to identify locations for environmentally friendly and low-impact recreational opportunities such as hiking, bank fishing, picnicking, and bird watching.
Recreation	TVA lands and waters are vitally important to support and protect water quantity and quality, and to support outdoor recreation, including water sports, hunting, fishing, hiking, and birding, camping, and picnicking.
Sensitive Species Management	
Sensitive Species Management	TVA should enhance sensitive species monitoring, habitat enhancement, and begin research in listed species genetics.
Transportation	
Transportation	Address how the outcome of this evaluation will interact with and facilitate the delivery of federal, local, and state transportation plans and projects.
Vegetation	
Exotic Invasive Plant Species	Effective natural resource management in today's environment must also include removal and control of exotic, invasive species and protection of native species.
Native Vegetation	Natural shoreline conditions should be preserved and trees and vegetation should be left on the shoreline to the maximum extent possible.
Visual Resources	
Project-Specific Impacts	Marinas are normally well lit at night and significantly change an area visually at night. The effect of light should be studied when marinas are proposed to ensure it will not negatively impact wildlife and the quality of life of nearby property owners and the value of their property.
Water Quality and Shoreline Conditions	
Water Quality	In managing its land and waters, TVA must protect water quality and quantity. Both are important for recreation, drinking water, agriculture, ecosystems, wildlife, and our economy.
	TVA's Water Resources Program appears to have made great strides in improving water quality by working within watershed communities to educate and motivate residents and provide the needed programs and tools for assessments and effective actions. Expansion of this program to more watersheds would be beneficial.
Wetlands	
Wetlands	Wetlands delineations are similarly important for areas that may be developed.
Wildlife and Conservation	
Wildlife Habitat Management	The amount of TVA land available for wildlife habitat improvement is limited, but timber harvest, prescribed burning, and other habitat manipulations should be considered where there are suitable tracts. Wildlife habitat management could be conducted in tandem with other recreational-like park trail systems and public fishing amenities. In addition, opportunities to enhance or create wetland habitats for waterfowl and other wildlife should be evaluated in some small, isolated areas.

Issue Category	Summary of Comments
Issues Outside the Scope of the NRP	
Aquatic Plant Management	Please reconsider the present policy of weed control in TVA lakes.
Contract Management	TVA should tighten its contract-writing specification enough so that both TVA and the contractor can be held responsible for actions under the contracts.
Fossil Power Operations	Several comments were submitted concerning the Kingston coal ash spill, future management of coal ash, and transitions to alternative fuel sources.
Mineral Rights Policy	TVA needs to demonstrate stewardship for the life-cycle costs of the resources it uses within its power supply program. TVA only uses a small percentage of mountain top removal coal. TVA should make a policy that it will not purchase mountain top removal coal. Such a TVA policy would have a large influence in the efforts to preserve our natural resources.
Muscle Shoals Reservation Redevelopment	Please don't allow Muscle Shoals Reservation to be released for commercial or residential development.
Procurement	TVA should demonstrate extended product responsibility through its purchases.
Section 26a Permitting	26a permit hearings should be held when requested by a member of the public. Currently TVA can approve 26a permits at its discretion without a 26a permit hearing no matter how many people request a hearing. When TVA approves a 26a permit without a hearing, the public is denied an opportunity to become a party of record and cannot file an appeal. This practice leads to an abuse of power whenever TVA does not want additional scrutiny of a project the public opposes.

AGENCIES SENT A COPY OF THE SCOPING NOTICE

Table C-5. Federal Agencies Sent a Copy of the Public Scoping Notice

Federal Agencies
Appalachian National Scenic Trail
Blue Ridge Parkway
Center for Disease Control
Chattahoochee-Oconee National Forests
Federal Highway Administration
George Washington and Jefferson National Forests
Great Smoky Mountains National Park
Mammoth Cave National Park
National Center for Environmental Health
Natural Resources Conservation Service: Chief, Eastern Region State Conservationists in: Alabama Georgia Kentucky Mississippi North Carolina Tennessee Virginia
U.S. Army Corps of Engineers: Asheville, North Carolina, District Nashville, Tennessee, District Norfolk, Virginia, District Raleigh, North Carolina, District Savannah, Georgia, District
U.S. Environmental Protection Agency – Region 4
U.S. Fish and Wildlife Service: Asheville, North Carolina Athens, Georgia Cookeville, Tennessee Daphne and Decatur, Alabama Frankfort, Kentucky Gloucester, Virginia Southwest Virginia Field Office

Table C-6. Agencies in Georgia Sent a Copy of the Public Scoping Notice

Georgia State Agencies
Department of Economic Development – Tourism and Marketing
Department of Natural Resources Fisheries State Historic Preservation Officer State Parks and Historic Sites Division Wildlife Resources
Georgia State Clearinghouse

Table C-7. Agencies in Alabama Sent a Copy of the Public Scoping Notice

Alabama State and Regional Agencies
Alabama Elk River Development Agency
Bear Creek Development Authority
Boating Law Administrator
Department of Agriculture and Industries
Department of Conservation and Natural Resources Division of State Parks
Department of Economic and Community Affairs
Department of Environmental Management
Department of Transportation
Forestry Commission
Historical Commission
North-Central Alabama Regional Council of Governments
Northwest Alabama Council of Local Governments
Top of Alabama Regional Council of Governments
Tourism Department

Table C-8. Agencies in Kentucky Sent a Copy of the Public Scoping Notice

Kentucky State Agencies
Arts and Heritage Cabinet Tourism
Department of Parks
Energy and Environment Cabinet Department for Environmental Protection Division of Water Quality Division of Air Quality
Heritage Council State Historic Preservation Officer

Table C-9. Agencies in Mississippi Sent a Copy of the Public Scoping Notice

Mississippi State and Regional Agencies
Department of Archives and History
Department of Environmental Quality
Department of Finance and Administration
Department of Wildlife, Fisheries, and Parks
Division of Tourism Development
Northeast Mississippi Planning and Development District
Tombigbee River Valley Water Management District

Table C-10. Agencies in North Carolina Sent a Copy of the Public Scoping Notice

North Carolina State Agencies
Department of Commerce Tourism, Marketing, and Global Branding
Division of Archives and History
Division of Parks and Recreation
National Forests in North Carolina
North Carolina State Clearinghouse

Table C-11. Agencies in Tennessee Sent a Copy of the Public Scoping Notice

Tennessee State and Regional Agencies
Beech River Development Authority
Department of Agriculture
Department of Economic and Community Development
Department of Environment and Conservation Division of Air Pollution Control Division of Archaeology Division of Natural Heritage Division of Recreation Educational Services Division of Water Pollution Control Historical Commission Parks and Conservation Operations
Department of Tourism Development
Department of Transportation Environmental Planning and Permits Division
East Tennessee Development District
First Tennessee Development District
Greater Nashville Regional Council
Memphis Area Association of Governments
Northwest Tennessee Development District
South Central Tennessee Development District
Southeast Tennessee Development District
Southwest Tennessee Development District
Tellico Reservoir Development Agency
Tennessee Duck River Development Agency
Tennessee Wildlife Resources Agency
Upper Cumberland Development District

Table C-12. Agencies in Virginia Sent a Copy of the Public Scoping Notice

Virginia State and Regional Agencies
Department of Conservation and Recreation
Department of Environmental Quality Division of Environmental Enhancement
Department of Game and Inland Fisheries
Department of Historic Resources
Department of Transportation Policy, Planning, and Environment
Mount Rogers Planning District Commission
Virginia Tourism Corporation

Table C-13. Agencies That Commented on the Public Scoping Notice

Federal Agencies
Natural Resources Conservation Service Georgia (State Conservationist) North Carolina
U.S. Fish and Wildlife Service Asheville, North Carolina Cookeville, Tennessee Daphne, Alabama Frankfort, Kentucky
State and Regional Agencies
Alabama Department of Conservation and Natural Resources
Georgia Clearinghouse
Georgia Department of Natural Resources Historic Preservation Division
Greater Nashville Regional Council
Kentucky Energy and Environment Cabinet Division of Water
Mississippi Clearinghouse
North Carolina Clearinghouse
North Carolina Wildlife Resources Commission Division of Inland Fisheries
Tennessee Department of Agriculture
Tennessee Department of Transportation
Tennessee Department of Water Supply
Upper Cumberland Development District
Virginia Department of Environmental Quality Office of Environmental Impact Review
Virginia Department of Game and Inland Fisheries
Virginia Department of Health Office of Drinking Water
Virginia Department of Transportation Natural Resources Program
Organizations or Community Groups
American Whitewater
Environmental Integrity Project
Scottsboro Forest Products
Solar Valley Coalition
Tennessee Citizens for Wilderness Planning
Tennessee Environmental Coalition
The Friends of Norris Lake
World Wildlife Fund

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Appendix D – Reservoir Lands Planning: Forecast System Designations

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FORECAST SYSTEM DESIGNATIONS

Forecast Designation	Definition
Dam Reservation	*Land managed to protect the integrity of the dam and associated switchyards and power lines*. Most TVA dam reservations provide a visitor reception building that overlooks the facilities. Day use recreational activities such as picnicking, fishing, hiking, and bird watching are encouraged. Campgrounds and boat-launching facilities are often available. Generally speaking, maintenance levels and care of the facilities are higher on dam reservation land than on other areas of the reservoir. Hunting and unregulated camping are generally prohibited on the reservations.
Public Recreation	*Land set aside for use by the public for recreational activities*. This includes informal, dispersed activities such as hunting, hiking, fishing, and primitive camping, as well as more formal activities in developed areas such as parks, boat-launching areas, and campgrounds.
Reservoir Operations (Islands)	*Islands in the mainstream or tributaries used for informal, dispersed recreation and natural resource management projects.*
Reservoir Operations (Mainland)	*Generally narrow bands of shoreland retained by TVA for flood control and other reservoir operations purposes*. Although there are no outstanding rights to construct water use facilities, TVA allowed back-lying residential property owners to construct facilities on these lands until 1992. Since 1992, facilities have only been allowed on reservoir operations land in those areas where existing facilities have been permitted.
Power Transmission and Power Needs	*Land reserved for future power development or to maintain the integrity of existing power lines*. Interim wildlife enhancement projects are often implemented on these lands.
Commercial Recreation	*Land that TVA has reserved primarily for commercial use.* This use includes, but is not limited to, marinas, commercial boat docks, and campgrounds. Informal, dispersed recreational activities often occur on this land as an interim use.
Minor Commercial Landings	*Tracts allocated for minor commercial landings available for public or private development of small-scale barge facilities*. These are sites that can be used for transferring pulpwood, sand, gravel, and other natural resource commodities between barges and trucks. Since this use is intermittent and usually not a major activity, there would generally be no significant impact on adjacent land uses.
Industrial	*Land that TVA identified as having potential for future industrial development*. Informal, dispersed recreational activities often occur on this land as an interim use.
Navigation Safety Harbors Landings	*Sites used for tying off commercial barge tows and recreational boats during adverse weather conditions*. Safety landings are straight stretches of shoreline fronting the commercial channel, and safety harbors are shoreline areas recessed into coves or creeks off the commercial channel.

Forecast Designation	Definition
Forestry Research	*Tracts used as ongoing sites for monitoring tree growth and stress*. In addition, trees are used in these areas to produce reliable seed sources.
Steam Plant Study	*Tracts set aside to potentially serve as a future steam plant location*. The actual construction of a steam plant would depend on energy demands and cost-benefit considerations.
Wildlife Management	*Land managed for the enhancement of natural resources for human use and appreciation*. Management of resources is the primary focus of this designation. Management strategies include planting food plots, selective timber harvesting, and other forms of manipulating habitat to attract certain wildlife species. Appropriate activities in this zone include hunting, wildlife observation, and camping on undeveloped sites.
Small Wild Areas	*These TVA natural areas are areas managed by TVA or in cooperation with other public agencies or private conservation organizations to protect exceptional natural or aesthetic qualities that can also support dispersed, low-impact types of outdoor recreation.* Where appropriate, development could include foot trails, signs, parking areas, and primitive camping, and efforts can be undertaken to encourage the public and interpretation for visitors.

Appendix E – Reservoir Lands Planning: Multiple Use Tract Allocation Methodology

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METHODOLOGY APPLIED DURING MULTIPLE USE TRACT ALLOCATION

Overview
The multiple use tract allocations reservoir lands planning process was based on active participation by various TVA staffs, other government agencies, nongovernment organizations, and the public. Comments from these groups were used to identify regional and local land management needs and to develop reservoir-specific objectives for realizing TVA's reservoir land management goals, which include:

- Protecting the visual and environmental quality of reservoirs and adjoining lands.
- Providing a diversity of quality recreation opportunities on TVA reservoirs and adjoining land.
- Planning for and promoting responsible economic development and growth.
- Protecting and enhancing the forestry, fisheries, and wildlife resources, as well as preserving the cultural and agricultural resources around the reservoir area for future generations.

Specific objectives or steps for reaching these goals were developed from the advice and technical expertise of TVA staff and from public input about local values and priorities related to land use. Because the public's interests and the available resource base are different on each reservoir, the management objectives were tailored to fit the specific reservoir.

The reservoir land management plans (RLMPs) guided TVA resource management and property administration decisions on the reservoir lands that are under TVA stewardship and control. It identified the most suitable uses for all the tracts of TVA-managed land, providing sites for recreation, industry, navigation, wildlife and forest management, cultural and environmental preservation, and agriculture.

The planned acreage was TVA-retained (fee-owned) land. The remaining portions of shoreline not addressed in the RLMPs fell into the following two categories:

- Shoreline fronting land formerly owned by TVA that has been sold or transferred for commercial, industrial, or public recreation purposes, or that has been transferred to other government agencies for uses other than public recreation, or that has been committed by TVA for dam reservations or power plants.
- Shoreline fronting former TVA reservoir land commonly referred to as "marginal strip" that was sold for private development purposes with deeded rights to request approval for construction of private shoreline improvements (boat docks, ramps, seawalls, etc.); this category also includes TVA-retained rights on sold land and the acquired rights to flood private land that was never owned by TVA.

In relation to TVA property administration, the RLMPs provided information that allowed a faster response to requests for the use of TVA-managed land. All requests for changes to the RLMP or requests for use of TVA-managed land were subject to TVA review through the reservoir land use review process. When requests are received, TVA staff would compare the request with the use allocated in the RLMP. If the request is not congruent

with the RLMP, the RLMP would be used to identify alternative tracts that are more suitable for the proposal, or the applicant may be given the opportunity to provide information that warrants a modification to the RLMP in the public's interest.

The RLMP established general guidelines for use of each tract, but "on-the-ground" management activities would be more clearly defined by TVA's resource management staffs. TVA land resource staffs comply with state-approved best management practices (BMPs) when implementing land management activities. The agency performs appropriate levels of environmental review on all proposed actions, including requests from the public for use of TVA-managed lands (e.g., recreational and industrial easements or permits under Section 26a of the TVA Act). Most actions are classified as categorical exclusions (i.e., actions which by their very nature have no significant environmental impacts) and are subjected to environmental review in the form of a categorical exclusion checklist. However, actions or proposals that do not qualify as categorical exclusions may require an environmental assessment or environmental impact statement as stipulated under TVA's procedures for compliance with NEPA.

Most RLMPs encompassed a 10-year planning horizon. During this time, TVA would monitor growth pressures, economic trends, and environmental conditions around the reservoir. The supporting database would be updated on a regular basis. Revisions to an RLMP would be considered as changing circumstances warrant. After 10 years, TVA would review the data, solicit public input, and update the RLMP, as appropriate.

Planning Team Mission
A planning team, representing various staffs within TVA, undertook a detailed planning process that resulted in the land use allocations presented in RLMPs. Site visits, public input, and information from TVA's resource specialists were carefully analyzed in making land use allocations.

Reservoir Resource Data
TVA's resource specialists provided information that was used to develop an extensive computerized database about physical resource characteristics of the land; existing uses of TVA-managed land and adjoining property; economic conditions in the area; and such environmental constraints as wetlands, floodplains, threatened and endangered species, and water and air quality. Other resource data, often more detailed, were collected on site-specific archaeological concentrations, historic structures, forest resources, prime farmland, and wildlife habitats. Some data were gathered from a designated study area that extended about 0.5 mile from TVA's property line.

Public Information Process
In addition to documented resource data, local residents and lake users were important in determining suitable uses for TVA-managed lands adjacent to the reservoir. TVA made a concerted effort to inform and encourage the public to participate in the development of the RLMP.

Key contacts were made by the planning staff with local community cooperators, such as county commissions. The goal was to encourage local officials and community leaders to attend the informational meetings held in local areas. The purpose was to inform and encourage government officials; service and civic organizations; congressional field staffs; chambers of commerce; industrial, tourism, and commercial development groups;

environmental groups; and other citizens to participate in the planning process for the reservoir.

Informational meetings were held in numerous locations throughout the local areas. At each meeting, TVA staff briefly described the upcoming planning effort as it related to future use of TVA-managed lands around the reservoir(s). TVA staff attempted to explain the planning process and the importance of public involvement in development of a quality RLMP to the participants. By taking this approach, TVA believed the public would be better informed at an early stage and would want to participate in future public workshops.

Media contacts and news releases were made available to local TV stations, radio stations, and area newspapers. In addition, TVA's planning staff initiated an extensive mailing campaign to invite by personal letter, individuals, government officials, area special interest groups, and organizations to attend the scheduled public workshops. The focus was to provide information packages about the planning process and about what each participant could expect at the workshops. By using these processes plus a mix of written invitations, public service announcements, media feature stories, letters about the project taken home by schoolchildren, and local constituent networks, TVA hoped for the maximum attendance and productivity at each workshop.

Public Workshops
Public workshops were held to ask participants specific questions about the reservoir(s). The planning team attended each public workshop and used the compiled agency and public comments, along with technical advice from TVA staffs, to develop the reservoir goals and management objectives of the RLMPs. These objectives provided guidelines for the planning team's analysis of available information and their subsequent identification of appropriate land uses for the TVA-managed land.

Capability Analysis
In the first phase of a two-phase analysis, the planning team analyzed the ability of the reservoir lands to support various uses. TVA staffs provided the planning team with capability ratings of excellent, good, fair, or poor for every possible use on each tract of TVA-managed land. The ratings were based on an analysis of specific criteria that indicated whether a tract was physically capable of supporting a given use.

Suitability Analysis and Tract Allocation
The second phase, a land use suitability analysis, is based on the capability ratings as well as other factors such as previous investments, interest by other agencies, TVA's objectives, and local or regional needs. TVA staff provided the planning team with maps exhibiting proposed uses for the TVA-managed land. Along with the map, each staff provided a written narrative and land needs justification for every tract of TVA-managed land requested by that staff. The planning team then compared a map of all the proposed uses with other maps and written justifications that identified existing resource data, such as wetlands, floodplain locations, threatened or endangered species, prime farmland, and historic or archaeological resource sites. In some cases, the data showed obvious constraints or conflicts with proposed uses, and such obvious unsuitable uses were eliminated. The planning team then analyzed the suitability of remaining potential uses by reviewing other information, such as the economic conditions of the reservoir area, the reservoir management objectives, public comment, and TVA land management goals and policies. Through debate and discussion, the planning team arrived at a consensus agreement and identified the most suitable use or uses for each tract of TVA-managed land.

Review Process

After allocating each tract of land for one or more compatible uses, the planning team looked at the entire RLMP in terms of how it met the reservoir management goals and planning objectives. In areas where the planning team felt the objectives were not met, adjustments were made to the RLMP. On tracts where uncertainty existed or there was specific conflict about appropriate use, the planning team made additional field inspections to ensure proper allocations. The RLMP was then reviewed within TVA and revised. The revised RLMP was mailed to individuals, agencies, and organizations for their review. A compilation of all the comments received, along with the TVA staff responses, was prepared. The responses included recommendations for changes to the RLMP based on the public input, review of the database, and consideration of the reservoir management goals and objectives.

Appendix F – Reservoir Lands Planning: Land Use Zone Definitions

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ALTERNATIVE A (CURRENT) LAND USE ZONE DEFINITIONS

Zone		Definition
1	**Non-TVA Shoreland**	Shoreland that TVA does not own in fee. This land may be privately owned or owned by a governmental entity other than TVA. Uses of this non-TVA land may include residential, industrial, commercial, and/or agricultural. In many instances, TVA may have purchased the right to flood and/or limit structures on this non-TVA land (i.e., flowage easement). TVA's permitting authority under Section 26a of the TVA Act applies to construction of structures on non-TVA shoreland. Non-TVA Shoreland allocations are based on deeded rights and, therefore, will not change as a result of the land planning process. This category is provided to assist in comprehensive evaluation of potential environmental impacts of TVA's allocation decision.
2	**Project Operations**	Land currently used, or planned for future use, for TVA operations and public works projects, including: • ***Land adjacent to established navigation operations***—Locks, lock operations and maintenance facilities, and the navigation work boat dock and bases. • ***Land used for TVA power projects operations***—Generation facilities, switchyards, and transmission facilities and rights-of-way. • ***Dam reservation land***—Areas acquired and managed for the primary purpose of supporting the operation and maintenance of TVA dams and associated infrastructure; secondary uses may also include developed and dispersed recreation, maintenance facilities, watershed team offices, research areas, and visitor centers. • ***Navigation safety harbors/landings***—Areas used for tying off commercial barge tows and recreational boats during adverse weather conditions or equipment malfunctions. • ***Navigation dayboards and beacons***—Areas with structures placed on the shoreline to facilitate navigation. • ***Public works projects***—Includes public utility infrastructure, such as substations and rights-of-way for sewer lines, water lines, transmission lines, and major highway projects.
3	**Sensitive Resource Management**	Land managed for protection and enhancement of sensitive resources. Sensitive resources, as defined by TVA, include resources protected by state or federal law or executive order and other land features/natural resources TVA considers important to the area viewscape or natural environment. Recreational natural resource activities, such as hunting, wildlife observation, and camping on undeveloped sites, may occur in this zone, but the overriding focus is protecting and enhancing the sensitive resource the site supports. Areas included are: • TVA-designated sites with potentially ***significant archaeological resources***. • TVA public land with ***sites/structures listed in or eligible for listing in the National Register of Historic Places***. • ***Wetlands***—Aquatic bed, emergent, forested, and scrub-shrub wetlands as defined by TVA. • ***TVA public land under easement, lease, or license to other agencies/individuals*** for resource protection purposes. • ***TVA public land fronting land owned by other agencies/individuals*** for resource protection purposes.

Zone		Definition
		• ***Habitat protection areas***—These TVA natural areas are managed to protect populations of species identified as threatened or endangered by the U.S. Fish and Wildlife Service, state-listed species, and any unusual or exemplary biological communities/geological features. • ***Ecological study areas***—These TVA natural areas are designated as suitable for ecological research and environmental education by a recognized authority or agency. They typically contain plant or animal populations of scientific interest or are of interest to an educational institution that would utilize the area. • ***Small wild areas***—These TVA natural areas are managed by TVA or in cooperation with other public agencies or private conservation organizations to protect exceptional natural, scenic, or aesthetic qualities that can also support dispersed, low-impact types of outdoor recreation. • ***River corridor with sensitive resources present***—A river corridor is a segment of a river and the adjacent land along the banks. River corridors often consist of a linear green space of TVA land serving as a buffer to tributary rivers entering a reservoir. These areas will be included in Zone 3 when identified sensitive resources are present. • ***Significant scenic areas***—Areas designated for visual protection because of their unique vistas or particularly scenic qualities. • ***Champion tree site***—Areas designated by TVA as sites that contain the largest known individual tree of its species in that state. The state forestry agency "Champion Tree Program" designates the tree, while TVA designates the area of the sites for those located on TVA public land. • ***Other sensitive ecological areas***—Examples of these areas include heron rookeries, uncommon plant and animal communities, and unique cave or karst formations.
4	**Natural Resource Conservation**	Land managed for the enhancement of natural resources for human use and appreciation. Management of resources is the primary focus of this zone. Appropriate activities in this zone include hunting, timber management to promote forest health, wildlife observation, and camping on undeveloped sites. Areas included are: • ***TVA public land*** managed for wildlife or forest management projects. • ***TVA public land under easement, lease, or license to other agencies*** for wildlife or forest management purposes. • ***TVA public land fronting land owned by other agencies*** for wildlife or forest management purposes. • ***Dispersed recreation areas*** maintained for passive, dispersed recreation activities, such as hunting, hiking, bird watching, photography, primitive camping, bank fishing, and picnicking. • ***Shoreline conservation areas***—Narrow riparian strips of vegetation between the water's edge and TVA's back-lying property that are managed for wildlife, water quality, or visual qualities. • ***Wildlife observation areas***—TVA natural areas with unique concentrations of easily observed wildlife that are managed as public wildlife observation areas. • ***River corridor without sensitive resources present***—A river corridor is a linear green space along both stream banks of selected tributaries entering a reservoir managed for light boat access at specific sites, riverside trails, and interpretive activities. River corridors will be included in Zone 4 unless sensitive resources are present (see Zone 3). • ***Islands of 10 acres or less.***

Zone		Definition
5	Industrial	Land currently used, or planned for future use, for economic development, including businesses in distribution/processing/assembly and light manufacturing. Preference will be given for businesses requiring water access. There are two primary types of uses for TVA land allocated for Industrial: **(1) access for water supply or structures associated with navigation such as barge terminals, mooring cells, etc., or (2) land-based development potential.** Areas included are: • ***TVA public land under easement, lease, or license to other agencies/ individuals/entities*** for industrial purposes. • ***TVA public land fronting land owned by other agencies/individuals/entities*** for industrial purposes. In some cases, TVA land allocated to industrial use would be declared surplus and sold at public auction. Types of development that can occur on this land are: • **Light industrial**—TVA waterfront land that would support light manufacturing activities. Light industry does not include retail or service-based businesses. • **Industrial access**—Access to the waterfront by back-lying property owners across TVA property for water intakes, wastewater discharge, or conveyance of commodities (i.e., pipelines, rail, or road). Barge terminals are associated with industrial access corridors. • **Barge terminal sites**—Public or private facilities used for the transfer, loading, and unloading of commodities between barges and trucks, trains, storage areas, or industrial plants. • **Fleeting areas**—Sites used by the towing industry to switch barges between tows or barge terminals that have both offshore and onshore facilities. • **Minor commercial landing**—A temporary or intermittent activity that takes place without permanent improvements to the property. These sites can be used for transferring pulpwood, sand, gravel, and other natural resource commodities between barges and trucks.
6	Developed Recreation	Land currently used, or planned for future use, for concentrated, active recreational activities that require capital improvement and maintenance of developed infrastructure, including: • ***TVA public land*** developed for recreational purposes, such as campgrounds, day use areas, etc. • ***TVA public land under easement, lease, or license to other agencies/individuals/entities*** for developed recreational purposes. • ***TVA public land fronting land owned by other agencies/individuals/ entities*** for developed recreational purposes. Residential use, long-term accommodations, and/or individually owned units are not permitted on land allocated for Developed Recreation. Types of development that can occur on this land are: • ***Water access***—Recreation, generally on small shoreline areas, involving primarily limited levels of development that may include a launching ramp, courtesy piers, canoe access, picnic areas, trails, associated parking areas, etc. These areas are typically operated by federal, state, or local governmental entities for public access. • ***Public recreation***—Recreation with facilities or uses developed and owned by a public agency that are open to the public. Facilities at public

Zone		Definition
		recreation areas could include playgrounds/play structures, picnic facilities, tennis courts, horseshoe areas, play courts, recreation centers, athletic fields, trails, greenways, natural areas, amphitheaters, food concessions (vending, snack bar), access to water for fishing and boating, swimming areas and swimming pools, marina facilities owned by the public entity, parking, and campgrounds. Cabins or other overnight accommodations (other than campgrounds) are only permitted if the public recreation area is operated by a state or state agency as a component of a state park system. Public recreation areas and facilities are typically owned and operated by the federal, state, county, or local government. However, private entities may operate recreation facilities on public recreation land as concessionaires under agreement with the public entity controlling the property. The use of the facilities may be offered free or for a fee. Time-forward, public-private partnerships where facilities are owned by private investors will not be approved on public recreation land. All structures and facilities should be owned by the public entity. • ***Commercial recreation***—Recreation amenities that are provided for a fee to the public intending to produce a profit for the private owner/operator. These primarily water-based facilities typically include marinas and affiliated support facilities such as stores, restaurants, campgrounds, and cabins and lodges. Where applicable, TVA will require appropriate compensation for the commercial use of the property.
7	**Shoreline Access**	TVA-owned land where Section 26a applications and other land use approvals for residential shoreline alterations are considered. Requests for residential shoreline alterations are considered on parcels identified in this zone where such use was previously considered and where the proposed use would not conflict with the interests of the public. Types of development/management that may be permitted on this land are: • ***Residential water use facilities***, e.g., docks, piers, launching ramps/driveways, marine railways, boathouses, enclosed storage space, and nonpotable water intakes. • ***Shoreline access corridors***, e.g., pathways, wooden steps, walkways, or mulched paths that can include portable picnic tables and utility lines. • ***Shoreline stabilization***, e.g., bioengineering, riprap, gabions, and retaining walls. • ***Shoreline vegetation management.***

ALTERNATIVES B, C, AND D PROPOSED LAND USE ZONE DEFINITIONS

Zone		Definition
1	**Non-TVA Shoreland**	Shoreland that TVA does not own in fee. This land may be privately owned or owned by a governmental entity other than TVA. Uses of this non-TVA land may include residential, industrial, commercial, and/or agricultural. In many instances, TVA may have purchased the right to flood and/or limit structures on this non-TVA land (i.e., flowage easement). TVA's permitting authority under Section 26a of the TVA Act applies to construction of structures on non-TVA shoreland. Non-TVA Shoreland allocations are based on deeded rights and, therefore, will not change as a result of the land planning process. This category is provided to assist in comprehensive evaluation of potential environmental impacts of TVA's allocation decision.
2	**Project Operations**	Land currently used, or planned for future use, for TVA operations and public works projects, including: • ***Land adjacent to established navigation operations***—Locks, lock operations and maintenance facilities, and the navigation work boat dock and bases. • ***Land used for TVA power projects operations***—Generation facilities, switchyards, and transmission facilities and rights-of-way. • ***Dam reservation land***—Areas acquired and managed for the primary purpose of supporting the operation and maintenance of TVA dams and associated infrastructure; secondary uses may also include developed and dispersed recreation, maintenance facilities, miscellaneous TVA field offices, research areas, and visitor centers. • ***Navigation safety harbors/landings***—Areas used for tying off commercial barge tows and recreational boats during adverse weather conditions or equipment malfunctions. • ***Navigation dayboards and beacons***—Areas with structures placed on the shoreline to facilitate navigation. • ***Public works projects***—Includes rights-of-way for public utility infrastructure, such as sewer lines, water lines, transmission lines, and major highway projects.
3	**Sensitive Resource Management**	Land managed for protection and enhancement of sensitive resources. Sensitive resources, as defined by TVA, include resources protected by state or federal law or executive order and other land features/natural resources TVA considers important to the area viewscape or natural environment. Recreational natural resource activities, such as hunting, wildlife observation, and camping on undeveloped sites, may occur in this zone, but the overriding focus is protecting and enhancing the sensitive resource the site supports. Areas included are: • TVA-designated sites with potentially ***significant archaeological resources***. • TVA public land with ***sites/structures listed in or eligible for listing in the National Register of Historic Places***. • ***Wetlands***—Aquatic bed, emergent, forested, and scrub-shrub wetlands as defined by TVA. • ***TVA public land under easement, lease, or license to other agencies/individuals*** for resource protection purposes.

Zone		Definition
		• ***TVA public land fronting land owned by other agencies/individuals*** for resource protection purposes. • ***Habitat protection areas***—These TVA natural areas are managed to protect populations of species identified as threatened or endangered by the U.S. Fish and Wildlife Service, state-listed species, and any unusual or exemplary biological communities/geological features. • ***Ecological study areas***—These TVA natural areas are designated as suitable for ecological research and environmental education by a recognized authority or agency. They typically contain plant or animal populations of scientific interest or are of interest to an educational institution that would utilize the area. • ***Small wild areas***—These TVA natural areas are managed by TVA or in cooperation with other public agencies or private conservation organizations to protect exceptional natural, scenic, or aesthetic qualities that can also support dispersed, low-impact types of outdoor recreation. • ***River corridor with sensitive resources present***—A river corridor is a segment of a river and the adjacent land along the banks. River corridors often consist of a linear green space of TVA land serving as a buffer to tributary rivers entering a reservoir. These areas will be included in Zone 3 when identified sensitive resources are present. • ***Significant scenic areas***—Areas designated for visual protection because of their unique vistas or particularly scenic qualities. • ***Champion tree site***—Areas designated by TVA as sites that contain the largest known individual tree of its species in that state. The state forestry agency "Champion Tree Program" designates the tree, while TVA designates the area of the sites for those located on TVA public land. • ***Other sensitive ecological areas***—Examples of these areas include heron rookeries, uncommon plant and animal communities, and unique cave or karst formations.
4	**Natural Resource Conservation**	Land managed for the enhancement of natural resources for human use and appreciation. Management of resources is the primary focus of this zone. Appropriate activities in this zone include hunting, timber management to promote forest health, wildlife observation, and camping on undeveloped sites. Areas included are: • ***TVA public land*** managed for wildlife or forest management projects. • ***TVA public land under easement, lease, or license to other agencies*** for wildlife or forest management purposes. • ***TVA public land fronting land owned by other agencies*** for wildlife or forest management purposes. • ***Dispersed recreation areas*** maintained for passive, dispersed recreation activities, such as hunting, hiking, bird watching, photography, primitive camping, bank fishing, and picnicking. • ***Shoreline conservation areas***—Narrow riparian strips of vegetation between the water's edge and TVA's back-lying property that are managed for wildlife, water quality, or visual qualities. • ***Wildlife observation areas***—TVA natural areas with unique concentrations of easily observed wildlife that are managed as public wildlife observation areas. • ***River corridor without sensitive resources present***—A river corridor is a linear green space along both stream banks of selected tributaries entering a reservoir managed for light boat access at specific sites, riverside trails,

Zone		Definition
		and interpretive activities. River corridors will be included in Zone 4 unless sensitive resources are present (see Zone 3). • ***Islands*** without sensitive resources or existing development.
5	**Industrial**	Land currently used, or planned for future use, for economic development, including businesses in distribution/processing/assembly and manufacturing. Preference will be given for businesses requiring water access. There are two primary types of uses for TVA land allocated for Industrial: **(1) access for water supply or structures associated with navigation such as barge terminals, mooring cells, etc., or (2) land-based development potential.** Areas included are: • ***TVA public land under easement, lease, or license to other agencies/ individuals/entities*** for industrial purposes. • ***TVA public land fronting land owned by other agencies/individuals/ entities*** for industrial purposes. In some cases, TVA land allocated to industrial use would be declared surplus and sold at public auction. Types of development that can occur on this land are: • **Industry**—Manufacturing, fabrication, and distribution/processing/assembly involving chemical, electronics, metalworking, plastics, telecommunications, transportation, and other industries. Industry does not include retail or service-based businesses. • **Industrial access**—Access to the waterfront by back-lying property owners across TVA property for water intakes, wastewater discharge, or conveyance of commodities (i.e., pipelines, rail, or road). Barge terminals are associated with industrial access corridors. • **Barge terminal sites**—Public or private facilities used for the transfer, loading, and unloading of commodities between barges and trucks, trains, storage areas, or industrial plants. • **Fleeting areas**—Sites used by the towing industry to switch barges between tows or barge terminals that have both offshore and onshore facilities. • **Minor commercial landing**—A temporary or intermittent activity that takes place without permanent improvements to the property. These sites can be used for transferring pulpwood, sand, gravel, and other natural resource commodities between barges and trucks.
6	**Developed Recreation**	Land currently used, or planned for future use, for concentrated, active recreational activities that require capital improvement and maintenance of developed infrastructure, including: • ***TVA public land*** developed for recreational purposes, such as campgrounds, day use areas, etc. • ***TVA public land under easement, lease, or license to other agencies/individuals/entities*** for developed recreational purposes. • ***TVA public land fronting land owned by other agencies/individuals/ entities*** for developed recreational purposes. Residential use, long-term accommodations, and/or individually owned units are not permitted on land allocated for Developed Recreation. Types of development that can occur on this land are: • ***Public recreation***—Recreation amenities developed and owned by a public agency that are open to the public. Public recreation areas may

Zone		Definition
		have varying levels of development, ranging from a water access site (e.g., launching ramp) to a marina facility. Facilities at public recreation areas could include playgrounds/play structures, picnic facilities, tennis courts, horseshoe areas, play courts, recreation centers, trails, greenways, natural areas, amphitheaters, food concessions (vending, snack bar), access to water for fishing and boating, swimming areas and swimming pools, launching ramps, courtesy piers, canoe access, marina facilities owned by the public entity, parking, and campgrounds. Cabins or other overnight accommodations (other than campgrounds) are only permitted if the public recreation area is operated by a state or state agency as a component of a state park system. Public recreation areas and facilities are typically owned and operated by the federal, state, county, or local government. However, private entities may operate recreation facilities on public recreation land as concessionaires under agreement with the public entity controlling the property. The use of the facilities may be offered free or for a fee. Time-forward, public-private partnerships where facilities are owned by private investors will not be approved on public recreation land. All structures and facilities should be owned by the public entity. • ***Commercial recreation***—Recreation amenities that are provided for a fee to the public intending to produce a profit for the private owner/operator. These primarily water-based facilities typically include marinas and affiliated support facilities such as stores, restaurants, campgrounds, and cabins and lodges. Where applicable, TVA will require appropriate compensation for the commercial use of the property.
7	**Shoreline Access**	TVA-owned land where Section 26a applications and other land use approvals for residential shoreline alterations are considered in accordance with TVA's Shoreline Management Policy. Types of development/management that may be permitted on this land are: • ***Residential water use facilities***, e.g., docks, piers, launching ramps/driveways, marine railways, boathouses, enclosed storage space, and nonpotable water intakes. • ***Shoreline access corridors***, e.g., pathways, wooden steps, walkways, or mulched paths that can include portable picnic tables and utility lines. • ***Shoreline stabilization***, e.g., bioengineering, riprap, gabions, and retaining walls. • ***Shoreline vegetation management.***

Appendix G – Reservoir Lands Planning: Single Use Parcel Allocation and Rapid Land Assessment Methodologies

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METHODOLOGY APPLIED DURING SINGLE USE PARCEL ALLOCATION

Overview

In order to systematically manage lands around its reservoirs, TVA develops reservoir land management plans (RLMPs). RLMPs seek to integrate land and water program goals, provide for the optimum public benefit, and balance competing and sometimes conflicting resource uses. By providing a clear statement of how TVA intends to manage land and by identifying each parcel for specific purposes, TVA hopes to facilitate decision-making for the use of the public land in its care. Land planning guides TVA in the management of resources and property administration decisions on land under its control. Plans are adopted as Agency policy, providing for long-term land stewardship and accomplishment of TVA responsibilities under the 1933 TVA Act.

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

Preplanning

Planning is preceded by preplanning, a set of specific activities that must occur before planning can start. Specifically, TVA would determine the readiness to plan. An RLMP is a complex task requiring many specific skills, resources, and capabilities. A planning team would be organized. Planning is a large task that requires sustained attention from a mixed skills team for the duration of the project. Preplanning provides time to select team leadership and team members and to develop budgets and schedules. Reservoir-specific planning goals are developed by the planning team early in the planning process to guide the allocation of TVA-managed land. The goals should reflect TVA's management objectives for the reservoir, the results of public scoping and intergovernmental coordination, and TVA staff preferences.

An Interdisciplinary Team (IDT) would be assembled to help conduct the environmental review. A communication plan is developed to lay out a strategy for interfacing with TVA management and project stakeholders for the duration of the planning process. A reservoir base map is prepared. This map is used as a base to overlay all resource data coverages, parcel allocations, and other map information for all RLMP project maps.

Preallocation

The planning team maps all existing data for endangered or threatened species, wetlands, natural areas, aquatic habitat, and cultural resources. Next, the committed and uncommitted lands would be identified and mapped. Planning focuses on the uncommitted land, although land use changes can be proposed for committed land. The existing land use is documented in a conversion matrix, and the parcels are numbered. Most TVA reservoirs have either an existing RLMP or a designation from the Forecast System.

During preallocation, the planning team, IDT, and other TVA staff members would weigh the land capability and suitability against public and programmatic needs and existing land conditions. Because the RLMP process assumes the protection of all sensitive resources, all parcels with known sensitive resources should be allocated to Zone 3. TVA staff would

assess and document the suitability and capability attributes of sought-after parcels to be preallocated to Zones 2, 4, 5, and 6. The assessment is based on an established set of capability/suitability criteria for Economic Development, Navigation, Developed Recreation, Visual Resources, and Natural Resource Stewardship. A preallocation map would be used to solicit comments from the public.

At the conclusion of preallocation, the following objectives would be met:

- Resolution of any remaining conflicting zone designations on tracts/parcels with multiple allocated uses
- Alignment of zone allocations with planning goals
- Notation of parcels identified by the public or TVA for development for future data collection and IDT review

New Data Collection
Public input is essential for identifying land for specific uses, gaining insight into stakeholders needs, and defining project issues and concerns. After a public input period has ended, the planning team would compile data from stakeholder consultations and modifiy any preallocation designations, if appropriate.

Allocation and Draft RLMLP
During allocation, preallocated land uses are adjusted, as needed, to reflect public input and new data. The zone and parcel boundary decisions are recorded in a final allocation map for each alternative under consideration. Adjustments to the Shoreline Categorization Map (see TVA's *Shoreline Management Initiative*, 1998) may be needed to reflect corrections to landrights data and sensitive resource data from field collection.

Final RLMP
Potential changes to the draft RLMP are based on public and agency comments and TVA directives. Once all revisions have been completed, the planning team produces a final RLMP for approval by the TVA Board of Directors or the appropriate designee.

NEPA
Throughout the processes mentioned above, the necessary steps to complete the appropriate environmental review would be finalized as dictated in TVA's NEPA procedures located at http://www.tva.gov/environment/reports/pdf/tvanepa_procedures.pdf.

METHODOLOGY APPLIED DURING RAPID LANDS ASSESSMENT

Overview
With the varying methodologies and allocations, it was often difficult to calculate the acreage of public lands that had been planned for sensitive resources, natural resource management, industrial development, and recreation. In 2006, the Rapid Lands Assessment (RLA) methodology was developed to quickly convert the Multiple Use Tract Allocations and Forecast System designations to Single Use Parcel Allocations or zones.

Planning
A planning team was organized that included biologists, foresters, geographic information systems (GIS) specialists, lands planners, land use specialists, recreation planners, and water quality specialists. The goal of the planning team was to document existing land use conditions into a single allocation designation for Beech River, Chickamauga, Kentucky, Nickajack, Normandy, and Wheeler reservoirs. The current land use zones and definitions are consistent with those mentioned in the Single Use Parcel Allocation methodology.

Allocation
The planning team mapped all existing data for endangered or threatened species, wetlands, natural areas, aquatic habitat, and cultural resources. Since RLA methodology assumes the protection of all sensitive resources, all parcels with known sensitive resources were allocated to Zone 3. However, no additional field assessments were conducted during RLA. The planning team also gathered and evaluated information that had changed since the last reservoir land management plan (if applicable), regional trends, and existing land use agreements. Planning focused on the uncommitted land, and the planning team documented the types of land use agreements for committed lands. The existing land uses were documented using GIS. Next, the lands including marginal strips and other previously unplanned lands were aggregated or subdivided into logical parcels and assigned the single use allocation that best represented existing conditions or current needs. Allocation maps were created to communicate the single use allocations to the public.

At the conclusion of RLA, the following objectives were met:

- Resolution of any remaining conflicting zone designations on tracts/parcels with multiple allocated uses
- Alignment of zone allocations with the Land Policy
- Consistency in allocating land use across all TVA-managed lands

National Environmental Policy Act (NEPA)
Since RLA was originally intended as a communication tool, NEPA was not conducted on the RLA methodology or outcomes.

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Appendix H – Water Resource Pollutant Load Reduction Methodology

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POLLUTION REDUCTION CALCULATION METHODOLOGY

For most pollution reduction programs, pollution reduction levels are estimated with Equation 1:

$$PR_n = \frac{\{(B\$ + L\$)\}}{CR_n}$$

Where: PR_n is the amount of load reduction of pollutant n; *B$* is budgeted program expenditure; *L$* is amount of contributions from partners; and CR_n is the unit cost for load reductions for pollutant *n*. This calculation takes into account the large variety of practices that are likely to be used in any program, each of which has its own cost and pollution reduction characteristics.

For this document, it was assumed that these programs could generate a 100 percent match from partners. Based on modeling work from the Little River in Blount County, Tennessee (TVA unpublished), TVA estimated that average pollutant reduction costs were $3,000 per ton of sediment and $2,000 per pound of phosphorus.

The shoreline stabilization program focuses on a single group of practices. For this program, sediment reduction is calculated as shown in Equation 2:

$$PR_S = BL \times BR \times D \times H$$

Where: PR_S is the sediment load reduction; *BL* is the length of treated bank; *BR* is the recession rate of the bank; *D* is soil bulk density of the bank; and *H* is bank height. Average bank recession rate was assumed to be 0.5 foot per year; average bank soil bulk density was assumed to be 100 pounds/square-foot, and average bank height was assumed to be 10 feet. It was also assumed that total phosphorus reduction from bank stabilization was equal to 0.02 percent of the sediment reduction.*

The phosphorus loading reduction for the Targeted Reservoir Initiative is a ballpark professional-judgment estimate based on the cost of upgrading existing wastewater treatment plants and collection systems.

*Calculated incorrectly in the document and will require correction.

Appendix I – Overview of TVA's Endangered Species Act Consultation Procedure

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OVERVIEW OF TVA'S ENDANGERED SPECIES ACT CONSULTATION PROCESS

The Endangered Species Act (ESA) is a Federal law that provides the means for the protection, conservation, and enhancement of endangered and threatened species of plants and animals and of the ecosystems (habitats) on which they depend. Two sections of the ESA are directly applicable to the NRP. Section 7(a)(1) states that "Federal agencies shall, in consultation with and with the assistance of the Secretary [of Interior or Commerce], utilize their authorities in furtherance of the purposes of this Act by carrying out programs for the conservation of endangered species and threatened species listed pursuant to section 4 of this Act." Section 7(a)(2) states that "Each Federal agency shall, in consultation with and with the assistance of the Secretary, insure that any action authorized, funded, or carried out by such agency is not likely to jeopardize the continued existence of any endangered species or threatened species or result in the destruction of adverse modification of habitat of such species which is determined... to be critical." This appendix describes TVA's process for complying with Section 7(a)(2).

The ESA applies to actions in which there is discretionary federal involvement or control. It applies to a federal agency's own operations (e.g., construction, operation of facilities); to an agency's issuance of licenses or permits; and to any other programs or activities of any kind which are authorized, funded, or carried out (whether wholly or in part) by a federal agency.

By the broad definitions given above, virtually any action that TVA takes, or causes to be taken through funding, approval (e.g., 26a permits), or cooperative agreement, is subject to the ESA. Purely administrative matters (e.g., paperwork, procurement, personnel activities) are exempt. Ongoing activities or operations, e.g., power-plant operation, operation of the reservoir system, and flood-control operations are usually not affected (but see below).

As a general rule, the following actions would be subject to ESA.

- Any major construction activity. This is language taken directly from the regulations and is synonymous with the "major federal action" used in NEPA.
- Any substantial change in the operation of the river-reservoir system (e.g., significant changes in discharge regimes).
- Any resource management activity (e.g., introduction of species, wildlife habitat management, timber harvesting, aquatic weed vector control). Most of the NRP programs and activities are in this category.
- Sale, lease, or transfer of TVA land.
- Application of chemicals (e.g., herbicides or pesticides) on land or water.

For the most part, any proposed action subject to review under the NEPA is also subject to the ESA Section 7(a)(2) requirements. See 50 CFR § 402.03 (Applicability). Under the ESA, TVA must determine what listed species or designated critical habitats are likely to occur in the area to be affected and what the effects of the proposed action on those species or critical habitats are likely to be. TVA's procedure for compliance with the ESA is followed for all projects initiated, permitted, or funded by TVA.

ESA Compliance Process

TVA stores information on occurrences of candidate, threatened, and endangered species and designated critical habitats for these species in the TVA region in the TVA Regional Natural Heritage database. This information includes a GIS representation of these occurrences, and tabular data describing the condition and quality of the population (if known). TVA routinely exchanges data with the USFWS Ecological Services offices located within the TVA regionA and with state agencies in the seven Valley states. All TVA projects and permits are examined by TVA biologists and screened against these data to determine if the proposed action has a potential to affect any of listed species and/or their habitats, either due to the nature or location of the activity.

Steps in TVA's ESA Compliance Process

1. Biologists determine whether the project is subject to Endangered Species Act regulations. The only exempted actions are those that are purely administrative such as paperwork and personnel activities. Activities listed under Categorical Exclusions in TVA's NEPA compliance procedures (except purely administrative matters) still require endanger species review.

2. If the project is subject to ESA regulations, biologists determine whether listed species or critical habitats occur in the project area. This determination, and the following steps, is normally done as part of TVA's NEPA review of a project. FWS Ecological Services staff are often contacted at this stage to verify that TVA determinations are accurate.

3. If listed species occur in the project area, biologists will determine how those listed species (or designated critical habitats) could be affected by the action. If potential effects are identified, TVA staff consult with the FWS as required under Section 7(a)(2) of the ESA. If no effect on listed species or designated critical habitats is identified, this "no effect determination" is recorded as part of the ESA/NEPA Administrative Record for the project.

4. If it is determined that the project may effect, but is not likely to adversely affect listed species or critical habitat, Informal Consultation under the ESA is initiated. Projects are typically modified during this consultation process to avoid or minimize effects on endangered or threatened species or designated critical habitats. If FWS agrees with TVA's "not-likely-to-adversely-affect determination," the process is ended and TVA may proceed with the project.

5. If TVA or FWS concludes that the project may affect listed species or adversely modify critical habitat, the Formal Consultation process is used. As with Informal Consultation, projects are typically modified during this process to avoid or minimize the potential effects on endangered or threatened species or designated critical habitats. FWS reviews the information submitted by TVA in a Biological Assessment (BA) and determines whether the project will jeopardize the continued existence of any listed species or adversely modify critical habitat. If FWS determines that no jeopardy will occur, it issues TVA a Biological Opinion (BO) which may require TVA to undertake additional avoidance, minimization, and/or mitigation activities. An incidental take statement will be included in the BO. TVA may then proceed with the project. If FWS determines that jeopardy will occur, TVA

must cancel the project, adopt an alternative project, or apply for an exemption from the ESA. Unless an exemption is granted, the project cannot proceed as originally proposed.

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Appendix J – Endangered and Threatened Species and Sensitive Ecosystems Within the TVA Region

The text of this appendix is found on the Final EIS / NRP Compact Disc and on the NRP website at http://www.tva.com/environment/reports/nrp/index.htm

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Appendix K – Population Trend Data

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Table K-1. Population by County Within the TVA Region

State	County	Decennial Census				Census Estimate	Trend Projections, 1980-2009	
		1970	1980	1990	2000	2009	2020	2030
Tennessee River Watershed (125 Counties)								
AL	Blount	26,853	36,459	39,248	51,024	58,345	66,388	74,356
AL	Colbert	49,632	54,519	51,666	54,984	54,639	54,902	55,278
AL	Cullman	52,445	61,642	67,613	77,483	81,778	90,459	97,719
AL	DeKalb	41,981	53,658	54,651	64,452	69,380	75,339	81,202
AL	Etowah	94,144	103,057	99,840	103,459	103,645	103,883	104,430
AL	Franklin	23,933	28,350	27,814	31,223	31,091	32,660	33,864
AL	Jackson	39,202	51,407	47,796	53,926	52,838	54,215	55,293
AL	Lauderdale	68,111	80,546	79,661	87,966	89,599	93,678	97,335
AL	Lawrence	27,281	30,170	31,513	34,803	34,106	36,619	38,192
AL	Limestone	41,699	46,005	54,135	65,676	78,572	89,457	100,689
AL	Madison	186,540	196,966	238,912	276,700	327,744	371,805	416,053
AL	Marion	23,788	30,041	29,830	31,214	29,116	29,727	29,599
AL	Marshall	54,211	65,622	70,832	82,231	90,399	99,559	108,385
AL	Morgan	77,306	90,231	100,043	111,064	117,293	128,709	138,234
AL	Winston	16,654	21,953	22,053	24,843	23,997	25,562	26,493
GA	Catoosa	28,271	36,991	42,464	53,282	64,035	73,057	82,508
GA	Dade	9,910	12,318	13,147	15,154	16,127	17,685	19,071
GA	Fannin	13,357	14,748	15,992	19,798	22,945	25,741	28,660
GA	Gilmer	8,956	11,110	13,368	23,456	29,021	35,830	42,401
GA	Lumpkin	8,728	10,762	14,573	21,016	27,528	33,201	39,035
GA	Rabun	8,327	10,466	11,648	15,050	16,611	19,130	21,382
GA	Towns	4,565	5,638	6,754	9,319	11,010	13,039	14,963
GA	Union	6,811	9,390	11,993	17,289	21,252	25,609	29,818

State	County	Decennial Census				Census Estimate	Trend Projections, 1980-2009	
		1970	1980	1990	2000	2009	2020	2030
GA	Walker	50,691	56,470	58,340	61,053	64,983	67,532	70,432
GA	Whitfield	55,108	65,775	72,462	83,525	93,698	103,502	113,260
KY	Calloway	27,692	30,031	30,735	34,177	36,348	38,639	40,943
KY	Graves	30,939	34,049	33,550	37,028	37,719	39,358	40,851
KY	Livingston	7,596	9,219	9,062	9,804	9,598	9,915	10,111
KY	Lyon	5,562	6,490	6,624	8,080	8,291	9,161	9,870
KY	McCracken	58,281	61,310	62,879	65,514	65,880	68,173	69,867
KY	Marshall	20,381	25,637	27,205	30,125	31,200	33,658	35,684
KY	Trigg	8,620	9,384	10,361	12,597	13,290	15,049	16,491
MS	Alcorn	27,179	33,036	31,722	34,558	35,822	36,677	37,823
MS	Itawamba	16,847	20,518	20,017	22,770	23,000	24,235	25,288
MS	Prentiss	20,133	24,025	23,278	25,556	25,709	26,551	27,306
MS	Tishomingo	14,940	18,434	17,683	19,163	19,034	19,434	19,772
NC	Avery	12,655	14,409	14,867	17,167	17,932	19,446	20,774
NC	Buncombe	145,056	160,934	174,821	206,330	231,452	256,529	281,537
NC	Cherokee	16,330	18,933	20,170	24,298	26,307	29,259	31,965
NC	Clay	5,180	6,619	7,155	8,775	10,333	11,530	12,840
NC	Graham	6,562	7,217	7,196	7,993	8,001	8,425	8,751
NC	Haywood	41,710	46,495	46,942	54,033	57,109	61,266	65,275
NC	Henderson	42,804	58,580	69,285	89,173	103,669	120,528	136,508
NC	Jackson	21,593	25,811	26,846	33,121	36,891	40,931	44,996
NC	Macon	15,788	20,178	23,499	29,811	33,233	38,525	43,216
NC	Madison	16,003	16,827	16,953	19,635	20,442	21,986	23,381
NC	Mitchell	13,447	14,428	14,433	15,687	15,634	16,321	16,826
NC	Swain	8,835	10,283	11,268	12,968	13,404	14,871	16,016

State	County	Decennial Census				Census Estimate	Trend Projections, 1980-2009	
		1970	1980	1990	2000	2009	2020	2030
NC	Transylvania	19,713	23,417	25,520	29,334	30,203	33,436	35,938
NC	Watauga	23,404	31,666	36,952	42,695	45,479	51,515	56,393
NC	Yancey	12,629	14,934	15,419	17,774	18,548	20,107	21,469
TN	Anderson	60,300	67,346	68,250	71,330	74,849	77,070	79,694
TN	Bedford	25,039	27,916	30,411	37,586	45,947	51,334	57,619
TN	Benton	12,126	14,901	14,524	16,537	16,025	16,913	17,473
TN	Bledsoe	7,643	9,478	9,669	12,367	12,967	14,552	15,911
TN	Blount	63,744	77,770	85,969	105,823	122,784	138,303	154,231
TN	Bradley	50,686	67,547	73,712	87,965	97,710	108,967	119,753
TN	Campbell	26,045	34,923	35,079	39,854	40,970	43,677	46,042
TN	Carroll	25,741	28,285	27,514	29,475	28,517	29,157	29,437
TN	Carter	43,259	50,205	51,505	56,742	59,043	62,639	65,912
TN	Chester	9,927	12,727	12,819	15,540	16,312	17,858	19,248
TN	Claiborne	19,420	24,595	26,137	29,862	31,243	34,131	36,575
TN	Cocke	25,283	28,792	29,141	33,565	36,047	38,687	41,380
TN	Coffee	32,572	38,311	40,339	48,014	52,521	57,873	63,052
TN	Cumberland	20,733	28,676	34,736	46,802	54,109	64,080	73,189
TN	Decatur	9,457	10,857	10,472	11,731	11,525	12,001	12,340
TN	Dickson	21,977	30,037	35,061	43,156	48,230	55,441	61,904
TN	Fentress	12,593	14,826	14,669	16,625	17,677	18,675	19,754
TN	Franklin	27,289	31,983	34,725	39,270	41,310	45,304	48,664
TN	Giles	22,138	24,625	25,741	29,447	29,082	31,704	33,478
TN	Grainger	13,948	16,751	17,095	20,659	22,857	25,020	27,270
TN	Greene	47,630	54,422	55,853	62,909	66,282	70,957	75,349
TN	Grundy	10,631	13,787	13,362	14,332	14,130	14,427	14,634

State	County	Decennial Census				Census Estimate	Trend Projections, 1980-2009	
		1970	1980	1990	2000	2009	2020	2030
TN	Hamblen	38,696	49,300	50,480	58,128	63,033	67,917	72,940
TN	Hamilton	255,077	287,643	285,536	307,896	337,175	348,662	366,127
TN	Hancock	6,719	6,887	6,739	6,786	6,588	6,531	6,444
TN	Hardin	18,212	22,280	22,633	25,578	26,258	28,067	29,603
TN	Hawkins	33,757	43,751	44,565	53,563	57,784	63,197	68,457
TN	Henderson	17,360	21,390	21,844	25,522	27,037	29,312	31,437
TN	Henry	23,749	28,656	27,888	31,115	31,876	33,233	34,559
TN	Hickman	12,096	15,151	16,754	22,295	23,805	27,719	30,974
TN	Houston	5,853	6,871	7,018	8,088	8,154	8,819	9,328
TN	Humphreys	13,560	15,957	15,795	17,929	18,274	19,356	20,294
TN	Jefferson	24,940	31,284	33,016	44,294	51,722	58,923	66,386
TN	Johnson	11,569	13,745	13,766	17,499	18,006	20,063	21,769
TN	Knox	276,293	319,694	335,749	382,032	435,725	470,451	510,907
TN	Lawrence	29,097	34,110	35,303	39,926	41,314	44,503	47,212
TN	Lewis	6,761	9,700	9,247	11,367	11,521	12,435	13,218
TN	Lincoln	24,318	26,483	28,157	31,340	33,374	36,047	38,506
TN	Loudon	24,266	28,553	31,255	39,086	46,725	52,572	58,975
TN	McMinn	35,462	41,878	42,383	49,015	52,739	56,686	60,719
TN	McNairy	18,369	22,525	22,422	24,653	25,796	26,975	28,213
TN	Marion	20,577	24,416	24,860	27,776	28,068	29,904	31,340
TN	Marshall	17,319	19,698	21,539	26,767	30,279	34,180	37,985
TN	Maury	44,028	51,095	54,812	69,498	84,302	94,543	106,273
TN	Meigs	5,219	7,431	8,033	11,086	12,108	14,115	15,878
TN	Monroe	23,475	28,700	30,541	38,961	45,830	51,522	57,666
TN	Moore	3,568	4,510	4,721	5,740	6,096	6,772	7,368

State	County	Decennial Census				Census Estimate	Trend Projections, 1980-2009	
		1970	1980	1990	2000	2009	2020	2030
TN	Morgan	13,619	16,604	17,300	19,757	18,738	20,441	21,369
TN	Perry	5,238	6,111	6,612	7,631	7,826	8,656	9,294
TN	Polk	11,669	13,602	13,643	16,050	15,648	16,978	17,867
TN	Rhea	17,202	24,235	24,344	28,400	31,516	33,834	36,492
TN	Roane	38,881	48,425	47,227	51,910	53,508	55,439	57,487
TN	Rutherford	59,428	84,058	118,570	182,023	257,048	311,442	371,250
TN	Sequatchie	6,331	8,605	8,863	11,370	13,915	15,460	17,349
TN	Sevier	28,241	41,418	51,043	71,170	86,243	102,656	118,572
TN	Stewart	7,319	8,665	9,479	12,370	13,340	15,373	17,119
TN	Sullivan	127,329	143,968	143,596	153,048	154,552	159,532	163,786
TN	Unicoi	15,254	16,362	16,549	17,667	17,740	18,453	18,996
TN	Union	9,072	11,707	13,694	17,808	19,164	22,505	25,242
TN	Van Buren	3,758	4,728	4,846	5,508	5,480	5,905	6,208
TN	Washington	73,924	88,755	92,315	107,198	120,598	130,842	142,179
TN	Wayne	12,365	13,946	13,935	16,842	16,506	18,082	19,181
TN	Williamson	34,423	58,108	81,021	126,638	176,838	214,861	256,133
VA	Bland	5,423	6,349	6,514	6,871	6,791	7,074	7,249
VA	Dickenson	16,077	19,806	17,620	16,395	16,087	14,231	12,945
VA	Grayson	15,439	16,579	16,278	17,917	15,793	16,494	16,436
VA	Lee	20,321	25,956	24,496	23,589	25,166	23,903	23,548
VA	Russell	24,533	31,761	28,667	30,308	29,250	28,456	27,846
VA	Scott	24,376	25,068	23,204	23,403	22,585	21,673	20,924
VA	Smyth	31,349	33,345	32,370	33,081	31,738	31,579	31,162
VA	Tazewell	39,816	50,511	45,960	44,598	44,907	41,705	39,808
VA	Washington	40,835	46,487	45,887	51,103	53,018	55,568	58,121

State	County	Decennial Census				Census Estimate	Trend Projections, 1980-2009	
		1970	1980	1990	2000	2009	2020	2030
VA	Bristol city	14,857	19,042	18,426	17,367	17,690	16,783	16,249
VA	Wise	35,947	43,863	39,573	40,123	41,773	39,775	39,158
VA	Norton city	4,172	4,757	4,247	3,904	3,713	3,247	2,887
VA	Wythe	22,139	25,522	25,466	27,599	28,868	30,020	31,271
Total Watershed (125 Counties and 2 Independent Cities)		**4,023,778**	**4,768,207**	**5,025,692**	**5,837,174**	**6,425,319**	**7,016,111**	**7,610,967**
AL	Cherokee	15,606	18,760	19,543	23,988	24,448	27,305	29,531
GA	Chattooga	20,541	21,856	22,242	25,470	26,619	28,607	30,413
GA	Gordon	23,570	30,070	35,072	44,104	53,292	61,062	69,151
GA	Murray	12,986	19,685	26,147	36,506	40,621	49,832	57,394
KY	Allen	12,598	14,128	14,628	17,800	18,982	21,001	22,830
KY	Butler	9,723	11,064	11,245	13,010	13,329	14,395	15,280
KY	Carlisle	5,354	5,487	5,238	5,351	5,209	5,134	5,060
KY	Christian	56,224	66,878	68,941	72,265	80,938	83,993	88,642
KY	Cumberland	6,850	7,289	6,784	7,147	6,706	6,625	6,483
KY	Edmonson	8,751	9,962	10,357	11,644	11,926	12,846	13,589
KY	Fulton	10,183	8,971	8,271	7,752	6,814	6,138	5,420
KY	Grayson	16,445	20,854	21,050	24,053	25,581	27,348	29,116
KY	Hickman	6,264	6,065	5,566	5,262	4,851	4,409	4,002
KY	Logan	21,793	24,138	24,416	26,573	27,174	28,511	29,673
KY	Monroe	11,642	12,353	11,401	11,756	11,569	11,245	11,037
KY	Muhlenberg	27,537	32,238	31,318	31,839	31,274	31,052	30,809
KY	Simpson	13,054	14,673	15,145	16,405	17,019	17,971	18,827

State	County	Decennial Census				Census Estimate	Trend Projections, 1980-2009	
		1970	1980	1990	2000	2009	2020	2030
KY	Todd	10,823	11,874	10,940	11,971	12,253	12,314	12,534
KY	Warren	57,884	71,828	76,673	92,522	108,669	120,175	133,146
MS	Attala	19,570	19,865	18,481	19,661	19,755	19,652	19,735
MS	Benton	7,505	8,153	8,046	8,026	7,981	7,912	7,856
MS	Calhoun	14,623	15,664	14,908	15,069	14,422	14,092	13,725
MS	Chickasaw	16,805	17,851	18,085	19,440	18,683	19,539	19,944
MS	Choctaw	8,440	8,996	9,071	9,758	9,023	9,428	9,514
MS	Clay	18,840	21,082	21,120	21,979	20,722	21,194	21,181
MS	DeSoto	35,885	53,930	67,910	107,199	158,719	188,472	224,723
MS	Kemper	10,233	10,148	10,356	10,453	9,833	9,990	9,907
MS	Lafayette	24,181	31,030	31,826	38,744	43,975	48,258	52,956
MS	Leake	17,085	18,790	18,436	20,940	23,132	24,339	25,929
MS	Lee	46,148	57,061	65,581	75,755	81,913	92,166	100,914
MS	Lowndes	49,700	57,304	59,308	61,586	59,658	61,958	62,946
MS	Marshall	24,027	29,296	30,361	34,993	36,900	40,032	42,862
MS	Monroe	34,043	36,404	36,582	38,014	36,905	37,767	38,080
MS	Neshoba	20,802	23,789	24,800	28,684	30,302	32,993	35,408
MS	Noxubee	14,288	13,212	12,604	12,548	11,631	11,258	10,767
MS	Oktibbeha	28,752	36,018	38,375	42,902	44,544	48,315	51,425
MS	Panola	26,829	28,164	29,996	34,274	35,245	38,586	41,226
MS	Pontotoc	17,363	20,918	22,237	26,726	29,248	32,449	35,485
MS	Scott	21,369	24,556	24,137	28,423	29,341	31,467	33,389
MS	Tallahatchie	19,338	17,157	15,210	14,903	12,638	11,384	9,961
MS	Tate	18,544	20,119	21,432	25,370	27,337	30,226	32,864
MS	Tippah	15,852	18,739	19,523	20,826	21,661	22,809	23,847

State	County	Decennial Census				Census Estimate	Trend Projections, 1980-2009	
		1970	1980	1990	2000	2009	2020	2030
MS	Union	19,096	21,741	22,085	25,362	27,263	29,265	31,306
MS	Webster	10,047	10,300	10,222	10,294	9,852	9,843	9,714
MS	Winston	18,406	19,474	19,433	20,160	19,309	19,672	19,702
MS	Yalobusha	11,915	13,183	12,033	13,051	13,773	13,717	13,997
TN	Cannon	8,467	10,234	10,467	12,826	13,860	15,289	16,652
TN	Cheatham	13,199	21,616	27,140	35,912	39,876	47,711	54,276
TN	Clay	6,624	7,676	7,238	7,976	7,895	8,060	8,204
TN	Crockett	14,402	14,941	13,378	14,532	14,492	14,276	14,252
TN	Davidson	447,877	477,811	510,784	569,891	635,710	686,766	741,506
TN	DeKalb	11,151	13,589	14,360	17,423	18,954	21,065	23,039
TN	Dyer	30,427	34,663	34,854	37,279	37,811	39,246	40,471
TN	Fayette	22,692	25,305	25,559	28,806	38,785	40,838	45,284
TN	Gibson	47,871	49,467	46,315	48,152	49,468	48,784	48,956
TN	Hardeman	22,435	23,873	23,377	28,105	27,613	29,919	31,573
TN	Haywood	19,596	20,318	19,437	19,797	18,881	18,588	18,183
TN	Jackson	8,141	9,398	9,297	10,984	10,875	11,740	12,374
TN	Lake	8,074	7,455	7,129	7,954	7,303	7,568	7,610
TN	Lauderdale	20,271	24,555	23,491	27,101	26,471	27,857	28,828
TN	Macon	12,315	15,700	15,906	20,386	22,057	24,638	27,064
TN	Madison	65,774	74,546	77,982	91,837	97,317	106,819	115,294
TN	Montgomery	62,721	83,342	100,498	134,768	160,978	189,347	216,852
TN	Obion	30,247	32,781	31,717	32,450	31,431	31,241	30,903
TN	Overton	14,866	17,575	17,636	20,118	21,060	22,462	23,794
TN	Pickett	3,774	4,358	4,548	4,945	4,783	5,100	5,275
TN	Putnam	35,487	47,690	51,373	62,315	72,431	80,543	89,292

State	County	Decennial Census				Census Estimate	Trend Projections, 1980-2009	
		1970	1980	1990	2000	2009	2020	2030
TN	Robertson	29,102	37,021	41,494	54,433	66,581	76,240	86,678
TN	Scott	14,762	19,259	18,358	21,127	21,866	22,901	23,989
TN	Shelby	722,111	777,113	826,330	897,472	920,232	986,032	1,037,812
TN	Smith	12,509	14,935	14,143	17,712	19,201	20,742	22,423
TN	Sumner	56,266	85,790	103,281	130,449	158,759	183,462	208,766
TN	Tipton	28,001	32,930	37,568	51,271	59,495	69,604	79,223
TN	Trousdale	5,155	6,137	5,920	7,259	7,922	8,545	9,232
TN	Warren	26,972	32,653	32,992	38,276	40,481	43,581	46,543
TN	Weakley	28,827	32,896	31,972	34,895	33,459	34,534	35,021
TN	White	16,329	19,567	20,090	23,102	25,444	27,405	29,525
TN	Wilson	36,999	56,064	67,675	88,809	112,377	130,536	150,063
Total Area (203 Counties and 2 Independent Cities)		**6,797,199**	**7,928,344**	**8,373,818**	**9,674,255**	**10,598,952**	**11,563,240**	**12,521,417**

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Appendix L – Additional Climate Change Information

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ADDITIONAL CLIMATE CHANGE INFORMATION: POTENTIAL IMPACTS TO TVA-MANAGED LANDS DUE TO THE CHANGING CLIMATE

A great deal of uncertainty remains regarding the response of climate to a broad range of natural and anthropogenic influences, making climate forecasts quite difficult. It is possible that under current management plans, climate change itself could impact natural resources that TVA manages. The current program option may provide some indication of change over time and serve as a basis for options that mitigate detrimental impacts of climate change and positively manage the beneficial impacts. Current natural resources management that enacts conservation and enhancement serves to restore lands and water quality thus enhancing carbon storage.

Biological and Cultural Resources Management

It is possible that under current management, climate change itself could impact natural resources that TVA manages, including changes to ecosystem type and consequently sensitive biological resources due to increased temperature and changes in precipitation, and changes in forest and agricultural production (both positive and negative) due to potential changes in temperature, precipitation, and the availability of ambient carbon dioxide.

Under climate change extremes, sensitive species may face ecosystem loss and fragmentation, intensified impacts of invasive species and pests, and changes in the timing of ecological events triggered by seasonal temperature changes. Sensitive biological resources that are already rare could become more restricted or eliminated from an area.

Agricultural crops could be impacted by higher temperature and changes in evapotranspiration, the timing and magnitude of precipitation, and the need for irrigation or could alternatively be impacted by soil erosion. Crops could become more susceptible to disease and invasive species (Electric Power Research Institute [EPRI] and TVA 2009).

Forest management could potentially face two different climate impact scenarios. Certain forest types may benefit from increased growth and expanded growth range, while other types may experience detrimental effects including reduced forest growth, decreased forest area, shifts in tree species composition, and dieback caused by disturbance such as bug infestations and fire.

The current natural and cultural resources management plans utilize land stewardship assessment tools and sensitive biological resources management programs that serve to monitor ecosystems and species. Current management may provide some indication of change over time and serve as a basis for management options that mitigate detrimental impacts of climate change and positively manage the beneficial impacts. Current terrestrial habitat management through conservation and enhancement serve to restore lands and water quality thus enhancing carbon storage, while management of nonnative invasive plant and animal species would positively impact species at risk.

Terrestrial carbon sequestration is the capture and secure storage of carbon dioxide (CO_2) that would otherwise be emitted to or remain in the atmosphere. Terrestrial carbon sequestration is the process where atmospheric CO_2 is absorbed by trees, by plants through photosynthesis, and is stored as carbon in the biomass (trunks, branches, roots) and soil. This transformation of free-floating atmospheric carbon to a fixed-state carbon can be achieved through methods, such as tree planting, grass planting, and using forestry best management practices.

Recreation Management

It is possible that under current management, climate change itself could impact future management, including the demand for specific types of recreation by affecting the attractiveness of a recreational opportunity due to increased temperature or precipitation; participants may begin to change their recreational activities and destinations, including ceasing recreational activities altogether. Changes in streamflow also have a significant impact on the suitability of a resource for recreation. Fishing also stands to be heavily affected by climate change given that water flows and temperature both play important roles in the health of the fish population. Cold water fish populations, such as trout, may be diminished while warm water populations may increase (EPRI and TVA 2009). In regard to water-based recreation, rising lake and river temperatures could cause warm water fishing to be substituted for cold water fishing. Changes to water resources, which diminish habitats or lead to species loss, could also affect the availability or quality of wildlife viewing, hunting, fishing, and other activities involving wildlife.

Research has not clearly established how recreation would be affected within the TVA region, as this depends both on the effects of climate change on recreation resources and participants' adaptation and substitution decisions, neither of which appears to have been the subject of academic or other research.

Reservoir Lands Planning

No impacts are anticipated as a result of reservoir lands planning.

Water Resource Management

It is possible that under current management, climate change itself could impact management options including impacts to water quality and availability and impacts to wildlife habitat and biodiversity due to instream flow levels changes. Increased temperature in conjunction with no major increases in streamflow could reduce dissolved oxygen in water bodies, resulting in a reduction in water quality, in particular water's suitability to support oxygen-dependent aquatic organisms.

Reductions in hydrologic resources may leave less dilution flows in streams, leading to degraded water quality. Droughts and increasing temperatures may cause changes in biological composition of water bodies, and changes in flow may provide entry pathways for invasive species. Water demands for agricultural use, such as livestock and irrigation, could compete with industrial and municipal uses (EPRI and TVA 2009).

The current water resource management programs utilize public outreach workshops that educate stakeholders and promote water efficiency. Such programs could serve to promote efficient water use and consumption to support regional water use in the event that the demand for water increases in response to potential climate change. TVA's Stream and Tailwater Monitoring Program under the current management option use biological monitoring to evaluate watershed conditions. While specific long-term changes in biodiversity to climate change are not predictable at this time, monitoring stream habitat and health could provide useful information pertaining to ecosystem changes over time and provide data for future management options to mitigate adverse impacts in the event they should occur.

Literature Cited

Electric Power Research Institute (EPRI) and Tennessee Valley Authority. 2009. *Potential Impact of Climate Change on Natural Resources in the Tennessee Valley Authority*

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Appendix M – Comments on Draft EIS / Plan and Responses

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TABLE OF CONTENTS

PART 1 - INTRODUCTION 95
PART 2 - RESPONSES TO COMMENTS 97
2.1. ALTERNATIVES 95
2.1.1. Alternative C - Flagship Management 95
2.1.2. Alternative D - Blended Management 97
2.1.3. New or Modified Alternative 97
2.1.4. Support for Alternative C or D 99
2.2. AQUATIC ECOLOGY 99
2.3. BIOLOGICAL RESOURCES MANAGEMENT 99
2.3.1. Dewatering Projects 99
2.3.2. Forest Fragmentation 100
2.3.3. Forest Resource Management 100
2.3.4. Habitat Management 101
2.3.5. Integration with Other Planning Efforts 102
2.3.6. Invasive Species Management 103
2.3.7. Land Condition Assessment 104
2.3.8. Migratory Bird Management 104
2.3.9. Scenic Resources Management 106
2.3.10. Sensitive Biological Resources Management 106
2.3.11. Terrestrial Greenhouse Gas Sequestration 107
2.3.12. Wildlife Habitat Council - Third-Party Certifications 107
2.4. CLIMATE CHANGE 107
2.5. CULTURAL RESOURCES 108
2.5.1. Archaeological Outreach 108
2.5.2. ARPA Compliance and Enforcement 108
2.5.3. NHPA Compliance 108
2.5.4. Scope of Cultural Resources Management Activities 109
2.5.5. Support for the Proposed Action 111
2.6. EDITORIAL COMMENTS 111
2.6.1. Errors in Draft EIS 111
2.6.2. Errors in Draft NRP 112
2.6.3. Suggestions for Improvement of EIS and/or NRP 112
2.7. ENDANGERED & THREATENED SPECIES 120
2.8. ENVIRONMENTAL JUSTICE 121
2.9. MANAGED AREAS 121
2.10. NATURAL RESOURCE MANAGEMENT FUNDING 121
2.10.1. Historical and Current Funding 121
2.10.2. Proposed Funding 122
2.11. NEPA COMPLIANCE/ADEQUACY 125
2.11.1. Public Scoping 125
2.11.2. Scope of Existing Environment Descriptions 125
2.11.3. Scope of Impact Assessments 125
2.12. NRP IMPLEMENTATION 125
2.12.1. Implementation Guidance 125
2.12.2. Mitigation and Monitoring 126
2.12.3. Partnerships for Implementing the NRP 126
2.12.4. Reporting NRP Implementation Expenditures 126

2.12.5. Short Term Implementation Plan 127
2.12.6. Use of Volunteers to Implement NRP 127
2.13. NRP PLANNING PROCESS 127
2.13.1. Alignment with Environmental Policy 127
2.13.2. Benefits Analysis 128
2.13.3. Classification of Programs 129
2.13.4. Historic Natural Resource Planning Efforts 130
2.13.5. Overall Purpose of Plan 130
2.13.6. Planning Goals and Desired Future Conditions 130
2.13.7. Scenario Planning 131
2.13.8. Sustainability and Adaptation 131
2.13.9. TVA Coal Reserves 132
2.14. OTHER 132
2.14.1. General Support for Process 132
2.14.2. No Conflict With Existing Or Proposed Activities 133
2.14.3. Resource Management Unit Plans 133
2.15. PERMITTING 133
2.15.1. Permit and Regulatory Requirements 133
2.15.2. TVA Permitting and Land Use Requirements 134
2.16. PUBLIC ENGAGEMENT 135
2.17. PUBLIC INVOLVEMENT 137
2.18. RECREATION 137
2.18.1. Boating Capacity and Density 137
2.18.2. Commercial Recreation 137
2.18.3. Dispersed Recreation 138
2.18.4. Fishing 139
2.18.5. Integration with SCORPs 139
2.18.6. Recreation Facility Management 140
2.18.7. Recreation Inventory 141
2.18.8. Recreational Access 141
2.18.9. Recreational Use and Visitation Information 141
2.18.10. Stream Access Sites 141
2.19. RESERVOIR LANDS PLANNING 142
2.19.1. Allocations for Specific Tracts 142
2.19.2. Process for Changing Land Use Allocations 142
2.19.3. Reservoir Lands Planning Process 143
2.19.4. Residential Development 144
2.19.5. Target Ranges for Allocations to Land Use Zones 144
2.20. WATER RESOURCE MANAGEMENT 145
2.20.1. Aquatic Monitoring and Management 145
2.20.2. General 146
2.20.3. Mitigation of Impacts 147
2.20.4. Reservoir Shoreline Stabilization 147
2.20.5. Strategic Partnership Planning 148
2.20.6. Water Resource Improvement Tools 149
2.20.7. Water Resources Improvement Programs 150
PART 3 - INDEX OF COMMENTERS 155
PART 4 - COMMENT LETTERS FROM FEDERAL AND STATE AGENCIES AND FEDERALLY RECOGNIZED INDIAN TRIBES 157

PART 1 - INTRODUCTION

The Draft Natural Resource Plan (NRP) and Environmental Impact Statement (EIS) were released to the public on March 25, 2011, and the notice of their availability was published in the *Federal Register* on April 1, 2011. This initiated a 46-day public comment period that ended on May 16, 2011.

The Draft NRP and EIS were posted on the project website. Printed copies and/or CDs containing electronic files of the documents were mailed to state and federal agencies and to others upon request. Others on the project contact list were mailed or e-mailed notifications of the availability of the documents and instructions on how to submit comments. At their request, many people receiving these notices were mailed either printed copies or CDs of the draft documents.

TVA accepted comments submitted through an electronic comment form on the project website, and by mail and email. During the comment period, TVA held three public meetings (see table below) to describe the project and to accept comments on the Draft NRP and EIS. TVA staff presented a brief overview of the plan and answered questions about it. About 45 people attended these public meetings.

Public Meetings Held in 2011 Following Release of Draft NRP and EIS.

Date	Location
April 11	Knoxville, TN
April 20	Benton, KY
April 25	Muscle Shoals, AL

TVA received 151 comment submissions, which included letters, emails, oral statements, and submissions through the project website. TVA carefully reviewed all comment submissions and identified the specific comments about the NRP and EIS contained in each of them. In many instances, comment submissions by different authors contained similar specific comments that addressed the same issues and concerns. These comments were synthesized into comment statements for a combined response. The result of this analysis and synthesis process is a list of 224 individual comments to which TVA has provided responses in Chapter 2 of this volume. The comments and responses are categorized into 21 different topics. Many of these topics are further categorized into different issues.

The two most frequent comment statements were specific to reservoir land planning for Pickwick Reservoir. One recommended that TVA rezone a particular tract of land from developed recreation to a conservation use. The other recommended that TVA increase the amount of land zoned for natural resource conservation and reduce the amount of land zoned for industrial and developed recreation. Of those commenters that endorsed a particular alternative, most favored Alternative C - Flagship Management. A few endorsed TVA's preferred Alternative D - Blended Management, provided it contained more programs and activities in Alternative C. Several commenters recommended that TVA increase its expenditures for natural resource management activities, as it presently makes up a very small proportion of TVA's overall budget,

PART 2

RESPONSES TO COMMENTS

2.1. Alternatives

2.1.1. Alternative C - Flagship Management

1. At a minimum, TVA should implement the priority level Advanced Management. At this level, the proportion of TVA's annual operating budget expended for natural resources management ($55 million) would amount to only 0.4 percent of the TVA total annual budget. To do less would not convey environmental leadership in a region rich in biological resources that have been adversely affected by TVA construction and operation of dams. In comparison, Bonneville Power Administration, which also receives no congressional appropriations, expended $745.2 million on their Fish & Wildlife Program in 2009. The cost of Alternative C is also probably less than other resource management agencies spend on a per-acre basis. (*Commenters: Mark Campen, Richard Preston – TOS, Axel C. Ringe - SC, Joyce Stanley - USDOI, Matthias Varhola*)

Response: Comment noted. TVA's preferred alternative includes some components of those programs and activities identified as Advanced Priority Level in the draft NRP and EIS. TVA's preferred alternative contemplates an increase in funding for these programs.

2. Despite TVA's leadership and good track record in resource conservation, the quality and quantity of many natural resources in the Valley have continued to decline. The recent rapid population growth and major economic shifts that have caused much of this decline are projected to continue over the next two decades. Many recent and ongoing changes at the federal and state levels are reducing society's ability to respond to the increasing challenges on resource conservation. Examples include the elimination of federal support for regional Resource Conservation and Development Councils and state support for Tennessee Local Planning Assistance. TVA's leadership and assistance through many programs comprising the Flagship Management Alternative C would best help address these challenges. (*Commenter: Wolf Naegeli - FGS*)

Response: Comment noted. The NRP alternatives, including the preferred alternative, include several programs to increase TVA's monitoring activities and to better respond to emerging issues. They also include increased support for public outreach and education programs to better educate the public on conservation and resource management issues. TVA also proposes to more actively seek partnerships with other federal, state, and non-governmental organizations to more effectively leverage resources to better manage TVA lands and to more actively participate in local and regional conservation planning efforts.

3. Many of the most innovative and proactive proposed natural resource management programs are only included under Alternative C. The selection of Alternative D as TVA's preferred alternative neither does justice to the effort that went into the preparation of the plan nor to the history and tradition of TVA's leadership in natural resources management. (*Commenter: Wolf Naegeli - FGS*)

Response: Comment noted. The selection of Alternative D was based on trade-off between natural resource stewardship needs, potential TVA programs and activities to address these needs, and TVA's anticipated availability of funding and other resources to implement the

programs and activities. Relative to TVA's historic efforts, the preferred alternative represents increased efforts in some areas and decreased efforts in others.

4. The expanded information gathering, documentation, and analysis programs in the Flagship Management Alternative C are likely to result in this alternative having a higher return on investment than the reduced programs under the preferred Alternative D. The additional programs under Alternative C would enable TVA to recognize important trends earlier, adapt more efficiently to new developments and requirements, and be a more effective leader and partner. Under Alternative C, TVA would be better able to implement proactive solutions which are almost invariably less expensive and have a lower risk of failure than the reactive solutions that would be more likely under Alternative D. (*Commenter: Wolf Naegeli - FGS*)

Response: Comment noted. In selecting the assessment and monitoring programs associated with the preferred Alternative D, TVA has tried to balance these programs with on-the-ground resource management programs, outreach programs, and the resources available to implement all of these programs.

5. We support and urge TVA to implement Alternative C - Flagship Management. This alternative will provide the best long-range management and TVA should commit the resources necessary to implement it. (*Commenters: Linda S. Casey - AFC; Paul E. Davis - TDEC, Sandra Goss - TCWP, Jeremy Lloyd, Mary Linda Schwarzbart, Crystal Sloan, Joyce Stanley - USDOI, Wayne Whitehead – FBPA*)

Response: Comment noted.

6. We support Flagship Management and the inclusion of strategic watershed land-use planning and a vision for interconnecting TVA lands with neighboring riparian zones and other parks and reserves in the watershed. Such an interconnected system of managed lands will benefit the long-term viability of biodiversity and continued provision of ecosystem services. It should also include participation by other stakeholders, targeted education programs, sharing relevant information, sponsoring participatory citizen science, and promoting incentives for best practices in land management that are compatible with conservation goals. (*Commenters: Sandra Goss - TCWP, Deb O'Dell*)

Response: Many TVA lands are long, linear highly fragmented lands surrounded by modified or developed areas. Other TVA lands are substantial in size and have high conservation value. TVA works with numerous conservation agencies to manage some of these lands to benefit wildlife and wildlife-oriented recreation. Examples of these partnerships include many state and federal refuges and management areas which are former TVA properties. TVA recognizes the contribution that its remaining lands provide to biodiversity and ecosystem services. Cooperative efforts in land planning and management, stakeholder participation, education and best practices in land management would increase under both the Alternative C and the preferred Alternative D. The increase would be greatest under Alternative C.

7. We understand that economic factors must be considered in TVA's natural resource management planning, but urge TVA to implement as many of the forward-thinking initiatives from the Flagship Management alternative as necessary. (*Commenter: Amy Ewing - VDGIF*)

Response: Comment noted.

2.1.2. Alternative D - Blended Management

8. We prefer Alternative C as it would provide the greatest overall benefit to the environment. We understand that Alternative C may not be the most practicable alternative due to resource constraints and therefore accept the preferred Alternative D. (*Commenter: Heinz J. Mueller - USEPA*)

Response: Comment noted.

9. We support Alternative D - Blended Management, the preferred alternative. (*Commenter: Dennis Riecke - MDW*)

Response: Comment noted.

2.1.3. New or Modified Alternative

We agree with TVA's selection of the Blended Management Alternative D but note that it should be improved by including several additional programs proposed under the Flagship Management Alternative C. These programs, described in DEIS Appendix H, are:
1) Develop and access improvements at stream access sites, and assist partners with acquisition and development of additional stream access sites. Increasing angler access is an increasingly important goal in Georgia.
2) Provide technical support to other agencies and stakeholders and share recreation information. This would assist in identifying underdeveloped recreational opportunities and planning desired improvements.
3) Foster partnerships to assist in identifying unmet recreation needs around TVA managed reservoirs. Once unmet recreational opportunities are identified, TVA could bring its technical resources to bear in implementing partnered programs.
4) Develop....opportunities to improve public awareness of exotic and invasive species... Since these challenges are not confined by geo-political boundaries, a regional approach to education that incorporates existing state agency policies may be desirable.
5) Share stream (and tailwater) and reservoir data with other agencies and stakeholder groups. We appreciate TVA's willingness to share data “upon request,” and encourage development of passive biological data availability through Web-based platforms. Further, expanding continuous data collection efforts for key aquatic resources would provide TVA and other resource agencies valuable data to guide future management actions. (*Commenter: Dan Forster - GDNR*)

Response: Comment noted. Following are responses to the numbered items. 1) While TVA intends to continue managing the existing stream access sites, the preferred alternative does not include efforts by TVA to acquire and develop stream access sites or assist partners with site acquisition and development. These needs can be more appropriately addressed by state fish and wildlife agencies and budget pressures reduce TVA’s ability to enhance its activities in all program areas, including this one. 2) Under the preferred alternative, TVA would share information from the reservoir recreation inventory and technical innovations associated with the sustainable recreation initiative. It would also provide limited planning support to agencies in the TVA region, but does not otherwise intend to provide technical information that is readily available from other sources. 3) Under the preferred alternative, TVA would continue to work with agencies and other organizations to identify unmet recreation needs and consider them in future reservoir land plans in order to provide suitable lands to meet these needs. 4) Invasive species is a likely topic of the proposed public outreach programs. 5) In addition to providing stream and tailwater data upon request, under the preferred alternative TVA would make this data available online.

11. We support an alternative/program option midway between the enhanced and flagship management options. While we would otherwise support the flagship option, the gap in implementation between enhanced and flagship is too great for successful results under realistic economic and management scenarios. So we recommend the preferred alternative include the following activities at the flagship level:
a. Biological and Cultural Resources Management
    1. Preservation Program
    2. Trails Management
    3. Land Condition Assessment, and Land Stewardship Maintenance Checklist
    4. TVA Natural Heritage Database
    5. TVA Wetlands Database
    6. Public Outreach Programs
    7. Sensitive Biological Resources Management
    8. Terrestrial Habitat Management
b. Recreation Management
    1. Day Use Areas Management
c. Water Resources Management
    1. Aquatic Monitoring and Management
    2. Partnership Programs
    3. Water Resource Improvement Programs (Commenter: Axel C. Ringe - SC)

Response: Comment noted. The levels of implementation for the various activities identified in the final NRP and the preferred alternative in the FEIS represent tradeoffs between the needs of the various natural resources and the availability of funding and other resources to address the needs. TVA has revised some Water Resources Management activities to more aggressively address water resource issues. A new Aquatic Ecology Management program focuses on protection of specific aquatic habitats that support exceptional aquatic diversity in addition to maintaining and enhancing other aquatic communities in streams, reservoirs, and tailwaters. The Strategic Partnership Planning activities are to be implemented at the flagship level. The Water Resource Improvement Programs have been revised and are proposed to be implemented at a level that is expected to result in as great or greater pollutant load reductions than flagship level programs listed in the draft NRP and EIS.

12. While we accept TVA's preferred Alternative D, we recommend it be revised as follows:
- Biological and Cultural Resource Management - Maintain the demonstration projects on terrestrial GHG management practices at the current levels and continue participating in the two third-party consortiums on terrestrial GHG management.
- Recreation Management - Maintain the assistance in greenway development at least at the existing level.
- Water Resource Management - Maintain stream assessment at least at the existing levels. (*Commenter: Heinz J. Mueller - USEPA*)

Response: Under the revised preferred Alternative D, as described in Chapter 3 of the FEIS, TVA would maintain its current terrestrial GHG management demonstration projects and participation in third-party consortiums focusing on this subject. TVA would also continue to maintain the existing trails on TVA lands and would consider proposals from other parties to develop greenways on TVA lands. TVA's stream assessment and monitoring efforts would be increased under the preferred Alternative D.

2.1.4. Support for Alternative C or D

13. We support the implementation of either Alternative C or Alternative D. (*Commenter: Ellie L. Irons - VDEQ*)

Response: Comment noted.

2.2. Aquatic Ecology

14. Neither the Biological Resources Management Program nor the Water Resources Management Program explicitly addresses the issue of the aquatic ecosystems of the TVA reservoirs. These reservoirs are now characterized by game fishes and invasive species. TVA should attempt to bring the reservoir ecologies in line with native lacustrine ecosystems. (*Commenter: Axel C. Ringe - SC*)

Response: The NRP alternatives include an Aquatic Ecology Management program in which TVA would partner and actively participate in enhancing aquatic biological communities in TVA streams, reservoirs, tailwaters downstream of TVA dams, as well as protecting specific habitats that support exceptional aquatic biological diversity. This would include activities such as habitat protection and enhancement, biological monitoring, and pollution reduction. In addition, TVA proposes to develop and implement a public outreach program to raise public awareness of land use practices that degrade aquatic communities and raise public awareness of invasive aquatic animal species consistent with EO 13112. This could include activities such as developing presentations to deliver to communities, working with marinas to support proper boat hull cleaning, and providing information to stakeholders on steps they could take to reduce the spread of certain exotic and invasive species. These programs would be implemented at the flagship level under the preferred Alternative D.

2.3. Biological Resources Management

2.3.1. Dewatering Projects

15. We discourage TVA from continuing the management of dewatering projects except where essential to maintain safe operations of TVA facilities and to restore and protect natural wetlands. (*Commenters: Donald S. Dott, Jr. - KNPC*)

Response: As described in the NRP EIS and Plan, dewatering units located on Kentucky and Wheeler Reservoirs, by their design and operation, provide unique opportunities for waterfowl and wetland wildlife management through existing agreements with the Tennessee and Alabama state wildlife agencies and the U.S. Fish and Wildlife Service (USFWS). Dewatering units operated by the USFWS provide diverse migratory and over-wintering refuge habitat for thousands of waterfowl and waterbird species, which provides substantial opportunities for birding and other wildlife observation opportunities for the public. Units managed by the states in conjunction with TVA provide these same wildlife observation opportunities in addition to prime waterfowl hunting opportunities. In addition to the habitat components provided by the management of these units, TVA has contractual requirements to protect certain public and private infrastructure associated with the dewatering operations such as highway road and railroad embankments. As part of the NRP implementation, TVA proposes to continue engineering-based assessments of the dewatering units to determine necessary repairs and maintenance required to maintain the safe operation of the facilities while best protecting the natural and managed wetlands within these units.

2.3.2. Forest Fragmentation

16. Forest fragmentation is a continuing problem in the TVA region that increases susceptibility to invasions of exotic species, reduces habitat for forest interior species, and reduces native plant diversity. TVA should manage its lands in a manner that protects and increases large blocks of contiguous mature forest. We discourage creating additional early successional habitat and “day lighting” forest roads. (*Commenters: Donald S. Dott, Jr. - KNPC*)

Response: Comment noted. TVA recognizes that forest fragmentation is a problem in much of the TVA region and considers the potential effects on forest fragmentation as it reviews proposed resource management actions, as well as other actions. The avoidance of fragmentation is, for example, an objective in planning new transmission lines. In some situations, the benefits of resource management activities that create early successional habitat can outweigh the potential adverse impacts of forest fragmentation.

2.3.3. Forest Resource Management

17. For many years TVA made efforts to identify, manage, and protect old growth forests on its lands. Old growth forests do not appear to be mentioned in the draft NRP. Has TVA abandoned its concern for them? (*Commenter: Joe Feeman*)

Response: No. TVA remains committed to managing all of its natural resources in an appropriate and prioritized manner, including old growth forests.

18. I question the inclusion of the program to develop and maintain a qualified fire management crew. The state divisions of forestry already have the capability for assisting with controlled burns and controlling wildfires on TVA lands and have been doing so cost-effectively for years. TVA would be duplicating these efforts at a much higher cost. (*Commenter: Joe Feeman*)

Response: In some situations, state fire crews have either not had the time or the ability to conduct prescribed burns for TVA at the time and/or location desired. By having staff trained in fire management, TVA would have the latitude to conduct this work if the state is unable to conduct the work as TVA wishes it to be done. Additionally, from a safety standpoint, TVA staff must be trained in fire management in order to participate in prescribed burns that state agencies may conduct on TVA property. TVA would continue to work with State fire crews whenever possible to conduct prescribed burns on TVA lands.

19. The condition of our native forests is declining and generic stocks have been compromised by non-local seedlings planted by landowners. TVA should make land available to and fund tree improvement programs such as that of the University of Tennessee to establish seed orchards producing locally adapted tree seedlings. These seedlings would then be provided to private and public landowners for reestablishing healthy forests and for carbon sequestration. (*Commenters: Joe Feeman, Dagny Vigander*)

Response: As part of the Forest Resource Management component of the NRP, TVA is proposing to monitor broad forest condition trends and to conduct basic forest protection activities to address these trends and conditions on TVA lands. TVA is also proposing to provide support to state forestry assessment and management plans from a partnership perspective. TVA has provided land and support to tree improvement programs in the past in partnership with local universities. As part of the NRP, TVA is proposing to partner with universities in the future to address issues related to forest resource management, including the potential for tree improvement programs and terrestrial greenhouse gas sequestration management.

20. The forest resource management program should be expanded to include the activities of gap creation, prescribed burning, and selective harvest/thinning for habitat improvement. (*Commenter: Sandra Goss - TCWP*)

Response: The NRP activities include forest management activities such as managing danger trees, remediating tree cutting/vegetation damage and encroachments on TVA lands, continuing small-scale tree removal operations associated with storm or insect damages, forest wildlife habitat enhancements (potentially including gap creation), monitoring broad forest trends on TVA lands and conducting basic forest protection activities. See FEIS Section 2.1.2, Forest Resource Management.

21. The list of biological resources management programs on draft NRP page 56 includes "Monitor broad forestry trends on TVA-managed lands..." Forestry is the practice of forest management. I presume this program should be to "Monitor broad forest trends..." (*Commenter: Joe Feeman*)

Response: Comment noted. The word "forestry" has been changed to "forest" in this usage.

22. The proposed forest management activities are weak and mostly restricted to small-scale vegetation removal efforts. This will do little to address the decline in the forests on TVA lands over the last 15-20 years described in the draft NRP. It is apparent that TVA has little current information on the condition of the forests on its lands. Despite this, forest inventory efforts are classified as a flagship program and thus unlikely to be implemented. This likely continuing lack of forest condition information will hamper any forest management efforts regardless of whether for wildlife management or timber production purposes. (*Commenter: Joe Feeman*)

Response: Comment noted. TVA proposes to prioritize its natural resource management efforts to most effectively and efficiently utilize its limited resources. Forest management activities are and would continue to be essentially custodial with relatively little active management other than timber salvage operations and limited wildlife habitat enhancement projects.

23. We support the formation of a fire management crew and implementation of a burn program to promote forest health, facilitate collaboration with other land management agencies, and complement ongoing habitat improvement work. (*Commenter: Dave McHenry - NCWRC*)

Response: Comment noted.

2.3.4. Habitat Management

24. ATVs should be restricted from Small Wild Areas and from zones classified Sensitive Resource Management and Natural Resource Conservation. Heavy ATV traffic can cause erosion, with subsequent sediment runoff that impacts fish and other aquatic life local and downstream. ATVs are also noisy, disturb wildlife, and shatter the peace that other users might be seeking. (*Commenter: Sandra Goss - TCWP*)

Response: Comment noted. The use of ATVs is generally prohibited on TVA property, according to established TVA Stewardship Guidelines. Additionally, the use of motorized vehicles, including ATVs, is strictly prohibited on TVA-developed trails; in sensitive environmental areas, small wild areas, designated wildlife management areas and refuges; within reservoir drawdown zones where it could result in environmental damage or public use conflicts; and at other locations where it may result in adverse impacts to natural and cultural resources. ATV abuse is one of the resource conditions recorded during land conditions

assessments; if it is found to be resulting in adverse impacts, TVA Police are requested to provide enforcement. TVA has an ongoing effort to install signs, gates, and other barriers in many areas to restrict ATVs from TVA lands.

25. The biological resources management programs should include an explicit native grass establishment program (including any necessary prescribed burning, grazing, and mowing). The native grasses should include big bluestem, little bluestem, Indian grass, and switchgrass. (*Commenter: Sandra Goss - TCWP*)

Response: TVA, with assistance from partners, has established about 1,000 acres of native warm season grasses and associated forbs at several locations across the Tennessee Valley to enhance wildlife habitat and biodiversity. Under the preferred alternative, TVA would continue to maintain these areas. TVA would also continue to partner with agencies and non-governmental organizations to enhance the management of agricultural lands, which could result in increasing the area of native grasslands.

26. The habitat management programs listed in draft NRP Section 6.4.2.1.1 and elsewhere should include aquatic habitat improvements such as fish attractors and artificial spawning beds that would enhance fish communities and recreational angling opportunities on TVA lakes. (*Commenter: Dan Forster - GDNR*)

Response: An Aquatic Ecology Management program where TVA would partner and actively participate in enhancing aquatic biological communities is a component of Alternatives B, C, and the preferred Alternative D. This would include activities such as habitat protection and enhancement, biological monitoring, and pollution reduction in both reservoirs and streams.

27. The NCWRC supports prescribed burning and other efforts to improve habitat, particularly early successional habitat, wherever appropriate on TVA lands. Early successional habitat is sparse on both public and private lands in western North Carolina and is important for many game and nongame species. NRP Alternative C and to a lesser extent Alternative D would provide the greatest wildlife habitat benefits. Of particular benefit is the Agricultural and Open Lands Management program that converts lands that are unsuitable or poorly suited for agriculture into quality early successional or forested wildlife habitat. Similarly, where timber harvest or salvage is undertaken, we recommend clearing log decks and widening skid trails to create early successional openings. (*Commenter: Dave McHenry - NCWRC*)

Response: Comment noted.

2.3.5. Integration with Other Planning Efforts

28. Although the Draft EIS Section 2.1.5 mentions TVA's participation in planning efforts such as the development of state wildlife action plans, it is unclear how the recommendations in these action plans would be implemented in TVA's natural resource management activities. Linkage to these plans should be a part of all alternatives and would foster cooperative projects between TVA and state wildlife agencies. (*Commenter: Zoe Turner*)

Response: TVA partners with state, federal, and NGO groups as part of its current natural resource planning and management activities. These partnerships will continue, and will include consideration of the goals state wildlife action plans and other large-scale conservation plans developed by these partners. Where the goals of state wildlife action plans and other large-scale conservation plans support TVA's land management goals, these action would be

implemented on TVA lands. Under the Preferred Alternative, TVA would increase its direct involvement in these planning efforts.

29. An objective of the NRP should be to manage TVA lands in a manner that supports a nationwide network of biological corridors and interconnected conservation lands, particularly along riparian zones. This will require increased collaboration with other agencies and landowners in land-use planning and management activities. The NRP should therefore be tightly integrated with other regional planning efforts including those undertaken by the Alliance for the Cumberlands, state chapters of The Nature Conservancy, and the Tennessee Citizens for Wilderness Planning. (*Commenters: Virginia Dale-AFORR/TCWP, Keith L. Kline, Zoe Turner*)

Response: Comment noted. TVA has been and will continue to be participants in conservation planning efforts under all of the NRP alternatives. Biological corridors and habitat connectivity are taken into consideration in these planning efforts. TVA is already involved with some planning efforts undertaken by the listed organizations and will consider the others.

30. The NRP documents make no mention of the use of GAP Analysis (i.e., http://gapanalysis.usgs.gov/) as a tool in large-scale comprehensive reservoir land and habitat conservation planning. This tool would help TVA determine habitat quality and quantity for a variety of biological resources. (*Commenter: Zoe Turner*)

Response: TVA will continue to be involved in landscape scale conservation efforts with state, Federal, and NGO partners, and will examine the potential for GAP analysis to be used as a tool in TVA land planning efforts.

31. We recommend that the Virginia Scenic River Program be introduced as a laudable goal for the rivers within TVA's lands. This could be integrated under the Sensitive Biological Resources or other parts of the NRP. This program gives a framework for educated citizens to create an awareness of the benefits and uniqueness of their local natural resources. It also integrates land and water stewardship for the optimum public benefit in conjunction with providing awareness that helps protect and manage the river resources within the Tennessee River system. It is also used in many localities as an environmental tourism tool. (*Commenter: Roberta Rhur - VDCR*)

Response: Comment noted. TVA's natural resource management public outreach efforts incorporate many of the same goals as those of the Virginia Scenic River Program framework.

2.3.6. Invasive Species Management

32. Relevant to the list of program activities in draft NRP Chapter 4 and Appendix A, please explain how the areas and invasive species to be controlled will be prioritized. (*Commenter: Sandra Goss - TCWP*)

Response: As proposed in the NRP Nonnative Invasive Plant Management program, TVA would prioritize invasive plant control efforts on areas with sensitive resources, existing habitat enhancements such as native warm season grasses and legumes, high public use, and with high partnership potential. More specifically, TVA would establish a prioritization process to identify imminent threats from invasive plants on: threatened and endangered species populations such as mountain skullcap; habitat protection areas with unique habitats such as cedar glades; areas where there are stated concerns and interests from adjoining state and/or Federal land owners such as Fontana Dam Reservation; and areas where partnerships are in place to maximize resources and control success. Under Alternative C, TVA would continue to

actively participate in the state and regional exotic pest plant councils on early detection initiatives to proactively address new invasive plants threats in the Tennessee Valley Region.

33. The area proposed for invasive plant management range from 600 to 40,000 acres/year under the various alternatives and priority levels. Please explain this enormous range. How does it relate to the area currently infested and forecast to be infested by invasive plants? (*Commenter: Ron Fugatt - NU*)

Response: Based on TVA's Lands Conditions Assessments conducted by natural resource managers over the last three years, invasive plants are infesting approximately 17.5 percent of the 231,000 acres of Zone 3 (Sensitive Resources Management) and Zone 4 (Natural Resource Conservation) reservoir properties. This amounts to approximately 40,000 acres of TVA reservoir lands. Without active management efforts, the area infested by invasive plants is likely to increase. At the proposed Flagship management option level in the Plan, TVA would address management of these 40,000 acres of invasive plants. The wide range of acreage is based on different levels of management efforts across the proposed alternatives. The Preferred Alternative would prioritize invasive plant management efforts on TVA's most sensitive and unique habitats where these plants are jeopardizing the existence of threatened and endangered species or biologically critical habitats.

2.3.7. Land Condition Assessment

34. Please describe the status of TVA's shoreline inspection program that analyzes shoreline conditions, including violations and encroachments. What is the annual cost of this program? How will it be addressed within each of the NRP action alternatives? (*Commenter: Zoe Turner*)

Response: Due to organizational changes and limited resources, TVA staff did not conduct systematic shoreline inspections in the 2010 fiscal year. Because of the manner in which costs of shoreline inspections in previous years were recorded, a breakout of the past annual costs of this program is not available. In FY11, TVA plans to inspect target areas including select reservoirs and Zone 3 and Zone 4 lands from June through September. TVA staff is currently preparing a plan which will outline shoreline inspection targets and schedules for the next one-to-three years. This plan will include estimated costs and alignment with the selected NRP alternative.

2.3.8. Migratory Bird Management

35. A proposed migratory bird management activity is to continue to lead the Tennessee River Valley Shorebird Working Group. This group was developed to assist TVA in filling its commitment in the Reservoir Operations Study to determine how the changes in reservoir water levels affected the large numbers of shorebirds migrating through the Tennessee Valley. TVA should make the results of these studies, in particular the effect of the changed water levels, available to the public. If these studies show that the water level changes resulted in a loss of shorebird habitat, TVA should address the mitigation of this loss in the final NRP. (*Commenters: Mark Campen, Richard Preston – TOS*)

Response: Three graduate theses examining Tennessee River Valley waterbird resources funded in partnership with the University of Tennessee and the U.S. Fish and Wildlife Service are available through U.T. TVA's valley-wide shorebird report has been drafted and is currently under review by TVA management. Following completion of the internal TVA review and review by the TRV Shorebird Working Group, the report will be made available via TVA's website. Results of TVA's valley-wide shorebird investigation indicate that the reservoir system provides over 30,000 acres of shorebird habitat.

The availability of this habitat varies among reservoirs and among years, depending upon seasonal rainfall, drought and sporadic storm events (i.e., remnants of hurricanes). The dynamic nature of the reservoir system and varying drawdown schedules allow the system to provide shorebird habitat during much of the migratory season. Reservoirs such as Kentucky and Douglas Reservoir provide habitats earlier in the shorebird migration. In contrast, Chickamauga Reservoir provides new shorebird habitat later in the shorebird migration. This relationship between early and late reservoirs provides thousands of acres of shorebird habitat within the system. A similar relationship occurs between reservoir and off-reservoir sites. During years with heavy rainfall amounts, off-reservoir sites are recharged, providing habitat while reservoir habitats are flooded. The opposite is true during years with lower levels of rainfall. TVA is reviewing the need for mitigation for habitat loss. However, given the abundance of habitat, the large numbers of shorebirds observed on reservoirs managed under the new reservoir guide curves, and the ability of the system to provide new habitat during several portions of shorebird migration, the need for mitigation may not be warranted.

36. The migratory bird management program should include proactive waterfowl and shorebird management. Examples are maintaining mudflats (including manipulating water levels to expose mudflats in the spring and fall) to accommodate shorebirds and increasing cover in backwaters to better accommodate waterfowl. (*Commenter: Sandra Goss - TCWP*)

Response: TVA recognizes the benefits its reservoirs and associated wetlands and mudflats provide to waterfowl, shorebirds, wading birds and other wildlife. The dewatering units, managed in partnership with other agencies, also provide excellent habitat for these birds and other wildlife. Although the timing and management of reservoir water levels is outside the scope of the NRP, TVA is considering ways to further benefit migratory birds.

37. There is currently no Memorandum of Understanding between TVA and the U.S. Fish and Wildlife Service that identifies how TVA will accomplish the requirements of E.O. 13186 on Migratory Birds. It is unclear whether the development of this MOU is proposed under any of the alternative actions. (*Commenter: Joyce Stanley - USDOI*)

Response: TVA and the U.S. Fish and Wildlife Service have discussed a MOU required under E.O. 13186. Until the MOU is developed, TVA will continue to incorporate provisions outlined within E.O. 13186 in its projects as appropriate. TVA intends to continue to work with the Service to address this issue and considers the development of the MOU as part of its activities to comply with E.O. 13186.

38. We are pleased to see attention being given to migratory bird management. The development and implementation of the memorandum of understanding on migratory bird management under Executive Order 13186 should be listed under the Custodial program options because it is required by the EO. (*Commenters: Mark Campen, Richard Preston – TOS*)

Response: Comment noted. The development and implementation of the memorandum are included as part of the E.O. 13186 compliance activities.

39. Wet coal ash storage areas and related water treatment ponds at some of TVA's coal plants have provided important habitat for herons, egrets, waterfowl, coots and shorebirds for decades. The collapse of the ash pond at Kingston Fossil Plant eliminated some of this habitat and TVA's decision to eliminate all wet ash storage areas will likely eliminate more important habitat. Because the coal plants are within the realm of the NRP, it should describe how TVA intends to compensate for this loss of habitat. The combination of the potential loss of habitat resulting

from ROS and the loss of ash pond habitat has the potential to have a major impact on shorebirds migrating through the Tennessee Valley, especially in the fall when other suitable habitat is less available than in the spring. (*Commenters: Mark Campen, Richard Preston – TOS*)

Response: TVA recognizes the extensive waterbird and related recreation uses at ash settling ponds at several generation facilities, however discussions related to ash management are outside the scope of the NRP. TVA will assess potential impacts of the wet/dry ash conversions to these resources during the planning of these actions.

2.3.9. Scenic Resources Management

40. The current and proposed programs and activities contain little regarding the protection and preservation of the abundant scenic resources within the area covered by the plan. We recommend the inclusion of a discussion and management strategy for scenic resources. (*Commenter: Roberta Rhur - VDCR*)

Response: The NRP alternatives do not include specific programs or activities for the management of scenic resources. Scenic protection was a zoning category under the former multiple use tract allocation reservoir land planning methodology. Although the current multiple use parcel allocation methodology does not include a scenic protection zoning category, the protection of significant scenic areas is a criteria for allocating lands to Zone 3 - Sensitive Resource Management. As described in Final EIS Section 5.12, the NRP alternatives, and particularly Alternatives C and D, will result in localized improvements to the scenic quality of TVA lands. TVA also considers impacts to scenic resources as part of its National Environmental Policy Act (NEPA) review activities.

2.3.10. Sensitive Biological Resources Management

41. The biological resources management programs should include proactive sensitive species planning, monitoring, and habitat improvement. (*Commenter: Sandra Goss - TCWP*)

Response: Conservation planning, sensitive species monitoring, and habitat improvements to benefit both sensitive and common species are incorporated into the various NRP alternatives. Under the preferred Alternative D, the level of effort for some of these activities, such as invasive plant management and the development and implementation of comprehensive natural area management plans, would increase over the current level

42. The Tennessee River drainage in Virginia supports a large number of Virginia's imperiled aquatic species as well as some imperiled terrestrial species. It is also a global biological hot spot for imperiled aquatic species. The Virginia Department of Game and Inland Fisheries spends a lot of effort to manage, protect, and recover these species. We support TVA's initiatives to protect and manage these wildlife resources. (*Commenter: Amy Ewing - VDGIF*)

Response: Comment noted. Since publication of the draft NRP, TVA has added a new water resource management activity that would increase its efforts to improve the health of the biologically diverse Clinch, Powell, and Duck River watersheds.

43. The Virginia Department of Game and Inland Fisheries maintains the Aquatic Wildlife Conservation Center at the Marion, VA hatchery. This facility is used to propagate mollusks, fish, and amphibians native to the Tennessee and other drainages for purposes of research and recovery. We are interested in working cooperatively with TVA towards the goals supported by

the Center through funding opportunities available through TVA and its partners. (*Commenter: Amy Ewing - VDGIF*)

Response: TVA appreciates the interest of VDGIF in partnerships that benefit natural resources in the Tennessee River drainage and will continue to share information with VDGIF regarding these resources and seek out new opportunities for cooperative actions.

2.3.11. Terrestrial Greenhouse Gas Sequestration

44. DEIS Chapter 2 describes programs for terrestrial greenhouse gas sequestration. TVA should consider the offsetting effects of GHGs produced by fire suppression activities when discussing the benefits of terrestrial carbon sequestration of forested lands. (*Commenter: Heinz J. Mueller - USEPA*)

Response: Comment noted. TVA works closely with state Divisions of Forestry and multiple rural volunteer fire departments across the seven-state Tennessee Valley watershed to help control damaging wildfires and to conduct small scale (less than 1,000 acres annually) prescribed burns on TVA lands. These prescribed burns are to enhance forest stand health, maintain early successional plant communities, and help control invasive plants, as well as to meet other resource management objectives. While small quantities of GHGs are typically emitted during these prescribed burns, the enhanced vegetative growth rates of trees, shrubs, and deep-rooted native warm season grasses and other herbaceous plants likely offset much of these emissions.

45. TVA proposes to continue and/or expand terrestrial greenhouse gas sequestration basic research. This appears to be duplicating efforts of other institutions with more expertise, equipment, and experience. This type of research also requires a long-term commitment which is not guaranteed. TVA should instead make its land available to and help fund other researchers. (*Commenter: Joe Feeman*)

Response: Comment noted. TVA is committed to reducing the GHG emissions from its operations and will continue to explore effective means to accomplish this reduction. The preferred NRP alternative does not include expanded terrestrial GHG sequestration research efforts. TVA would consider requests from other researchers to conduct cooperative research efforts on TVA land.

2.3.12. Wildlife Habitat Council - Third-Party Certifications

46. The proposed continuation and expansion of participation in the Wildlife Habitat Council certification program is unnecessary. TVA has its own wildlife biologists capable of creating wildlife habitat and was once a leader in wildlife habitat enhancement. It could use peer agency and university staff at no cost for third-party endorsements. The certification is an unnecessary expense and public relations effort. (*Commenter: Joe Feeman*)

Response: Comment noted. TVA considers the certification of a third party such as the WHC as one methodology to help regain TVA's leadership role in wildlife management.

2.4. Climate Change

47. The NRP and EIS should address how possible future changes in the environment due to climate change could change the way TVA manages its natural resources and how TVA will adapt to these changes. Anticipated changes include an increase in extreme weather events, changes in forest conditions such as biomass and species composition, and changes in

demand for various recreational activities. This discussion should include the recommendations in the October 14, 2010 interagency Climate Change Adaptation Task Force. (*Commenters: Virginia Dale - AFORR/TCWP, Heinz J. Mueller - USEPA*)

Response: Final EIS Section 5.17 - Climate has been revised to better describe potential effects of climate change on the natural resources managed by TVA. TVA has also increased the level of aquatic monitoring and assessment activities in the preferred alternative, including the addition of a new Climate Change Sentinel Monitoring program. These changes were made, in part, to respond to the recommendations of the Climate Change Adaptation Task Force.

2.5. Cultural Resources

2.5.1. Archaeological Outreach

48. How does the Thousand Eyes Program relate to the other public outreach and education programs? (*Commenter: Russell Townsend - EBCI*)

Response: TVA is required to have an archaeological outreach program under the Archeological Resources Protection Act (ARPA). This program is designed to help promote the need to protect archaeological resources from looting and other vandalism. TVA proposes to continue to implement the Thousand Eyes program and will look for opportunities to coordinate it with other outreach efforts through the Environmental Education program in order to provide an integrated approach to resource management.

2.5.2. ARPA Compliance and Enforcement

49. The number of proposed ARPA inspection security checks ranges from an unquantified “by reported incident” to 5,000 per year. How many ARPA incidents does TVA currently investigate per year? (*Commenter: Ron Fugatt - NU*)

Response: TVA currently conducts approximately 1,000 security checks per year. TVA investigates 10-20 cases per year with 4-5 cases submitted to the U.S. Attorney's office for further investigation and/or prosecution. Under the preferred alternative, the number of ARPA security checks would continue to be about 1,000 per year. If additional funding is available during the life of the NRP, TVA would increase the number of officers devoted to ARPA and the number of security checks they conduct.

2.5.3. NHPA Compliance

50. The description of the NHPA Section 106 Compliance program on DEIS pages 27-28 include developing emergency procedures for Section 106 compliance. They do not mention the development of plans for late or inadvertent discoveries. Is there also a need for this? (*Commenter: Tom McCulloch - ACHP*)

Response: As part of Alternative C, TVA would develop a plan for emergency procedures for Section 106 Compliance in the event the agency must declare an emergency, such the Kingston Fossil Plant ash spill. This would allow TVA to respond quickly to such an emergency while having procedures in place for ensuring compliance with Section 106. TVA has developed procedures for inadvertent discoveries as defined under the Native American Graves Protection and Repatriation Act (NAGPRA) with several federally recognized Indian tribes pursuant to memoranda of understanding with these tribal governments. In the event that post-review discoveries occur following completion of a Section 106 undertaking, TVA follows the processes laid out in 36CFR800 for post-review discoveries.

51. The NHPA Section 106 Compliance program described on DEIS pages 27-28 includes the development of programmatic agreements with individual states regarding compliance for repetitive actions. This is a good idea and some PAs may be applicable to more than individual states. We have developed lists of repetitive actions that generally have no potential to affect historic properties and can share them with you. (*Commenter: Tom McCulloch - ACHP*)

Response: Comment noted. TVA Cultural Compliance staff would be happy to receive copies of these lists to assist in the development of any programmatic agreements for repetitive actions.

2.5.4. Scope of Cultural Resources Management Activities

52. Do the cultural resources management programs address cultural resources on power plant sites? (*Commenter: Tom Littlepage*)

Response: Yes, TVA manages the cultural resources on power properties the same as it does on reservoir lands.

53. Please explain how the NHPA, ARPA, and NAGPRA define TVA's custodial role and the custodial level of effort. And how did TVA determine the quantities of activities such as surveying and nominating properties for the National Register associated with the custodial levels for programs addressing these laws? (*Commenters: Tyler B. Howe - EBCI, Russell Townsend - ECBI*)

Response: While numerous federal obligations are included in NHPA, ARPA, and NAGPRA, the acts and associated regulations do not set out goals or requirements that specify a certain level of effort. Each land managing agency is required to manage the historic properties and archaeological resources on their lands pursuant to these Acts. Because agencies differ in terms of agency mission, land and resource base, and budgets, there is no consistent policy that can be applied across agencies.

The numbers provided in the custodial option represent a minimal approach to meet the requirements of the law. Most legislation requires agencies to make a “good-faith effort” in meeting these obligations. TVA's managed lands are primarily located along the Tennessee River and its tributaries and as a result are the location of many archaeological and other settlement type sites. While the land area is small relative to many other Federal agencies, the cultural resources are dense and their vulnerability to various threats is great, with most being easily accessible by water and land. With only approximately 30 percent of its lands systematically surveyed, TVA must make prudent choices in its annual inventory efforts while making a good-faith effort to meet its responsibilities under Section 110 of the NHPA. Under the preferred alternative, TVA would conduct archaeological surveys on 3,000 acres per year; although an increase from the current 2,000 acres per year, TVA would not complete its Section 110 inventory for 65 years. By using additional funds to expand these efforts to 5,000 acres per year under Alternative C - Flagship Management, TVA could reduce this inventory completion to around 40 years.

In the recent past TVA has been limited in its nominations to the National Register of Historic Places (NRHP). Alternative B - Custodial Management would set minimal goals to evaluate and nominate two NRHP eligible sites each year. It is estimated that only 25 percent of the 11,500 archaeological sites have been evaluated for eligibility for the NRHP. It is anticipated that at least half of these sites are NRHP eligible. In addition, many of TVA's structures have also played a significant role in our Nation's history, making them eligible for the NRHP. Nominating two sites each year would be a minimal effort. Under Alternative C, TVA would evaluate and

nominate up to ten each year - improving the public exposure to these sites and helping to encourage the protection of the resources.

ARPA Investigations are quantified by considering the number of security checks by TVA Police each year. This would mean 1,000 of TVA's 11,500 recorded sites would be visited each year and monitored for illegal activity. This is only 11 percent of the sites located on TVA land. Alternative C would increase this to 5,000 sites visited each year, a significant increase in monitoring and site protection efforts. This would be accomplished through additional officers available for ARPA enforcement and additional archaeologists on staff to assist these officers in conducting assessments under the Act.

NAGPRA does not include specified numbers associated with the repatriation of materials in our collections. TVA has been working on a timeline for completion of these efforts independently of the NRP. Pursuant to the programmatic agreement that is currently being developed for Section 106 Compliance of the NRP, TVA plans to identify long-term goals for the implementation of these programs that will include prioritizing lands or sites and identifying what TVA can do to increase these efforts should money be available.

54. Please provide a breakdown of the general location of the 11,500 archaeological sites that TVA manages. How many are along the reservoirs, on power plant sites, and on transmission lines? (*Commenter: Ron Fugatt - NU*)

Response: A majority of the 11,500 archaeological sites are located on reservoir lands (both inundated and above pool, although a majority of these are above pool). A few archaeological sites are located on power plant sites. Most transmission lines are located on lands where TVA has purchased an easement, rather than owning the land. Consequently, TVA does not have the same management responsibilities for most archaeological sites on transmission lines as it does on lands it controls with fee-title. TVA does survey for archaeological sites along proposed transmission lines and takes appropriate measures to avoid and/or mitigate impacts to eligible or potentially eligible sites from TVA construction and maintenance activities.

55. The Eastern Band of Cherokee Indians Tribal Historic Preservation Office recognizes that the draft NRP was constructed “to enable TVA to better balance its stewardship objectives and obligations while working within resource and financial considerations.” However, it is the Office's opinion that a monetary value cannot be placed on some resources, such as non-renewable cultural resources. Given the abundance of cultural resources on TVA's lands, the protection of these resources should be TVA's first priority. It would be an affront to our Tribal Elders if important Cherokee sites were damaged because the lead federal agency in charge of their stewardship did not find it economically beneficial to properly manage them. (*Commenter: Tyler B. Howe - EBCI*)

Response: TVA understands the sensitive nature of these non-renewable resources to the Eastern Band of Cherokee Indians and other federally recognized Indian tribes who may be culturally affiliated with these archaeological sites. While it is not appropriate to place a value on these resources in determining the economic feasibility of stewardship responsibilities, TVA has considered the benefits of some programs in terms of the scientific knowledge and data that can be saved through such activities such as the site stabilization program or through investigations pursuant to the Archeological Resources Protection Act (ARPA). This effort shows that the knowledge and information that can be saved from these efforts far outweighs the costs associated with the activity itself. These values are consistent with the values archaeologists must place on resources impacted through the prohibited acts defined under ARPA. TVA

understands that the scientific value of these sites is not the only value that can be placed on the resources. Further, TVA recognizes that a value cannot be placed on the cultural significance of these resources and that its obligations to be stewards of these resources cannot be justified through economic feasibility.

2.5.5. Support for the Proposed Action

56. We continue to support TVA's efforts for protecting and preserving archaeological sites and recommend that TVA monitor sites along reservoir shorelines and evaluate the National Register eligibility of previously recorded sites. (*Commenter: Claudia Brown - NCSHPO*)

Response: Comment noted.

2.6. Editorial Comments

2.6.1. Errors in Draft EIS

57. DEIS Section 5.8.8 lacks an assessment of potential impacts from each alternative to endangered and threatened plants. This section states that direct and indirect impacts would be anticipated from the introduction and spread of invasive plants, and this would affect Ruth's golden aster. It also states that cumulative impacts to listed plants may result from habitat destruction by increased commercial and residential development. We recommend that the FEIS include a consistent assessment of the potential impacts to all groups of endangered and threatened species. (*Commenter: Joyce Stanley - USDOI*)

Response: Comment noted. Final EIS Section 5.8 has been revised to provide more consistent analyses of the impacts to endangered and threatened species.

58. The description of the No Action Alternative in DEIS Section 3.2.1 states that “TVA would continue its current natural resource management efforts by implementing the existing stewardship programs...” (page 91) yet several programs such as the aquatic ecology management program and water efficiency program, which are listed in DEIS Table 2-27 as current programs, are not listed in DEIS Section 3.2.1.4. DEIS Appendix H also appears to exclude these programs from the No Action Alternative. Please clarify these tables and the status of these programs. (*Commenter: Heinz J. Mueller - USEPA*)

Response: Under the preferred alternative, TVA would conduct the Aquatic Ecology Management activities at the highest flagship level. These activities are not part of TVA's current resource management activities (the No Action Alternative). Water efficiency program activities will be implemented under TVA’s Strategic Sustainability Performance Plan, a separate effort from the NRP. The sustainability plan includes the continued reduction of TVA's water usage and aims for TVA to become a leading example to the community on water use efficiency and management.

59. The Endangered Species Act listing status of the spectaclecase (*Cumberlandia monodonta*), sheepnose (*Plethobasus cyphyus*), and rayed bean (*Villosa fabalis*) is given in Table K-8 as candidate species. The status of these species has recently been revised to “proposed endangered.” The snuffbox (*Epioblasma triquetra*), recently listed as “proposed endangered,” should be included in Table K-8 as it occurs in the Tennessee River watershed. (*Commenter: Joyce Stanley - USDOI*)

Response: The status of these species has been corrected in Table K-8 of the FEIS.

60. We support TVA's monitoring of critical habitats for endangered and threatened species on TVA lands. The DEIS Executive Summary, page S-5, states no T&E species are “known to occur on the TVA-managed lands that are a part of this plan.” This is contradictory to statements in DEIS Chapter 3, page 93, that 40 sites containing populations of federally listed animals and plants on TVA lands are monitored. (*Commenter: Dan Forster - GDNR*)

Response: The Final EIS Executive Summary has been revised to correct this.

2.6.2. Errors in Draft NRP

61. NRP Section 2.4 states that “TVA will use three techniques to collect public input during the draft document stage.” Only two techniques are listed. (*Commenter: Dan Forster - GDNR*)

Response: This error has been corrected in the final NRP.

2.6.3. Suggestions for Improvement of EIS and/or NRP

62. DEIS Executive Summary page S-7 paragraph 2 states Alternative D would create the greatest potential benefit in only three categories (visual resources, listed plant species and vegetation). Table S-1 (page S-8) states Alternative D would also “provide the greatest beneficial impact” on aquatic ecology relative to all other alternatives. Aquatic ecology should be added to the list of "greatest potential benefit” categories under Alternative D. (*Commenter: Dan Forster - GDNR*)

Response: The summaries of environmental consequences in the DEIS Executive Summary and the Comparison of Alternatives in DEIS Section 3.5 erroneously stated that Alternative D would result in the greatest beneficial impacts to visual resources, listed plant species, vegetation, and aquatic ecology. As with most other resource areas, the greatest beneficial impacts to these resource areas would result from Alternative C. The corresponding sections in the Final EIS have been revised to state this.

63. DEIS Section 2.4.1, Aquatic Ecology Management, provides a description of the program using the future tense (would) yet this program is listed in Table 2-27 as a current program. This issue occurs in several other places in Chapter 2. (*Commenter: Heinz J. Mueller - USEPA*)

Response: The term “would” is used in this context to describe all of the program and activities that TVA is considering, regardless of whether they are existing programs. Chapter 3 further differentiates existing and proposed programs and activities.

64. DEIS Section 2.4.3 states “Water Resource Campaigns could include focused efforts to raise public awareness...“ The word “could” leaves readers uncertain what this program will actually entail when implemented. Please describe this and other programs more definitively in the Final EIS. (*Commenter: Heinz J. Mueller - USEPA*)

Response: The description of the Water Resource Outreach Campaigns in FEIS Section 2.4.3 has been revised to better describe its components. The descriptions of other activities have also been similarly revised with more details added.

65. DEIS Section 3.1, Development of Alternatives, provides little information on how and why TVA selected the four alternatives analyzed in the DEIS. We recommend that TVA provide additional information on how alternative management strategies were selected. We also recommend that TVA provide more detail in the FEIS on how and why specific new programs are being proposed under the preferred alternative. (*Commenter: Heinz J. Mueller - USEPA*)

Response: The discussion of alternatives and their formulation has been revised in Section 3.1 of the Final EIS. Section 3.2 of the Final EIS has also been revised to better describe the bases for the different quantities and activity levels associated with the various alternatives. The preferred alternative was selected because of its integrated approach to benefit multiple resources while complying with regulations, executive orders, and TVA policies. Its selection is based on public and interagency input, as well as the need to balance TVA's resource management responsibilities with the availability of funding from TVA ratepayers while maintaining low cost and reliable power.

66. DEIS Table 3-1 uses the term “Enhanced Management” which appears to be the same management strategy listed in the other parts of the document as the “Blended Management” approach, which is TVA's preferred alternative. Please clarify this. (*Commenter: Heinz J. Mueller - USEPA*)

Response: “Enhanced Management” as used in DEIS Table 3-1 is generally an intermediate level of effort between custodial and flagship. For many activities, it represents an increase over TVA's present level of effort. The Blended Management Alternative (Alternative D) includes a range of levels of effort - custodial, enhanced, and flagship.

67. In both the DEIS and the NRP, it is difficult to determine which programs will be developed and which will be enhanced under the preferred alternative. The clearest explanation of this is in DEIS Appendix H. This explanation should be use more prominently in both the final NRP and EIS. (*Commenter: Heinz J. Mueller - USEPA*)

Response: Comment noted. DEIS Appendix H has been merged in final EIS Chapter 3 - Alternatives to more clearly define the programs and activities associated with each alternative. The final NRP has been restructured to provide a single chapter for each resource area. These chapters more clearly describe the programs that would be developed and and/or enhanced.

68. In Sections 5.8.1 and 5.8.2 of the DEIS, TVA determines that the alternatives may result in short-term direct and indirect adverse impacts on endangered or threatened aquatic and terrestrial species. These impacts would be assessed, avoided, and/or minimized through existing regulatory mechanisms. The DEIS then notes that only beneficial long-term changes to aquatic resources and benefits to terrestrial species and their habitats, including listed species, would occur and that none of the alternatives would result in adverse direct, indirect, or cumulative impacts to federally listed species and their habitats. We find these determinations, i.e., short-term direct and indirect adverse impacts, beneficial long-term changes, no direct, indirect, or cumulative impacts, to be confounding and inconsistent. (*Commenter: Joyce Stanley - USDOI*)

Response: Sections 5.8.1 and 5.8.2 of the Final EIS have been revised to clarify these determinations.

69. Many of the program options are described in terms of amounts of things such as acres or miles of shoreline. For some of these program options, it is unclear whether the specified amount is an annual amount, the amount over the 20-year planning period, or over some other time period. If is also unclear whether the amount could include the same areas that are treated multiple times during the planning period or whether this is a new area each treatment cycle. Please clarify this. (*Commenter: Tom Littlepage*)

Response: The listings in the final NRP of the activities comprising the preferred alternative includes their implementation timelines.

70. Many of the tables in DEIS Chapter 2 list current and proposed resource management programs. It is not clear whether the proposed programs listed in these tables are being proposed under the preferred alternative. Please clarify this. (*Commenter: Heinz J. Mueller - USEPA*)

Response: The tables and associated text in DEIS Chapter 2 were designed to describe both TVA's current resource management programs and programs proposed under one or more of the alternatives. DEIS Chapter 3 describes which programs are associated with each alternative. Final EIS Chapters 2 and 3 have been revised to better explain this.

71. Please consider including in the final EIS a table listing tracts of TVA lands designated Zone 3 or Zone 4 and their acreage, particularly for tracts over 50 acres. These large tracts could then be analyzed in the context of large-scale cooperative habitat conservation initiatives undertaken by other agencies and organizations. (*Commenter: Zoe Turner*)

Response: Zone 3 and Zone 4 tracts over 50 acres in area make up a significant proportion of the total acreage of these zones. Due to the large number of tracts fitting this description, it is not feasible to include a listing of them in the final NRP or EIS. However, the locations of many of these tracts can be found in the Reservoir Land Management Plans and their associated maps that TVA has issued. These can be found at http://www.tva.com/environment/land/land_mgmt_plans.htm. These data would continue to be considered in all large-scale cooperative planning efforts in which TVA is involved.

72. Please include information on State Natural Areas located on TVA lands. (*Commenter: Avis Kennedy*)

Response: The Natural Areas section does not list state natural areas existing on TVA lands specifically but does refer to natural areas and ecologically significant sites occurring on or adjacent to TVA lands under contractual agreements with other agencies. FEIS Appendix A includes a map of these areas. The focus of the NRP is the lands and water that TVA manages, and not those areas managed by others. TVA does not propose to change any of the existing licenses, easements, or other agreements for the management of natural areas on TVA lands as part of the NRP.

73. Please provide a better description of the proposed funding for the various alternatives with the current funding and 1999 funding for comparable programs and activities. (*Commenter: Avis Kennedy*)

Response: Estimated costs for full implementation of the proposed alternatives are as follows: Alternative A: $7-8 million Alternative B: $7-10 million Alternative C: $45-$55 million Alternative D: $19-20 million. These are late-stage implementation costs and not initial plan costs. In 1999, TVA spent approximately $7-10 million on comparable programs and activities. This was the last year in which TVA got appropriations for these activities.

74. Section 1.4 of the draft NRP states that the scope of the plan is the 293,000 acres of reservoir properties and power plant properties. What is the acreage of land that TVA has acquired for possible future power plant projects and is this land within the scope of the plan?

How much of the 293,000 acres is comprised of power plant properties? (*Commenter: Joyce Stanley - USDOI*)

Response: The 293,000 acre land area refers to TVA reservoir lands, including dam and associated hydroelectric plant reservations. These dam and hydro plants occupy most of the 20,510 acres allocated to Zone 2 - Project Operations. The 293,000 acres of reservoir lands does not include lands occupied by active and former fossil and nuclear power plants. These power plants occupy about 9,100 acres. The major potential power plant site owned by TVA is the Saltillo site near the upper end of Kentucky Reservoir. This 1,600-acre site is outside the scope of the NRP.

75. Since the TVA Environmental Policy provided the “umbrella” policy for the Integrated Resource Plan and NRP and is referenced multiple times in the NRP and NRP DEIS, we recommend that it be added to the appendix of the Final EIS. (*Commenter: Heinz J. Mueller - USEPA*)

Response: The pertinent objectives and critical success factors in the TVA Environmental Policy are stated in Section 1.4 of the Final EIS. The full 14-page Environmental Policy is not reprinted in the EIS in order to conserve resources. It is readily available at http://www.tva.com/environment/policy.htm; this URL is also given in Final EIS Section 1.3.2.

76. Table S-1 in the EIS Summary should label the preferred alternative. (*Commenter: Heinz J. Mueller - USEPA*)

Response: The preferred alternative has been labeled in the corresponding table in the Final EIS Summary.

77. The arrangement of DEIS Section 2.1, Biological and Cultural Resources Management, is unclear. It begins with an overview of biological resources, followed by an overview of cultural resources, details of cultural resources programs, and details of biological resources programs. We recommend that the cultural resources descriptions be grouped together and that the biological resources descriptions be grouped together. (*Commenter: Heinz J. Mueller - USEPA*)

Response: Final EIS Chapter 2 has been reorganized into separate biological resources and cultural resources sections.

78. The discussion of endangered and threatened species in Section 4.7 and Appendix K of the DEIS is confusing. It interchangeably discusses certain taxonomic groups within the entire TVA region and others only on the 293,000 acres of managed lands. It is also confusing that some taxonomic groups discussed in the DEIS contain not only listed species, but federally protected (i.e., bald eagle) and candidate species. We recommend that federally listed aquatic species and plant species occurring in the TVA region be listed by TVA-managed lands or reservoirs (to better define the action area and potentially affected species). We also recommend that the federally listed species tables (K-9, K-10, and K-12) be identified by individual state occurrences for those areas where the proposed actions would take place. (*Commenter: Joyce Stanley - USDOI*)

Response: This discussion in the Final EIS has been revised to be clearer. Final EIS Sections 4.7.2 and 4.7.3 describe the distribution of federally listed terrestrial animals and plants on TVA lands, and, for some species, list the individual reservoirs on which they occur.

79. The discussions of reservoir lands planning in both the NRP and EIS contain little to no mention of the Zone 1 Non-TVA Shoreland lands. It would be helpful to include them in the allocation tables and discussions to better portray current and potential land use around the reservoirs. It would also be helpful to consistently include the current allocations (for example in NRP Executive Summary Table 2) to show the potential change. (*Commenter: Dan Forster - GDNR*)

Response: Zone 1 lands, which are privately owned, make up approximately 21 percent of the length of the shoreline of TVA reservoirs (TVA 1998). In many instances, TVA owns the right to flood and/or limit structures on portions of these lands. They are not included in the NRP because TVA does not have the right to manage the natural resources on them or, other than activities occurring on the shoreline or in the area where TVA owns the right to flood, have the right to zone their use.

80. The Dispersed Recreation Management activities and Boundary Maintenance do not belong under Biological Resources, where they are listed on NRP page 14 and elsewhere in the NRP and EIS. (*Commenter: Joyce Stanley - USDOI*)

Response: Comment noted. TVA has decided to retain Dispersed Recreation Management and Boundary Maintenance in the Biological Resources sections of the final NRP and Final EIS. This decision is based on the fact that dispersed recreation is a major source of impacts to biological resources. Adequately maintained boundaries are an important factor in the use of an area for dispersed recreation.

81. The geographic scope of the NRP is a much greater area than the 293,000 acres described by TVA. Therefore additional federally listed species could be affected by TVA's actions and need to be included in Appendix K. TVA has not adequately justified why additional areas have been excluded. TVA should coordinate closely with the seven individual U.S. Fish and Wildlife Service Ecological Service Offices to identify and update the listed species tables in Appendix K. (*Commenter: Joyce Stanley - USDOI*)

Response: The majority of TVA actions related to NRP programs will occur on the ~293,000 acres described in this document. Other programs (particularly related to Water Quality programs) will occur over the entire Tennessee River watershed. During the planning and implementation of NRP program activities, TVA will consult with the U.S. Fish and Wildlife Service as required under Section 7(a)(2) of the ESA to ensure that potential impacts to federally listed endangered, threatened, or candidate species are avoided, minimized, or mitigated appropriately.

82. The mission statement on NRP page 4 should place more emphasis on the importance of stewardship activities as part of TVA's core business. (*Commenter: Joyce Stanley - USDOI*)

Response: Comment noted. The statement of purpose and need for the NRP has been revised.

83. The mixture of program options, priority levels, and alternatives, along with overlapping names such as “custodial,” “enhanced,” “blended,” “flagship,” and “advanced” make it very difficult to determine what is included in the various alternatives and what TVA actually proposes to implement. The descriptions of the programs in the plan do not always align with those in the EIS. The plan and the EIS are, consequently, difficult and confusing to review. (*Commenters: Mark Campen, Jean Elmore, Joe Feeman, Sandra Goss - TCWP, Renee Hoyos*

- TCWN, Mark Iverson - BGMU, Avis Kennedy, Tom Littlepage, Richard Preston – TOS, Axel C. Ringe - SC, Paul Sloan - TDEC, Dagny Vigander)

Response: Comment noted. The final EIS has been revised to more clearly describe the components of the various alternatives. The overlapping names have also been eliminated from both the final EIS and NRP. TVA also has attempted to provide more consistent descriptions of the various programs and activities comprising the alternatives in the final EIS and NRP.

84. The NRP Executive Summary states that TVA is an environmental steward of the nation's fifth-largest river system (page 4). This should be expounded upon to describe the relative importance of the Tennessee River system in terms of its aquatic and terrestrial biodiversity and the resultant impacts to this biodiversity from the construction and operation of TVA's dams. Other areas in the NRP (e.g., Section 3.5, page 43) fail to mention the Tennessee River's unique and sensitive biodiversity, the historic detrimental impacts of TVA's operations on this biodiversity, and recent attempts to restore this biodiversity. (*Commenters: Axel C. Ringe - SC, Joyce Stanley - USDOI*)

Response: Comment noted. Additional information on the importance of the biodiversity of the Tennessee River system has been added to the Final NRP. TVA has also supplemented the Aquatic Ecology Management program to more directly maintain and enhance this valuable resource.

85. The NRP should better define the geographic scope of the proposed activities. The interchangeable use of TVA-managed lands and TVA's entire 202-county, 59 million- acre power service area throughout the document is confusing. The inclusion of watershed water quality and water resource management (pages 4, 14 and 20) implies that natural resource activities occur on a broad geographic scale. (*Commenter: Joyce Stanley - USDOI*)

Response: The geographic scope of the biological, cultural, and recreation management activities is the 293,000 acres of reservoir lands that TVA manages and the approximately 9,100 acres of non-hydroelectric power plant reservations. The scope of the water resource management activities includes these lands as well as the remainder of the Tennessee River watershed. Section 1.5.1 of the final NRP has been revised to better explain this.

86. The NRP should include a discussion of how TVA will measure the results of implementing the NRP in terms of the resource needs and effort and expenditures in addressing the resource needs. (*Commenter: Avis Kennedy*)

Response: Final NRP Section 9.4 describes how results will be measured during the implementation of the NRP. An immediate NRP implementation activity is to establish a comprehensive assessment process and metrics to evaluate the effectiveness of the NRP.

87. The NRP states “Natural resources management has been a core component of their business since its inception” (page 3). We recommend the NRP include a history of funding for the types of activities included in the NRP, as well as a description of how the proposed funding for the various alternatives relates to historical expenditures. (*Commenter: Joyce Stanley - USDOI*)

Response: A history of stewardship spending is included in the Final NRP executive summary and in Section 1.5. These sections describe TVA funding since federal appropriations were discontinued in 1998.

88. The NRP states that advice on stewardship activities was solicited from the Regional Resource Stewardship Council (page 6). Please add a summary of this advice. (*Commenter: Joyce Stanley - USDOI*)

Response: A summary of advice provided by the Regional Resource Stewardship Council can be found at http://www.tva.com/rrsc/readingroom5/pdf/10-29-09_advice.pdf.

89. The part of Section 4.7 of the DEIS on trends in threatened and endangered terrestrial animals should include more information on white-nose syndrome. This disease causes significant mortality in several species of bats, including the Indiana bat, and may have significant impacts to bat populations in the TVA region. The EIS should document that it has been confirmed in four states within the TVA region (Tennessee, Virginia, North Carolina, and Kentucky). (*Commenter: Joyce Stanley - USDOI*)

Response: Section 4.7 of the Final EIS has been revised to include more information on white-nose syndrome. TVA continues to be involved with various conservation teams addressing and monitoring the spread of WNS throughout the region. In response to a request from the USFWS, TVA has closed all of its caves to public access to help reduce the spread of WNS. Additionally, TVA staff follows all decontamination protocols when monitoring populations of bats.

90. The Partnerships section of draft NRP page 10 states that “TVA will examine collaborative opportunities to address local natural resource needs.” Landscape Conservation Cooperatives should be considered as part of this effort. (*Commenter: Joyce Stanley - USDOI*)

Response: Landscape Conservation Cooperatives are a likely component of the Conservation Planning activities included in the biological resource management programs.

91. The readability of the NRP would be improved by numbering the tables and adding a list of tables and figures. (*Commenter: Sandra Goss - TCWP*)

Response: In the Final NRP, all tables are numbered and a list of tables and figures is included.

92. The statement “Through public outreach and education campaigns, TVA should promote past, present, and stewardship efforts while reinforcing the public's role in the protection and preservation of natural resources” on draft NRP page 10 requires clarification. (*Commenter: Joyce Stanley - USDOI*)

Response: Comment noted. A chapter on public engagement efforts which encompass the biological, cultural, recreation and water resource areas has been added to the Final NRP.

93. The structure, complexity, and lack of historical context in the draft NRP causes all but the most diligent to surrender. This obfuscation appears to be a deliberate attempt to overwhelm property owners and other interested parties and will reduce the number of comments that TVA would otherwise have succeeded. Other agencies and regulatory authorities, such as the Securities and Exchange Commission, are required to produce simple readable reports without compound sentences and in active (not passive) voice. (*Commenters: Hugh L. Davis, III*)

Response: Comment noted. The final NRP has been revised to simplify the presentation of the propose programs and activities and to improve its readability.

94. The tables in NRP Chapter 4 and Appendix A require careful and iterative study to infer anything about what TVA would implement under the various program options and priority levels. It would be helpful to have an expanded text explanation of these tables and the quantities listed in the tables. (*Commenter: Sandra Goss - TCWP*)

Response: The final NRP has been revised to include separate chapter for each of the major resource areas. The programs and activities that TVA intends to implement are more clearly described in these chapters. Final EIS chapters 2 and 3 have also been revised to more clearly describe the various programs and options that would be implemented under each alternative, including the bases for the different quantities associated with different alternatives.

95. TVA's current level of natural resource management activities is not clearly described in terms of both the types of actions and the land area or other quantity currently affected by each action. The NRP mentions that staff provided input to help identify TVA's current level of management, but does not describe that level. Is the current level of management comparable to the Custodial Management option? (*Commenters: Mark Campen, Richard Preston – TOS, Axel C. Ringe - SC, Joyce Stanley - USDOI*)

Response: TVA's current level of natural resource management activities, including the land area and other affected quantities, is describe in Final EIS Chapter 3. The current level of management is comparable to the Custodial Management option for many activities, higher for a few activities, and lower for a few activities.

96. We agree with the statement in the DEIS that bald eagle and gray bat populations appear to have increasing and stable numbers. TVA should include citations/sources that validate this information. (*Commenter: Joyce Stanley - USDOI*)

Response: TVA works with other resource agencies to survey gray bats and bald eagles on TVA lands. TVA provides annual gray bat and bald eagle monitoring data to the USFWS. These data, along with data acquired from other resource management agencies suggest that populations of gray bats have remained stable while bald eagle numbers continue to increase throughout the Valley. As stated in the final EIS, these observations are primarily based on the unpublished observations of TVA staff.

97. We recommend that 303(d) and TMDL information be added to EIS Table 4-5 listing the ecological health ratings of TVA reservoirs. (*Commenter: Heinz J. Mueller - USEPA*)

Response: The state 303(d) and 305(b) impaired waters information has been added to the Final EIS Table 4-7. TMDLs have not been completed for most of the reservoirs and the addition of this information would little useful information.

98. We recommend that EIS Section 5.17, Climate, provide more discussion (in addition to Appendix M) in the FEIS regarding now climate change will impact current and proposed programs listed in the NRP. (*Commenter: Heinz J. Mueller - USEPA*)

Response: Final EIS Section 5.17 has been revised to provide more discussion of the interactions between climate change and the proposed programs listed in the NRP.

99. We recommend that EIS Table 1-2 be reorganized to better show the RLMP Developed / Not Developed status. The current configuration is hard to read. (*Commenter: Heinz J. Mueller - USEPA*)

Response: Final EIS Table 1-2 has been reorganized to better show whether an RLMP has been developed for each reservoir.

100. We recommend that the description of the Preferred Alternative provide additional information and details on how TVA proposes to determine which stewardship programs will be implemented first when opportunities and/or resources become available. Will programs be prioritized and how? (*Commenter: Heinz J. Mueller - USEPA*)

Response: Chapter 9 of the final NRP describes how TVA intends to prioritize and implement the various programs and activities.

101. We understand that it is not possible for TVA to initiate consultation under Section 7 of the Endangered Species Act on the NRP, as site-specific activities are not yet identified. The FEIS, however, should include a description of the planning, review, and ESA compliance process TVA will use for future NRP implementation activities. (*Commenter: Joyce Stanley - USDOI*)

Response: TVA has provided a brief overview of its ESA Compliance Process in Appendix H of the Final EIS.

102. While the draft EIS looks very comprehensive, it uses indecisive terms such as “TVA proposes,” “is considering,” and “would” throughout the document. Because of this word usage, it is difficult to determine which programs and activities will be implemented. (*Commenter: Tom McCulloch - ACHP*)

Response: Final EIS Chapters 2 and 3 have been revised to better define the programs and activities associated with the various alternatives. Because the decision on which alternative will be implemented will not be made until after the final EIS and final NRP are issued, the final EIS continues to use terms such as “proposes,” “is considering,” and “would.” TVA's preferred alternative, Alternative D, is clearly identified in the final EIS.

2.7. Endangered & Threatened Species

103. Based on the information provided to us, we believe the following federally listed species have the potential to occur in the NRP project area: Indiana bat, gray bat, Price's potato-bean, interior least tern, relict darter, clubshell, fanshell, fat pocketbook, orangefoot pimpleback, pink mucket, rabbitsfoot, ring pink, rough pigtoe, and sheepnose. We recommend that TVA submit potential projects that have the potential to affect these species for our review and consultation. (*Commenters: Virgil Lee Andrews, Jr. - USFWS*)

Response: When TVA proposes action to implement the NRP programs, it will review the potential environmental effects of this action. Included in this review is compliance with the Endangered Species Act. This process is outlined in Section 5.8 of the FEIS. All federally listed species that could be affected by the proposed action will be addressed through consultation with the U.S. Fish and Wildlife Service as appropriate.

104. Several bald eagle nest sites exist in the NRP project area. Although the bald eagle has been removed from the list of endangered and threatened species, it continues to be protected under the Migratory Bird Treaty Act and the Bald and Golden Eagle Protection Act. TVA should comply with the National Bald Eagle Management Guidelines when undertaking any activities within 1,500 feet of a bald eagle nest. (*Commenters: Virgil Lee Andrews, Jr. - USFWS*)

Response: Comment noted. TVA considers the National Bald Eagle Management Guidelines when planning resource management activities as well as during the review process for these and other proposed actions. TVA also maintains data on known bald eagle nests within the TVA region.

105. The endangered smooth coneflower (*Echinacea laevigata*) has the potential to occur in the Clear Creek Lake Dam area. We recommend TVA conduct an inventory of this area prior to any actions that could result in disturbance. If the plant is present, TVA should coordinate with Virginia Department of Agriculture and Consumer Services to ensure compliance with Virginia's Endangered Plant and Insect Species Act. (*Commenter: Roberta Rhur - VDCR*)

Response: TVA recently surveyed its lands for this and other listed species at both Clear Creek and Beaver Creek Lakes in Washington County, Virginia during the development of the Northeastern Tributary Reservoirs Land Management Plan. The smooth coneflower was not found on these lands.

2.8. Environmental Justice

106. We appreciate the discussion of environmental justice in DEIS Chapters 4 and 5. Because the NRP addresses natural resource management strategies at a macro level, it is difficult to identify direct impacts on EJ communities. We recommend that TVA improve the EJ analysis by enhancing public participation and identifying key EJ stakeholders in the study area in order to have more meaningful engagement of the EJ community. Agencies should, as appropriate, acknowledge and seek to overcome linguistic, cultural, institutional, geographic, and other barriers to meaningful participation and incorporate active outreach to affected groups. (*Commenter: Heinz J. Mueller - USEPA*)

Response: Comment noted. TVA is implementing some of the recommended actions to increase the engagement of the EJ community during its review of place- and facility-based actions.

2.9. Managed Areas

107. Beaver Creek Dam is within Sugar Hollow Park. Please contact the City of Bristol for additional information regarding this managed land (http://www.bristolva.org/parks.html). (*Commenter: Roberta Rhur - VDCR*)

Response: Comment noted. TVA will coordinate with the City of Bristol parks department while planning natural resource management activities at Beaver Creek dam.

2.10. Natural Resource Management Funding

2.10.1. Historical and Current Funding

108. Draft NRP Section 1.3 describes the loss of historical federal appropriations for non-power programs and the October 1997 legislative directive that TVA fund essential stewardship management activities with power funds. There is, however, no indication that Congress intended the shifting of costs to diminish the importance of non-power natural resource programs. (*Commenter: Paul Sloan - TDEC*)

Response: Comment noted. The Energy and Water Appropriations Act of 1998 required TVA to fund “essential stewardship activities” with power revenues and other funds to the extent appropriations and non-power revenues (e.g., fees) are insufficient. Congress did not indicate that this shifting of costs diminished the importance of natural resource programs.

109. What proportion of TVA's current funding for natural resource management is for labor and how much labor terms of full-time equivalent staff does TVA devote to this management on a per-acre basis? (*Commenter: Paul Sloan - TDEC*)

Response: TVA's current funding for NRP-related activities is approximately $7 million per year and most of this is for labor. Based on the reservoir land area of 293,000, this is the equivalent of approximately two dedicated full-time equivalent employees per 10,000 acres.

2.10.2. Proposed Funding

110. Even the proposed funding for the flagship management alternative, at $55 million, is less than 0.5 percent of TVA's overall budget and a very small amount relative to TVA's stewardship responsibilities, as well as the economic benefits of the natural resource management activities. (*Commenter: Paul Sloan - TDEC*)

Response: Comment noted.

111. How do the projected amounts of funding for the proposed alternatives relate to the program priority levels? For example, if little funding is available, would it be spent on custodial level efforts instead of enhanced and advanced levels? (*Commenter: Avis Kennedy*)

Response: TVA's first priority would be to fund all custodial level activities. All of those activities comprise part of the preferred alternative. TVA would fund the other activities in the preferred alternative and then consider increased activity levels as well as additional activities as additional funding and/or partnerships become available. In the Final NRP, the discussions of each resource area (Chapters 3-8) focus exclusively on what the recommended strategy is for TVA, and the implementation strategy (Chapter 9) discusses how the programs would be prioritized.

112. In light of TVA's economic development mission and the benefits from increased sustainable development of the lakes' recreation resources, I recommend TVA consider a larger increase in funding for the Recreation Management programs. If the total proposed increase for funding the NRP needs to remain the same, I suggest the proposed increase for Water Resource Management be reduced.
Benefits of increased development of recreation resources include:
- Benefits to local and national economies by supporting jobs and generating income. An increase in visitation proportional to the increase in funding could result in more than $100 million increase in visitor spending and more than 1,500 jobs throughout the reason.
- Provide opportunities for active recreation, helping to combat the nation's significant health problem of lack of physical activity.
- Provide programs and activities to strengthen family ties and friendships and opportunities for children to develop personal skills and social values.
- Increased motivation to learn more about the environment and environmental issues.
(*Commenter: Avis Kennedy*)

Response: TVA attempts to manage its natural resources in an integrated manner to provide multiple sustainable benefits for users of resources managed by TVA. Good water quality supports water-based recreation as well as providing other benefits. Reducing activities in the water management area would have impacts on recreational activities. Under TVA's preferred alternative, activities under both program areas would be enhanced.

113. Several years ago TVA voluntarily gave up federal funding for natural resource management programs and offered to fund them with power funds. TVA has not lived up to this commitment. A recurrent theme throughout the draft NRP is reliance on partnerships and volunteers. This will not be sufficient for fulfilling TVA's stewardship responsibilities. Successful implementation of the NRP will require dedicated NRM funding that has the same priority as power program funding. Otherwise TVA should transfer the lands to another federal agency. (*Commenter: Joe Feeman*)

Response: Comment noted. TVA continues to dedicate funds to natural resource management activities. The preferred NRP alternative is designed to improve the cost-effectiveness of those activities and produce more value from TVA's funding. TVA considers partnerships and volunteers as possible ways to supplement TVA funding.

114. The draft NRP highlights the importance of TVA's natural resource management activities with statements highlighting TVA's involvement in preserving and protecting the Valley's lands and its role as the environmental steward of the nation's fifth-largest river system. TVA's recent and proposed funding for stewardship activities do not reflect these statements. TVA historically received $40-50 million in federal appropriations for these activities. By 2001, after appropriations ceased, TVA spent around $24 million for these activities. The custodial and preferred blended options call for $7-10 million and $20-24 million respectively. These amounts represent a decrease in the proportion of TVA's budget spent on stewardship activities and do not appear to be linked to the actual resource needs. (*Commenter: Axel C. Ringe - SC*)

Response: The NRP programs only make up a portion of the federal appropriations that is referenced in this comment. Prior to 1998, TVA received funding for a number of essential stewardship activities, including flood control, navigation, reservoir operations, dam safety, and programs included in the NRP. At that time, TVA was spending approximately $79 million on these activities. Since appropriations ceased in 1998, TVA has continued to support these essential stewardship activities each year. In 2009, TVA spent $94 million on similar activities. More detail on past stewardship spending has been added to the NRP and can be found in Section 1.5 of the introduction.

115. The final plan and EIS should analyze the cost of the different action alternatives in the context of TVA's annual operating budget, revenues, and potential rate impacts. The flagship alternative appears to cost 0.02% of TVA's annual revenues and should have little impact on rates. This is a small amount for the long-term benefits of the flagship alternative. (*Commenters: Mark Campen, Zoe Turner*)

Response: The different alternatives do represent varying amounts of TVA's annual operating budget, although the variation is small relative to total TVA budget. This variation was not a primary consideration in the selection of the preferred alternative. Benefits to the public and strategic considerations were the primary factors of this decision in addition to costs.

116. The proposed funding for NRP implementation ($21-25 million annually) is modest given the amount of land and water managed by TVA. A rough comparison of this proposed funding with that expended annually by the Nashville District Corps of Engineers for its Recreation and Natural Resources programs shows that the Corps spends slightly less on lakes on the Cumberland River and its tributaries. Given that TVA manages about twice the land and water area as the Corp's Nashville District, the proposed funding is about half the amount per acre. (*Commenter: Avis Kennedy*)

Response: Comment noted.

117. TVA has the responsibility to be good stewards and properly invest in the management of its lands. It has a long legacy of being an innovative leader and is more than an electric utility. TVA should recognize that its natural resource stewardship activities are as important as electricity. The value of these lands and the threats to them will only continue to increase as the region continues to develop. (*Commenter: concerned citizen*)

Response: Comment noted.

118. What financial commitment will TVA make to implement the NRP? If none, what is the significance of selecting a particular alternative/program option/strategy/priority? Are the costs given in NRP Chapter 6 annual costs? (*Commenter: Sandra Goss - TCWP*)

Response: The costs given in draft NRP Chapter 6 are annual costs. TVA anticipates that under the Preferred Alternative, funding for natural resource management activities would increase gradually over time. Whether that occurs will depend on the amount of revenue available to TVA to support these and all of the other activities in which it engages.

119. What proportion of the proposed funding for each NRP alternative would be devoted to labor and to capital improvements? (*Commenter: Paul Sloan - TDEC*)

Response: As described in final NRP Chapter 2, TVA proposes to increase its funding for implementing the NRP (Alternative D - Blended Management in the Final EIS) from $9-11 million in the 2012 - 2014 fiscal years to $19-20 million per fiscal year once it is fully implemented. During this period, TVA proposes to spend about $750,000 per year for capital improvements. Based on this amount, about 96 percent of NRP funding at full implementation would be for labor and the remainder for capital improvements.

Following are the proposed annual labor and capital improvement expenditures for the other alternatives: Alternative A (current expenditures) — $7 million for labor and $1.5 million for capital improvements; Alternative B — $$8.5 - 9.5 million for labor and $15,000 - 25,000 for capital improvements; and Alternative C — $47 - 48 million for labor and $1.95 - 2.0 million for capital improvements.

120. While the draft NRP states that the implementation of Alternatives C and D will require increased funding, it fails to address potential revenues that could fund this implementation. Obvious revenues that TVA should address include user fees and timber sales. A nominal user fee such as $20 per year could raise substantial revenues that would benefit the users. A timber sale program would provide several benefits beyond revenues and could be managed while preserving older forests. (*Commenter: Linda S. Casey - AFC; Joe Feeman*)

Response: Potential sources of funding for implementing the NRP are described in Section 9.2 of the final NRP. They include partnerships, user fees, reallocation of essential stewardship funding (presently ~ $94 million), increased recreation fees, increased application fees, and the annual budgeting process. TVA does not anticipate timber sales becoming a significant source of revenue.

2.11. NEPA Compliance/Adequacy

2.11.1. Public Scoping

121. In October 2009 during the public scoping for the NRP, I mailed a letter on behalf of numerous respondents that was not fully included as individual responses to the draft NRP. Please correct this omission and the incorrect calculation of submitted responses. The scoping responses show a clear public request for more conservation and less concentrated development. (*Commenter: Michael Reddoch*)

Response: This comment letter was treated as a single response, rather than as a separate response for each person on whose behalf it was submitted. Nevertheless, both phases of scoping comments showed much greater public support for increased conservation efforts and less concentrated development.

2.11.2. Scope of Existing Environment Descriptions

122. DEIS Chapter 4 - Existing Environment does not provide adequate information on the condition of many of the resources on TVA land. For example, while TVA proposes Forest Resource Management programs, there is no description of the how much forest TVA manages. (*Commenter: Louis Smith*)

Response: Final EIS Chapter 4 - Existing Environment has been revised to better describe the various resources including forests that are the subject of the NRP programs and activities.

2.11.3. Scope of Impact Assessments

123. The various natural resource management programs are obviously intended to have an effect on the resources being managed. The Draft EIS, however, does not adequately describe these effects. For example, will the proposed Forest Resource Management programs create more forest, improve the forest, or keep the forest the same? The Final EIS should more clearly describe these effects. (*Commenter: Louis Smith*)

Response: Final EIS Chapter 4 - Existing Environment has been revised to better describe the condition of the resources on TVA lands that are the subject of many of the proposed NRP programs and activities. Final EIS Chapter 5 - Environmental Consequences has also been revised to better describe the effects of the NRP alternatives on these resources.

2.12. NRP Implementation

2.12.1. Implementation Guidance

124. The draft NRP should be simplified so that it can be understood and more effectively used by staff to guide the implementation of natural resource management activities. Given its generality and lack of clarity, it is hard to see how staff would use it. An additional explanation of how it is intended to be used by staff would also be helpful. (*Commenter: Sandra Goss - TCWP*)

Response: The NRP would be used by TVA staff as a high-level strategic plan for prioritizing and implementing its natural resource management activities. It is not intended to provide detailed, year-by-year implementation plans. These will be developed during the annual planning and budgeting process. To improve clarity, the Final NRP has been reorganized to devote a separate chapter to each resource area. This allows the reader to find all information about a resource area (e.g., recreation) in one place, and should improve the readability of the plan.

2.12.2. Mitigation and Monitoring

125. A proposed cultural resources management program is to monitor and manage ongoing mitigation measures to ensure compliance with Section 106 of the NHPA and NEPA documents. We applaud this effort and encourage the use of CEQ's 2011 guidance on Mitigation and Monitoring when developing these monitoring plans. (*Commenter: Heinz J. Mueller - USEPA*)

Response: Comment noted. TVA currently has a system for tracking this type of mitigation measures and will follow CEQ's guidance on Mitigation and Monitoring in refining this system for cultural resources mitigation obligations as appropriate.

2.12.3. Partnerships for Implementing the NRP

126. TVA should put greater emphasis on the necessity and wisdom of broad-based collaborations and partnerships. The Valley states have a rich diversity of expertise and core competencies among a number of federal, state, and local agencies and organizations. Leveraging these resources will provide great potential energy for implementing the NRP. (*Commenter: Paul Sloan - TDEC*)

Response: Comment noted. TVA recognizes that collaborations and partnerships will play an increasingly important role in its natural resource management activities.

127. We encourage TVA to contact us when planning lands and water management activities in Virginia so that we can help guide the work in a manner that benefits our constituents and the species and programs for which we are responsible. We also look forward to working with TVA as partners in these activities. (*Commenter: Linda S. Casey, AFC; Amy Ewing - VDGIF*)

Response: Comment noted. TVA will involve state natural resource management agencies and others when developing reservoir lands plans and when planning other NRP implementing activities as appropriate.

128. We look forward to partnering with TVA as TVA implements those portions of the final Plan that are appropriate for public participation. (*Commenter: Axel C. Ringe - SC*)

Response: Comment noted. TVA plans to actively recruit volunteers as it implements the proposed volunteer program and other activities that could benefit from the participation of volunteers.

2.12.4. Reporting NRP Implementation Expenditures

129. TVA should consider producing an annual natural resources expenditure report similar to the Northwest Power Planning Council's annual reporting of the Bonneville Power Administration's Fish and Wildlife Program expenditures. This report should be available on-line. (*Commenter: Joyce Stanley - USDOI*)

Response: Until 2009, TVA reported its stewardship expenditures in its annual budget (Blue Book) submission to the Office of Management and Budget (OMB). OMB reviewed these submissions and ultimately included them in the Consolidated Budget of the United States. TVA is presently considering how and where to report these expenditures in the future.

2.12.5. Short Term Implementation Plan

130. The final NRP and EIS would be improved by including a description of when TVA intends to implement the specific programs and actions. It would particularly help to identify those that TVA intends to implement within the next five years under the preferred alternative in the final EIS. (*Commenters: Ron Fugatt - NU, Heinz J. Mueller - USEPA*)

Response: Final NRP Chapter 9 describes the proposed strategy for implementing the NRP. It identifies and prioritizes programs and activities to be implemented during the years 2012 - 2014, 2015 - 2016, 2017 - 2021, and after 2011.

2.12.6. Use of Volunteers to Implement NRP

131. I have spent many hours as a volunteer helping to build and improve the East Lakeshore Trail on Tellico Reservoir which is now almost 20 miles long. I have also been involved with the annual Tellico spring lakeshore cleanup. Please continue to support the partnership between the Watershed Association of Tellico Reservoir and TVA with an adequate budget for proper development, maintenance, and protection of the trail and other resources. (*Commenter: Edwin J. Young*)

Response: Comment noted. TVA plans to continue our support of volunteer partnerships like the one with the Watershed Association of Tellico Reservoir.

132. The Watershed Association of Tellico Reservoir has a pool of volunteers that is willing to be trained and assist in the assessment of dispersed recreation areas. (*Commenter: Lloyd J. Donnelly-WATR*)

Response: Comment noted. Under all alternatives except for the No Action Alternative, TVA proposes to establish a formal volunteer program and anticipates increasing the use of volunteers. This program is described in NRP Section 3.5.2 and FEIS Section 2.6.

2.13. NRP Planning Process

2.13.1. Alignment with Environmental Policy

133. A specific goal of the NRP is to align TVA's stewardship programs and plans with the Environmental Policy. The NRP should, therefore, clearly articulate the expectations of the Environmental Policy as a threshold. These expectations set a high bar by calling on TVA to be a proactive leader that makes comprehensive assessments of its resources, improves the quality of those resources, promotes ecological diversity and wildlife habitat and creates measurable indicators of progress. The NRP must be the blue print for achieving these expectations over the next twenty years. (*Commenter: Paul Sloan - TDEC*)

Response: Comment noted.

134. The draft NRP describes the enhanced and flagship management levels alternately as an “option” and then “opportunity” to elevate “the public value of TVA”s natural resource management programs” (page 8). A more preferable characterization is to fix the value of these programs at a level sufficient to meet TVA's high Environmental Policy expectations. While flagship management is described as a “gold standard” higher than the Environmental Policy objectives, it is, instead, the Environmental Policy that sets the gold standard. The NRP should acknowledge this fact and articulate a plan for achieving it. (*Commenter: Paul Sloan - TDEC*)

Response: TVA's Environmental Policy sets out a number of aspirational goals not only for natural resource management, but for TVA's other activities, including providing electric energy. The Custodial Option has been designed to address the aspirational goals for natural resource management, as well as applicable laws, regulations, and executive orders. The question before TVA is how to do this in light of the entirety of its goals and other activities. The Custodial Option sets the floor, but the other options would provide a more robust response to the policy's goals. The enhanced and flagship management levels have been designed to elevate TVA's resource management through a combination of designed increased commitment of TVA resources, increased engagement and leverage of partnerships and resources from other sources. These alternatives also provide flexibility to address emerging issues and increased user demands on the resources over the life span of the plan.

135. The draft NRP establishes three levels of commitments (Custodial, Blended, and Flagship) distinguished by different funding levels and the level of program activities within each resource area. This construct does not clearly answer the most important question: What level of natural resource management fully meets the expectations of TVA's Environmental Policy? (*Commenter: Paul Sloan - TDEC*)

Response: See response to Comment 134.

136. The draft NRP seems to suggest that the "custodial" level meets both TVA's legal obligations and its policy expectations. While I defer on the legal issue, it fails to meet the policy expectations defined in the TVA Environmental Policy, including the requirement of proactive leadership. This is apparent in a comparison of the Custodial Priority Level of programs listed in NRP Appendix A with the program options listed in NRP Chapter 4. (*Commenter: Paul Sloan - TDEC*)

Response: Comment noted. TVA acknowledges that the Custodial level contains relatively little additional proactive leadership and to this extent is not as robust of a response to the policy as either the enhanced or flagship options. TVA's preferred alternative does this, however.

137. There are clearly budgetary constraints each fiscal year. These constraints should impact the time period in which the NRP objectives are achieved during the plans 20-year horizon and not determine whether TVA commits to a "gold standard" or a lesser standard that would be inconsistent with the aspirations of TVA's environmental policy. The NRP should be a plan for TVA to fully meet its proactive leadership objectives at some point during the next 20 years that is consistent with budgetary constraints. (*Commenter: Paul Sloan - TDEC*)

Response: See responses to Comments 134 and 136.

2.13.2. Benefits Analysis

138. How is TVA using the Entrix economic benefits analysis report in the planning process? This is not clearly explained in the draft NRP. The report is vague and mostly conjecture, with little useful information for making decisions about natural resource management. Environmental economics is not a science that provides "black and white" answers and I hope TVA is not putting too much emphasis on the results of the report. The cost of producing the report would likely have funded a significant number of implementation activities. (*Commenter: Joe Feeman*)

Response: The Entrix report was used as in input into the scenario planning process described in the draft NRP. The report described both quantitative and qualitative benefits provided by

each program that TVA took into account when developing the preferred alternative and prioritizing programs and activities.

139. Reducing the amount of sediment and phosphorus in rivers would reduce the costs of operating water treatment plants. Please quantify the anticipated treatment plant cost reductions for the various amounts of sediment and phosphorus reductions proposed under the different alternatives. (*Commenter: Ron Fugatt - NU*)

Response: The proposed Nutrient Source - Identification and Improvement Program would help leverage wastewater treatment plant upgrades to target and reduce phosphorus loading to reservoirs. This program proposes nutrient and phosphorus reductions from streams entering reservoirs, which would further reduce not only wastewater treatment costs but also reduce costs of treating public drinking water (through reducing organic content of intake water). Quantifying those leveraged dollars and avoided costs at this time is not possible until reduction goals set for reservoirs and watershed streams.

140. The NRP contains little information on the economic costs and benefits of the proposed programs and activities, including the indirect benefits to local economies. How were these benefits considered in determining the preferred alternative? A more detailed explanation of the scope of this cost/benefit and its role would be helpful. (*Commenters: Jean Elmore, Ron Fugatt - NU, Mitch Jones - TMA, Deborah Woolley - TCCI*)

Response: A general discussion of the economic benefits, including indirect benefits to local economies, has been added to final NRP Section 1.6. Benefits of individual programs were weighed against costs during the development of the preferred alternative.

141. While we appreciate the quality and clarity of the proposed programs, the explanation of the choice of the preferred alternative is not transparent. We suspect that the projected program costs and the Economic Benefits assessment by Cardno ENTRIX played a significant part in that choice.
While the benefits assessment methodology appears sound and the limitations and lack of data appropriately described, the problem with the analysis is that it is backward-looking and may have limited relevance to the program benefits in the coming 20 years. Most of the qualitative notes of the benefits assessment consider public perception of TVA rather than benefits to natural resource health and viability, quality of life, and the region's economy in a broad sense. (*Commenter: Wolf Naegeli - FGS*)

Response: The mix of programs and activities that comprises the final NRP and the preferred Alternative D in the Final EIS was selected based on an analysis of benefits to the resource, economic benefits, economic development, public perception, and strategic considerations by TVA. An overview of the analysis can be found in Section 1.4 of the final NRP and Section 3.1 of the final EIS.

2.13.3. Classification of Programs

142. We question the classification as “Enhanced” or “Flagship” assigned to many of the natural resource management activities that are either 1) fundamental NRM activities or 2) have long been carried out by other resource agencies. Examples of fundamental NRM activities are land asset management, endangered and threatened species monitoring and management, and natural areas maintenance. Examples of activities long carried out by others are Leave No Trace and providing interactive, online maps of TVA lands. (*Commenter: Richard Preston – TOS*)

Response: Comment noted. TVA acknowledges that a number of the activities proposed as enhanced or flagship may have been conducted by other agencies for some time. This does not mean that TVA also doing these activities would have no value or would not enhance the natural resources under TVA's management.

2.13.4. Historic Natural Resource Planning Efforts

143. The NRP appears to be the "latest and greatest" of repeated TVA efforts to integrate resource management on TVA lands. These efforts included "process redesign" in the mid-1990s, "unit planning" in the late 1990s, the integrated resource team and the Watts Bar integrated resources management plan in the early-mid 2000s, and then another integrated resource team effort in the late 2000s. Then TVA laid off experienced natural resource management staff. The unit planning effort was the only one of these efforts that was successful and its implementation generated a revenue stream. What assurances can TVA make to the public that the current NRP effort will turn out different from these previous efforts? (*Commenter: Joe Feeman*)

Response: The NRP is the first such strategic plan that TVA has developed and submitted to the Board of Directors for approval that addresses the management of the natural resources entrusted to its care. The NRP builds upon the various historic approaches mentioned in the comment to address a broader range of resource management activities in an integrated approach. The active and continued involvement of the public in implementing and revising the NRP in the future should provide some assurance that this effort will continue.

2.13.5. Overall Purpose of Plan

144. Please clarify the purpose of the NRP. Is it to provide strategic direction or a guide for implementing the natural resource management programs and activities? (*Commenter: Deborah Woolley - TCCI*)

Response: The NRP serves both purposes. First and foremost it provides a strategic direction for TVA to manage the natural resources entrusted to its care. Second, it serves as a high level guide for implementing programs, especially during the first five years.

2.13.6. Planning Goals and Desired Future Conditions

145. The custodial level options appear to be based on meeting legal requirements rather than the base level of management necessary to maintain the health of the resources. Regulatory compliance does not necessarily result in the broad spectrum of resources being maintained in healthy conditions. (*Commenter: Paul Sloan - TDEC*)

Response: Comment noted.

146. The goal of the NRP stated on draft plan page 18 is laudable. Both the draft plan and EIS fail to succinctly define the actual on-the-ground conditions of the resources that TVA proposes to manage, as well as TVA's desired future conditions for these resources. The lack of this information makes it very difficult to evaluate the likely effectiveness of the proposed program options, priority levels, and alternatives. (*Commenters: Mark Campen, Avis Kennedy, Richard Preston – TOS, Paul Sloan - TDEC*)

Response: Comment noted. Neither the NRP nor the EIS succinctly define TVA's desired future conditions in more than general terms. A high priority during the first few years of implementing the NRP is to more comprehensively assess resource conditions on TVA lands. A related

priority during early plan implementation is to establish a process for measuring the results of implementing the NRP.

147. TVA staff should ask these questions during their development of the final NRP:
1) Does the NRP call for obtaining sufficient data and related information to conduct a comprehensive assessment of the condition of the resources?
2) Does the NRP call for timely development of a comprehensive assessment of the data gathered?
3) Does the NRP call for timely development of an implementation strategy based on good data, properly assessed and formulated to fully meet the TVA Environmental Policy expectations?
The answer to each of these questions needs to be “yes” before the NRP is submitted to the TVA Board for its approval.
(*Commenter: Paul Sloan - TDEC*)

Response: Chapter 2 of the final NRP is an implementation strategy for the preferred alternative which addresses these questions.

2.13.7. Scenario Planning

148. By attempting to use the same format and scenario planning process as the power-focused Integrated Resource Plan, TVA has created confusing and poorly organized documents. They appear to have been prepared by consultants with little experience in natural resource management. The applicability of the NRP scenarios listed is draft NRP Table 5.2 is unclear, as it fails to note that TVA is required to manage its natural resources regardless of economic and legislative conditions. (*Commenter: Joe Feeman*)

Response: Comment noted. The format of the Final NRP has been restructured to improve its readability. Each resource area now has its own dedicated chapter that pulls together all discussion in one place. In addition, the final NRP focuses primarily on the specifics of the plan and many of the tables have been removed for simplicity.

2.13.8. Sustainability and Adaptation

149. Our primary criticism of the draft NRP is that it is not holistic and visionary enough in analyzing global and regional trends over the past two decades and the likelihood of significant changes during the next 20 years. The only mention of future global change is associated with the carbon emissions from certain activities. Many of the NRPs program proposals have the potential to affect public awareness and society's responses to the threats and impacts of foreseeable changes. Although it is beyond the scope of the NRP to discuss specifics for each program proposal, the NRP should include guidelines on how global-change and sustainability factors will be assessed during program development and implementation. While the data necessary for full life-cycle assessments are lacking in many cases, sustainability science is making rapid progress and TVA should commit to conducting full life-cycle assessments where feasible. (*Commenter: Wolf Naegeli - FGS*)

Response: The various NRP alternatives, especially Alternatives C and D, have been designed to be flexible and adaptable to changing conditions. Under all of the Action Alternatives, TVA would increase its monitoring and assessment activities in order to increase its ability to detect change, regardless of whether the change is driven by climate, human population, or other factors. Many of the management activities such as dispersed recreation area improvement and natural area maintenance would largely be driven by the results of these increased monitoring and assessment activities. TVA also proposes to regularly review and, as necessary, revise the NRP; the need to adapt to changing conditions will be a major factor in this review process.

TVA acknowledges that sustainability science is making rapid progress and the data necessary to conduct life-cycle assessments is becoming more available. A major focus of the proposed improvements to TVA recreation facilities is to increase the sustainability of their operation by reducing energy and water use, using renewable energy, and better managing stormwater. TVA is also closely monitoring the development of life-cycle assessments and starting to incorporate them in its planning efforts. TVA has considered “change” in the NRP, whether or not it was specifically addressed or titled as “global change.” For example, within the Dispersed Recreation section, TVA identified the need for increased numbers of key projects such as development of new bank fishing sites and improved access to TVA property due to increased demand. In the Lands Planning section, the driving force behind lands planning efforts is the increased demand on TVA lands for various facilities and recreational uses, tied to increased development and population around TVA reservoirs. All of these issues, as well as others, were taken into consideration with scenario planning. This process was conducted to analyze the optimal program mix across a number of different future scenarios. To ensure that changing conditions are incorporated, TVA has committed to updating the NRP on a 5-year cycle.

2.13.9. TVA Coal Reserves

150. In the NRP, TVA continues to avoid addressing its management of its mineral rights. TVA developed an EIS addressing this for its Koppers coal reserves but has yet to release this EIS. The mining of these reserves would have a tremendous negative environmental impact. As part of its proclaimed environmental leadership, TVA should donate these reserves to the Tennessee Wildlife Resources Agency and ask the federal government to reduce the TVA debt it holds by the value of the mineral rights. (*Commenter: Joe Feeman*)

Response: Comment noted. As stated in the NRP and Final EIS Section 1.5, TVA's management of its mineral rights is outside the scope of the NRP.

151. Neither the recently completed TVA Integrated Resource Plan nor this NRP address TVA's management of its coal reserves, despite the TVA Board's 2006 directive. Coal is an important natural resource and one of the least expensive sources of electricity. TVA invested millions of dollars of rate payer's money in its coal reserves and many thousands of dollars in developing an EIS on its future management of its Koppers coal reserves. This EIS should be completed and released to the public for review and interpretation. It could also influence the pending Lands Unsuitable for Mining petition for the Upper Cumberland Wildlife Management Area and much of the Koppers reserve. (*Commenter: Tim K. Slone*)

Response: Comment noted. As stated in the NRP and Final EIS Section 1.5, the management of TVA's mineral rights is outside the scope of the NRP.

2.14. Other

2.14.1. General Support for Process

152. I am pleased with the Natural Resource Plan and believe it will result in the necessary strong strategic document to guide TVA's natural resource management. (*Commenter: Ronald E. Frere*)

Response: Comment noted.

153. We applaud TVA's efforts in drafting the NRP to guide its natural resource management for the next 20 years. (*Commenters: Dan Forster - GDNR, Heinz J. Mueller - USEPA, Paul Sloan - TDEC*)

Response: Comment noted.

154. We are pleased to see that under the preferred Blended Management Alternative, as stated in DEIS Chapter 5 “TVA would implement additional projects designed to benefit biological and cultural resources and improve recreational opportunities.” We are also pleased to see that under the various alternatives, TVA would continue to allocate land containing sensitive resources to the most protective land use zones, land use changes would emphasize developed recreation uses or natural resource conservation, and that air emissions from proposed actions would be avoided, mitigated, or require emissions reductions from other sources. (*Commenter: Amin Davis-NCDENR*)

Response: Comment noted.

155. We commend TVA for the effort that has gone into developing the plan and the increase in visibility (both within and outside TVA) that it should bring to TVA's natural resource management responsibilities. We hope that TVA will commit the necessary resources to fully meet these responsibilities. (*Commenters: Mark Campen, Richard Preston – TOS*)

Response: Comment noted.

156. We commend TVA for the integrated and holistic approach in preparing the NRP. We suspect it will become another milestone in TVA's record of leadership and contributions to the practice of natural resources management. We are very pleased with the intent to strengthen educational outreach and public participation opportunities, create an independent foundation and trust fund, and institute a volunteer program to encourage active citizen participation. (*Commenter: Wolf Naegeli - FGS*)

Response: Comment noted.

2.14.2. No Conflict With Existing Or Proposed Activities

157. We have reviewed your proposal and have found no conflict with existing or proposed activities. (*Commenter: Donald Necessary - VDOT*)

Response: Comment noted.

2.14.3. Resource Management Unit Plans

158. According to Section 2.1.3 of the DEIS, TVA completed ten Resource Management Unit Plans between 1998 and 2001 that prescribe resource management activities on 17,675 acres. Please put electronic versions of these plans on the TVA website for additional review within the context of the FEIS and the subsequent NRP. (*Commenter: Zoe Turner*)

Response: The Boone Reservoir Resource Management Unit Plan is available on the TVA website at http://www.tva.gov/environment/reports/boone/index.htm. Other unit plans are available upon request; contact eic@tva.gov.

2.15. Permitting

2.15.1. Permit and Regulatory Requirements

159. All lands being developed in Virginia are subject to transportation regulations related to the Virginia Department of Transportation's review of local government comprehensive plans, traffic impact analyses, and access management and roadway regulations and standards. These are

described in more detail in http://www.vdot.virginia.gov/projects/chapter527/default.asp and http://www.virginiadot.org/projects/accessmgt/default.asp. (*Commenter: Donald Necessary-VDOT*)

Response: Comment noted.

160. Any activity resulting in a new or modification to existing public water supply systems will require approval by the North Carolina Public Water Supply Section of the Division of Environmental Health. The proposed activity should include provisions to protect all public water systems and sources within the project area. (*Commenter: Jim Adams - NCDEH*)

Response: Comment noted.

161. Because the EIS/NRP is programmatic in nature and does not primarily address site-specific future facility development, we request to be informed of any future implementing actions with the potential to impact Division of Parks and Recreation holdings. (*Commenter: Amin Davis - NCDENR*)

Response: Comment noted.

162. If impacts to Virginia State Waters are proposed, TVA should submit a Joint Permit Application to the Virginia Marine Resources Commission. The Department of Environmental Quality Southwest Regional Office will make the final permit decision. All activities requiring instream work should be performed in the dry utilizing coffer dams, stream diversion, and/or working during low flow conditions. Other measures to avoid and minimize impacts should also be utilized and disturbed stream beds should be restored to their original contours. Unavoidable permanent impacts to wetlands or to streams in excess of three hundred linear feet will require mitigation through purchase of mitigation bank credits or the creation, enhancement, or preservation of wetlands or streams within the project's watershed. (*Commenter: Michelle Henicheck - VDEQ*)

Response: Comment noted.

163. Several of the proposed activities, including shoreline stabilization, construction of boat docks/marinas, trail construction, new access roads, and stream and wetland restoration/enhancement activities may result in a discharge of fill material into waters regulated by the Corps under Section 404 of the Clean Water Act and Section 10 of the Rivers and Harbors Act. (*Commenter: Scott Jones - USACE*)

Response: Comment noted.

2.15.2. TVA Permitting and Land Use Requirements

164. Based on the history of the Pickwick Pines Marina project, we recommend the following: All TVA-managed public lands should be leased or sold for the fair market value and the appraisals should be made available to the public. TVA should require developers of TVA shoreline property to demonstrate that they have the financial means to complete the project as planned and to post a performance bond with TVA before any actual construction begins. This is especially needed for commercial and industrial developments. TVA should enact stricter measures to better conserve riparian zones and more aggressively enforce existing shoreline permitting and land use requirements. If TVA does not have the resources to enforce these requirements, TVA should not approve the project. TVA should hold 26a permit hearings when requested by the public and be transparent in its reviews and subsequent modifications of

permit requirements. Permit requirements should be stated in clear, unambiguous language. (*Commenters: Marietta Haaga, John and Mary Ben Heflin, Keith L. Kline, Darrell Williams*)

Response: Decisions to lease or sell TVA land are governed by TVA's Land Policy. This policy can be viewed at http://www.tva.com/river/landandshore/land_policy.htm. TVA recognizes the importance of demonstrated financial means and performance bonds and has addressed them in its new guideline for managing commercial recreation facilities on TVA land. See http://www.tva.com/river/recreation/commercial.htm. TVA also recognizes the need for a more aggressive approach to enforcing permit requirements and land use agreement conditions and committed to this at the June 10, 2010 TVA Board of Directors meeting. See http://www.tva.com/abouttva/board/pdf/06-10-2010_board%20v9.pdf. TVA has inspected or plans to inspect in the near future all commercial and industrial leases as well many permittees to assess and ensure compliance.

TVA typically issues public notices of land use and Section 26a approval requests in the local newspaper and on TVA's website at http://www.tva.com/river/landandshore/landuse_action.htm. Some land use and 26a approval requests are also the subject of joint public notices issued by TVA and the U.S. Army Corps of Engineers; these are listed at http://www.lrn.usace.army.mil/cof/proposed_activities.htm. Public participation is a vital part of the TVA land use and permit approval decision-making process. Public notices are issued for all property proposed to be auctioned and for the disposal of some other TVA lands. TVA ensures meaningful opportunities are made available for public participation in TVA decisions about stewardship land use actions and to provide third parties an opportunity to express interest in commercial recreation properties. TVA's Section 26a regulations contain criteria on when and how TVA will conduct public hearings on 26a applications as well as appeals of decisions on 26a applications. These are available at http://www.tva.com/river/26apermits/regs_a.htm#13044.

2.16. Public Engagement

165. Many environmental impacts that affect TVA reservoirs and lands occur on property that TVA does not directly control. TVA should do a better job of providing support to those landowners and resource users to fix their problems and minimize the impacts. For example, Fort Loudoun Reservoir has a large amount of privately owned shoreline that is poorly maintained and highly erodible. This creates a water quality problem and increases sedimentation to the extent that recreation, power production, and navigation could be affected. TVA should have a program that educates individual landowners about options for stabilizing shorelines, including advice on costs and possible contractors. Such a program could be accomplished in coordination with local lake associations. (*Commenters: Sandra Goss - TCWP, Tom Littlepage*)

Response: TVA recognizes the importance of working with adjacent land owners to improve and protect shorelines and reservoir water quality. TVA has established programs and tools to increase the public's understanding of shoreline management and steps that can be taken to protect the shoreline. TVA's 1999 Shoreline Management Policy addressed this issue by establishing standards for the use of reservoir shorelines by adjacent residential landowners. TVA has also developed a series of riparian management fact sheets that are designed to help property owners understand soil erosion, the importance of vegetation along waterways in reducing erosion, and provide information on erosion prevention measures and management practices to reduce erosion. These fact sheets are available at http://www.tva.gov/river/landandshore/stabilization/index.htm. TVA intends to develop a new outreach program focusing on waterfront property owners. Goals of this program include increasing the understanding of the benefits of shoreline vegetation in erosion reduction, water quality and

aquatic habitat improvement, and promoting best management practices to stabilize the shoreline. Because costs of shoreline stabilization are greatly dependent on the specific site variables, it is not practical for TVA to issue general cost estimates for this work. Factors such as scope of work, materials used, local availability of materials, design plans, and ease of access vary for each project and affect the project cost.

166. Much of TVA's efforts in outreach and coordination are through small amounts of funding for materials and supplies for efforts such as lake cleanups. These can result in a large investment by others. Can you quantify the benefits of these small investments in terms of dollars and broad-based environmental education and understanding? (*Commenter: Mitch Jones - TMA*)

Response: There is great variability in the types of work performed by volunteers and their levels of participation. Therefore it is not possible to provide a comprehensive cost-benefit or readily quantify increases in environmental understanding or appreciation due to participation in activities supported by TVA. TVA has estimated cost savings incurred during specific events, such as a reservoir shoreline clean up, by tracking the amount of volunteer hours accumulated during the event and comparing it to the number of hours and dollars TVA would have spent to perform the same work.

A recent example is the volunteer participation in National Trails Day. Volunteers worked approximately 265 hours performing maintenance activities on TVA trails. The dollar value associated with this one day event is estimated to be $6,625. Studies have shown that providing hands-on experiences and information are effective tools in helping people recognize the value of natural resources. Additionally, as reported in the Keep America Beautiful 2009 study, Littering Behavior in America: “Individuals are much more likely to litter into a littered environment. And once there, it attracts more litter. By contrast, a clean community discourages littering and improves overall community quality of life.” Therefore, by engaging volunteers to participate in various volunteer activities or environmental education sessions, TVA can promote responsible stewardship.

167. Through its energy education programs, TVA already has a good infrastructure that could be used for improving environmental and ecological literacy. TVA should also consider working with the numerous other environmental education programs that exist across the region. (*Commenter: Paul Sloan - TDEC*)

Response: During implementation of the NRP environmental education program, TVA intends to coordinate with TVA’s other existing education programs to facilitate delivery and gain efficiencies when possible. TVA also intends to engage partners across the region and look for opportunities to coordinate environmental messages and outreach programs.

168. TVA should emphasize the problems caused by soil erosion and solutions to this problem in its education and outreach programs. Soil erosion is a significant problem in the TVA region that many local residents and industries unwittingly contribute to. A valuable solution is the use of no-till agricultural techniques, which is not mentioned in the NRP. No-till also has the benefit of increasing soil storage of carbon. (*Commenter: Deb O'Dell*)

Response: TVA recognizes that soil erosion is a concern throughout the region and has established programs and tools to reduce erosion and increase the public’s understanding of the soil erosion’s impacts, causes, and preventive measures. TVA's efforts in this area would increase under the preferred alternative. NRP Final EIS Section 2.5.6 lists many of the most

commonly used best management and conservation practices for reducing erosion and improving water quality. This is not an exhaustive list and TVA could recommend no-till techniques in particular situations. The Natural Resources Conservation Service and local Soil Conservation Districts and Soil and Water Conservation Districts currently serve as lead agencies to provide assistance to agricultural land owners for best management practices such as no-till drilling.

169. Why is there no environmental education program included at the custodial level? (*Commenter: Ron Fugatt - NU*)

Response: The custodial level programs are those that TVA has determined are necessary to meet legal, regulatory and TVA policy requirements and goals. TVA staff determined that the environmental education program and most other public outreach programs do not meet this criterion.

2.17. Public Involvement

170. The NRP refers to the Regional Resource Stewardship Council and its role in formulating the NRP. Please explain what the Council is, how it is selected and functions, and the affiliations of those who serve on it. (*Commenter: Sandra Goss - TCWP*)

Response: The role of the Regional Resource Stewardship Council in developing the NRP is described in NRP Section 1.3. Additional information about the Council is available at http://www.tva.gov/rrsc/.

2.18. Recreation

2.18.1. Boating Capacity and Density

171. Through the current and proposed boating capacity and density studies programs, TVA continues to avoid the boating capacity issue. High boating density is a real problem on certain areas of many reservoirs. TVA needs to work more closely with the state boating agencies to conduct “real” studies and take actions to alleviate the safety problems and crowding. These include looking more closely at the cumulative impacts of permitting new marinas, allowing deed modifications to facilitate more subdivision lots and associated private docks, and increasing harbor limits for marinas. (*Commenter: Joe Feeman*)

Response: Comment noted. TVA anticipates increasing resources to partner with and support state boating law administrators in planning, completing and implementing detail boating capacity studies under Alternative C and would consider this under the preferred alternative as resources become available.

2.18.2. Commercial Recreation

172. How does TVA's new approach to the licensing and management of commercial recreational facilities on TVA land fit into the NRP? (*Commenter: Mitch Jones - TMA*)

Response: The NRP was developed to address TVA's overall natural resource (including recreation) stewardship activities. The licensing and management of specific commercial recreation facilities is outside the scope of the NRP.

173. Why does the NRP exclude consideration of commercial recreation? (*Commenter: Mitch Jones - TMA*)

Response: The facility-based recreation programs and activities included in the various NRP alternatives primarily focus on the management of recreation facilities owned by TVA. The Clean Marina Initiative and the proposed Camp-Right Campground Program address some aspects of commercial recreation facility management. Under the lands planning alternatives, TVA would continue to evaluate proposals for the development of commercial recreation facilities on TVA lands. Other aspects of commercial recreation are outside the scope of the NRP.

174. Will the new fee structure that TVA has imposed on commercial recreation facilities cover the costs of administering the new fee program? (*Commenter: Avis Kennedy*)

Response: While the newly implemented commercial recreation fee structure is outside the scope of the NRP, it is expected to cover the cost of its administration.

2.18.3. Dispersed Recreation

175. Dispersed recreation is the primary public use of TVA lands. An inventory of dispersed sites is great, but only if TVA intends to actively manage them. Otherwise TVA should use the inventory money to remediate sites. (*Commenter: Joe Feeman*)

Response: Comment noted.

176. It is unclear why the Dispersed Recreation Management programs are included under Biological and Cultural Resources Management and not in the Recreation Management section. (*Commenter: Heinz J. Mueller - USEPA*)

Response: Dispersed Recreation Management is included in the Biological Resources Management section because the impacts of dispersed recreation (e.g., erosion and vegetation damage) frequently affect biological resources. Many of the experiences sought by dispersed recreation participants are also based on biological resources; these include wildlife and wildflower viewing and hunting.

177. The dispersed recreation management programs should include the development of more informal camping areas with limited infrastructure and low management costs. Informal camping is preferred by many users of TVA land. TVA should also start a campground host program on informal camping areas to control use and abuse. (*Commenter: Joe Feeman*)

Response: Comment noted. Developing new informal or primitive camping areas or recruiting campground hosts for these areas are not components of the preferred alternative. The preferred alternative for dispersed recreation includes ramping up over 3-5 years for an increased effort to repair 5 – 15 heavily impacted dispersed/informal recreation sites annually. These repairs would include improving areas currently used for informal camping so that this use can continue with reduced environmental impacts.

178. We support the establishment of areas (blue ways, draft NRP page 44) that are only open to quiet water recreation such as canoes and kayaks, as well as expanded no wake zones. Such areas are increasingly important in light of both the continuing increase in marinas and motorized boat traffic on TVA reservoirs and the increased interest in non-motorized boating. (*Commenters: Sandra Goss - TCWP, Roberta Rhur - VDCR*)

Response: Comment noted. Other than issuing permits for boating access areas, docks, and marinas, TVA does not regulate boating. State agencies regulate boating within their respective state boundaries.

179. While the construction of new trails is desirable, the proposed addition of 10 miles of new trails per year under the custodial management is questionable. Why is this activity considered custodial? Some of TVA's existing trails, such as the Hemlock Bluff Trail, are at present not adequately maintained. TVA's custodial trail management efforts should concentrate on better maintaining the existing trails. (*Commenter: Joe Feeman*)

Response: Neither the Custodial Management alternative not the preferred alternative in the Final EIS and NRP include the construction of new trails. TVA would, however, consider allowing partners to construct and maintain trails on TVA lands under the preferred alternative. Under the preferred and other alternatives, TVA proposes to improve the management of its existing trail system. In addition, as part of Public Engagement efforts, TVA proposes to increase its use of volunteers for activities such as maintaining trails.

2.18.4. Fishing

180. DEIS Section 2.1.2 lists bank fishing as a dispersed recreation key opportunities. We support actions to improve bank fishing access and facilities. In addition to these improvements, TVA should consider fish habitat rehabilitation and enhancement. Fish habitat quality declines as reservoirs age and can be rehabilitated by improvements such as fish attractors near public access areas. Such habitat improvements increase angler catch rates and the quality of the recreational experience. We welcome the opportunity to partner with TVA and others to implement this. (*Commenter: Dan Forster - GDNR*)

Response: Comment noted. TVA recognizes bank fishing as a growing outdoor pursuit. On many reservoirs throughout the Tennessee Valley, TVA provides the only access bank fishermen have to the reservoir. In areas highlighted for premier bank fishing opportunities, TVA wants fishermen to have maximum success in their endeavor. As outlined in the NRP, partnerships will be an important component to the success of the plan. This would include partnering in projects to improve bank fishing opportunities and the habitat that supports those opportunities. TVA looks forward to working with all existing and potential partners as the NRP is implemented.

2.18.5. Integration with SCORPs

181. The manner in which the NRP integrates with each of the states' State Comprehensive Outdoor Recreation Plans should be better explained. While Land and Water Conservation Funds may not be applicable to TVA's proposed activities, the outdoor planning provided by each SCORP should not be overlooked. For example, increased water access may help meet one of Virginia's most popular recreational resources. (*Commenter: Roberta Rhur - VDCR*)

Response: TVA shares information from its TVA Recreation Inventory Database with the seven TVA states in support of their SCORP planning process and reviews and comments on draft sections of the SCORP that impact the TVA service area. TVA appreciates the guidance provided by the state's SCORPs and provides coordination, plan reviews, land rights, permits and when available, supplemental funding to assist with implementation of approved State and regional recreation plans and associated projects on public lands.

2.18.6. Recreation Facility Management

182. According to draft NRP page 62, there is not a Custodial level for operation of Day Use Areas. Please explain this omission. (*Commenter: Avis Kennedy*)

Response: This comment is specific to the operation of day use areas off of dam reservations. TVA determined that its continued operation of these areas did not meet the definition of custodial program options. Therefore, TVA's continued operation of these areas was not included in Alternative B - Custodial Management. TVA's continued operation of these areas is included in the preferred Alternative D and is one of the activities included in Section 6.4.4 of the Final NRP. TVA also proposes to upgrade up to 2 of these areas per year under the preferred alternative.

183. Recreation management should remain a high priority. We support the management of TVA recreation facilities at the enhanced or flagship level. (*Commenter: Dan Forster - GDNR*)

Response: Comment noted. Under the preferred alternative, many recreation management activities would be implemented at the enhanced level and a few would be implemented at the flagship level.

184. The draft NRP contains several references to the Americans with Disability Act and its guidelines without much elaboration. It would be beneficial for the NRP to commit in greater detail to the establishment of trails and campgrounds with handicapped access (e.g., wheelchair-accessible nature trails, streams, and fishing facilities). (*Commenter: Sandra Goss - TCWP*)

Response: Comment noted. Under all alternatives, TVA intends to continue upgrading its facilities to meet ADA standards. TVA also considers accessibility in the design and construction of trails and stream access sites.

185. TVA proposes to continue operating eight campgrounds on dam reservations. Please explain the strategic and security reasons behind this proposal. (*Commenter: Mitch Jones - TMA*)

Response: After the attacks of 9/11, TVA installed security gates at dam and power operations reservations. These gates provide TVA the ability for restrict public access in the event of a heightened security alert by Homeland Security. In this event, the campgrounds and recreation areas on these reservations would be evacuated and closed to the public. Keeping these campgrounds and recreation areas in service and managed by TVA helps meet recreation demand while maintaining TVA's ability to respond to enact necessary security measures.

186. Under the preferred alternative, most of the focus is on the continued operation and upgrades to existing recreation facilities. Relatively few activities are proposed that will likely result in a marked increase in recreational opportunities and use on TVA lands. How will this approach meet the expressed interest and projected increase in recreational demand? (*Commenter: Renee Hoyos - TCWN*)

Response: The approach of the preferred alternative is to achieve a balance between limited TVA resources and providing for unmet recreation needs. To date, making land available for agency and commercial recreation development has helped provide cost-effective recreation opportunities around the reservoir system. This would continue under all alternatives.

2.18.7. Recreation Inventory

187. Why is it necessary to complete a thorough recreation inventory every year? What type of change requires inventories this frequently? (*Commenter: Ron Fugatt - NU*)

Response: TVA has recently implemented a web-based Recreation Map Viewer (http://recreation.tva.com/ext_cl.aspx). The supporting recreation facility information is current updated on a 3-year cycle. Decreasing the update cycle would make the information more timely and useful.

2.18.8. Recreational Access

188. The NCWRC actively pursues and develops boating and fishing access areas for sportsmen and we support increasing the number of these areas as proposed under Alternative C. We specifically encourage consideration of a new public low-water boat ramp on Fontana Reservoir between Mouse Branch and Panther Creek. A ramp here would respond to angler desires and improve access for anglers and hunters, particularly in the mid-lake region where poor winter and spring weather can make access difficult from other ramps. A new ramp would also allow access when other ramps are not usable due to low reservoir levels. (*Commenter: Dave McHenry - NCWRC*)

Response: Comment noted. TVA would work with agency partners to make available TVA public lands for development of this type of public boat access areas in suitable and appropriate locations.

189. We are happy to partner with TVA to develop increased recreational access and use of TVA lands while continuing to management and protect the unique natural resources on TVA's lands and waters in Virginia. We look forward to working with TVA to implement the Biological Resource and Recreation Management access initiatives in the NRP. (*Commenter: Amy Ewing - VDGIF*)

Response: Comment noted.

2.18.9. Recreational Use and Visitation Information

190. According to the draft NRP, TVA areas attract about 6 million people per year. What areas are included in this estimate? It would be beneficial for TVA to have better visitation data, better data on expenditures by visitors, and better information on the economic benefits of these expenditures. (*Commenter: Avis Kennedy*)

Response: The estimate of 6 million people per year is for dispersed (informal) recreation users on all TVA reservoir lands. TVA agrees with the desirability of better data on visitation, expenditures, and the economic benefits of these expenditures.

2.18.10. Stream Access Sites

191. Because public access to streams in parts of the TVA Region has diminished over the last few decades, we support the continued operation and improvement of TVA's existing stream access sites as well as efforts to acquire and develop additional stream access sites. (*Commenter: Dan Forster - GDNR*)

Response: Comment noted. Assisting in acquisition and development of additional sites is not part of the preferred NRP alternative.

2.19. Reservoir Lands Planning

2.19.1. Allocations for Specific Tracts

192. Regarding draft NRP page 12, please elaborate whether lands already allocated to one of the zones will remain as allocated under the Comprehensive Valleywide Land Plan. (*Commenters: Sandra Goss - TCWP, John and Mary Ben Heflin, Drew Wilson*)

Response: TVA's first priorities in implementing the proposed Comprehensive Valleywide Land Plan would be to complete land plans with single use parcel allocations for the reservoirs that lack them. TVA would then update existing reservoir land plans on an as-needed or cyclic basis. Zoning allocations could be changed during the plan updates, as well as during off-cycle allocation changes under the conditions defined in the TVA Land Policy.

193. We request that TVA rezone Pickwick Reservoir Tract No. XPR-141PT2 (the former Pickwick Pines Marina property) from Developed Recreation to Natural Resource Conservation. With two large marinas nearby, this area is already heavily congested with boat traffic. (*Commenters: Bo Allen, Louis F. Allen, Rodney Baber, Steve & Debbie Blackwell, David L. Bourland, Donald E. Bourland, Douglas Braff, Keith Brown, Andy and Pam Cobb, William Cowan, Wood Dale, Frank Dalton, Kathleen Dalton, Martha Frances Dalton, Frank Davis, David Delich, Gus Denton, Bonnie Doyle, Dena Edelen, Thomas Farnsworth, Robert Field, Marietta Haaga, Glenn W. Habenicht, Betsey Hamilton, Josh Hammond, Tim Hayes, Rob Heflin, Glen Herald, Martha Hester, Jeanne Hollis, Martha H. Huie, Ann Day Hunt, Bill and Pat Johnston, Will Johnston, John Marshall Jones, Kenneth P. Jones, M. Kruger - MAS, Jamie Lendrum, John Lichterman, Rob Liddon - BDBCB, Robert Liddon, Ben Long, H. Lynn Magill, Nancy Magill, Margaret Mallory, Vincent and Marsha Marascuilo, Vic Marlar, Paul A. Matthews, William P. Maury II, Joan and Sarah Melvin, Lancelot Minor, Kimbrough Mullins, Carroll Nenon, Charles Netherly, Lissa Noel, Larry Nolan, Marvin Palmer, Scott B. Peatross, Anne Phillipy, Robert J. Pinstein, Bill Reddoch, Diane Reddoch, Michael Reddoch, King W. Rogers, David M. Rudolph, J. Tyler Shawkey, William Smith, Patrick D. Snow, Michael Stanley, Richard Sweat, Sherry Whitten, Catherine Wilfong, Bailey Williams, Darrell Williams, David Williams, Gloria Williams, Jennifer Williams, Nora Williams*)

Response: Comment noted. TVA will consider this and other public comments in determining the future use of Pickwick Reservoir Tract No. XPR-141PT2. This reservoir-specific activity is not within the scope of this programmatic review.

2.19.2. Process for Changing Land Use Allocations

194. TVA should modify its Land Policy to allow parcel allocations to be changed outside of the normal planning process when the change is to Natural Resource Conservation or Sensitive Resource Management, rather than only to Industrial or Commercial Recreation uses. Given the long time periods between reservoir planning efforts, the current policy of only allowing interim changes for intensive development uses hinders TVA's ability to manage natural resources and protect public lands. It also reflects a pro-development bias. (*Commenters: Louis F. Allen, Robert Alvarez, Steve & Debbie Blackwell, David L. Bourland, Donald E. Bourland, Edward Boyer, Douglas Braff, William Cowan, Wood Dale, Frank Dalton, Kathleen Dalton, Martha Frances Dalton, Frank Davis, Hugh L. Davis, III, David Delich, Gus Denton, Bonnie Doyle, Dena Edelen, Thomas Farnsworth, Joe Feeman, Robert Field, Marietta Haaga, Glenn W. Habenicht, Betsey Hamilton, Tim Hayes, John and Mary Ben Heflin, Rob Heflin, Glen Herald, Martha Hester, Jeanne Hollis, Martha H. Huie, Ann Day Hunt, Will Johnston, John Marshall Jones, Kenneth P. Jones, M. Kruger - MAS, Jamie Lendrum, Rob Liddon - BDBCB, Robert Liddon, Ben Long, H. Lynn Magill, Nancy Magill, Margaret Mallory, Paul A. Matthews, William P. Maury II,*

Joan and Sarah Melvin, Lancelot Minor, Kimbrough Mullins, Charles Netherly, Lissa Noel, Larry Nolan, Marvin Palmer, Scott B. Peatross, Robert J. Pinstein, Bill Reddoch, Michael Reddoch, King W. Rogers, David M. Rudolph, J. Tyler Shawkey, William Smith, Patrick D. Snow, Michael Stanley, Matthew Thornton, Sherry Whitten, Catherine Wilfong, Darrell Williams, David Williams, Jennifer Williams, Nora Williams, Drew Wilson, Gina M. Youngblood)

Response: Comment noted. TVA will consider this if and when the Land Policy is reviewed for possible amendments. It was approved by the TVA Board of Directors on November 30, 2006. The NRP proposes to shift TVA's reservoir lands planning to a more comprehensive Valleywide perspective. The CVLP would establish the range of allocated uses for the lands TVA manages across its reservoir system. However, TVA would continue to develop and update RLMPs for a portion of a reservoir, an entire reservoir, or a group of reservoirs using the Single Use Parcel Allocation methodology. A prioritized list of areas to be planned would be developed upon completion of the NRP and one of the goals of the NRP is to accelerate the reservoir land planning cycle.

2.19.3. Reservoir Lands Planning Process

195. Because the Rapid Lands Assessment is based on desktop analysis rather than comprehensive field surveys, it is inappropriate to use as a baseline for TVA's land management plans as stated in Section 1.6.3 of the NRP and elsewhere. (*Commenter: Joyce Stanley - USDOI*)

Response: The RLA was used to supplement available information. The baseline acreages under the Comprehensive Valleywide Land Plan were established using a combination of allocations in Board-approved land plans that are based on ground-truthed data and results of the Rapid Lands Assessment methodology. Based on additional surveys, TVA anticipates that some parcels of land may be better represented by different land use allocations. For example, field assessments may identify additional areas that warrant the sensitive resource management allocation.

196. The change in reservoir lands planning proposed under the preferred alternative would affect numerous landowners on TVA reservoirs. When TVA began developing past reservoir land plans it notified shoreline property owners and invited them to meetings to discuss the plan. TVA has not done this with this currently proposed reservoir land plan, and consequently is not adequately involving potentially affected landowners in this land planning process. (*Commenter: Donald Reynolds*)

Response: Public input is essential for making decisions concerning the allocation of TVA-managed public land. When developing reservoir land management plans, TVA will continue to solicit public input. TVA actively solicits public input and will provide opportunities for the public to make comments on the management of reservoir lands. Opportunities for public review could include such venues as a public notice, public meetings, facilitated small group workshops, stakeholder consultations, and/or questionnaires for collecting public input. TVA used a variety of techniques to solicit public input to the NRP. However, because the reservoir lands planning component would not, by itself, result in changes in allocations of individual tracts of TVA land, TVA did not directly specifically notify individual reservoir property owners.

197. The NRP should include the lands planning process for each reservoir. (*Commenter: Darrell Williams*)

Response: Section 2.4.1 of the final EIS and Section 8.3 of the final NRP list the status and type of land plan for each reservoir. If Alternative C or D is selected for implementation, TVA's first priority in implementing the Comprehensive Valleywide Land Plan (see final NRP Section 9.3) would be to complete land plans using the single use parcel allocation method for the reservoirs that are currently planned using the multiple use tract method (Chickamauga, Kentucky, Nickajack, and Wheeler). TVA would then complete land plans for the forecast method reservoirs (Fort Loudoun and Normandy), followed by those with no land plan (Great Falls, Wilson, Beech River Project). Due to the NRP's broad scope, RLMPs for a portion of a reservoir, an entire reservoir, or a group of reservoirs are considered implementation of this project.

2.19.4. Residential Development

198. TVA should discourage large shoreline residential developments such as the Rarity projects. (*Commenter: Virginia Dale - AFORR/TCWP*)

Response: Comment noted. Under the 2006 Land Policy, TVA would not make its reservoir lands where shoreline access rights do not already exist available for such developments.

2.19.5. Target Ranges for Allocations to Land Use Zones

199. The ranges for the amount of land proposed to be allocated to the various zones shown in draft NRP Table 2, Page 12, are very broad. Please explain the sources and reasons for these ranges. (*Commenters: Ron Fugatt - NU, Diane Reddoch, Paul Sloan - TDEC*)

Response: In response to public comments and after further analysis, the ranges of allocated land area to the various zones under the Comprehensive Valleywide Land Plan presented in the final EIS and NRP have been narrowed from those presented in the drafts. The bases for the ranges are explained in final EIS Section 2.4.1.

200. TVA should increase the amount of land on Pickwick Reservoir allocated for Natural Resource Conservation and reduce the amount of land allocated for Industrial and Developed Recreation, particularly in the Yellow Creek area. This area is already heavily developed with marinas, industries, barge terminals, and boat ramps and is heavily congested with boat traffic on weekends and holidays. (*Commenters: Louis F. Allen, Robert Alvarez, Steve & Debbie Blackwell, David L. Bourland, Donald E. Bourland, Edward Boyer, Douglas Braff, Keith Brown, William Cowan, Wood Dale, Frank Dalton, Kathleen Dalton, Martha Frances Dalton, Frank Davis, David Delich, Gus Denton, Dena Edelen, Thomas Farnsworth, Robert Field, Sandra Goss - TCWP, Marietta Haaga, Glenn W. Habenicht, Betsey Hamilton, Tim Hayes, John and Mary Ben Heflin, Rob Heflin, Glen Herald, Martha Hester, Jeanne Hollis, Martha H. Huie, Ann Day Hunt, Will Johnston, John Marshall Jones, Kenneth P. Jones, M. Kruger - MAS, Jamie Lendrum, Rob Liddon - BDBCB, Robert Liddon, Ben Long, H. Lynn Magill, Nancy Magill, Margaret Mallory, Paul A. Matthews, William P. Maury II, Joan and Sarah Melvin, Lancelot Minor, Kimbrough Mullins, Charles Netherly, Lissa Noel, Larry Nolan, Marvin Palmer, Scott B. Peatross, Robert J. Pinstein, Richard Preston – TOS, Bill Reddoch, Michael Reddoch, King W. Rogers, David M. Rudolph, J. Tyler Shawkey, William Smith, Patrick D. Snow, Michael Stanley, Richard Sweat, Matthew Thornton, Sherry Whitten, Catherine Wilfong, Bailey Williams, Darrell Williams, David Williams, Gloria Williams, Jennifer Williams, Nora Williams, Drew Wilson, Gina M. Youngblood*)

Response: Comment noted. TVA will consider these comments when making future land use decisions for Pickwick Reservoir lands.

201. We oppose the reduction in lands zoned for sensitive resource management and natural resource conservation proposed under the recreation-focused lands reservoir planning alternative. We also note that the linkage between the Reservoir Lands Planning component of the NRP and the proposed natural resource management activities is not defined. (*Commenter: Mark Campen*)

Response: Based on public input and a reassessment of likely future needs, TVA reduced the increase in the proportion of land potentially allocated to Developed Recreation under the Comprehensive Valleywide Land Plan to a maximum of 25 percent (i.e., up to 10 percent of TVA reservoir lands). The CVLP allocation ranges for Zone 3 - Sensitive Resource Management (currently 17 percent of TVA reservoir lands) and Zone 4 - Natural Resource Conservation (currently 61 percent of TVA reservoir lands) were also reduced to 16 - 18 percent and 58 - 65 percent, respectively. Although TVA does not propose constructing new developed recreation facilities under the various NRP alternatives, the demand for such facilities is anticipated to increase and the potential increase in lands allocated for Developed Recreation under the CVLP would help accommodate this demand. A large proportion of the biological and cultural resource management activities would occur on Zone 3 and Zone 4 land and the proposed CVLP allocation ranges should continue to provide an adequate land base for these activities.

2.20. Water Resource Management

2.20.1. Aquatic Monitoring and Management

202. TVA and Georgia Wildlife Resources Division have shared data on several occasions in the past. We believe that data sharing is in the best interest of both agencies and the public and support efficient means of data sharing. We also support continued TVA stream, tailwater, and other ecological monitoring efforts. (*Commenter: Dan Forster - GDNR*)

Response: In addition to continuing to provide stream and tailwater data upon request, TVA is proposing under the preferred alternative to develop an “online” data sharing capability that would satisfy this need. While acknowledging that “continuous” data collection can have different meanings, TVA believes its proposed level of stream and tailwater monitoring, in addition to other monitoring being proposed as part of other NRP programs, will serve to maintain and enhance TVA’s and other resource agencies’ ability to make future management decisions.

203. We recommend that TVA increase the number of sampling sites in streams, reservoirs and tailwaters to the level described in Alternative C. This monitoring should also include additional embayment sites which often have distinct water quality issues. (*Commenter: Paul E. Davis - TDEC*)

Response: Broad aquatic monitoring serves a crucial role in assessing and protecting Valley water resources. In response to comments on the Draft EIS and NRP, TVA has increased the Stream and Tailwater Monitoring Program “Custodial” and “Enhanced” number of stream assessments to be conducted, respectively, from 50 and 70 to 110 and 125. In addition, a new program, the Nutrient Source-Watershed Identification and Improvement Program, has been added with a strong monitoring emphasis for identifying and reducing nutrient loading into targeted reservoirs (and embayments) and streams, which could also improve conditions in some streams currently listed as nutrient-impaired on states’ 303(d) lists.

A new program emphasis on aquatic biodiversity protection has been added to the Aquatic Ecology Management Program, which includes biological monitoring and habitat assessment activities that will foster collaborative efforts among stakeholders to protect exceptionally diverse aquatic biological communities and habitats. Additionally, a new Climate Change Sentinel Monitoring Program is now incorporated into the NRP that will partner with other agencies to conduct long-term climate, water quality, and biological monitoring of 1 to 2 watersheds in each of the five predominant ecoregions in the Tennessee Valley. The combined sampling efforts of these programs would be robust and equal to, or greater than, the flagship number of stations identified in the draft NRP. As part of its Strategic Partnership Planning Program, TVA would partner (coordinate) with other agencies to select and prioritize sites chosen for sampling and analysis. Finally, TVA intends to make its monitored data easily available to all stakeholders and explore utilization of the EPA-supported STORET / WQX framework as a part of its evaluation.

204. We request that TVA use the EPA-supported STORET / WQX framework for managing and sharing water quality monitoring data. This will facilitate data exchange between TVA and state water quality agencies and increase the ease of the use of the valuable information collected by TVA. (*Commenter: Paul E. Davis - TDEC*)

Response: Comment noted. Under Alternative C and preferred Alternative D, TVA proposes to make its monitoring data readily available on the Web. As part of this effort, TVA would explore using the EPA-supported STORET / WQX framework.

205. When prioritizing sites for sampling, TVA should consider the states' most recent 303(d) lists of impaired streams. This will help both TVA and the state water quality agencies identify restoration needs and opportunities. We recommend that TVA coordinate monitoring efforts so that TVA's monitoring and other relevant activities are synchronized with the states' watershed management activities. (*Commenter: Paul E. Davis - TDEC*)

Response: Comment noted. TVA intends to continue monitoring at its current sites but will consider 303(d) listing status and other factors in selecting additional sites to monitor. TVA also proposes to coordinate with other agencies when selecting and prioritizing monitoring sites.

2.20.2. General

206. Given TVA's abilities, resources, and regulatory authorities, its water resources efforts could have more impact by focusing on efforts to improve impaired tributary streams than on things like reservoir shoreline stabilization. Focusing on impaired streams should be a custodial activity. The targeted watershed initiatives should be higher priority than the targeted reservoir initiatives. (*Commenters: Renee Hoyos - TCWN, Paul Sloan - TDEC*)

Response: While TVA has regulatory authority over obstructions in and along the Tennessee River and its tributaries and controls uses and disturbances on property under its control, TVA does not have regulatory authority over private lands. This limits TVA’s ability to directly address many of the factors contributing to impaired streams. However, a new Nutrient Source-Watershed Identification and Improvement Program has been added to Alternatives B, C, and D which focuses on improving reservoirs by identifying major watershed sources of pollutants (primarily nutrients and sediment) with pollution load reduction targets for streams flowing into reservoirs. This program is expected to improve some streams that are currently listed as impaired on state 303(d) lists. Under the preferred alternative, this program would focus on improving two of the reservoirs receiving large phosphorus and nitrogen loadings. Additional NRP programs are proposed that would conduct stream monitoring, habitat enhancements, public outreach, and strategic partnerships. These are also expected to improve streams.

207. Many of TVA's current and proposed water resources management programs are not essential activities and overlap efforts of other agencies such as the Natural Resources Conservation Service that are better equipped to handle them. Much of the proposed program funding, such as giving money to partnerships and groups to spend on stream projects, could be better spent on managing TVA lands, where there is little overlap with other agencies. (*Commenter: Joe Feeman*)

Response: Water quality is one of six strategic objectives of TVA's Environmental Policy which states that TVA will actively promote reservoir and stream water quality, reduce the impact of its operations and leverage alliances with local and regional stakeholders to promote water conservation. The NRP would help achieve these objectives by focusing on developing a sustainable and holistic approach for TVA to carry out its resource stewardship activities. The main emphasis of the water resource programs is on monitoring, planning, providing technical support and funding, and implementing programs designed to focus on TVA's reservoirs and tributary streams in a manner that addresses emerging issues and compliments the efforts of other agencies.

208. We recognize and support TVA's effort and future commitment to monitoring, maintaining and enhancing the water resources of the Tennessee Valley. (*Commenter: Dan Forster - GDNR*)

Response: Comment noted.

2.20.3. Mitigation of Impacts

209. According to the discussion of the TVA Environmental Policy on draft NRP page 23, a focus area of the NRP is to "Mitigate TVA's impact on aquatic systems while balancing thermal cooling needs with consumptive use." It is unclear how the actions proposed in the NRP will mitigate these impacts and how this mitigation will be prioritized. (*Commenter: Joyce Stanley - USDOI*)

Response: While this critical success factor is listed as part of the Water Resource Protection and Improvement objective in the TVA Environmental Policy, it is a not major focus area of the NRP programs and activities. Thermal cooling needs for power generation has recently been addressed in TVA's Integrated Resource Plan Final EIS. Other aspects of TVA's consumptive use of water are being addressed under TVA's Strategic Sustainability Performance Plan (Executive Order 13514).

2.20.4. Reservoir Shoreline Stabilization

210. Both the enhanced and flagship programs propose specific amounts of shoreline to be stabilized. Based on TVA's shoreline inventories, how much shoreline is in need of stabilization? How do the proposed amounts of stabilization relate to the need for stabilization? (*Commenter: Mark Iverson - BGMU*)

Response: TVA is charged with the management and stewardship of some 11,000 miles of reservoir shoreline. In the early 1990s TVA assessed this shoreline and identified that 8 percent were eroding. Some of these areas are classified as sensitive resource areas because they contain archeological resources. In addition, eroding sites affect water quality, aquatic and terrestrial habitat, and recreational opportunities. TVA, working on its own and with partners, has been successful in protecting over 80 miles of eroding reservoir shoreline since 1992. The NRP proposes to continue this effort by stabilizing approximately 60 miles for water quality purposes and up to 22 miles for protection of archaeological sites over the next 20 years. It is

understood that this is a dynamic system and with continuing land use changes, increased development, and more water craft on TVA reservoirs, shoreline erosion could increase. The main focus is taking corrective action, continuing to assess and target resources, and to minimize erosion and manage the shoreline resource for the greatest public benefit.

211. How much sediment input to reservoirs is the result of sediment runoff from exposed unvegetated areas within the reservoir drawdown zones? (*Commenter: John Matney*)

Response: The amount of sediment entering reservoirs as a result of sediment runoff from exposed drawdown zones has not been determined. Quantifying this sediment input in some reservoirs would be a component of the Nutrient Source-Watershed Identification and Improvement program.

212. The discussion of reservoir shoreline erosion and stabilization does not describe the impacts of the higher summer reservoir levels implemented through the Reservoir Operations Study on shoreline erosion. What effects did the ROS changes have on erosion? How accurately were they predicted in the ROS EIS? (*Commenter: Joe Feeman*)

Response: Comment noted. TVA has not conducted an assessment of the effects of the ROS changes on shoreline erosion.

213. TVA is doing too little to prevent the loss of islands from erosion. Many islands that provide important habitat for waterfowl, eagles, ospreys, and other wildlife have greatly decreased in size in recent years. Increased boat traffic and the trend towards larger boats with larger wakes contribute to this loss of islands. TVA should do something to stabilize these islands for future generations to enjoy. (*Commenter: Tom Aslinger*)

Response: TVA agrees that islands in reservoirs are special features. They are valued for their recreational opportunities, ecological and archaeological significance, waterfowl and wildlife habitat, and scenic interests. Because of these values, a significant portion of TVA's shoreline stabilization work since 1994 has been on islands. Stabilization projects on islands include Seven Mile Island on Pickwick Reservoir; Bucky’s Island on Boone; Patterson Island on Kentucky; Leuty, Huffine, Jackson Branch, Sand, and Gordon Branch Islands on Watts Bar; and Skull Island and Hiwassee Islands on Chickamauga. Under the preferred NRP alternative, TVA plans to stabilize about 3 miles of shoreline per year, and part of this will likely be island shorelines.

214. TVA's shoreline stabilization efforts and outreach efforts should emphasize biostabilization. This technique is often as effective, has lower costs, and is a more environmentally friendly solution for streambank stabilization and restoration. (*Commenter: Deb O'Dell*)

Response: Stream restoration work performed by TVA when implementing the NRP would use the principles of natural stream channel design and biostabilization techniques when possible. The text of final EIS Section 2.5.6 has been revised to clarify this.

2.20.5. Strategic Partnership Planning

215. Regarding Strategic Partnership Planning: TVA continues to be a valuable partner when managing the resources of North Georgia. We hope that our partnership will continue or expand. (*Commenter: Dan Forster - GDNR*)

Response: TVA recognizes that working with partners and stakeholders is the most effective and sustainable approach to managing natural resources across the Tennessee Valley. This is why TVA has included the Strategic Partnership Planning program as a major component of the NRP water resource management activities. The program focuses on building strong partnerships with state, regional, and national organizations to address stewardship issues of mutual importance. This includes maintaining and exploring new opportunities for collaboration with partners in North Georgia and other states in the Valley.

216. Strategic partnership planning should be one of the highest priority water resource programs given its potential for increasing holistic watershed management. I urge you to implement it at the advanced flagship level. (*Commenter: Tom Littlepage*)

Response: TVA recognizes that working with partners and stakeholders is the most effective and sustainable approach to managing natural resources across the Tennessee Valley. This is why TVA developed a Strategic Partnership Planning program as a major component of the water resource programs and proposes to implement it under the preferred alternative The program focuses on building strong partnerships with state, regional, and national organizations to address stewardship issues of mutual importance. This includes maintaining and exploring new opportunities for collaboration with partners in North Georgia and other states in the Valley.

217. The TVA support for local watershed groups has been critical for their success in addressing water quality issues. TVA should continue to provide staff support and funding to leverage other funds and support. (*Commenters: Carol A. Doss - UPRR/KSWVB, Sarah Ketron - BWP*)

Response: Over the past two decades, TVA has worked to protect and improve water quality through implementing watershed initiatives. These efforts focused on working with federal, state, and local agencies and organizations to identify and quantify water quality problems, then working collaboratively with the partner to develop plans that target improvement actions. In addition to providing technical expertise, the TVA provided support in leveraging funds, building partnerships/coalitions, and promoting outreach efforts for water quality improvement. These watershed initiatives have been successful because of partnerships and TVA recognizes that working with partners and stakeholders is the most effective and sustainable approach to managing natural resources across the Tennessee Valley. TVA proposes to continue these efforts through the Strategic Partnerships Planning program included in Alternatives B, C, and D, and expand them under Alternatives C and D. Additional information on this program is available in final EIS Section 2.5.2.

2.20.6. Water Resource Improvement Tools

218. DEIS Section 2.4.5, Water Resource Improvement Tools, lists a Stream and Riparian Management and Restoration Program. We recommend the use of natural stream channel design when possible for stream restorations. We also recommend that TVA provide additional details on the stream restoration methodologies that would be used under this program. (*Commenter: Heinz J. Mueller - USEPA*)

Response: Comment noted. Stream restoration work performed by TVA would use the principles of natural stream channel design when possible. Final EIS Section 2.5.3 has been revised to clarify this. Final EIS Section 2.5.6 describes stream restoration methodologies.

219. The description of the Water Pollutant Trading program in DEIS Section 2.4.5 states “Regulatory processes that allow Trading would be present in the watershed, and stakeholders

would be involved in developing the Trading mechanisms." Please provide more details on water pollutant trading opportunities in the Tennessee Valley. (*Commenter: Heinz J. Mueller - USEPA*)

Response: Such a program does not yet exist in the Tennessee Valley. Water quality pollutant trading can be an effective tool for reducing point-source pollutant loads at a lower cost by achieving those reductions from non-point sources within the same watershed (with appropriate pollutant reduction credit ratios). Although both a regulatory requirement (such as a point-source permit limit that would require substantial wastewater treatment costs) and a regulatory allowance for trading (trading rules) normally would need to be present to support a trade, this tool also could be used, with a proper funding stimulus (such as "credit banking"), to achieve non-regulatory pollutant load reductions. From a regulatory perspective, promulgation of new or more stringent water quality criteria and/or a regulatory requirement to reduce pollutant loading from a water body could increase opportunities for pollutant trading as a tool.

220. We applaud the inclusion of the Urban Storm Water Assistance program. Choosing effective stormwater BMPs is a key challenge facing anyone interested in improving the quality of our rivers, lakes, and coastal waters. We encourage TVA to visit the EPA Urban BMP Performance website at http://cfpub.epa.gov/npdes/stormwater/urbanbmp/bmpeffectiveness.cfm for additional BMPs that could be considered for implementation. (*Commenter: Heinz J. Mueller - USEPA*)

Response: Comment noted. TVA recognizes the use of proper storm water management practices is a critical component in protecting and improving water resources in the Tennessee Valley, including lands owned and managed by TVA. These practices are included in the NRP as tools that could be used in implementation of TVA's water resource programs. Final EIS Section 2.5.6 describes these tools. TVA has found EPA's Urban BMP Performance website to be a valuable resource and intends to continue consulting it as the NRP is implemented.

2.20.7. Water Resources Improvement Programs

221. How will the various amounts of sediment and phosphorus reductions proposed under the different alternatives be measured? (*Commenter: Ron Fugatt - NU*)

Response: Phosphorus and sediment reductions targets in the Natural Resource Plan are estimates from simple models (see Appendix I) for evaluating relative impacts of the different alternatives. For implementation of the plan, load reductions will be estimated based on modeling and/or monitoring as appropriate.

222. It appears from the program description in DEIS Appendix H that programs listed to reduce suspended sediment and phosphorus have set goals under the "no-action" alternative and that these goals would be eliminated under the preferred alternative. Please clarify this. (*Commenter: Heinz J. Mueller - USEPA*)

Response: A new program, the Nutrient Source-Watershed Identification and Improvement Program, has been added to the Natural Resource Plan that would achieve the phosphorus and sediment reductions under the preferred alternative. See FEIS Section 2.5.4 for a description of this program.

223. The listing of water resources improvement programs contains many promising ideas, but most are only included in Alternative C. We suggest that TVA include more of them in Alternative D. (*Commenter: Dan Forster - GDNR*)

Response: The Water Resources Improvement Programs category has been revised to include several new and combined programs that are included in Alternative D (Preferred Alternative).

224. The most important part of Water Resource Management should be to cleanup small streams flowing into the TVA system. This will require the Flagship option and TVA, the states, and volunteer organizations working together and having the resources and leadership to do it properly. This area could benefit from TVA establishing an independent Foundation and Trust Fund to provide stream cleanup funds. (*Commenter: Sandra Goss - TCWP*)

Response: Comment noted. The NRP includes a Strategic Partnership Planning program that would be implemented under the preferred alternative at the Flagship level. This program would develop regional collaborative projects to improve water quality in the Tennessee River watershed, provide technical assistance through enhanced data collection and sharing opportunities, build relationships with key contacts at agencies and organizations throughout the Valley, and network with current and prospective financial contributors to enhance TVA's ability to secure external funding. The funding of stream cleanup efforts could be brought to the attention of the Foundation and Trust Fund, depending on how the Fund is implemented.

PART 3

INDEX TO COMMENTERS

Following is a list of the commenters, their affiliations, and the identification numbers of their comments.

A

Adams, Jim, North Carolina Division of Environmental Health (NCDEH) 160
Allen, Bo, Memphis, TN 193
Allen, Louis F., Memphis, TN 193, 194, 200
Alvarez, Robert, Germantown, TN 194, 200
Andrews, Virgil Lee Jr., U.S. Fish and Wildlife Service (USFWS), Frankfort, KY 103, 104
Aslinger, Tom, Bartlett/TVA, Sale Creek, TN 213

B

Baber, Rodney, Memphis, TN 193
Blackwell, Steve and Debbie 193, 194, 200
Bourland, David L., Memphis, TN 193, 194, 200
Bourland, Donald E., Collierville, TN 193, 194, 200
Boyer, Edward, Germantown, TN 194, 200
Braff, Douglas, Locust Valley, NY 193, 194, 200
Brown, Claudia, North Carolina State Historic Preservation Office (NCSHPO), Raleigh, NC 56
Brown, Keith, Memphis, TN 193, 200

C

Campen, Mark, Knoxville, TN 1, 35, 38, 39, 83, 95, 115, 146, 155, 201
Casey, Linda S., Alabama Forestry Commission (AFC), Montgomery, AL 5, 120, 127
Cobb, Andy and Pam 193
Concerned Citizen, TN 117
Cowan,William 193, 194, 200

D

Dale, Virginia, Advocates for the Oak Ridge Reservation (AFORR)/Tennessee Citizens for Wilderness Planning (TCWP), Oak Ridge, TN 29, 47, 198
Dale, Wood, Glendora, MS 193, 194, 200
Dalton, Frank, Corinth, MS 193, 194, 200
Dalton, Kathleen, Corinth, MS 193, 194, 200
Dalton, Martha Frances 193, 194, 200
Davis, Amin, North Carolina Department of Environment and Natural Resources (NCDENR), Raleigh, NC 154, 161
Davis, Frank, Corinth, MS 193, 194, 200
Davis, Paul E., Tennessee Department of Environment and Conservation (TDEC), Nashville, TN 203, 204, 205
Davis, III, Hugh L., Jackson, MS 93, 194
Delich, David, PSCA, Arlington, TN 193, 194, 200
Denton, Gus, Memphis, TN 193, 194, 200
Donnelly, Lloyd J., Watershed Association of Tellico Reservoir (WATR), Loudon, TN 132

Doss, Carol A., Upper Tennessee River Roundtable (UPRR)/Keep Southwest Virginia Beautiful (KSWVB), Abingdon, VA 217
Dott, Jr., Donald S., Kentucky State Nature Preserves Commission (KNPC), Frankfort, KY 15, 16
Doyle, Bonnie 193, 194

E

Edelen, Dena, Memphis, TN 193, 194, 200
Elmore, Jean, Tupelo, MS 83, 140
Ewing, Amy, Virginia Department of Game and Inland Fisheries (VDGIF), Richmond, VA 7, 42, 43, 127, 189

F

Farnsworth, Thomas, Memphis, TN 193, 194, 200
Feeman, Joe, Norris, TN 17, 18, 21, 22, 45, 46, 83, 113, 120, 138, 143, 148, 150, 171, 175, 179, 194, 207, 212
Field, Robert, Germantown, TN 193, 194, 200
Forster - GDNR, Dan, Georgia Department of Natural Resources-Wildlife Resources Division (GDNR), Social Circle, GA 10, 26, 60, 61, 62, 79, 153, 180, 183, 191, 202, 208, 215, 223
Frere, Ronald E. 152
Fugatt, Ron, Newport Utilities (NU), Newport, TN 33, 49, 54, 130, 139, 140, 169, 187, 199, 221

G

Goss - TCWP, Sandra, Tennessee Citizens for Wilderness Planning (TCWP), Knoxville, TN 6, 20, 24, 25, 32, 36, 41, 83, 91, 94, 118, 124, 165, 170, 178, 184, 192, 200, 224

H

Haaga, Marietta, Memphis, TN 164, 193, 194, 200
Habenicht, Glenn W., Cordova, TN 193, 194, 200
Hamilton, Betsey, New Albany, MS 193, 194, 200
Hammond, Josh, Memphis, TN 193
Hayes, Tim, Counce, TN 193, 194, 200
Heflin, John and Mary Ben, Memphis, TN 164, 193, 194, 200
Heflin, Rob, Tuscaloosa, AL 193, 194, 200
Henicheck, Michelle, Virginia Department of Environmental Quality - Division of Water (VDEQ) Quality, Richmond, VA 162
Herald, Glen, Collierville, TN 193, 194, 200
Hester, Martha, Germantown, TN 193, 194, 200
Hollis, Jeanne, Memphis, TN 193, 194, 200
Howe, Tyler B., Eastern Band of Cherokee Indians (EBCI), Cherokee, NC 53, 55
Hoyos, Renee, Tennessee Clean Water Network (TCWN) 83, 186, 206
Huie, Martha H., Memphis, TN 193, 194, 200
Hunt, Ann Day, Birmingham, AL 193, 194, 200

I

Irons, Ellie L., Virginia Department of Environmental Quality - Office of Environmental Impact Review (VDEQ), Richmond, VA 13
Iverson, Mark, Bowling Green Municipal Utilities (BGMU), Bowling Green, KY 83, 210

J

Johnston, Bill and Pat 193
Johnston, Will, Nashville, TN 193, 194, 200
Jones, John Marshall, Memphis, TN 193, 194, 200
Jones, Kenneth P., Memphis, TN 193, 194, 200
Jones, Mitch, Tennessee Marina Association (TMA) 140, 166, 172, 173, 185
Jones, Scott, U.S. Army Corps of Engineers, Asheville Regulatory Field Office (USACE), Asheville, NC 163

K

Kennedy, Avis, Regional Resource Stewardship Council (RRSC), Nashville, TN 72, 73, 83, 86, 111, 112, 116, 146, 174, 182, 190
Ketron, Sarah, Boone Watershed Partnership, Inc. (BWP), Johnson City, TN 217
Kline, Keith L., Oak Ridge, TN 29, 164
Kruger, M., Memphis Aviation Services (MAS), Collierville, TN 193, 194, 200

L

Lendrum, Jamie 193, 194, 200
Lichterman, John, Memphis, TN 193
Liddon, Rob, Baker Donelson Bearman Caldwell and Berkowitz (BDBCB), Memphis, TN 193, 194, 200
Liddon, Robert, Memphis, TN 193, 194, 200
Littlepage, Tom, AL 52, 69, 83, 165, 216
Lloyd, Jeremy, Walland, TN 5
Long, Ben, Corinth, MS 193, 194, 200

M

Magill, H. Lynn, Germantown, TN 193, 194, 200
Magill, Nancy 193, 194, 200
Mallory, Margaret, Memphis, TN 193, 194, 200
Marascuilo, Vincent and Marsha, Williston, TN 193
Marlar, Vic, Corinth, MS 193
Matney, John 211
Matthews, Paul A., Memphis, TN 193, 194, 200
Maury II, William P., Memphis, TN 193, 194, 200
McCulloch, Tom, Advisory Council on Historic Preservation (ACHP), Washington, DC 50, 51, 102
McHenry, Dave, North Carolina Wildlife Resources Commission (NCWRC), Raleigh, NC 23, 27, 188
Melvin, Joan and Sarah, Memphis, TN 193, 194, 200
Minor, Lancelot, Memphis, TN 193, 194, 200
Mueller, Heinz J., Environmental Protection Agency (USEPA), Atlanta, GA 8, 12, 44, 47, 58, 63, 64, 65, 66, 67, 70, 75, 76, 77, 97, 98, 99, 100, 106, 125, 130, 153, 176, 177, 218, 219, 219, 220, 222
Mullins, Kimbrough, Memphis, TN 193, 194, 200

N

Naegeli, Wolf, Foundation for Global Sustainability (FGS), Knoxville, TN 2, 3, 4, 141, 149, 156

Necessary, Donald, Virginia Department of Transportation (VDOT), Bristol, VA 157, 159
Nenon, Carroll 193
Netherly, Charles, Olive Branch, MS 193, 194, 200
Noel, Lissa, Memphis, TN 193, 194, 200
Nolan, Larry, Iuka, MS 193, 194, 200

O

O'Dell, Deb, Knoxville, TN 6, 168, 214

P

Palmer, Marvin, Memphis, TN 193, 194, 200
Peatross, Scott B., Memphis, TN 193, 194, 200
Phillipy, Anne, Yellow Creek, TN 193
Pinstein, Robert J., Memphis, TN 193, 194, 200
Preston, Richard, Tennessee Ornithological Society (TOS), Munford, TN 1, 35, 38, 39, 83, 95, 142, 146, 155, 200

R

Reddoch, Bill, Germantown, TN 193, 194, 200
Reddoch, Diane, Memphis, TN 193, 199
Reddoch, Michael, Memphis, TN 121, 193, 194, 200
Reynolds, Donald, AL 196
Rhur, Roberta Virginia Department of Conservation and Recreation (VDCR), Richmond, VA 31, 40, 105, 107, 178, 181
Riecke, Dennis, Mississippi Department of Wildlife (MDW), Fisheries, and Park, Jackson, MS 9
Ringe, Axel C., Sierra Club-Tennessee Chapter (SC), New Market, TN 1, 11, 14, 83, 84, 95, 114, 128
Rogers, King W., Memphis, TN 193, 194, 200
Rudolph, David M., Memphis, TN 193, 194, 200

S

Schwarzbart, Mary Linda, Knoxville, TN 5
Shawkey, J. Tyler, Memphis, TN 193, 194, 200
Sloan, Crystal, EagleRidge Technologies, Inc. (ET), Rockwood, TN 5
Sloan, Paul, Tennessee Department of Environment and Conservation (TDEC), Nashville, TN 83, 108, 109, 110, 119, 126, 133, 134, 135, 136, 137, 145, 146, 147, 153, 167, 199, 200
Slone, Tim K., Caryville, TN 151
Smith, Louis, TN 122, 123
Smith, William, Collierville, TN 193, 194, 200
Snow, Patrick D., Bartlett, TN 193, 194, 200
Stanley, Joyce, U.S. Department of Interior (USDOI), Atlanta, GA 1, 5, 37, 57, 59, 68, 74, 78, 80, 81, 82, 84, 85, 87, 88, 89, 90, 92, 95, 96, 101, 129, 195, 209
Stanley, Michael 193, 194, 200
Sweat, Richard, Germantown, TN 193, 200

T

Thornton, Matthew, Memphis, TN 194, 200
Townsend, Russell, Eastern Band Cherokee Indians (EBCI), Cherokee, NC 48, 53

Turner, Zoe, Knoxville, TN 28, 29, 30, 34, 71, 115, 158

V

Varhola, Matthias, Sevierville, TN 1
Vigander, Dagny, Norris, TN 19, 83

W

Whitehead, Wayne, French Broad Preservation Association (FBPA), Knoxville, TN 5
Whitten, Sherry, Iuka, MS 193, 194, 200
Wilfong, Catherine, Memphis, TN 193, 194, 200
Williams, Bailey 193, 200
Williams, Darrell, Memphis, TN 164, 193, 194, 197, 200
Williams, David, Cordova, TN 193, 194, 200
Williams, Gloria 193, 200
Williams, Jennifer, Washington, DC 193, 194, 200
Williams, Nora, Ridgewood, NJ 193, 194, 200
Wilson, Drew, Memphis, TN 192, 194, 200
Woolley, Deborah, Tennessee Chamber of Commerce and Industry (TCCI) 140, 144

Y

Young, Edwin J., Loudon, TN 131
Youngblood, Gina M., Memphis, TN 194, 200

PART 4

COMMENT LETTERS FROM FEDERAL AND STATE AGENCIES AND FEDERALLY RECOGNIZED INDIAN TRIBES

Comment Letters from Federal Agencies

Rec'd 4/27/11

DEPARTMENT OF THE ARMY
WILMINGTON DISTRICT, CORPS OF ENGINEERS
151 PATTON AVENUE
ROOM 208
ASHEVILLE, NORTH CAROLINA 28801-5006

REPLY TO
ATTENTION OF

April 25, 2011

Regulatory Division

Action ID Number: SAW-2011-00772

Charles P. Nicholson
NEPA Compliance Manager
Tennessee Valley Authority
400 West Summit Hill Drive, WT 11D
Knoxville, Tennessee 37902

Dear Mr. Nicholson:

Reference is made to the request for comments regarding the Tennessee Valley Authority's (TVA) Natural Resource Plan (NRP) and Draft Environmental Impact Statement (EIS) dated March 23, 2011. We have reviewed both documents and have provided general comments below.

Wilmington District's Regulatory boundary encompasses North Carolina which includes three TVA reservoirs and their surrounding managed lands: Chatuge Lake, Fontana Lake, and Hiwassee Lake. These lakes along with jurisdictional streams and wetlands adjacent to the reservoirs and in the surrounding managed lands are all subject to Section 404 of the Clean Water Act and in the case of Fontana Lake subject to Section 10 of the Rivers and Harbors Act. Activities in these regulated aquatic resources that result in the discharge of dredged and/or fill material may require a Department of the Army (DA) permit. Based upon a review of your Natural Resource Plan, there appears to be some planned recreational and watershed resource improvements that may result in a discharge of fill material into regulated waters. Some examples include shoreline stabilization activities, construction of boat docks/marinas, trail construction, new access roads, and stream and wetland restoration/enhancement activities. The type of DA authorization required (i.e., general or individual permit) will be determined by the location, type, and extent of jurisdictional area impacted by the project, and by the project design and construction limits.

We realize that the implementation of these planned activities are dependent upon many factors and are preliminary in nature. Our main concern is to make your agency aware of potential permitting requirements for work within jurisdictional waters and wetlands within TVA reservoirs and surrounding managed lands. As projects arise, we suggest that you contact our

office to coordinate any potential DA permits that may be needed. Should you have any further questions related to DA permits, please contact me at 828-271-7980, extension 222. You may also visit our website at the following link, http://www.saw.usace.army.mil/wetlands/index.html for more information on our regulatory program.

Sincerely,

Scott Jones, PWS
Chief, Asheville Regulatory Field Office

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Kentucky Ecological Services Field Office
330 West Broadway, Suite 265
Frankfort, Kentucky 40601
(502) 695-0468

Rec'd 5/9/11

May 2, 2011

Mr. Charles P. Nicholson
NEPA Compliance Manager
Tennessee Valley Authority
400 West Summit Hill Drive, WT 11D
Knoxville, Tennessee 37902

Re: FWS 2011-B-0463; Tennessee Valley Authority (TVA), Natural Resource Plan (NRP), for TVA Natural Resources Management Activities within the State of Kentucky

Dear Mr. Nicholson:

The U.S. Fish and Wildlife Service (Service) Kentucky Field Office has reviewed TVA's draft NRP and the associated draft Environmental Impact Statement pursuant to your March 23, 2011 request. The Service offers the following comments in accordance with the Endangered Species Act (ESA) of 1973 (87 Stat. 884, as amended; 16 U.S.C. 1531 *et seq.*), the Migratory Bird Treaty Act (MBTA) (40 Stat. 775, as amended; 16 U.S.C. 703 *et seq.*), and the Bald and Golden Eagle Protection Act (BGEPA) (54 Stat. 250, as amended, 16 U.S.C. 668a-d). Please note that these comments only apply to TVA activities that would occur within the State of Kentucky. Please contact the Service's Tennessee, Alabama, Georgia, North Carolina, and Virginia Field Offices for their comments regarding activities, associated with the NRP, which would occur in their respective States.

Endangered Species Act

TVA's managed lands within the State of Kentucky are confined to the following counties: Calloway, Graves, Lyon, Livingston, Marshall, McCracken, and Trigg Counties. In order to assist you in determining if the proposed activities, associated with the NRP, have the potential to impact protected species we have searched our records for occurrences of listed species within the above-listed Counties. Based upon the information provided to us and according to our databases, we believe that the following federally listed species have the potential to occur within or within the vicinity of proposed activities that are associated with the NRP.

Common Name	Scientific Name	Federal Status
Indiana bat	*Myotis sodalis*	endangered
gray bat	*Myotis grisecens*	endangered
Price's potato-bean	*Apios priceana*	threatened
Interior least tern	*Sterna antillarum athalassos*	endangered

relict darter	*Etheostoma chienense*	endangered
clubshell	*Pleurobema clava*	endangered
fanshell	*Cyprogenia stegaria*	endangered
fat pocketbook	*Potamilus capax*	endangered
orangefoot pimpleback	*Plethobasus cooperianus*	endangered
pink mucket	*Lampsilis abrupta*	endangered
rabbitsfoot	*Quadrula cylindrica*	candidate
ring pink	*Obovaria retusa*	endangered
rough pigtoe	*Pleurobema plenum*	endangered
sheepnose	*Plethobasus cyphyus*	candidate

We must advise you that collection records available to the Service may not be all-inclusive. Our database is a compilation of collection records made available by various individuals and resource agencies. This information is seldom based on comprehensive surveys of all potential habitats and thus does not necessarily provide conclusive evidence that protected species are present or absent at a specific locality.

In general, projects involving tree removal, ground disturbing activities, stream bank disturbances, stream channel disturbances, alteration of stream flow, or discharges have the potential to alter habitat that coincides with the habitat that is required for the above-listed species. Therefore, we recommend submitting projects, associated with the NRP, which would involve any of these activities to our office for project-specific consultations. This would ensure that the projects would be in full compliance with the ESA.

Bald and Golden Eagle Protection Act

Several records for bald eagle (*Haliaeetus leucocephalus*) nest sites exist within the Kentucky counties in which TVA operates. Although the bald eagle has been removed from the List of Endangered and Threatened Species, it continues to be protected under the MBTA and the BGEPA.

The Service developed the National Bald Eagle Management (NBEM) Guidelines to provide landowners, land managers, and others with information and recommendations to minimize potential project impacts to bald eagles, particularly where such impacts may constitute "disturbance," which is prohibited by the BGEPA. A copy of the NBEM Guidelines is available at: http://www.fws.gov/migratortbirds/BaldEagle.htm. Those guidelines recommend: (1) maintaining a specified distance between the activity and the nest (buffer area); (2) maintaining natural areas (preferably forested) between the activity and nest trees (landscape buffers); (3) avoiding certain activities during the breeding season; and, (4) informing on-site personnel of the possible presence of nesting bald eagles within the project boundary, and identifying, avoiding, and immediately reporting any such nests to this office.

A 1,500 foot radius around the proposed project area should be surveyed for the presence of bald eagle nests. If a bald eagle nest is discovered within 1,500 feet of a proposed project area, then the NBEM Guidelines should be followed to determine whether the project is likely to disturb nesting bald eagles.

Thank you again for your request. Your concern for the protection of endangered and threatened species is greatly appreciated. If you have any questions, please contact Jim Gruhala of my staff at (502) 695-0468 extension 116.

Sincerely,

Virgil Lee Andrews, Jr.
Field Supervisor

Advisory Council on Historic Preservation

From: Tom McCulloch [mailto:tmcculloch@achp.gov]
Sent: Wednesday, May 11, 2011 12:40 PM
To: Pritchard, Erin E
Subject: RE: TVA Programmatic Agreement

I've looked over the NPR document, and have only a couple of comments.

First, it all looks very comprehensive, but still uses soft language throughout when it discusses what TVA will do, giving the impression that stuff may or may not get done or get implemented. For example, on page 26 and other places is a lot of "TVA proposes" to do this, TVA "is considering" doing that. In part 5.9 again is a lot of TVA "would" do this and that. Throughout, this should be changed to the active voice of "TVA will" or "TVA intends to ..."

Second, in the discussion below Table 2-6, is there a need also to develop plans for late or inadvertent discoveries in addition to for emergencies? The final activity on this chart is "Develop PAs with individual states for compliance with repetitive actions. This is a good idea, and some may be applicable to more than individual states. We have been compiling lists of repetitive actions that generally have no potential to cause effects to historic properties that I can send to you if you decide to go forward on this activity.

What is the timetable for selecting an alternative?

I'll have comments on the PA later this week. tom

United States Department of the Interior

OFFICE OF THE SECRETARY
Office of Environmental Policy and Compliance
Richard B. Russell Federal Building
75 Spring Street, S.W.
Atlanta, Georgia 30303

11/308
9043.1

May 9, 2011

Charles P. Nicholson
NEPA Compliance Manager
Tennessee Valley Authority
400 West Summit Hill Drive, WT 11D
Knoxville, TN 37902

Re: Comments and Recommendations on the Draft Programmatic Environmental Impact Statement (DPEIS) for the Tennessee Valley Authority Natural Resources Plan (NRP)

Dear Mr. Nicholson:

The United States Department of the Interior (Department) have reviewed the Draft Programmatic Environmental Impact Statement for the Tennessee Valley Authority Natural Resources Plan (NRP)

According to the document, the geographical scope for biological and cultural resource management has been limited to current reservoir lands, and active and former fossil and nuclear properties. However, the geographical scope for the water resource management component of the NRP includes the entire Tennessee River watershed because of the programs associated with improving watershed water quality.

Consequently, we found that several federally listed species occurring in Mississippi, within the Tennessee River watershed, had been omitted from Appendix K – Listed Species and Sensitive Ecosystems within the TVA Region: Table K-4.

They are as follows:

Mitchell's satyr butterfly	*Neonympha mitchellii mitchellii*	E
Price's potato bean	*Apios priceana*	T
Cumberlandian combshell	*Epioblasma brevidens*	ECH
Rabbitsfoot mussel	*Quadrula cylindrica cylindrica*	C
Slabside Pearlymussel	*Lexingonia dolabelloides*	C
Bald eagle	*Haliaeetus leucocephalus*	BGPA, MBTA

E-endangered, CH-critical habitat designated, T-threatened, C-candidate, BGPA-Bald and Golden Eagle Protection Act, MBTA-Migratory Bird Treaty Act

Each of these species can be greatly affected by the degradation as well as the improvement of water quality. Therefore, we believe it is appropriate to consider these species within the application of any water management activities, as well as all land based resource management.

These comments pertain only to those TVA management areas located in Mississippi. For further information or coordination, please contact Kathy Lunceford on (601) 218-4298.

Additionally, in accordance with the Endangered Species Act (ESA) of 1973 (87 Stat. 884, as amended; 16U.S.C. 1531 *et seq.),* the following comments apply to the portion of the project located in Kentucky and do not consider the potential impacts to federally listed species occurring in other states within the study area. The Department is also including several general comments regarding additional information that should be included in the DEIS, that is not specific to Kentucky.

Federally Listed Species: TVA has stated in the DEIS that TVA's actions will not harm any species listed as threatened or endangered and will not adversely modify critical habitat. This applies to all actions authorized, funded, or carried out by TVA. If an action has the potential to affect listed species or their habitats, TVA must consult with the Department. Therefore, the Department believes that any management actions proposed under the preferred alternative (Blended Management-Alternative D) will be evaluated under Section 7 of the ESA and should not result in any long-term adverse effects to federally protected species or designated critical habitat and may lead to long-term beneficial effects for many species.

General Comments: The Department does recommend that TVA include additional information in the Threatened and Endangered Species section of the DEIS (Section 4.7) under the Trends of Listed Terrestrial Animals sub-heading (pg. 166) related to White-nose Syndrome (WNS). White-nose Syndrome has been shown to cause significant mortality in several species of bat, including the Indiana bat, and may have significant impacts to bat populations within the TVA region. The DEIS should document that WNS has been confirmed by the Department in four states that occur within the TVA Region (Tennessee, Virginia, North Carolina, and most recently, Kentucky).

The DEIS also states that bald eagles and gray bats appear to have increasing and stable numbers. While the Department does not dispute this statement, we do believe that TVA should include a citation/source that validates this information. Questions concerning these comments should be directed to Carrie Allison at (502) 695-0468.

Furthermore, the TVA Region (TVA's power service area) comprises 202 counties and approximately 59 million acres. The NRP and DPEIS describe how TVA will manage its natural resources over the next 20 years on 293,000 acres of lands adjacent to reservoirs, active and former fossil and nuclear properties, and the Raccoon Mountain Pumped Storage Plant and Buffalo Mountain Wind Power Project sites. This 458 square-mile area encompasses parts of seven states, including Tennessee, Alabama, Georgia, Kentucky, Mississippi, North Carolina and Virginia. The NRP would be implemented at TVA's fossil and nuclear properties and at Raccoon Mountain and Buffalo Mountain as interim and/or secondary management teclmiques, as appropriate. The NRP addresses the planning processes and TVA's Environmental Policy

(approved May 2008) objectives related to water resources protection and improvement, sustainable land use, and natural resources management. The DPEIS examines potential impacts associated with implementing the NRP proposed for these resources and reasonable alternative management strategies, including a no action alternative and three action alternatives.

Under Alternative A - No Action Alternative, TVA would continue to implement its existing stewardship programs and tools, aligning with existing policies and strategies, and continue to apply the existing methodology when planning lands along TVA reservoirs; this alternative would emphasize regulatory technical requirements assessments of TVA-managed resources and partnerships, and capital projects associated with TVA-managed recreational facilities. Under the three action alternatives (alternatives B, C, and D), TVA would alter its management approach to reflect the implementation of varying levels of activities across numerous stewardship programs. Under Alternative B – Custodial Management, specific programs that address safety and compliance with TVA's mission, applicable laws, regulations, and EOs and policies would be implemented; as laws, regulations, policies and EOs are created or amended, implementation activities would be revised to reflect this. In those areas in which TVA would discontinue programs or projects, existing contractual agreements relating to those programs or projects would be honored. Under Alternative C – Flagship Management, TVA would explore, pilot, test, and implement new strategies for enhancing stewardship programs and developed recreational facilities while emphasizing sustainable technologies; similarly, activities or projects that address safety and compliance with TVA's mission and applicable laws, regulations, policies, and EOs would be implemented. Under the preferred alternative, Alternative D - Blended Management, key programs have been identified that are integral toward enhancing future implementation efforts while maintaining activities and projects that address safety and comply with TVA's mission and applicable laws regulations, policies and executive orders (EOs); this alternative takes into account the interconnectivity of each resource area and their supporting programs, helping to establish a foundation by which TVA may implement greater levels of programs in the future.

Under each of the above described alternatives, TVA would continue to conduct environmental reviews to address site-specific issues prior to the approval of any proposed activity on lands under TVA's control. Future activities and land uses would continue to be guided by the TVA Land Policy and other relevant policies. In its reservoir lands planning activities, the allocation of uses on TVA property is not intended to supersede deeded land rights that may be held by others.

TVA indicated in the DPEIS that no federally listed aquatic species are known to occur on lands that would be directly managed by TVA as part of the NRP. However, they do recognize that federally listed aquatic species do occur throughout the TVA region, including 51 species within the state of Tennessee (one insect, 37 mollusks, and 13 fish). They have further identified five federally listed, protected, or candidate terrestrial animal species as potentially occurring on TVA-managed lands and 44 federally listed as endangered or threatened plant species occurring throughout the seven-state TVA Region. We found it confusing that TVA interchangeably discusses certain taxonomic groups within the entire TVA Region and others only on the 293,000 acres of managed lands (Section 4.7 Endangered and Threatened Species and Appendix K in the DPEIS). It is also confusing that some taxonomic groups, included in the DPEIS, contain not only listed species, but also federally protected (i.e., bald eagle *(Haliaeetus*

leucocephalus]) and candidate species. We recommend that federally listed aquatic species and plant species occurring in the TVA Region (included in tables K-9 and K-12 of the DPEIS) be listed by TVA- managed lands or reservoirs (if this is the proposed action area or otherwise better define the action area and listed species clearly linked to the action area). We further recommend that federally listed aquatic, terrestrial, and plant species tables (K-9, K-10, and K-12) be identified by individual state occurrences for those areas where the proposed action would take place. We also noted that the federal status of the spectaclecase *(Cumberland monodonta),* sheepnose *(Plethobasus cyphyus),* and rayed bean *(Villosa fabalis)* have been included in Table K-8 as candidate species. This is incorrect; the status of these three species has recently been revised to "proposed endangered". In addition, the snuffbox *(Epioblasma triquetra),* another species with a recent change in status to "proposed endangered", should be included in Table K-8 because it also occurs in the Tennessee River watershed within the TVA Region.

In general, we feel that the geographic scope of the proposed NRP is a much greater area than the 293,000 acres described by TVA and that additional federally listed species, which could be potentially affected by TVA's actions, need to be included in Appendix K. We believe that effects to listed species would extend and include additional areas within the TVA Region and feel that TVA has not adequately justified why additional areas have been excluded. We recommend that TVA coordinate closely with the seven individual ESOs to identify and update the listed species tables included in Appendix K.

TVA determined under 5.8.1 Aquatic Species (pages 241-242) and 5.8.2 Terrestrial Species (pages 243-244) in the DPEIS that short-term direct and indirect adverse impacts may occur as a result of the implementation of specific projects under any one of the alternatives and that any direct, indirect, or cumulative impacts to listed aquatic and terrestrial species would be assessed, avoided, and/or minimized via existing regulatory mechanisms (particularly the Endangered Species Act [ESA] and National Environmental Policy Act). They indicate that only beneficial long-term changes to aquatic resources and benefits to terrestrial species and their habitats, including listed species, are anticipated from TVA's proposed resource management and stewardship activities and that adoption of any of the four alternatives would not result in direct, indirect, or cumulative adverse impacts to federally listed species or their habitats. We find the above determinations to be confounding and inconsistent. TVA indicates that short-term direct and indirect impacts "may occur" under any of the alternatives, but only "beneficial" long-term changes are anticipated and that adoption of any of the alternatives "would not" result in direct, indirect, or cumulative impacts.

An assessment of potential impacts from each alternative was not included in the DPEIS under 5.8.3 Plants (pages 244-245) as it was under 5.8.1 Aquatic Species and 5.8.2 Terrestrial Species. However, TVA has indicated under 5.8.3 that direct and indirect impacts would be anticipated to listed plant communities from the introduction and spread of nonnative invasive plant (NNIP) species, including indirect impacts to the federally listed as endangered Ruth's golden aster *(Pityopsis ruthii)* from the spread of NNIPs and woody vegetation on the Hiwassee and Ocoee rivers. TVA further indicated that cumulative impacts to listed plant species may be expected from rare plant habitat destruction as a result of increased commercial and residential development in the TVA region. We suggest that TVA be consistent and include an assessment of potential impacts to listed plants from each alternative in the same manner that they addressed aquatic and terrestrial species.

We understand that it is not possible for TVA to initiate ESA consultation on the NRP, as site-specific activities have not yet been identified. However, TVA should include a description of planning, review, and the ESA compliance process to be completed for future programs and activities.

TVA stated in the DPEIS that palustrine wetlands are the predominant wetlands in the TVA Region and that approximately 90 percent of the wetlands on TVA-managed lands are located on mainstem Tennessee River reservoirs. In Section 5.5 Wetlands of the DPEIS (pages 227-229), TVA has indicated that there would be no significant direct wetland impacts under Alternative A and that TVA would continue to comply with state and federal wetland protection regulations and EO 11990 through its environmental review process. If direct wetlands impacts are unavoidable, impacts would be assessed and mitigated via existing regulatory mechanisms. Indirect and cumulative adverse effects on wetlands under Alternative A would be related to the indirect effect of increased demand for shoreline access and regional growth. TVA determined that wetland impacts under Alternative B would be similar to those under Alternative A. TVA describes implementation of Alternative C as a positive effect on wetlands on TVA-managed lands, and indicated that no direct or indirect adverse wetlands impacts would result from this alternative. TVA would continue to comply with federal wetland protection regulations and EO 11990 through its environmental review process. TVA determined that cumulative impacts under Alternative C would have a long-term, moderate, beneficial cumulative effect on wetlands due to wetland identification, protection, and restoration efforts and that regionally, cumulative adverse effects on wetlands would be related to the indirect effect of increased demand for shoreline access and regional growth. Under Alternative D, TVA would mix portions of the programs and policies included in alternatives B and C. TVA indicated that direct, indirect, and cumulative impacts on wetlands would be similar to those under Alternative C and that as strategic partnerships and resources become available, TVA would enhance management of both the in-house wetland database and wetlands on its lands.

Based on the alternatives described by TVA in the DPEIS, we recommend that TVA select Alternative C - Flagship Management as the preferred alternative. This alternative would address natural resources from a broader scale. It provides greater opportunities for protection and recovery of listed species and their habitats, as well as other trust resources.

We have the following recommendations specific to the draft NRP that we believe would assist in improving and clarifying portions of the document:

1. The NRP states that "Natural resources management has been a core component of their business since its conception" (page 3). We recommend that a history of funding for the types of activities included in the NRP be provided in the NRP's foreword to illustrate TVA's expenditures to natural resources to date and how the various alternatives presented in the DPEIS relate to historical expenditures. TVA should also consider producing a natural resources expenditure report on an annual basis and providing on-line access to that information, similar to the Northwest Power Planning Council's annual reporting of the Bonneville Power Administration's

(BPA) Fish & Wildlife Program expenditures (refer to http://www.naylometwork.com/app-ppd/articleslindex-v2.asp?aid=121787&issueiD=22627 for an example; BPA expended a total of $12.69 billion on fish and wildlife expenditures from 1978 to 2009).

2. In the mission statement (page 4), we recommend that more emphasis be placed on the importance of stewardship activities as part of TVA's core business.

3. In the Executive Summary it is stated that, that TVA is an environmental steward on the nation's fifth-largest river system" (page 4). We recommend that this be further expounded upon, specifically with regard to the relative importance of the Tennessee River system in terms of its aquatic and terrestrial biodiversity and resultant impacts to various species from construction and operation of TVA's dams. Other areas in the document fail to mention the Tennessee River's unique and sensitive biodiversity (3.5, page 43).

4. As with the DPEIS, the geographic scope of proposed activities needs to be better defined. It is confusing whether TVA is referring to TVA-managed lands or to TVA's entire 202-county, 59 million- acre power service area because both continue to be mentioned interchangeably throughout the document. Reference is also made to watershed water quality and water resource management (pages 4, 14 and 20), which implies that stewardship, natural resource activities occur on a broad geographic scale.

5. TVA describes the public scoping process in some detail in the DPEIS, but detailed information regarding how pubic scoping occurred (how information was disseminated, who was invited, what questions were posed to the public, and how were those questions evaluated, etc.) have not been included under "Public Participation and Stakeholder Input" of the NRP (page 6). We are concerned that the public seeping process was likely confused because the Notice of Intent included the NRP with TVA's Integrated Resource Plan. Very few public comments have been received for such a broad geographic area and associated constituents (page 30).

6. The document mentions soliciting advice on stewardship activities from the Regional Resource Stewardship Council (page 6). We recommend including a summary of their advice (particularly advice provide by their natural resource committees) under "Public Participation and Stakeholder Input".

7. We are unclear on TVA's current level of management. The document mentions that staff provided input to help identify TVA's current level of management, but that level is not indicated. Is the current level of management comparable to the "Custodial Management" option?

8. Because the Rapid Lands Assessment is based on desktop analysis, rather than comprehensive field surveys, we believe that it is inappropriate to use as a baseline for TVA's land management plans, as indicated in the discussion about Reservoir Lands Planning Approach and Methodology (1.6.3, page 23).

9. The statement, "Through public outreach and education campaigns, TVA should promote past, present and future stewardship efforts while reinforcing the public's role in the protection and preservation of natural resources", requires clarification (page 10 under "Analysis Results").

10. TVA indicates that they will "examine collaborative opportunities to address local natural resource needs" (page 10 under "Partnerships"). We recommend that Landscape Conservation Cooperatives be considered as part of such an effort.

11. At a minimum, we recommend that TVA implement the priority level "Advanced Management". At the "Advanced Management" level, the proportion of TVA's annual operating budget ($55 million) expended for natural resources management would still amount to only 0.4% of the TVA total annual budget. This does not convey environmental leadership in a region rich in biological resources that has historically been adversely affected by TVA's construction and operation of dams. In comparison, BPA also receives no congressional appropriations, expended $745.2 million on their Fish & Wildlife Program in 2009.

12. The "NRP Snapshot" (page 14) includes "dispersed recreation" (second bullet under Biological and Cultural Resources and seventh bullet under Blended Program List [Biological]). We feel that this activity does not fit under either category. In addition, we do not believe that "boundary maintenance" belongs in the Blended Program List (Biological) (8th bullet).

13. It is unclear how TVA prioritizes mitigation of their impacts on aquatic systems and how mitigation would be accomplished (first bullet under "Water Resource Protection and Improvement", page 23).

14. It is unclear whether the 293,000 acres indicated as TVA managed lands (first paragraph, page 19) includes lands that were acquired for possible future power projects.

15. There currently is not an existing Memorandum of Understanding between TVA and the Department that identifies how TVA will accomplish the requirements of the Migratory Bird Executive Order (Table 4.3, page 35 and page 54).

16. More information should be included regarding the "Natural Resources Communication Program" (Table 3.9, page 48) and how this program differs from the "Environmental Education Program" listed in the same table.

17. Many of the activities that would be part of the Trails Management Program (Table 4.3, page 52) and many Forest Resource Management activities (Table 4.3, page 56) will require ESA consultation.

18. The activity to expand information gathering efforts for identification of sensitive natural resources (included under the Flagship Option in Table 4.3, page 53), development of a

list of target species, creating monitoring plans, developing management plans, etc. (Table 4.3, page 54) and implementation of maintenance needs on natural areas (Table 4.3, page 55) should be included in the Custodial Option. If there are questions regarding these comments, please contact Todd Shaw at (931) 528-6481, extension 215.

Thank you for the opportunity to comment on this project. I can be reached on (404) 331-4524 or by email at joyce_stanley@ios.doi.dov.

Sincerely,

Joyce Stanley, MPA
Regional Environmental Protection Assistant

for

Gregory Hogue
Regional Environmental Officer

cc: Jerry Ziewitz – FWS
Brenda Johnson - USGS
David Vela – NPS
Jeffery Coker – OSMRE
OEPC - WASH

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

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May 16, 2011

Ms. Susan J. Kelly
Senior Manager
Tennessee Valley Authority
400 West Summit Hill Drive
Knoxville, Tennessee 37902

Subject: EPA NEPA Review Comments on TVA's DEIS for "Natural Resource Plan"; CEQ #20110092

Dear Ms. Kelly:

The U.S. Environmental Protection Agency (EPA) has reviewed the subject Tennessee Valley Authority (TVA) Draft Environmental Impact Statement (DEIS) in accordance with our responsibilities under Section 102(2)(C) of the National Environmental Policy Act (NEPA) and Section 309 of the Clean Air Act. It is our understanding that TVA proposes to adopt a Natural Resource Plan (NRP) to determine how the agency will manage its natural resources over the next twenty years. The NRP addresses the planning processes and Environmental Policy objectives related to Water Resources Protection and Improvement, Sustainable Land Use, and Natural Resource Management.[1]

EPA has reviewed several TVA EISs over the past several years that relate to the development of the NRP. These include: the Reservoir Operations Study Programmatic Environmental Impact Statement (PEIS), the Shoreline Management Initiative: An Assessment of Residential Shoreline Development Impacts in the Tennessee Valley Final Environmental Impact Statement, and various Reservoir Management Plan EISs. We applaud TVA's efforts in development of a comprehensive plan to manage TVA's vast natural resources across the Tennessee Valley. We also appreciate TVA's efforts to coordinate with the Region on this EIS, which resulted in a meeting at TVA's Knoxville office on May 10, 2011.

Accompanying the NRP DEIS was a separate Draft NRP document. While we have concentrated on the NEPA review and comment of the DEIS, we have also provided review comments on the Draft NRP. Our comments are provided for TVA's consideration during its development of the Final EIS (FEIS) and the Final NRP.

Overview

The NRP in combination with the Integrated Resource Plan (IRP), which EPA recently reviewed, are implementation plans for the 2008 Environmental Policy. It is our

[1] P. S-1

understanding that the NRP is the first plan that TVA has developed that will comprehensively guide TVA's management strategies of all natural resources that TVA oversees. As stated in the DEIS, TVA's goals of the NRP are to align TVA's stewardship programs and plans with the 2008 TVA Environmental Policy, guide TVA's land use and resource management decisions and actions, integrate effective, efficient stewardship objectives with the goal of optimizing the public use benefits of TVA-management lands, provide clarity and transparency to the public, and lastly strike a balance between the competing and sometimes conflicting resource uses of TVA-managed lands.[2]

Alternatives

TVA analyzed four alternatives in the DEIS including the no-action alternative:

- **Alternative A, the "No Action" Alternative** - TVA would continue to implement the existing stewardship programs and tools, aligning with existing policies and strategies, and would continue to apply the existing methodology when planning lands along TVA reservoirs.
- **Alternative B, the "Custodial Management" Alternative** - TVA would only implement specific programs that address safety and compliance with TVA's mission, applicable laws, regulations, executive orders, and policies.
- **Alternative C, the "Flagship Management" Alternative** - TVA would explore, pilot test, and implement new strategies for enhancing stewardship programs and developed recreation facilities while emphasizing sustainable technologies.
- **Alternative B, the "Blended Management" Alternative (Preferred)** - TVA identified key programs that are integral toward enhancing future implementation efforts while maintaining activities and projects that address safety and comply with TVA's mission and applicable laws, regulations, policies, and EOs.

The DEIS evaluates four primary resource areas in a programmatic manner. These resource areas included: Biological and Cultural Resources, Recreation, Water Resources, and Reservoir Lands Planning. Under each resource multiple programs were listed. Under the preferred alternative, some existing programs will be maintained at the current levels, some existing programs will be enhanced, and in some cases new programs will be proposed.

Planning strategies listed in the NRP provides the outline of how TVA will manage its natural resources over the next 20 years. It should be noted that based on the May 10, 2011 meeting, EPA understands that TVA intends to treat the NRP as a "living document" and will re-evaluate the document every 5 years. It is also our understanding that based on the significance of the changes to the NRP in the future, TVA will determine the level of NEPA necessary. EPA applauds TVA's use of NEPA in this planning process.

[2] P. S-2

EPA Recommendations

Organization of DEIS and NRP:
EPA finds it difficult to determine which programs will be enhanced and developed under the preferred alternative. EPA notes numerous tables in Chapter 2 that provided information on current and proposed programs yet it is unclear if these programs are being proposed under the preferred alternative (see enclosure for more detail). Appendix H appears to provide clearer detail and should be used more prominently in the document.

EPA also notes from the May 10, 2011 presentation material that TVA intends to restructure the NRP document. TVA has proposed to re-organize the NRP and dedicate separate chapters for each resource area. EPA concurs with this modification as it should provide for a more concise document.

Near Term Programs and Actions:
EPA understands that the NRP and the DEIS are addressing resource areas in a programmatic manner in which only minimal information on specific implementation actions may be available. EPA recommends that TVA provide some "near term" (next five years) programs and actions that TVA intends to implement under the preferred alternative in the FEIS.

Alternatives:
Based on the information provided in the DEIS, EPA prefers alternative C, which would provide the greatest overall benefit to the environment. Although, EPA understands that Alternative C may not be the most practicable alternative due to resource constraints and therefore accepts TVA's preferred alternative D, the blended management approach. However, EPA has some specific comments below regarding specific programs listed in Appendix H.

Anticipated Future Conditions – Climate Change:
On October 14, 2010 the Climate Change Adaption Task Force, which included representatives from the White House Council on Environmental Quality (CEQ), the Office of Science and Technology Policy (OSTP), and the National Oceanic and Atmospheric Administration (NOAA) released an interagency report that addressed how federal agencies can better prepare for impacts from climate change. The task force made the following recommendations:

- Make adaptation a standard part of Agency planning to ensure that resources are invested wisely and services and operations remain effective in a changing climate.
- Ensure scientific information about the impacts of climate change is easily accessible so public and private sector decision-makers can build adaptive capacity into their plans and activities.

- Align Federal efforts to respond to climate impacts that cut across jurisdictions and missions, such as those that threaten water resources, public health, oceans and coasts, and communities.
- Develop a U.S. strategy to support international adaptation that leverages resources across the Federal Government to help developing countries reduce their vulnerability to climate change through programs that are consistent with the core principles and objectives of the President's new Global Development Policy.
- Build strong partnerships to support local, state, and tribal decision makers in improving management of places and infrastructure most likely to be affected by climate change.

Based on our review of the DEIS, TVA has adequately described the current environmental setting for the NRP, but possible changes to the environment in the future due to climate change may change the way TVA manages its natural resources. EPA encourages TVA to incorporate the above recommendations from the task force into future planning efforts associated with the NRP. EPA does note information regarding climate change was included in Appendix M, but we are requesting additional information and clarification of how TVA will respond to climate change in light of the above recommendations.

Environmental Justice (EJ)

EPA appreciated TVA's efforts to address EJ in Chapters 4 and 5. The socioeconomic and EJ discussions focused on state population density, employment, income, minority populations, and poverty. Since the NRP is addressing management strategies of natural resources at such a macro level, it is difficult to identify direct impacts on EJ communities. However, EPA does recommend that TVA improve the EJ analysis by enhancing public participation and identifying key EJ stakeholders in the TVA study area. This would provide for a more meaningful engagement of the EJ community. TVA should also note that agencies should, as appropriate, acknowledge and seek to overcome linguistic, cultural, institutional, geographic, and other barriers to meaningful participation, and should incorporate active outreach to affected groups.

EPA DEIS Rating

EPA commends TVA for its development of a comprehensive natural resource management plan and DEIS that provides a strategic plan to guide the management of TVA's natural resources, and EPA concurs with TVA's preferred alternative – Blended Management. Overall the proposed programs listed under the preferred alternative provide positive benefits to the environment. Based on our review, EPA recommends that TVA focuses on the following areas for revision in the FEIS: document organization, identification of near term action items, adaption to anticipated future conditions, and EJ. EPA rates this DEIS as an "EC-2" (Environmental Concerns, with additional information requested). Regarding our request for additional information, please refer to the attached document labeled *Detailed Comments*.

EPA appreciates the opportunity to review the DEIS. Should TVA have questions regarding our comments, please feel free to contact Dan Holliman of my staff at 404/562-9531 or holliman.daniel@epa.gov.

Sincerely,

Heinz J. Mueller
Chief, NEPA Program Office
Office of Policy and Management

Enclosures: Summary of Rating Definitions
Detailed Comments

DETAILED COMMENTS

Consistent with Section 102(2)(c) of the National Environmental Policy Act (NEPA) and Section 309 of the Clean Air Act, the U.S. Environmental Protection Agency (EPA) Region 4 appreciates the opportunity to provide scoping comments on the proposed EIS for the referenced project. It is our understanding that TVA proposes to adopt a Natural Resource Plan (NRP) to determine how the agency will manage its natural resources over the next twenty years. The NRP addresses the planning processes and the planning processes and Environmental Policy objectives related to Water Resources Protection and Improvement, Sustainable Land Use, and Natural Resource Management. The NRP addresses biological and cultural resources management, recreation management, reservoir lands planning, and water resource management.

TVA analyzed four alternatives in the DEIS including the no-action alternative:

- **Alternative A, the "No Action" Alternative** - TVA would continue to implement the existing stewardship programs and tools, aligning with existing policies and strategies, and would continue to apply the existing methodology when planning lands along TVA reservoirs.
- **Alternative B, the "Custodial Management" Alternative** - TVA would only implement specific programs that address safety and compliance with TVA's mission, applicable laws, regulations, executive orders, and policies.
- **Alternative C, the "Flagship Management" Alternative** - TVA would explore, pilot test, and implement new strategies for enhancing stewardship programs and developed recreation facilities while emphasizing sustainable technologies. Under Alternative
- **Alternative B, the "Blended Management" Alternative (Preferred)** - TVA identified key programs that are integral toward enhancing future implementation efforts while maintaining activities and projects that address safety and comply with TVA's mission and applicable laws, regulations, policies, and EOs.

EPA Comments

Summary:

- **Table S-1:** EPA recommends that TVA label the preferred alternative in Table S-1 for clarity.

Chapter 1:

- **Table 1-2:** EPA recommends that the Table be reorganized to show RLMP Developed / RLMP Not Developed. The current configuration is somewhat hard to read.
- Since the TVA Environmental Policy provides the "umbrella" policy for the IRP and NRP and it is referenced multiple times in the DEIS. EPA recommends that the document be added to the appendix of the FEIS.

Chapter 2:

- **Tables 2-1 – 2-3** – These tables provide a listing of specific management programs for different resources. It is unclear if the "proposed programs" listed in these tables are being proposed under the preferred alternative. If so, this should be made clear in the FEIS.
- **Table 2-2** is located in the Biological Resource Section yet includes information regarding Culture Resource Management programs. EPA recommends that the Cultural Resource Management information be moved into the Cultural Resource Management discussion section for clarity.
- The Cultural Resource Management Overview begins before Section 2.1.1 titled "Cultural Resource Management.[3] EPA recommends moving the Cultural Resource Management Overview into section 2.1.1.
- EPA notes TVA's proposal to establish a program to monitor and manage ongoing measures to ensure compliance with Section 106 of the NHPA agreement and NEPA documents.[4] EPA applauds TVA's efforts and encourages the use of CEQ's guidance on Mitigation and Monitoring (2011) when developing these monitoring plans.
- **Table 2-10** – Again it is unclear if the improvement activities listed in table 2-10 are associated with the preferred alternative.
- **Table 2-19 and 2-27**- Table provides a listing of specific management programs for different resources. It is unclear if the "proposed programs" listed in these tables are being considered under the preferred alternative. If so, this should be made clear in the FEIS. Additional discussion is provided with regards to Table 2-27 in proceeding comments. Also, EPA notes that several "current programs" will be enhanced under different alternatives. EPA recommends that TVA add an "enhanced" column to tables similar to Table 2-27 in Chapter 2.
- Terrestrial Greenhouse Gas Sequestration is discussed in Chapter 2. EPA recommends that TVA consider the offsetting effects of GHGs produced by fire suppression activities when discussing the benefits of terrestrial carbon sequestration of forested lands.
- **Table 2-21** - Again it is unclear if the improvement activities listed in table 2-21 are associated with the preferred alternative.
- **Section 2.4.1 - Aquatic Ecology Management** – Provides a description of the program using future tense (would)[5] yet this program is listed in the Table 2-27 as a current program. EPA noted this issues for multiple program descriptions throughout Chapter 2.
- **Section 2.4.3 – Water Resource Outreach Campaigns** – A statement "Water Resource Outreach Campaigns could include focused efforts to raise public awareness ……"[6] is made in this section. The word "could" leaves the reader wondering what this program will actually entail when implemented. EPA

[3] P. 25
[4] P. 28
[5] P. 68
[6] P. 72

recommends that TVA make an effort in the FEIS to be more definitive about newly proposed programs.

- **Section 2.4.5 – Water Resource Tools – Urban Storm Water Assistance –** EPA applauds TVA's efforts to address urban storm water issues. Choosing effective stormwater BMPs is one of the key challenges facing anyone interested in improving or protecting the quality of our rivers, lakes, and coastal waters. EPA encourages TVA to visit the EPA Urban BMP Performance website for additional BMPs that could be considered for implementation on TVA land: http://cfpub.epa.gov/npdes/stormwater/urbanbmp/bmpeffectiveness.cfm
- **Section 2.4.5 – Water Resource Improvement Tools – Stream and Riparian Management and Restoration –** EPA recommends that use of natural stream channel design when possible for stream restorations. EPA recommends that TVA provide additional details regarding stream restoration methodologies that TVA will utilize under this program.
- **Section 2.4.5 – Water Resource Improvement Tools – Water Pollutant Trading -** EPA request clarification of the statement "Regulatory processes that allow Trading would be present in the watershed, and stakeholders would be involved in developing the Trading mechanisms."[7] It may be beneficial to readers if TVA provided more details on water pollutant trading opportunities in the Tennessee Valley.

Chapter 3

- **Table 3-1 –** The term "Enhanced Management" is used in Table 3-1 which appears to be the same management strategy listed in the other parts of the document as the "Blended Management" approach, which TVA has selected as the preferred alternative. EPA request clarification.
- **Alternatives Development –** EPA notes that information regarding how and why TVA selected the four alternatives analyzed in the DEIS is lacking. EPA recommends that TVA provide additional information on how alternative management strategies where selected. EPA also recommends that TVA provide more detail in the FEIS on how and why specific new programs are being proposed under the preferred alternative.
- **Section 3.2.1.1 – Biological and Cultural Resources Management** – EPA is unclear on why the "Dispersed Recreation Management" discussion is included in this section and not the Recreation Management section.
- **Section 3.2.1.4 – Water Resource Management** – It is stated section 3.2.1 that "Under the No action Alternative, TVA would continue its current natural resource management efforts by implementing the existing stewardship programs…."[8] yet several programs such as the aquatic ecology management program and the water efficiency program, which are listed in table 2-27 as current programs, are not listed in Section 3.2.1.4. It would be logical for a reader to assume that if these are current programs (listed in table 2-27) they would be included in the no-action alternative. In addition, Appendix H, appears to exclude

[7] P. 82
[8] P. 91

these programs, which is consistent with the text in section 3.2.1.4. EPA recommends clarification of tables in document.

- **Section 3.6 – The Preferred Alternative** – EPA recommends that TVA provide addition information and details on how TVA proposes to determine which stewardship programs will be implemented first when opportunities and and/or resources become available. Will programs be prioritized and how?

Chapter 4

- **Table 4-5 – Ecological Health Ratings of TVA Reservoirs** – EPA recommends that 303(d) and TMDL information be added to this table.

Chapter 5

- **Section 5.17 - Climate** – EPA recommends that TVA provide more discussion (in addition to Appendix M) in the FEIS regarding how Climate Change will impact current and proposed programs listed in the NRP.

Appendix H – EPA finds this table to be very helpful in summarizing the specific programs being proposed for each alternative. EPA did review the table in Appendix H and had some concerns with regards to the elimination of certain programs.

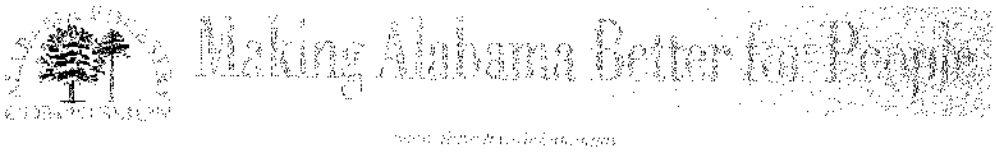
EPA comments on Appendix H:

- Biological and Cultural Resource Management
  - Terrestrial Greenhouse Gas Sequestration Management
    - Currently TVA conducts demonstration projects on 41 acres of TVA managed land focusing in issues related to terrestrial GHG management practices. Under the preferred alternative this effort would be eliminated. EPA recommends that these efforts be at least maintained at the existing levels.
    - Currently TVA conducts 2 demonstration projects focusing on issues related to terrestrial GHG management practices. Under the preferred alternative this effort would be eliminated. EPA recommends that these efforts be at least maintained at the existing levels.
    - Currently TVA has entered into 2 third-party consortiums focusing on issues related to terrestrial GHG management. Under the preferred alternative this effort would be eliminated. EPA recommends that these efforts be at least maintained at the existing levels.
- Recreation
  - It appears that assisting in the development of greenway miles may decrease from current effort levels listed under the "no-action" alternative. EPA recommends that these efforts be at least maintained at the existing levels.

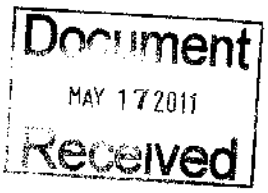
- Water Resource Management
  - It appears that stream assessments may decrease from current effort levels listed under the "no-action" alternative. EPA recommends that these efforts be at least maintained at the existing levels.
  - Addition clarification is requested for programs listed to reduce suspended sediment and reduce phosphorus. It appears from Appendix H that these programs currently have set goals under the "no-action" alternative and these goals would be eliminated under the preferred alternative.

Comment Letters from State Agencies

Alabama



May 10, 2011



Ms. Susan J. Kelly
Senior Manager
Tennessee Valley Authority
1101 Market Street
Chattanooga, TN 37402-2801

Dear Ms. Kelly:

The Alabama Forestry Commission has reviewed your Draft Natural resources Plan and Draft Environmental Impact Statement as requested. We have considered all four alternatives for management as discussed in the documents. Our preferred method would be Alternative C (Flagship Management) as a minimum and Alternative D (Blended Management) if funding is available. While we recognize that more enhanced management would be more costly, this could be offset with income from sustainable forest management and recreational activities on those lands. As stated in your Plan, the benefits expected would increase in direct proportion with your level of natural resources management.

We would also recommend an enhanced Land Conditions Assessment described in the Plan as funding is made available. Partnerships would assist in achieving the goals set out in your Plan and we are willing to assist as needed in helping to achieve a higher level of sustainable forest management and wildlife habitat enhancement. We are encouraged that TVA has realized that proper natural resource management is the key to healthy forests, with better and more abundant wildlife habitat, along with many other ecosystem services. Thank you for the opportunity to comment.

Sincerely,

Linda S. Casey

Linda S. Casey, RF
State Forester

Georgia

Rec'd 4/1/11

GEORGIA STATE CLEARINGHOUSE MEMORANDUM
EXECUTIVE ORDER 12372 REVIEW PROCESS

TO: Charles Nicholson
Tennessee Valley Authority
400 W. Summit Hill Drive, WT 11D
Knoxville, TN 37902

FROM: Barbara Jackson

DATE: 3/28/2011

APPLICANT: Tennessee Valley Authority

PROJECT: Draft Natural Resource Plan (NRP), Draft Environmental Impact Statement (EIS)

CFDA #:

STATE ID: GA110328002

FEDERAL ID:

Material related to the above project was received by the Georgia State Clearinghouse on 3/28/2011. The review has been initiated and every effort is being made to ensure prompt action. The project will be reviewed for its consistency with goals, policies, plans, objectives, programs, environmental impact, criteria for Developments of Regional Impact (DRI) or inconsistencies with federal executive orders, acts and/or rules and regulations, and if applicable, with budgetary restraints.

The initial review process should be completed by 4/29/2011 (*approximately*). If the Clearinghouse has not contacted you by that date, please call (404) 656-3855, and we will check into the delay. We appreciate your cooperation on this matter.

When emailing or calling about this project, please reference the State Application Identifier number shown above. If you have any questions regarding this project, please contact us at the above number.

Form SC-1
Aug. 2010

D Remote ID: R page of

GEORGIA STATE CLEARINGHOUSE MEMORANDUM
EXECUTIVE ORDER 12372 REVIEW PROCESS

TO: Barbara Jackson
Georgia State Clearinghouse
270 Washington Street, SW, Eighth Floor
Atlanta, Georgia 30334

FROM: MR. F. ALLEN BARNES F. Allen Barnes
GA DNR-EPD DIRECTOR'S OFFICE

APPLICANT: Tennessee Valley Authority

PROJECT: Draft Natural Resource Plan (NRP), Draft Environmental Impact Statement (EIS)

STATE ID: GA110328002

FEDERAL ID:

DATE:

☑ This project is considered to be consistent with those state or regional goals, policies, plans, fiscal resources, criteria for developments of regional impact, environmental impacts, federal executive orders, acts and/or rules and regulations with which this organization is concerned.

This project is not consistent with:

☐ The goals, plans, policies, or fiscal resources with which this organization is concerned. (Line through inappropriate word or words and prepare a statement that explains the rationale for the inconsistency. (Additional pages may be used for outlining the inconsistencies. Be sure to put the GA State ID number on all pages).

☐ The criteria for developments of regional impact, federal executive orders, acts and/or rules and regulations administered by your agency. Negative environmental impacts or provision for protection of the environment should be pointed out. (Additional pages may be used for outlining the inconsistencies. Be sure to put the GA State ID number on all pages).

☐ This project does not impact upon the activities of the organization.

NOTE: Should you decide to FAX this form (and any attached pages), it is <u>not</u> necessary to mail the originals to us. [770-344-3568]

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STATE CLEARINGHOUSE

Form SC-3
Aug. 2010

GEORGIA
DEPARTMENT OF NATURAL RESOURCES
HISTORIC PRESERVATION DIVISION

MARK WILLIAMS
COMMISSIONER

DR. DAVID CRASS
DIVISION DIRECTOR

March 30, 2011

Barbara Jackson
Georgia State Clearinghouse
270 Washington Street, SW, Eighth Floor
Atlanta, Georgia 30334

Re: Draft Natural Resource Plan, Draft Environmental Impact Statement
Statewide, Georgia
GA-110328-002

Dear Ms. Jackson:

The Historic Preservation Division (HPD) has received information concerning the above referenced undertaking. Our comments are offered to assist the Tennessee Valley Authority (TVA) in complying with the provisions of Section 106 of the National Historic Preservation Act of 1966, as amended.

HPD has received the documents entitled "Natural Resource Plan Draft March 2011" and "Natural Resource Plan Environmental Impact Statement Draft March 2011." We look forward to future coordination with TVA on Section 106 compliance for future activities as appropriate.

If we may be of further assistance, please do not hesitate to contact Elizabeth (Betsy) Shirk, Environmental Review Coordinator, at (404) 651-6624.

Sincerely,

Elizabeth Shirk

for Karen Anderson-Cordova
Program Manager
Environmental Review & Preservation Planning

KAC/ECS

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STATE CLEARINGHOUSE

254 WASHINGTON STREET, SW | GROUND LEVEL | ATLANTA, GEORGIA 30334
404.656.2840 | FAX 404.657.1368 | WWW.GASHPO.ORG

GEORGIA
DEPARTMENT OF NATURAL RESOURCES
WILDLIFE RESOURCES DIVISION

MARK WILLIAMS
COMMISSIONER

DAN FORSTER
DIRECTOR

May 16, 2011

Charles P. Nicholson, PhD
NEPA Compliance Manager
Tennessee Valley Authority
400 West Summit Hill Drive
Knoxville, TN 37902

Dear Dr. Nicholson:

Thank you for the opportunity to review TVA's Draft Natural Resource Plan (NRP) and associated Environmental Impact Statement. We applaud TVA's extensive efforts in drafting the NRP which will guide TVA natural resource management for the next 20 years. The NRP evaluated four management approaches, with each strategy reflecting an increasing level of commitment to implement. We agree with TVA's selection of the Blended Management Action Alternative (D); however, there may be opportunities to improve upon certain areas in the Blended Alternative (D) by adding elements of Alternative C to it. Those areas include aquatic habitat, improving or expanding stream and reservoir access, nuisance and invasive species awareness, ecological data monitoring, and web-based data sharing. By including selected programs proposed under the Flagship Option (C) into Alternative (D), the NRP could be strengthened in the areas noted above.

We appreciate the opportunity to provide comments to the NRP and look forward to our continued partnership in natural resource management. Specific comments to the Draft NRP and EIS are included for your consideration. If you have any questions or need further information, please contact Jim Hakala at (770) 387-4821.

Sincerely,

Dan Forster

cc: Jim Hakala

2070 U.S. HIGHWAY 278 S.E. | SOCIAL CIRCLE, GEORGIA 30025-4711
770.918.6400 | FAX 706.557.3030 | WWW.GEORGIAWILDLIFE.COM

Comments for Draft Natural Resource Plan

Executive Summary, Analysis Results, Page 12: The Allocation Designation table (Table 2) should include land use Zone 1 (Non-TVA Shoreland). The table seems incomplete without it, and the reader must search Appendix F of the EIS to determine there is, in fact, a Zone 1. Also consider including existing land-use values for each zone to see how land use could change under the NRP targets.

Chapter 2, Section 4, Draft NRP Public Comment Period, Page 30: The NRP states, "TVA will use three techniques to collect public input during the draft document stage". Only two techniques are listed.

Chapter 4, Section 5, Stream Access, Page 63: Public access to north Georgia streams has diminished over the last few decades. Increasing or improving stream access would be beneficial, and we support increased public stream access.

Chapter 4, Section 7, Stream and Tailwater Monitoring Program, Page 66: TVA and Georgia Wildlife Resources Division have shared data on several occasions in the past. We believe that data sharing is in the best interest of both agencies and the public. Therefore, we continue to support efficient means of data sharing. We also support TVA sampling efforts in local streams and tailwaters.

Chapter 4, Section 7, Strategic Partnership Planning, Page 66: TVA continues to be a valuable partner when managing the resources of North Georgia. We hope that our partnership will continue or expand.

Chapter 4, Section 7, Water Resources Improvement Programs, Page 67: Many promising ideas reside here, but most are included only in Alternative C. We suggest that TVA include more goals under Alternative D.

Chapter 6, Section 4.2.1.1, Habitat Management, Page 83: Aquatic habitat improvements such as fish attractors and artificial spawning beds could be used to enhance fish communities and recreational angling opportunities on many TVA lakes.

Chapter 6, Section 4.2.3, Recreation Management, Page 84: We agree that recreation management should remain a priority. We support management of TVA recreation facilities at the enhanced level or higher.

Appendix A, Figure A-5: Documentation of TVA stream access sites is appreciated. TVA stream access is very important for north Georgia anglers and boaters. This is especially

important given the predicted rate of human population increase reported for the region in the NRP and EIS.

Comments for Draft Environmental Impact Statement

Executive Summary, Environmental Consequences, page S-7: Paragraph two states Alternative D would create the greatest potential benefit in only three categories (visual resources, listed plant species and vegetation). Table S-1 (pg. S-8) indicates alternative D would also "provide the greatest beneficial impact" on aquatic ecology relative to all other alternatives. Therefore, aquatic ecology should be added to the list of "greatest potential benefit" categories under alternative D.

Chapter 2, Dispersed Recreation Management, Page 30: Two important aspects of "Dispersed Recreation," are improved bank fishing opportunity and TVA facility improvements. In addition to improving shoreline bank fishing access and facilities, TVA should also consider fish habitat rehabilitation and enhancement. Fish habitat quality declines over time as a reservoir ages and such habitat requires rehabilitation. Fish habitat improvements, such as fish attractor sites near public accesses, also improve angler catch rates and the quality of the recreational experience. TVA should consider the additions described, above, to the document text. We welcome the opportunity to partner with other agencies or stakeholders to improve recreational angling accessibility and quality.

Chapter 2, Endangered and Threatened Species Monitoring Page 40-41: We support TVA's monitoring of critical habitats for known T&E species on TVA managed areas. The Executive Summary (Endangered and Threatened Species, Page S-5) states no T&E species are 'known to occur on the TVA-managed lands that are a part of this plan." This is contradictory to statements made in Chapter 3, "Endangered and Threatened Species Program" (Page 93) stating that about 40 sites "containing populations of federally listed animals and plants on TVA-managed or influenced public lands are monitored." These statements may need clarification.

Chapter 3, Aquatic Monitoring and Management, Page 99: We support TVA's continued efforts to collect and share data from annual stream assessments and other ecological monitoring efforts.

Chapter 4, Section 4.5, Water Quality and Ecological Health Monitoring, Pages 159-160: We recognize and support TVA's effort and future commitment to monitoring, maintaining and enhancing the water resources of the Tennessee Valley.

Blended Management Action Alternative (D): TVA's preferred alternative. This alternative is predicted to have the greatest beneficial impact on aquatic ecology (Table S-1, pg. 13), while providing an intermediate (between alternatives B and C) level of benefit for recreational activities and water quality. Alternative D generally improves upon TVA's current level of

commitment to natural resource management on TVA holdings. However, there are several program components in Alternative C that should be considered to Alternative D. (see Appendix H – "Comparison of Programs and Goals Across Alternatives" (pgs. 351-366). Suggested additions follow:

Appendix H, Develop and implement improvements at stream access sites, Page 363: of which there are four in Georgia. Improving angler access is an increasingly important goal as the state population grows. Appendix H, Assist partners with acquisition and development of additional stream access at sites, as appropriate, Page 363.

Appendix H, Provide technical support to other agencies and stakeholders and share recreation information, as appropriate, Page 363: This would assist in identifying underdeveloped recreational opportunities and planning desired improvements.

Appendix H, Foster partnerships to assist in identifying unmet recreation needs around TVA-managed reservoirs, Page 363: Once unmet recreational opportunities are identified, TVA could bring its technical resources to bear in implementing partnered programs.

Appendix H, Develop....opportunities to improve public awareness of exotic and invasive species... Page 365: Since these challenges are not confined by geo-political boundaries, a regional approach to education that incorporates existing state agency policies may be desirable.

Appendix H, Share stream (and tailwater) and reservoir data with other agencies and stakeholder groups, Page 365: We appreciate TVA's willingness to share data "upon request", and encourage development of passive biological data availability through Web-based platforms. Further, expanding continuous data collection efforts for key aquatic resources would provide TVA and other resource agencies valuable data to guide future management actions.

Kentucky

rec'd Apr 25, 2011

KENTUCKY STATE NATURE PRESERVES COMMISSION

Steven L. Beshear
Governor

801 Schenkel Lane
Frankfort, Kentucky 40601-1132
Phone (502) 573-2886
Fax (502) 573-2355
www.naturepreserves.ky.gov

Dr. Leonard Peters
Secretary
Energy and
Environment Cabinet

Donald S. Dott, Jr.
Director

April 18, 2011

Charles P. Nicholson, PhD
Manager, NEPA Compliance
Tennessee Valley Authority
400 West Summit Hill Drive, WT 11B
Knoxville, TN 37902-1499

Dear Mr. Nicholson,

Thank you for the opportunity to comment on TVA's draft natural resource plan and associated EIS.

We applaud TVAs continuing efforts to manage their lands in ways that support multiple uses, while striving for sustainability of natural resources and protection of sensitive areas and species associated with these lands.

Forests throughout the region continue to be fragmented and disturbed, increasing their susceptibility to invasions by exotic species and reducing habitat for forest interior species, and resulting in a decline of native plant diversity. TVA has an opportunity to develop and protect interior forest habitat and play an important role in supporting those species that depend on it, as well as create forest tracts that are resilient to invasions by exotic species.

We encourage TVA to consider protecting more of their forest lands as contiguous, naturally maturing forest. We recognize that TVA is also interested in managing their forests for other uses but believe that all needs can be met if careful planning is conducted, including identifying those tract that could significantly contribute to large forest blocks. We urge TVA to reconsider creating additional early successional habitat. Much of the remaining forest is already in various stages of early succession. Forests throughout the region continue to be fragmented and intensely logged, while contiguous blocks of mature forests are becoming increasingly rare. Early successional habitat increases fragmentation and risks for invasion by exotics, and can contribute to a drop in regional biodiversity. We also discourage the management practice "day lighting" as it encourages spread of exotics, increases fire danger, and results in fragmentation. While roads can serve as fire breaks, more roads also provide more access for arsonists, and increase spread of exotics and fragmentation.

We further discourage TVA from continuing dewatering projects, except where essential to maintain safe operations of TVA facilities, and to restore and protect natural wetlands.

Please contact me if you have any questions or would like additional information. We would be glad to assist you throughout the planning process.

Sincerely,

Donald S. Dott, Jr.
Director

mkh

Mississippi

Mississippi Department of Wildlife, Fisheries, and Parks

Name: Dennis Riecke

Comments: The Mississippi Department of Wildlife, Fisheries, and Parks has reviewed the TVA Natural Resource Plan and Draft Environmental Impact Statement. We support the recommended alternative and concur with the findings stated in both documents.

North Carolina

North Carolina Department of Cultural Resources
State Historic Preservation Office
Claudia Brown, Acting Administrator

Beverly Eaves Perdue, Governor
Linda A. Carlisle, Secretary
Jeffrey J. Crow, Deputy Secretary

Office of Archives and History
Division of Historical Resources
David Brook, Director

April 11, 2011

Tennessee Valley Authority
400 West Summit Hill Drive
Knoxville, TN 37902-1499

Re: Natural Resource Plan Consultation, Integrated Resource Plan for TVA's Environmental And Energy Future, Multi County, CH 09-1621

We have received the above project from the State Clearinghouse for review and have the following comments.

We continue to support TVA's efforts for protecting and preserving archaeological sites, and recommend that TVA move forward with monitoring along reservoir shorelines, as well as evaluating the National Register eligibility of previously recorded archaeological sites.

The above comments are made pursuant to Section 106 of the National Historic Preservation Act and and the Advisory Council on Historic Preservation's Regulations for Compliance with Section 106 codified at 36 CFR Part 800.

Thank you for your cooperation and consideration. If you have questions concerning the above comment, please contact Renee Gledhill-Earley, environmental review coordinator, at 919-807-6579. In all future communication concerning this project, please cite the above-referenced tracking number.

Sincerely,

Renee Gledhill-Earley

for Claudia Brown

cc: State Clearinghouse

Location: 109 East Jones Street, Raleigh NC 27601 **Mailing Address**: 4617 Mail Service Center, Raleigh NC 27699-4617 **Telephone/Fax**: (919) 807-6570/807-6599

DEPARTMENT OF ENVIRONMENT AND NATURAL RESOURCES
DIVISION OF ENVIRONMENTAL HEALTH

Inter-Agency Project Review Response

Project Number
11-0227

County
Asheville Region

Project Name **TVA**

Type of Project **Draft Environmental Impact Statement - Proposal of Natural Resource Plan to guide future natural resource mgmt activities. View at http://www.tva.gov/environment/reports/nrp**

Comments provided by:

- ☐ Regional Program Person
- ☒ Regional Supervisor for Public Water Supply Section
- ☐ Central Office program person

Name **Jim Adams-Asheville RO** Date **04/05/2011**

Telephone number: (828) 296-4500

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Program within Division of Environmental Health:

- ☒ Public Water Supply
- ☐ Other, Name of Program: _____

Response (check all applicable):

- ☐ No objection to project as proposed
- ☐ No comment
- ☐ Insufficient information to complete review
- ☐ Comments attached
- ☒ See comments below

PLAN AND SPECIFICATION APPROVAL BY THE NC PUBLIC WATER SUPPLY SECTION IS REQUIRED FOR ANY NEW, OR MODIFICATION OF EXISTING PUBLIC WATER SYSTEMS THAT WILL BE IMPACTED BY OR CREATED AS A PART OF THE PROJECT. PROVISIONS SHALL BE MADE TO PROTECT ALL PUBLIC WATER SYSTEMS AND SOURCES WITHIN THE PROJECT AREA.

Return to:
Public Water Supply Section Environmental Review Coordinator for the Division of Environmental Health

NCDENR

North Carolina Department of Environment and Natural Resources
Division of Parks and Recreation

Beverly Eaves Perdue, Governor | Dee Freeman, Secretary | Lewis Ledford, Director

May 12, 2011

MEMORANDUM

TO: Melba McGee, Environmental Coordinator
Office of Legislative and Intergovernmental Affairs

FROM: Amin Davis, Environmental Review Coordinator AKD
Division of Parks and Recreation

SUBJECT: TVA Natural Resource Plan - Draft Environmental Impact Statement

REFERENCE: Project No. 11-0227 (Reference Nos. 11-0207, 11-0086, & 10-0010)

Dear Melba,

The North Carolina Division of Parks and Recreation (DPR) has reviewed the above-referenced project information available for review at http://www.tva.gov/environment/reports/nrp/. DPR understands that the Tennessee Valley Authority (TVA) has completed a Draft Environmental Impact Statement (DEIS) associated with its programmatic Natural Resources Plan (NRP) to identify and select a long-range strategy that will guide future decisions by TVA associated with the management and protection of regional natural resources. This DEIS evaluates the potential environmental consequences of four alternative management strategies on natural resource elements within the TVA power service area which comprises 201 counties within a 58 million-acre region; 15 of these counties are situated in North Carolina.

A review of Geographic Information Systems (GIS) data provided by TVA revealed that all three TVA facilities located in North Carolina are hydropower dams that are not within the vicinity of any areas managed by DPR. Additionally, the nearest TVA coal-fired facility (John Sevier Coal Plant in Tennessee) is located at least 50 miles from the nearest DPR lands (Yellow Mountain State Natural Area). Additionally, DPR is pleased to know the following based on information provided in the DEIS, Chapter 5 (*Environmental Consequences*):

1.) Under TVA'a Preferred Alternative (*Blended Management Alternatives*), "TVA would implement additional projects designed to benefit biological and cultural resources and improve recreational opportunities";
2.) Under all alternatives, "TVA would continue to allocate parcels containing sensitive resources (archaeological and historic properties, wetlands, rare species, and natural areas) to the most protective [land use] zone";
3.) "Maximum projected changes in land uses would either emphasize developed recreation uses or natural resource conservation"; and
4.) "Air emissions identified from proposed development associated with this alternative would be reviewed to determine whether they could be mitigated by control technology, emission-reduction strategies, or avoidance. For any air quality impacts that cannot be mitigated, a full air quality analysis would be required, and the emissions from sources associated with any alternative would be controlled to meet current applicable regulatory requirements".

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However, since the nature of TVA's DEIS/NRP is 'programmatic' in nature and doesn't primarily address site-specific future facility development, DPR respectfully requests to be informed of any future facility/operational development that may potentially impact existing or future DPR holdings.

CC via email: Brian Strong, DPR Chief of Planning and Natural Resources
Carol Tingley, DPR Deputy Director
Harry LeGrand, Natural Heritage Program Biologist
Jon Blanchard, DPR Natural Resources Program Head
Linda Pearsall, Office of Conservation, Planning, and Community Affairs Director
Marshall Ellis, DPR Mountain Region Biologist
Max Rogers, DPR Parks Planner
Mike Lambert, DPR Chief of Operations
Tom Jackson, DPR West District Superintendent

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North Carolina Wildlife Resources Commission

Gordon Myers, Executive Director

MEMORANDUM

TO: Melba McGee, Environmental Coordinator
Office of Legislative and Intergovernmental Affairs

FROM: Dave McHenry, Mountain Region Coordinator
Habitat Conservation Program

DATE: May 11, 2011

SUBJECT: Tennessee Valley Authority Natural Resource Plan
OLIA No. 11-0227

The Tennessee Valley Authority (TVA) is seeking comments on a Natural Resource Plan (NRP) and Environmental Impact Statement (EIS). Comments from the North Carolina Wildlife Resources Commission (NCWRC) on the NRP are provided under provisions of the Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 U.S.C. 661 et seq.), the North Carolina Statutes (G.S. 113-131 et seq.), and the National Environmental Policy Act (42 U.S.C. 4332(2)(c)).

The NCWRC actively pursues and develops boating and fishing access areas for sportsmen throughout North Carolina. Therefore, we support increasing these areas on TVA lands as articulated under Alternative C of the NRP. If additional opportunities are pursued under the plan, then we specifically encourage consideration of a new public low-water boat ramp on Fontana Reservoir between Mouse Branch and Panther Creek. Anglers have expressed a desire for better access in this area. A ramp here would improve access for anglers and hunters, particularly in the winter and spring when poor weather makes access to the mid-lake region more difficult from other ramps. A new ramp also would be useful because it would allow access when other ramps are not useable due to low reservoir levels.

Mailing Address: Division of Inland Fisheries • 1721 Mail Service Center • Raleigh, NC 27699-1721
Telephone: (919) 707-0220 • **Fax:** (919) 707-0028

The NCWRC supports prescribed burning and other efforts to improve habitat, particularly early successional, wherever appropriate on TVA lands. Early successional habitat is sparse on both public and private lands in western North Carolina and it is important to ruffed grouse, whitetail deer, and many other game and nongame species such as the golden-winged warbler. Alternative C of the NRP, and to a lesser extent D, would provide the greatest wildlife habitat benefits. Of particular benefit is the Agricultural and Open Lands Management program that converts lands that are unsuitable or poorly suited for agriculture into quality early successional or forested wildlife habitats. Under the program, mowing, herbicide treatments, and/or burning as well as warm season grass planting could be used to improve and maintain much needed early successional habitat. Similarly, where timber harvest or salvage is undertaken, we recommend clearing log decks and widening skid trails to create early successional "openings". As outlined under plan alternatives, we also support the formation of a fire management crew and implementation of a burn program to promote forest health, facilitate collaboration with other land management agencies, and complement ongoing habitat improvement work in the region.

We appreciate the opportunity to provide comments on this plan. Please call me at (828) 452-2546 extension 24 if there are any questions about these comments.

cc: Mr. Powell Wheeler, NC Wildlife Resources Commission
Mr. David Stewart, NC Wildlife Resources Commission

Virginia

Rec'd 5/11/11

COMMONWEALTH of VIRGINIA

DEPARTMENT OF ENVIRONMENTAL QUALITY

Douglas W. Domenech
Secretary of Natural Resources

Street address: 629 East Main Street, Richmond, Virginia 23219
Mailing address: P.O. Box 1105, Richmond, Virginia 23218
TDD (804) 698-4021
www.deq.virginia.gov

David K. Paylor
Director

(804) 698-4000
1-800-592-5482

May 9, 2011

Mr. Charles P. Nicholson
NEPA Compliance Manager
Tennessee Valley Authority
400 West Summit Hill Drive, WT 11D
Knoxville, Tennessee 37902

RE: Draft Programmatic Environmental Impact Statement: Tennessee Valley Authority, Natural Resource Plan (DEQ 11-060F)

Dear Mr. Nicholson:

The Commonwealth of Virginia has completed its review of the above-referenced draft programmatic environmental impact assessment (PEIS) for the Tennessee Valley Authority's (TVA) Natural Resource Plan (NRP). The Department of Environmental Quality (DEQ) is responsible for coordinating Virginia's review of environmental documents prepared pursuant to the National Environmental Policy Act and responding to appropriate officials on behalf of the Commonwealth. The following agencies joined in this review:

Department of Environmental Quality
Department of Game and Inland Fisheries
Department of Conservation and Recreation
Department of Historic Resources

The City of Bristol, Washington County and Mt. Rogers Planning District Commission also were invited to comment.

PROPOSED ACTION

The TVA has issued a NRP and a PEIS regarding biological and cultural resources management, recreation management, reservoir lands planning, and water resource management. While TVA is engaged in its planning process, it is continuing to implement activities consistent with its current resource management strategies and programs. The geographical scope for biological and cultural resources management and recreation management components is the approximately 293,000 acres of reservoir lands and active and former fossil and nuclear properties. Two TVA-managed lands in Virginia are Clear Creek Reservoir and Beaver Creek Dam near the City of Bristol, which is surrounded by Washington County.

The PEIS examines potential impacts associated with implementing the NRP proposed for these resources and reasonable alternative management strategies, including a No Action Alternative. Under the No Action Alternative, TVA would continue its current management approach. Under three Action Alternatives (Alternatives B – Custodial Management, C –Flagship Management, and D—Blended Management), TVA would alter its management approach to reflect the implementation of varying levels of activities across numerous stewardship programs. TVA's Preferred Alternative is Alternative D.

COMMONWEALTH OF VIRGINIA COMMENTS

1. Water Quality and Wetlands.

1(a) Agency Jurisdiction. The State Water Control Board promulgates Virginia's water regulations, covering a variety of permits to include Virginia Pollutant Discharge Elimination System Permit, Virginia Pollution Abatement Permit, Surface and Groundwater Withdrawal Permit, and the Virginia Water Protection (VWP) Permit. The VWP Permit is a state permit which governs wetlands, surface water and surface water withdrawals/impoundments. It also serves as § 401 certification of the federal Clean Water Act § 404 permits for dredge and fill activities in waters of the United States. The VWP Permit Program is under the Office of Wetlands and Water Protection/Compliance within the DEQ Division of Water Quality Programs. In addition to central office staff who review and issue VWP permits for transportation and water withdrawal projects, the six DEQ regional offices perform permit application reviews and issue permits for the covered activities.

1(b) Agency Comments.

Comments on Alternatives

Under Alternative C (Flagship Management Alternative), TVA would explore, pilot/test and implement new strategies for enhancing wetland stewardship. This would include development and implementation of a wetland management policy that includes a proactive program for wetland identification, management, and protection on TVA-

managed lands. Implementation of the proposed action would result in a positive effect on wetlands on TVA-managed lands, and no direct or indirect adverse wetland impacts would result from this alternative.

Under Alternative D (Blended Management Alternative), TVA mixes portions of the programs and activities as described under Alternatives B (Custodial Management Alternative) and C. The direct, indirect, and cumulative impacts on wetlands would be similar to those described under the Flagship Management Alternative. As strategic partnerships and resources become available, TVA would enhance management of both the in-house wetland database and wetlands on its lands.

According to the report, under any of the alternatives, TVA would comply with all applicable federal, state, and local regulations. Likewise, prior to approving any proposal to use TVA land, TVA would conduct an appropriate level of site-specific environmental review to determine the potential environmental effects of the proposed use.

Application and Permitting Process

If impacts to state waters are proposed, a Joint Permit Application (JPA) should be submitted to the Virginia Marine Resources Commission (VMRC). The DEQ Southwest Regional Office (SWRO) will make the final permit decision regarding potential impacts to state waters.

Unavoidable permanent impacts to all wetlands or to streams in excess of three hundred linear feet will require mitigation through the purchase of mitigation bank credits or through the creation, enhancement or preservation of wetlands or streams within the project's watershed.

Protection and Mitigation Methods

- Once a final strategy has been developed, any activities requiring instream work should be performed in the dry, utilizing cofferdams, stream diversions and/or working during low flow conditions.
- Heavy equipment should work from uplands to the greatest extent possible and utilize mats and strict erosion and sediment controls for work that must be conducted from within surface waters.
- Caution should be taken to ensure prevention of the release of any oil or fuel from heavy equipment into surface waters.
- All disturbed stream beds should be restored to their original contours prior to redirecting the stream into the work area.
- Restore temporary impact areas to their original contours and revegetate with the same or similar species.
- Strictly adhere to erosion and stormwater management practices.
- DEQ OWWP encourages the project proponent to monitor construction activities to ensure erosion and stormwater management practices are adequately

preventing sediment and pollutant migration into surface waters, including wetlands.

1(c) Agency Finding. DEQ OWWP states that it agrees with the use of either Alternative C or Alternative D for the proposed activities.

1(d) Agency Recommendations. DEQ has the following recommendations:

- Conduct pre-application coordination with all applicable state agencies, including DEQ (Allen Newman at 276-676-4804) and VMRC (Justin Worrell at 757-247-8063), that may have jurisdiction over the proposed project.
- Ensure that environmental documents for site-specific projects include adequate descriptions of wetlands and surface waters within the project area and proposed project site, potential impacts, protection and mitigation methods, coordination with appropriate agencies, and permitting and regulatory requirements, including local requirements, and any other applicable information.

2. Recreational Resources.

2(a) Agency Jurisdiction. The Department of Conservation and Recreation's (DCR) Division of Planning and Recreational Resources (DPRR) administers the Virginia Scenic Rivers, Virginia Byways, and state trails programs and is responsible for developing the Virginia Outdoors Plan (VOP), the state's comprehensive outdoor recreation and open space plan. The VOP recognizes the importance of scenery to Virginians and many of the top ten activities are water based.

2(b) Agency Comments. DCR DPRR states that the plan offers the goal of engaging the public in future assessment and management, and this plan will no doubt need educated and dedicated staff for its goals to come to fruition. This need should not be understated in the plan. Where appropriate, how recreational resources associated with the reservoir are related to each other should be highlighted and clearly discussed for the benefit of decision makers.

The clarification of recreational areas conducive for non-motorized boating should be mentioned since this is a growing area of interest in Virginia. With regard to this and other non-motorized water activities, recreational management options which include no wake zones may be appropriate in certain areas.

The way this plan fits into each of the states' State Comprehensive Outdoor Recreation Plans (SCORPs) could be mentioned. While land and water conservation funds may not apply on the reservoir, the outdoor planning the SCORPs afford each state should not be overlooked. For example, the access to water via this TVA project work may help meet one of Virginia's most popular recreational resources.

Additionally, there is little in the plan regarding the protection and preservation of scenic resources, which are abundant within the coverage area of the plan. DCR DPRR

suggests that under Sensitive Biological Resources a discussion and management strategy be included of identified scenic resources within their planning area. Identification and protection of these resources are within the responsibility of TVA as acknowledged by Arthur E. Morgan, the first chairman of the TVA board.

Further it is recommended that under the Sensitive Biological Resources section that the Virginia Scenic River Program be introduced as a laudable goal for the rivers within TVA's lands. This program gives a framework for educated citizens to create an awareness of the benefits and uniqueness of their local natural resources. It also integrates land and water stewardship for the optimum public benefit in conjunction with providing awareness that helps protect and manage the river resources within the Tennessee River System. Many localities also use it as an environmental tourism tool, which is economically helpful. The implementation of the Virginia's Scenic River program would support all of the strategic Objectives of the NRP, Water Resources Protection and Improvement, and Sustainable Land Use and natural Resource Management, while actively engaging the public, especially if a local river committee was formed. Additional information on the Scenic River Program is available on the DCR website at the following address: www.dcr.virginia.gov/recreational_planning/srmain.shtml.

2(c) Agency Recommendations. The DCR DPRR has the following recommendations:

- Ensure the document reflects the need that educated and dedicated staff will be needed to implement the plan.
- Where appropriate, highlight the interconnectivity of recreational resources associated with the reservoir.
- Clearly discuss the interconnectivity of recreational activities.
- Clarify that recreational areas conducive for non-motorized boating are a growing area of interest in Virginia.
- Describe how this plan relates to each of the states' State Comprehensive Outdoor Recreation Plans (SCORPs).
- Include a discussion and management strategy of identified scenic resources within their respective planning area under Sensitive Biological Resources.
- Under the Sensitive Biological Resources section, introduce the Virginia Scenic River Program as a laudable goal for the rivers within TVA's lands.

Contact DCR DPRR (Lynn Crump at *Lynn.Crump@dcr.virginia.gov*) for additional information about these comments and recommendations.

3. Natural Heritage Resources.

3(a) Agency Jurisdiction. The mission of DCR is to conserve Virginia's natural and recreational resources. The DCR Division of Natural Heritage's (DNH) mission is conserving Virginia's biodiversity through inventory, protection and stewardship. The Virginia Natural Area Preserves Act, 10.1-209 through 217 of the Code of Virginia, was passed in 1989 and codified DCR's powers and duties related to statewide biological

inventory: maintaining a statewide database for conservation planning and project review, land protection for the conservation of biodiversity, and the protection and ecological management of natural heritage resources (the habitats of rare, threatened and endangered species, significant natural communities, geologic sites, and other natural features).

3(b) Agency Findings. According to the information currently in DCR's files, Smooth coneflower (*Echinacea laevigata*, G2G3/S2/LE/LT) populations have the potential to occur at Clear Creek Lake Dam project area. Smooth coneflower, the only native purple coneflower in Virginia, is a perennial herb with pink ray flowers. Throughout its range, this species is known from xeric woodlands and meadows, usually on basic or circumneutral soils over basic rock. In Virginia, the parent rocks include limestone, diabase, and gabbro. It requires relatively open areas created by natural disturbances; particularly fire (Ludwig, 1991). Smooth coneflower is threatened by the loss of naturally open habitat and over-collection (Ludwig, 1991). It is known from more than 40 occurrences in Virginia. This species is currently classified as endangered by the U.S. Fish and Wildlife Service (FWS) and as threatened by the Virginia Department of Agriculture and Consumer Services (VDACS). Under a Memorandum of Agreement established between the Virginia Department of Agriculture and Consumer Services (VDACS) and DCR, DCR has the authority to report for VDACS on state-listed plant and insect species.

3(c) State Natural Area Preserves. DCR's files do not indicate the presence of any State Natural Area Preserves under the agency's jurisdiction. DCR states that Beaver Creek dam is within Sugar Hollow Park.

3(d) Agency Recommendations. DCR has following recommendations:

- Since new and updated information is continually added to the Biotics Data System, contact DCR DNH at (804) 786-7951 for site-specific information.
- Due to the potential for this site to support populations of Smooth coneflower, DCR recommends an inventory for the resource in the area noted on the attached map if disturbance will occur in this area. With the survey results, DCR can more accurately evaluate potential impacts to natural heritage resources and offer specific protection recommendations for minimizing impacts to the documented resources. (DCR did not provide a copy of the map. Contact DCR -- Robbie Rhur at *Robbie.Rhur@dcr.virginia.gov* -- directly.)
- Contact the City of Bristol for additional information regarding Beaver Creek dam (*www.bristolva.org/parks.html*).
- Contact DCR DNH (J. Christopher Ludwig, Natural Heritage Inventory Manager, at *Chris.Ludwig@dcr.virginia.gov* or 804-371-6206) to discuss arrangements for field work. A list of other individuals who are qualified to conduct inventories may be obtained from the FWS. DCR DNH biologists are qualified and available to conduct inventories for rare, threatened, and endangered species.

4. Wildlife Resources.

4(a) Agency Jurisdiction. The Department of Game and Inland Fisheries (DGIF), as the Commonwealth's wildlife and freshwater fish management agency, exercises enforcement and regulatory jurisdiction over wildlife and freshwater fish, including state or federally listed endangered or threatened species, but excluding listed insects (Virginia Code Title 29.1). DGIF is a consulting agency under the U.S. Fish and Wildlife Coordination Act (16 U.S.C. sections 661 *et seq.*) and provides environmental analysis of projects or permit applications coordinated through DEQ and several other state and federal agencies. DGIF determines likely impacts upon fish and wildlife resources and habitat, and recommends appropriate measures to avoid, reduce or compensate for those impacts.

4(b) Agency Comments. DGIF states that the Tennessee drainage in Virginia is known to support a large number of Virginia's imperiled aquatic species as well as some imperiled terrestrial species, as identified in the NRP. This area is considered a global "biological hot spot" for imperiled aquatic species. DGIF uses a significant amount of resources to manage, protect and recover imperiled wildlife and their habitats within this region of the Commonwealth. DGIF is supportive of TVA's initiatives to protect and manage such wildlife resources through the stewardship and management of its lands and waters within this region of Virginia.

DGIF is willing to partner with TVA, as appropriate, to develop management scenarios that allow for increased recreational access to and use of its lands while continuing to manage and protect the unique natural resources known from TVA's lands and waters in Virginia. DGIF looks forward to working with TVA to implement the biological resources management and recreational access initiatives as described in the NRP.

DGIF states that it maintains the Aquatic Wildlife Conservation Center (AWCC) at a hatchery in Marion. This facility gives DGIF the opportunity to propagate species of mollusks, fishes and amphibians native to the Tennessee drainage, and other drainages, for the purposes of research and the recovery of these species and those closely associated with them. DGIF is interested in finding ways to work cooperatively with TVA towards meeting the goals supported by the AWCC through funding opportunities available through TVA and its partners.

DGIF understands that economic factors must be considered when developing TVA lands and waters management scenarios, but encourages the TVA to implement as many of the forward-thinking initiatives from the Flagship Management alternative as necessary. DGIF understands that a blended management structure may be the most practical alternative.

4(c) Agency Recommendations. DGIF has the following recommendations for TVA:

- Contact DGIF (Amy Ewing at 804-367-2211) as necessary to evaluate specific projects occurring within Virginia, so that DGIF may have the opportunity to guide the work in a manner that benefits its constituents and the species and programs for which DGIF is responsible.
- Contact DGIF (Mike Pinder, DGIF Region III Aquatic Biologist, at 540-961-8387 or *Mike.Pinder@dgif.virginia.gov*) to discuss how TVA can assist DGIF in its efforts to recover highly imperiled species native to the Tennessee drainage.

5. Historic Architectural Resources.

5(a) Agency Jurisdiction. The Department of Historic Resources (DHR) conducts reviews of projects to determine their effect on historic structures or cultural resources under its jurisdiction. DHR, as the designated State's Historic Preservation Office, ensures that federal actions comply with Section 106 of the National Historic Preservation Act of 1966, as amended, and its implementing regulation at 36 CFR Part 800. The preservation act requires federal agencies to consider the effects of federal projects on properties that are listed or eligible for listing on the National Register of Historic Places. Section 106 also applies if there are any federal involvements, such as licenses, permits, approvals or funding. DHR also provides comments to DEQ through the state environmental impact report review process.

5(b) Agency Comment. DHR states that it will respond directly to the TVA.

6. Local and Regional Comments.

6(a) Jurisdiction. In accordance with the Code of Virginia, Section 15.2-4207, planning district commissions encourage and facilitate local government cooperation and state-local cooperation in addressing, on a regional basis, problems of greater than local significance. The cooperation resulting from this is intended to facilitate the recognition and analysis of regional opportunities and take account of regional influences in planning and implementing public policies and services. Planning district commissions promote the orderly and efficient development of the physical, social and economic elements of the districts by planning, and encouraging and assisting localities to plan for the future.

6(b) Comments. The Mount Roger Planning District Commission, Washington County and the City of Bristol did not respond to DEQ's request for comments.

TVA PEIS Natural Resource Plan
DEQ 11-060F

REGULATORY AND COORDINATION NEEDS FOR FUTURE PROJECTS

1. Surface Waters and Wetlands. Conduct pre-application coordination with all applicable state agencies, including DEQ (Allen Newman at 276-676-4804) and VMRC (Justin Worrell at 757-247-8063), that may have jurisdiction over the proposed project. Contact VMRC (Justin Worrell at 757-247-8063) for information on submitting a JPA regarding site-specific projects.

2. Natural Heritage Resources.

- Contact the DCR DNH at (804) 786-7951 for an update on natural heritage information for site-specific projects.
- Contact the City of Bristol for additional information regarding Beaver Creek dam (*www.bristolva.org/parks.html*).
- Contact DCR DNH (J. Christopher Ludwig, Natural Heritage Inventory Manager, at *Chris.Ludwig@dcr.virginia.gov* or 804-371-6206) to discuss arrangements for field work related to inventories.

3. Wildlife Resources. Contact DGIF (Amy Ewing at 804-367-2211) as necessary to evaluate specific projects occurring within Virginia, so that DGIF may have the opportunity to guide the work in a manner that benefits its constituents and the species and programs for which DGIF is responsible.

4. Site-Specific Reviews.

- DEQ encourages TVA to submit site-specific environmental documents as required under the National Environmental Policy Act (NEPA) and the State Corporation Commission's laws and regulations. Other state approvals which may apply to future site-specific projects may not be included in this review. TVA must ensure that future projects in Virginia are constructed and operated in accordance with all applicable federal, state and local laws and regulations.

- Site-specific environmental documents should be submitted to the DEQ Office of Environmental Impact Review (Attention: Ms. Ellie Irons), P.O. Box 1105, Richmond, VA 23218. Please submit one hard copy for DEQ and each affected locality and associated planning district commission as well as 16 compact discs (CDs) with electronic copies or provide a website or FTP site for distribution during a coordinated review.

9

CONCLUSION

Thank you for the opportunity to review the PEIS. DEQ supports the implementation of either Alternative C or Alternative D for the proposed activities. DGIF encourages the TVA to implement as many of the forward-thinking initiatives from Alternative C – Flagship Management as necessary but understands that a blended management structure (Alternative D) may be the most practical alternative. Participating reviewing agencies have no objection to the preferred alternative.

We look forward to reviewing future, site-specific projects located in Virginia as well as those located outside the Commonwealth with the potential to affect Virginia's environment and natural resources. Detailed comments of reviewing agencies are attached for your review. Please contact me at (804) 698-4325 or Julia Wellman at (804) 698-4326 for clarification of these comments.

Sincerely,

Ellie L. Irons, Manager
Office of Environmental Impact Review

Enclosures

cc: Dave Barrett, Mount Rogers PDC
Mark K. Reeter, Washington County
James F. Rector, City of Bristol

ec: Amy Ewing, DGIF
Robbie Rhur, DCR
Keith Tignor, VDACS
Allen Newman, DEQ SWRO
Roger Kirchen, DHR

Virginia Department of Game and Inland Fisheries

Wellman, Julia (DEQ)

From: Ewing, Amy (DGIF)
Sent: Monday, May 09, 2011 1:38 PM
To: Wellman, Julia (DEQ)
Cc: jgfouse@tva.gov; Watson, Brian (DGIF); Pinder, Mike (DGIF); Reynolds, Rick (DGIF); Kittrell, Bill (DGIF); Boynton, Allen (DGIF)
Subject: ESSLog# 31714_11-060F_TVA Natural Resource Plan and Programmatic EIS

Please see updated comments in bold below:

We have reviewed Tennessee Valley Authority's (TVA) Natural Resource Plan (NRP) and Programmatic EIS and offer the following comments.

The Tennessee drainage in VA is known to support a large number of Virginia's imperiled aquatic species as well as some imperiled terrestrial species, as identified in the NRP. In fact, this area is considered a global bio hot spot for imperiled aquatic species. Our agency spends a lot of effort to manage, protect, and recover imperiled wildlife and their habitats within this region of the Commonwealth. We are supportive of TVA's initiatives to protect and manage such wildlife resources through the stewardship and management of their lands and waters within this region of VA.

We are happy to partner with TVA, as appropriate, to develop management scenarios that allow for increased recreational access to and use of their lands while continuing to manage and protect the unique natural resources known from TVA's lands and waters in Virginia. We look forward to working with TVA to implement their Biological Resources Management and Recreational access initiatives as described in the NRP.

We understand that economic factors must be considered when developing TVA lands and waters management scenarios, but encourage the TVA to implement as many of the forward-thinking initiatives from the Flagship Management alternative as necessary. We understand that a blended management structure may be the most practical alternative.

We further encourage TVA to contact us as necessary to evaluate specific projects occurring within Virginia so that we may have the opportunity to guide the work in a manner that benefits our constituents and the species and programs for which we are responsible.

We currently maintain the Aquatic Wildlife Conservation Center (AWCC) at our hatchery in Marion, VA. This facility allows us the opportunity to propagate species of mollusks, fishes, and amphibians native to the Tennessee drainage, and other drainages, for the purposes of research and the recovery of these species and those closely associated with them. We are interested in finding ways to work cooperatively with TVA towards meeting the goals supported by the AWCC through funding opportunities available through TVA and it's partners. Mike Pinder, VDGIF Region III Aquatic Biologist, may be contacted at 540-961-8387 or Mike.Pinder@dgif.virginia.gov to further discuss how TVA can assist us in our efforts to recover highly imperiled species native to the Tennessee drainage.

Thank you,
Amy

Amy Ewing
Environmental Services Biologist
VA Dept. of Game and Inland Fisheries
4010 W. Broad Street
Richmond, VA 23230
804-367-2211
amy.ewing@dgif.virginia.gov

Douglas W. Domenech
Secretary of Natural Resources

David A. Johnson
Director

COMMONWEALTH of VIRGINIA

DEPARTMENT OF CONSERVATION AND RECREATION

203 Governor Street
Richmond, Virginia 23219-2010
(804) 786-1712

MEMORANDUM

DATE: April 20, 2011

TO: Julia Wellman, DCR

FROM: Roberta Rhur, DCR, Environmental Impact Review Coordinator

Subject: DEQ 11-060F, TVA Natural Resource Plan

Division of Planning and Recreational Resources

The Department of Conservation and Recreation (DCR), Division of Planning and Recreational Resources (PRR), develops the *Virginia Outdoors Plan* and coordinates a broad range of recreational and environmental programs throughout Virginia. These include the Virginia Scenic Rivers program; Trails, Greenways, and Blueways; Virginia State Park Master Planning and State Park Design and Construction.

DCR finds the plan comprehensive and well thought out and DCR/PRR staff would like to make the following recommendations and comments. The plan offers the goal of engaging the public in future assessment and management, this plan will no doubt need educated and dedicated staff for its goals to come to fruition. This need should not be understated in the plan.

Where appropriate, the interconnectivity of recreational resources associated with the reservoir should be highlighted. The document does a great job of talking about each of the recreational activities and interconnectivity is inferred, but should be articulated to clearly leaves decision makers with the knowledge that all these activities on this resource work together to create and awesome resource. At some point in the document, the clarification of recreational areas conducive for non-motorized boating should be mentioned as this a growing area of interest in Virginia. With regard to this and other non-motorized water activities, recreational management options which include no wake zones may be appropriate in certain areas.

The way this plan fits into each of the states' State Comprehensive Outdoor Recreation Plans (Scarps) could be mentioned. While Land and Water Conservation Funds may not apply on the reservoir, the outdoor planning the SCORPs afford each state should not be overlooked. For example, the access to water via this TVA project work may help meet one of Virginia's most popular recreational resources.

Additionally, there is little in it regarding the protection and preservation of scenic resources, which are abundant within the coverage area of the plan. We suggest that under Sensitive Biological Resources a discussion and management strategy be included of identified scenic resources within their planning area.

Identification and protection of these resources is within the responsibility as acknowledged by "Arthur E. Morgan, the first chairman of the TVA board, to the agency on March 2, 1956, highlighting the importance of TVA's involvement in preserving and protecting the Valley's lands."

Further it is recommended that under the Sensitive Biological Resources section that the Virginia Scenic River Program be introduced as a laudable goal for the rivers within TVA's lands. This program gives a framework for educated citizens to create an awareness of the benefits and uniqueness of their local natural resources. It also integrates land and water stewardship for the optimum public benefit in conjunction with providing awareness that helps protect and manage the river resources within the Tennessee River System. Many localities also use it as an environmental tourism tool, which is economically helpful. The implementation of the Virginia's Scenic River program would support all of the strategic Objectives of the NRP, Water Resources Protection and Improvement, and Sustainable Land Use and natural Resource Management, while actively engaging the public, especially if a local river committee was formed. There is additional information on the Program at the following website: http://www.dcr.virginia.gov/recreational_planning/srmain.shtml

Please feel free to contact Lynn Crump, if you have additional questions on the Scenic River Program or protection of scenic resources.

Division of Natural Heritage

The Division of Natural Heritage (DCR) has searched its Biotics Data System for occurrences of natural heritage resources from the area outlined on the submitted map. Natural heritage resources are defined as the habitat of rare, threatened, or endangered plant and animal species, unique or exemplary natural communities, and significant geologic formations.

According to the information currently in our files, Smooth coneflower (*Echinacea laevigata*, G2G3/S2/LE/LT) populations have the potential to occur at Clear Creek Lake Dam project area. Smooth coneflower, the only native purple coneflower in Virginia, is a perennial herb with pink ray flowers. Throughout its range, this species is known from xeric woodlands and meadows, usually on basic or circumneutral soils over basic rock. In Virginia, the parent rocks include limestone, diabase, and gabbro. It requires relatively open areas created by natural disturbances; particularly fire (Ludwig, 1991). Smooth coneflower is threatened by the loss of naturally open habitat and over-collection (Ludwig, 1991). It is known from more than 40 occurrences in Virginia. Please note that this species is currently classified as endangered by the United States Fish and Wildlife Service (USFWS) and as threatened by the Virginia Department of Agriculture and Consumer Services (VDACS).

Due to the potential for this site to support populations of Smooth coneflower, DCR recommends an inventory for the resource in the area noted on the attached map if disturbance will occur in this area. With the survey results we can more accurately evaluate potential impacts to natural heritage resources and offer specific protection recommendations for minimizing impacts to the documented resources.

DCR-Division of Natural Heritage biologists are qualified and available to conduct inventories for rare, threatened, and endangered species. Please contact J. Christopher Ludwig, Natural Heritage Inventory Manager, at chris.ludwig@dcr.virginia.gov or 804-371-6206 to discuss arrangements for field work. A list of other individuals who are qualified to conduct inventories may be obtained from the USFWS.

Under a Memorandum of Agreement established between the Virginia Department of Agriculture and Consumer Services (VDACS) and the Virginia Department of Conservation and Recreation (DCR), DCR represents VDACS in comments regarding potential impacts on state-listed threatened and endangered plant and insect species. Survey results should be coordinated with DCR-DNH and USFWS. Upon review

of the results, if it is determined the species is present, and there is a likelihood of a negative impact on the species, DCR-DNH will recommend coordination with VDACS to ensure compliance with Virginia's Endangered Plant and Insect Species Act.

In addition, our files do not indicate the presence of any State Natural Area Preserves under DCR's jurisdiction in the project vicinity. Please note the Beaver Creek dam is within Sugar Hollow Park. Please contact the City of Bristol for additional information regarding this managed land (http://www.bristolva.org/parks.html)

New and updated information is continually added to Biotics. Please contact DCR for an update on this natural heritage information if a significant amount of time passes before it is utilized.

The Virginia Department of Game and Inland Fisheries maintains a database of wildlife locations, including threatened and endangered species, trout streams, and anadromous fish waters that may contain information not documented in this letter. Their database may be accessed from http://vafwis.org/fwis/ or contact Shirl Dressler at (804) 367-6913.

The remaining DCR divisions have no comments regarding the scope of this project. Thank you for the opportunity to comment.

Cc: Tylan Dean, USFWS

Literature Cited

Ludwig, J.C. 1991. Smooth Coneflower. In Virginia's Endangered Species: Proceedings of a Symposium. K. Terwilliger ed. The McDonald and Woodward Publishing Company, Blacksburg, Virginia. Pp. 144-145.

MEMORANDUM

VIRGINIA DEPARTMENT OF ENVIRONMENTAL QUALITY
DIVISION OF WATER QUALITY
Ellen Gilinsky, Ph.D., Director

TO: Julia Wellman
Office of Environmental Impact Review

FROM: Michelle Henicheck
Office of Wetlands and Water Protection

DATE: May 3, 2011

SUBJECT: TVA Natural Resource Plan and EIS
11-060F

The Department of Environmental Quality (DEQ) has reviewed the information for the above-referenced project. The Tennessee Valley Authority (TVA) has developed a draft Natural Resource Plan (NRP) and associated programmatic environmental impact statement (EIS) to evaluate the implementation and management of TVA's reservoir lands planning, biological and cultural resources management, water resources management, and recreation programs. The purpose of this study is to develop a plan that will allow TVA to proactively manage these resources of the Tennessee Valley over the next 20 years.

The objective of TVA's biological and cultural resources management is to implement sustainable practices to balance protection of natural and cultural resources while providing dispersed recreation opportunities across the region. The goal of TVA's recreation strategy is to work with regional partners to enhance existing recreation opportunities and address unmet recreation needs, while managing resources on and along the Tennessee River system.

TVA decided on four future program options each for biological and cultural resources management, recreation management, and water resource management, and three future options for reservoir lands planning. The four future options for biological and cultural resources management, recreation management, and water resource management are current management, custodial management, enhanced management, and flagship management

Section 5.5 on page 227 analyzes impacts to wetland that are associated with the four alternatives, including direct, indirect, and cumulative impacts. Under Alternative C (Flagship Management Alternative), TVA would explore, pilot/test, and implement new strategies for enhancing wetland stewardship. This would include development and implementation of a wetland management policy that includes a proactive program for wetland identification, management, and protection on TVA-managed lands. Implementation of the proposed action would result in a positive effect on wetlands on TVA-managed lands, and no direct or indirect adverse wetland impacts would result from this alternative.

Under Alternative D (Blended Management Alternative), TVA mixes portions of the programs and activities as described under Alternatives B (Custodial Management Alternative) and C. The direct, indirect, and cumulative impacts on wetlands would be similar to those described under the Flagship Management Alternative. As strategic partnerships and resources become available, TVA would enhance management of both the in-house wetland database and wetlands on its lands.

According to the report, under any of the alternatives, TVA would comply with all applicable federal, state, and local regulations. Likewise, prior to approving any proposal to use TVA land, TVA would conduct an appropriate level of site-specific environmental review to determine the potential environmental effects of the proposed use. DEQ agrees with the use of either Alternatives C or D for the proposed activities.

If impacts to State Waters are proposed, a Joint Permit Application (JPA) should be submitted to the Virginia Marine Resources Commission (VMRC). The DEQ Southwest Regional Office will make the final permit decision regarding potential impacts to State Waters.

Once a final strategy has been developed, any activities requiring instream work should be performed in the dry utilizing cofferdams, stream diversions and / or working during low flow conditions. Heavy equipment should work from uplands to the greatest extent possible and utilize mats and strict erosion and sediment controls for work that must be conducted from within surface waters. Caution should be taken to ensure prevention of the release of any oil or fuel from heavy equipment into surface waters. All disturbed stream beds should be restored to their original contours prior to redirecting the stream into the work area.

Unavoidable permanent impacts to all wetlands or to streams in excess of three hundred linear feet will require mitigation through the purchase of mitigation bank credits or through the creation, enhancement or preservation of wetlands or streams within the project's watershed. Restore temporary impact areas to their original contours and revegetate with the same or similar species.

We recommend strict adherence to erosion and stormwater management practices, and further encourage the project proponent to monitor construction activities to make certain that erosion and stormwater management practices are adequately preventing sediment and pollutant migration into surface waters, including wetlands.

Virginia Department of Transportation

TVA CCMS - View Comments Page 1 of 1

Name: Donald Necessary

Comments: The VDOT Bristol District Planning Division has reviewed the Tennessee Valley Authority's submission of proposed land use and management plan. No existing or future transportation projects will be impacted in Virginia.

All lands being developed in Virginia are subject to the following regulations. Each of the regulations define the procedures required in the development of property or changes in land use:

http://www.vdot.virginia.gov/projects/chapter527/default.asp - This document provides guidance on the details of §15.2-2222.1 of the Code and its supporting regulations that establish the rules, procedures, and deadlines for VDOT's review of local government comprehensive plans/plan amendments and traffic impact analyses for certain rezoning applications, site plans and subdivision plats.

http://www.virginiadot.org/projects/accessmgt/default.asp - The access management regulations and standards for principal arterials began implementation on July 1, 2008. Minor arterial, collector, and local streets regulations will be implemented on October 1, 2009.

Should you have any additional questions or comments, please advise.

Comment Letters from Federally Recognized Tribes

Eastern Band of Cherokee Indians
Tribal Historic Preservation Office
P.O. Box 455
Cherokee, NC 28719
Ph: 828-554-6852 Fax 828-488-2462

DATE: 3 - June - 11

TO: Tennessee Valley Authority
Patricia Bernard Ezzell
400 W. Summit Hill Drive
WT 11D – Cultural Resources
Knoxville, TN 37902

PROJECT(S): **Comments regarding the draft Natural Resource Plan.**

The Tribal Historic Preservation Office of the Eastern Band of Cherokee Indians (EBCI THPO) is in receipt of the notification to act as a consulting party for the above-referenced project information and would like to thank you for the opportunity to comment on this proposed section 106 of the National Historic Preservation Act (NHPA) activity. The EBCI THPO accepts the invitation to act as a consulting party on the above referenced section 106 undertaking as mandated under §36 CFR 800.

The EBCI THPO recognizes the draft Natural Resource Plan (NRP) was constructed "to enable TVA to better balance its stewardship objectives and obligations while working within resource and financial considerations." However, it is the opinion of the EBCI THPO that a monetary value cannot be placed on some resources, such as non-renewable cultural resources. Given that the TVA holds nearly 293,000 acres of reservoir land, approximately 11,000 miles of shoreline, and nearly 42,000 miles of tributary streams and rivers, the protection of cultural resources should be the TVA's first priority.

Continuing the *Custodial* level of cultural resource stewardship, while working within the letter of the NHPA, does not move the TVA into the spirit of the NHPA. For example, how does the suggestion of monitoring 1.1 to a total of 2.1 miles of shoreline exemplify a *Flagship* management level? With nearly 11,000 miles shoreline, 2.1 miles of shoreline monitoring is not even a drop in the bucket.

Likewise, with only two TVA ARPA dedicated law enforcement officers, how does the TVA intend to ramp up ARPA inspections from the *Custodial* level "by reported incident" to between 2,500 and 5,000 annual inspections for the *Enhanced* and *Flagship* levels? From reported incidents to 2,500 inspections annually is an enormous jump. Is it even wise to consider this percentage of increase, and yet only continue to train and outfit the 2 current officers?

Please define your custodial tasks as they pertain to cultural resources. With such an enormous land base impacting such a wide cross section of the Cherokee traditional territory, the EBCI THPO defines the TVA's task as protecting all currently known sites from development, wave action, looting and etc. Likewise, utilizing section 106 of the NHPA as a starting point, the TVA should work on protecting unknown sites, and

moderate and high probability areas from similar threats to one of the TVA's most important non-renewable resource.

Similarly, how does the TVA define their section 110 of the NHPA obligations when it comes to archeological surveys of their own properties? While the EBCI THPO recognizes that the NHPA never adequately determined a federal agencies level of involvement, it seems that 1,000 acres under the *Custodial* level pales in comparison to the 293,000 acres of reservoir land, 11,000 miles of shoreline, and nearly 42,000 miles of tributary streams and rivers, much of which lays within high probability areas.

How does the TVA know if they are doing enough to fulfill their section 110 of the NHPA responsibilities? For example, if TVA holds 293,000 acres of reservoir lands, it will take roughly 293 years to conduct the required archeological field work. Transversally, if TVA holds roughly 53,000 miles of shoreline, rivers, and streams, and conducts shovel tests at 20 meter intervals it will conduct roughly 1.325 million shovel tests. However, it will take 293 years to conduct said tests at the *Custodial* level. With a federal government failing to define the level of involvement under section 110, does the TVA consider 293 years an adequate amount of time to fulfill its section 110 responsibilities? According to the proposals in the NRP, which determined that the preferred alternative lies somewhere between *Custodial* and *Balanced*, the TVA has determined 293 years is appropriate. How does your agency know if it is doing enough beyond the required section 106 responsibilities, in addition to its section 110 responsibilities when considering cultural resources are one of the TVA's most important non-renewable resources?

To reiterate, the EBCI THPO does not believe you can place a monetary value upon cultural resources. It would be an affront to our Tribal Elders to state that such important Cherokee sites such as Chota or Nickojack were damaged because the lead federal agency who is in charge of their stewardship did not find it economically beneficial to monitor, stabilize, or protect the sites. Many such sites are held in stewardship by the TVA not only for their importance to Cherokee history, but to the larger aspects of United States history. Nor can one place a value upon the dignity of the resting places of the dead. Former Cherokee villages, which played an integral part in Cherokee and emerging US history, are also the resting places for untold numbers of Cherokee ancestors. TVA is looked upon as the federal stewards of both these sites, and the burial contained therein, and the EBCI THPO does not believe placing a dollar value upon such resources is neither within the spirit of cultural resource management, nor being a good neighbor.

We look forward to continuing the consultations regarding the NRP, and associated documents. If we can be of further service, or if you have any comments or questions, please feel free to contact me at (828) 554-6852.

Sincerely,

Tyler B. Howe
Tribal Historical Preservation Specialist
Eastern Band of Cherokee Indians