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WATTS BAR RESERVOIR
LAND MANAGEMENT PLAN AMENDMENT
FINAL
SUPPLEMENTAL ENVIRONMENTAL ASSESSMENT
Loudon, Meigs, Rhea, and Roane Counties, Tennessee

Prepared by:
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KNOXVILLE, TENNESSEE

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Table of Contents

List of Appendices

List of Tables

List of Figures

Symbols, Acronyms, and Abbreviations

§	Section
APE	Area of Potential Impact
BMP	Best Management Practices
CAA	Clean Air Act
CEO	Chief Executive Officer
CFR	Code of Federal Regulations
cfs	Cubic Feet per Second
cfs/sq mi	Cubic Feet per Second per Square Mile
CRM	Clinch River Mile
CVLP	Comprehensive Valleywide Land Plan
CWA	Clean Water Act
dBA	Decibels on the A-Weighted Scale
DO	Dissolved Oxygen
EA	Environmental Assessment
EIS	Environmental Impact Statement
EO	Executive Order
ESA	Endangered Species Act
FRP	Flood Risk Profile
FONSI	Finding of No Significant Impact
HUCs	Hydrologic Unit Codes
MSL	Mean Sea Level
NEPA	National Environmental Policy Act
NPS	Nonpoint Source
NRHP	National Register of Historic Places
NRP	Natural Resource Plan
NWI	National Wetland Inventory
PCB	Polychlorinated biphynol
RLMP	Reservoir Land Management Plan
SHPO	State Historic Preservation Officer
SMI	Shoreline Management Initiative
SMP	Shoreline Management Policy
TRM	Tennessee River Mile
TVA	Tennessee Valley Authority
TWRA	Tennessee Wildlife Resources Agency
U.S.	United States
USACE	United States Army Corps of Engineers
USCG	United States Coast Guard
USEPA	United States Environmental Protection Agency
USFWS	United States Fish and Wildlife Service
Valley	Tennessee River Valley Region

CHAPTER 1 – PURPOSE AND NEED FOR ACTION

1.1 Introduction

The Tennessee Valley Authority (TVA) prepares reservoir land management plans (RLMPs) to guide land use approvals, private water use facility permitting, and resource management decisions on TVA-managed public lands. In February of 2009, TVA issued the *Watts Bar Reservoir Land Management Plan and Environmental Impact Statement* (TVA 2009) that examined the potential effects of several alternative methods proposed to manage the 16,220 acres of public lands on and surrounding Watts Bar Reservoir (see Figure 1). On November 19, 2009, the TVA Board of Directors (Board) approved the 2009 Watts Bar Reservoir Land Management Plan (2009 RLMP).

After the 2009 RLMP and Environmental Impact Statement (EIS) were issued, TVA prepared an Errata Sheet that lists the 2009 RLMP and EIS corrections. In addition, TVA prepared the 2012 Kingston Recovery Project Land Management Plan (TVA 2012) to address eight of nine parcels on Watts Bar Reservoir that were impacted by the 2008 Kingston Fossil Plant ash spill.

TVA now proposes to amend the 2009 RLMP to change the land use allocations on six parcels in both Rhea and Roane Counties. The land use allocation changes are proposed in response to new issues and changes in conditions and circumstances that affect approximately 226 acres of TVA-managed property on Watts Bar Reservoir.

The six allocation changes are proposed in response to the following:

- Changes in ownership and use of adjacent private property (Parcels 153 and 197)
- Changes in shoreline access rights on adjacent private property (Parcels 89 and 256)
- Changes in proposed land uses on adjacent TVA reservoir property (Parcels 144 and 271)

The land use allocations on other Watts Bar Reservoir parcels would remain as described in the 2009 RLMP and its related supplements.

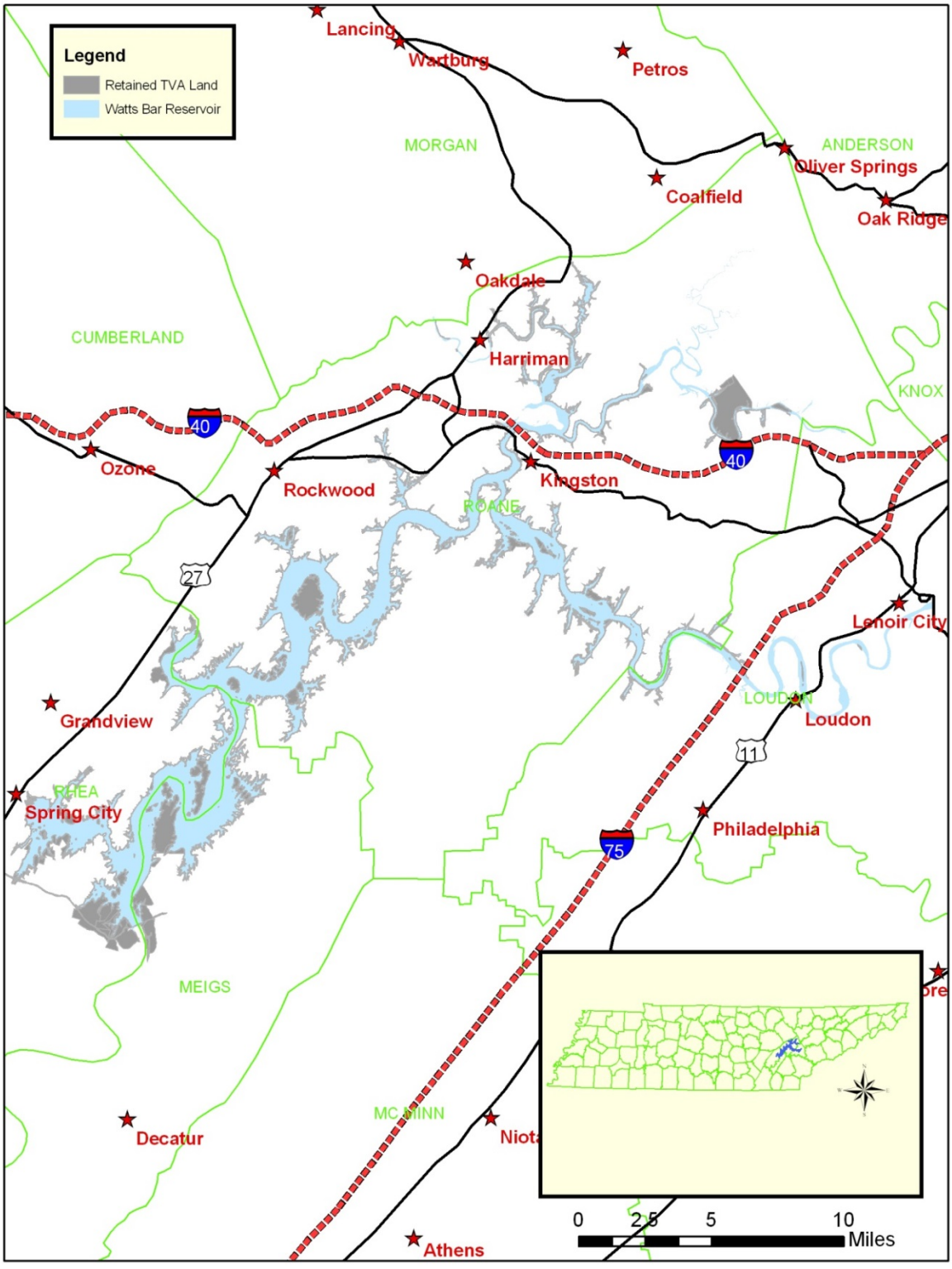


Figure 1-1. Watts Bar Reservoir Vicinity Map

1.2 Background

Shortly after its creation in 1933, TVA began a dam and reservoir construction program that required the purchase of approximately 1.3 million acres of land for the creation of 46 reservoirs within the Tennessee River Valley region (Valley). Most of these lands are located underneath the water of the reservoir system or have since been sold by TVA or transferred to other state or federal agencies. Today, TVA has custody and control of approximately 293,000 acres of reservoir property and approximately 470,000 acres of inundated property on behalf of the United States (U.S.) (collectively referred to as TVA public land). TVA also administers various land rights over privately owned land for the purpose of managing the TVA reservoir system. Approximately 37,000 acres are managed by TVA for power/corporate operations.

TVA manages 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 promote the continuing economic growth of the region. As part of the implementation of these goals, TVA develops RLMPs to integrate land and water program goals, to balance competing and sometimes conflicting resource uses, and to provide for optimum public benefit. RLMPs serve to guide decisions for TVA public land use. In managing public lands and resources under its authority, TVA seeks to provide effective and efficient management of natural, cultural, visual, and recreational resources to meet all regulatory requirements and applicable guidelines. TVA's reservoir lands planning processes must be consistent with TVA's policies and plans as well as TVA's responsibilities under the TVA Act of 1933, as amended.

In November of 2006, the TVA Board of Directors (Board) approved the TVA Land Policy to govern the retention, disposal, and planning of interests in real property. This policy provides for the continued development of RLMPs for reservoir properties with public input and with the approval of the Board or its designee. Up-to-date RLMPs are needed to make land planning allocations on reservoirs consistent with standing TVA policies like the Land Policy and the Shoreline Management Policy, regulations such as those promulgated under Section 26a of the TVA Act, and other guidance incorporating TVA's goals for managing natural resources on TVA public lands. RLMPs govern decisions about whether land is disposed of or retained and establish how the land may be used and by whom.

After TVA approves a RLMP for a reservoir, all future uses of TVA-managed lands on that reservoir must then be consistent with the land use allocations within that RLMP. In accordance with TVA policies and guidelines, allocation changes after the completion of a RLMP and, therefore, outside of the normal planning process (i.e., off-cycle) are allowable under the following circumstances:

(1) To correct administrative errors that occurred during the planning process;

(2) To implement TVA's Shoreline Management Policy, and

(3) To allow water-access for industrial or commercial recreation operations on backlying property.

Allocation changes that are needed for purposes other than those listed above must be completed during the normal land planning cycle. The proposed land use allocation

changes on Watts Bar Reservoir do not meet the criteria for an off-cycle allocation change, and therefore, TVA is engaging in a formal lands planning process with respect to these parcels.

On August 18, 2011, the Board approved TVA's Natural Resource Plan (NRP) and authorized the Chief Executive Officer (CEO) to implement it. The NRP guides TVA's natural resource management efforts in the areas of biological, cultural and water resource management, recreation management, public engagement, and reservoir lands planning. The NRP guides TVA to engage in land planning in order to maintain the quality of life in the Valley and balance the sometimes competing needs of shoreline development, recreational use, sensitive and natural resource management, and other important uses. The NRP removed power plant property from planned reservoir lands, which reduced the TVA-managed Watts Bar Reservoir land acreage by about 2,796 acres, from 16,220 acres to 13,425 acres.

The NRP includes a Comprehensive Valleywide Land Plan (CVLP) to guide the use of approximately 293,000 acres of TVA-managed property on 46 reservoirs. This plan identifies the most suitable uses for the land under TVA's control, identifying areas for project operations, sensitive resource management, natural resource conservation, industrial/commercial development, developed recreation, and shoreline access. The CVLP identifies land use allocation ranges that act as targets within which TVA intends to maintain a desired balance of public land uses. In August of 2017, the Board approved updates to the CVLP target ranges. The proposed allocation changes noted in this document fall within the approved CVLP allocation zone ranges.

The CVLP specifies that TVA can 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. The NRP estimated that this change to TVA policies to allow for updates to a portion of a reservoir would likely result in reservoirs being planned on a more regular basis than has occurred in the past, allowing TVA to be more responsive to changing conditions on each reservoir. The proposed update to a portion of Watts Bar Reservoir is consistent with the CVLP.

The purpose of TVA's land planning process is to apply a systematic method of evaluating and identifying the most suitable uses of TVA public lands in furtherance of TVA's responsibilities under the TVA Act and TVA policies and plans. Updates to RLMPs are needed to reflect changing land use needs and/or circumstances and to incorporate TVA's business needs and goals for managing its public lands.

TVA develops RLMPs using a Single-Use Parcel Allocation methodology, which defines separate parcels of reservoir lands and allocates those parcels and affiliated land rights to one of the following land use zones listed below.

TVA Land Planning Zones

Zone 1 - Non-TVA Shoreland

Zone 2 - Project Operations

Zone 3 - Sensitive Resource Management

Zone 4 - Natural Resource Conservation

Zone 5 - Industrial

Zone 6 - Developed Recreation

Zone 7 - Shoreline Access

Land planning zone definitions of the allowable land uses within each TVA land use zone are included as Appendix A.

1.3 Purpose and Need

In order to reflect changes in conditions and circumstances on Watts Bar Reservoir, TVA has prepared the Watts Bar Reservoir Land Management Plan Amendment (RLMP Amendment) to update a portion of Watts Bar Reservoir public lands and to change the land use allocations on six parcels. TVA is preparing this Supplemental EA to assess the impacts of the proposed land use allocation changes on six parcels involving approximately 226 acres of TVA public land on Watts Bar Reservoir.

1.4 Decision to be Made

Of the 13,425 acres of TVA planned reservoir lands on Watts Bar Reservoir, TVA proposes to change the land allocation of 226 acres (0.2 percent). As a result, the proposed allocation change for Parcel 144 would increase Zone 2 (Project Operations) acreage by 172.3 acres, and Zone 3 (Sensitive Resource Management) acreage would decrease by the same 172.3 acres. Likewise, the proposed allocation changes on portions of Parcels 89, 256, and 271 would decrease Zone 4 (Natural Resource Conservation) acreage by approximately 2.7 acres, and the proposed allocation changes for portions of Parcels 197 and 271 would increase Zone 6 (Developed Recreation) acreage by approximately 12.6 acres. Proposed allocation changes would also increase Zone 7 (Shoreline Access) acreage by approximately 30.7 acres, and although portions of Parcels 197 and 256 would no longer be allocated for Zone 7, Parcel 153 (40.6 acres) would revert back to Zone 7 which was its designated allocation prior to the Kingston ash spill.

The TVA Chief Executive Officer (CEO), following an opportunity for review by the Board, will decide whether to adopt the proposed RLMP Amendment or to continue the use of the existing 2009 RLMP.

1.5 Other Pertinent Environmental Reviews or Documentation

Watts Bar Reservoir Land Management Plan (TVA 1988)

In August of 1988, the Board approved the *Watts Bar Reservoir Land Management Plan* (1988 RLMP) to guide TVA resource management and property administration decisions concerning 10,405 acres of TVA land on Watts Bar Reservoir. A multidisciplinary TVA team undertook a detailed planning process that resulted in the land use designations in the 1988 RLMP. Both public input and information from TVA specialists were analyzed in making land use decisions. The 207 tracts of land on Watts Bar Reservoir were allocated under the now retired Multiple-Use Tract Allocation methodology, which assigned one or more of the 19 different land use allocations. Additionally, the 1988 RLMP did not include land already committed to long-term or permanent uses such as tracts encumbered by easements or property used for TVA dam reservations or power plants. Further, the narrow strips of TVA-managed land that fronts properties that TVA had previously sold or transferred, known as marginal strip, were not included under this planning methodology.

Shoreline Management Initiative (SMI): An Assessment of Residential Shoreline Development Impacts in the Tennessee Valley Final Environmental Impact Statement (TVA 1998)

In 1998, TVA completed the SMI EIS analyzing possible alternatives for managing residential shoreline development throughout the Valley. The selected Shoreline Management Plan (SMP) defines the standards for vegetation management, docks, shoreline stabilization, and other residential shoreline alterations. Across the TVA reservoir system, approximately 38 percent of the total shoreline is available for residential development, and one-third of that shoreline had been developed by the mid-1990s.

This Supplemental EA tiers from the Final SMI EIS concerning the categorization and management of TVA-owned shoreline access land along Watts Bar Reservoir. The residential shoreline on Watts Bar Reservoir comprises 340 miles or 47 percent of the total 721 miles of shoreline. In accordance with TVA's SMP, TVA has traditionally categorized the residential shoreline for previous RLMPs based on resource data collected from field surveys. During the development of the SMI EIS, a resource inventory was conducted for sensitive species and their potential habitats, archaeological resources, and wetlands along the residential shoreline. The shoreline categorization system established by the SMP was composed of three categories: Shoreline Protection, Residential Mitigation, and Managed Residential. In its RLMPs, TVA identifies which parcels are eligible to be managed for Zone 7 (Shoreline Access). However, TVA does not identify in the RLMP whether the shoreline access parcels are to be managed for Shoreline Protection, Residential Mitigation, or Managed Residential.

Proposed Water-Access Rights Exchange and Water Use Facilities for the Cove at Blackberry Ridge Final Environmental Assessment (TVA 2008)

In 2008, TVA issued a Final EA and Finding of No Significant Impact (FONSI) for the review of an easement for shoreline access and a Section 26a permit for community water use facilities on Watts Bar Reservoir. Under the proposal, the applicant would relinquish shoreline access rights elsewhere on the reservoir (Parcel 256a) in exchange for gaining shoreline access rights at Parcel 89a. The proposal was in accordance with TVA's Maintain and Gain program under its Shoreline Management Policy, which was implemented to ensure the maintenance of shorelines and the gain of additional public benefits if access rights are to be exchanged. Although TVA ended the Maintain and Gain program in August of 2009, this program was active when this EA was prepared.

In June of 2008, TVA's CEO approved the easement request. However, due to an Office of the Inspector General (OIG) investigation, the Section 26a permit for the community water use facility was not issued, and the easement was not executed. In November of 2016, the applicant re-initiated the request for the land transaction to be executed and TVA re-processed the request. In 2017, TVA reviewed the previous environmental records and considered whether additional environmental information or circumstances exist that could significantly affect the human environment. The 2017 environmental review confirmed that no additional environmental issues existed, it was not necessary to supplement the 2008 EA, and the 2008 FONSI remained valid.

Natural Resource Plan and Final Environmental Impact Statement (TVA 2011a)

TVA developed the NRP to guide its natural resource stewardship efforts. The NRP addresses TVA's management of biological, cultural and water resources, recreation,

reservoir lands planning, and public engagement. The NRP's goal is to integrate the objectives of these resource areas, provide for optimum public benefit, and balance the occasionally conflicting resource use demands. In developing the NRP, TVA completed an EIS (TVA 2011a), which describes the potential resource management programs and activities, alternative approaches to TVA's resource management efforts, and the environmental impacts of the alternatives, including the alternative comprising the NRP.

As part of the NRP, TVA developed a CVLP with target allocation ranges for each land use zone that TVA uses to guide resource management and administration decisions on the approximately 293,000 acres of TVA-managed property around 46 reservoirs. The 2017 Multiple Reservoir Land Management Plans EIS (TVA 2017) updated the CVLP allocation ranges and will inform the next NRP update.

Kingston Fossil Plant Ash Recovery - Proposed Recreation Areas Final Environmental Assessment (TVA 2011b)

In 2011, TVA completed an EA associated with the proposed Kingston ash recovery project. The EA serves to address the potential environmental impacts associated with implementing the 2012 *Kingston Recovery Project Land Management Plan* (2012 Recovery Plan) on Watts Bar Reservoir. Under the preferred alternative, TVA would develop three planned recreation areas and manage the developed recreation area and two green space public use areas. Additionally, TVA would designate land use allocations for eight of the nine parcels excluded from the 2009 RLMP and EIS on Watts Bar Reservoir in the vicinity of the Kingston ash recovery area.

Kingston Recovery Project Land Management Plan on Watts Bar Reservoir (TVA 2012)

On December 22, 2008, a dike failed at Kingston Fossil Plant, releasing roughly 5.4 million cubic yards of coal ash. In January of 2009, it was estimated that approximately 275 acres of TVA and private land were covered with ash, including two coves on Watts Bar Reservoir. Local roads passing Kingston Fossil Plant and about 3,000 feet of rail were damaged when the ash release occurred. Navigation on the Emory River from Emory River mile (ERM) 0 through ERM 4 was temporarily suspended pending cleanup. Beginning in January of 2009, TVA developed a recovery plan to address remediation of the areas affected by the ash spill.

As part of the Kingston recovery process, the 2012 Recovery Plan was completed in April 2012 to address eight of the nine parcels impacted by the ash spill that were excluded from the 2009 RLMP and EIS. This land planning effort allocated land use zones to 143.6 acres of the 184 acres of reservoir property impacted by the ash spill, and the 2012 Recovery Plan supplements the 2009 RLMP. A 40.6-acre parcel (Parcel 153) remained zoned as "Unplanned". The 2012 Recovery Plan indicated that its allocation depended on TVA's business needs, and the allocation would be determined at a later date.

Multiple Reservoir Land Management Plans and Environmental Impact Statement (TVA 2017)

On August 23, 2017, the Board approved the proposed Multiple Reservoir Land Management Plans for TVA-managed public lands on eight reservoirs in Alabama, Kentucky, and Tennessee: Chickamauga, Fort Loudoun, Great Falls, Kentucky, Nickajack, Normandy, Wheeler, and Wilson. The EIS considers alternative land management plans for the eight reservoirs that are surrounded by 138,221.4 acres of TVA-managed land. As part of these eight RLMPs and the Final EIS, the Board also approved the proposed changes to

the CVLP land use allocation target ranges, which were set forth in the 2011 NRP and are intended to aid with decision-making across the entire TVA reservoir system. The CVLP target range updates were adjusted to meet existing and proposed land uses and current business and natural resource management needs.

1.6 Scope of the Environmental Assessment

TVA has prepared this Supplemental EA to comply with the National Environmental Policy Act (NEPA) and associated implementing regulations, and it serves to supplement the 2009 RLMP and EIS. TVA's allocation of parcels to particular land use zones during lands planning is an administrative process that does not result in direct environmental impacts. However, the types of allowable actions in each land use zone could eventually have varying environmental impacts to resources when site-specific activities are allowed in the future based on the allocations in the RLMPs. The scope of the environmental analysis, then, will be programmatic in nature and will address the general types of environmental impacts anticipated from changing the types of activities that would be permissible within the TVA land use zones identified in Section 1.2.

TVA considered the possible environmental effects of the proposed allocation changes and determined that potential effects to the environmental resources listed below were relevant to the decision to be made; thus, the following environmental resources are addressed in this environmental review:

- Land Use and Prime Farmland
- Recreation
- Terrestrial Ecology (Plants and Wildlife)
- Aquatic Ecology
- Threatened and Endangered Species
- Water Quality
- Wetlands
- Floodplains
- Navigation
- Air Quality and Climate Change
- Historic and Archaeological Resources
- Natural Areas and Ecologically Significant Sites
- Aesthetics and Visual Resources
- Noise
- Socioeconomics

1.7 Scoping and Public Involvement

During the lands planning process, TVA considers potential environmental impacts associated with the proposed land use allocations and provides for public involvement in the decision-making process. TVA is utilizing its existing corporate website as the primary platform for public outreach. The project website, www.tva.gov/wattsbarlandplanreview, is intended to serve as the primary hub for distributing information to the public. Visitors can

navigate from the project website to other TVA websites for additional information pertaining to the 2009 RLMP and its supplements and TVA reservoir lands planning.

TVA held a 30-day scoping period, which concluded on November 22, 2017, to solicit public comments on the proposed changes to the land use allocations under consideration in this Supplemental EA and RLMP Amendment. A notice of public scoping including a request for comments was published in newspapers serving Knox, Loudon, Meigs, Rhea, and Roane counties, Tennessee. In addition to the newspaper publications and TVA website notifications of the public scoping period, TVA also notified federal agencies, local and state government entities, and local and regional organizations including natural resource, land management, conservation, recreation, and watershed entities.

TVA received input from the public regarding the action's potential to affect the natural and human environment and/or historic properties as well as other issues associated with the proposed allocation changes. Specifically, TVA received comment letters from three entities: the U.S. Fish and Wildlife Service (USFWS), Tennessee Citizens for Wilderness Planning, and the Tennessee Wildlife Federation. TVA prepared a Scoping Report to summarize its outreach efforts and the input that was received during the scoping period. Copies of the three comment letters are included in the Scoping Report. The predominant theme identified in the comments was that land use changes should include an evaluation of potential impacts on sensitive resources. The Scoping Report is available on the RLMP Amendment project website.

TVA released the Draft Supplemental EA on November 16, 2018 for public review and comment for a period ending December 18, 2018. TVA notified interested federally recognized Native America tribes, elected officials, and other stakeholders that the Draft Supplemental EA was available for review and comment. TVA also notified government agencies, including the Tennessee Department of Environment and Conservation (TDEC), the Department of the Army Corps of Engineers, the Environmental Protection Agency, the USFWS, and the U.S. Geological Survey Tennessee. Public notices were published in local newspapers, soliciting comments from other agencies, the general public, and any general interested organizations. Refer to Chapter 6 for the Draft EA distribution list. An electronic version of the document was also posted on TVA's website, where TVA also provided contact information and direction on how to submit comments.

During the public review and comment period, TVA received two comments from a government agency (TDEC). TVA's responses are provided in Appendix B.

1.8 Necessary Permits and Licenses

No federal permits are required to develop a RLMP. Site-specific information on reservoir resources has been characterized in this Supplemental EA, and potential impacts to these resources were considered in making land use allocation recommendations. When specific actions are proposed on TVA parcels and are addressed in a RLMP, additional environmental reviews for these actions would be undertaken as necessary to address potential project-specific impacts.

Appropriate agencies and offices regulating historic resources and endangered species are being consulted with during this planning process. TVA would comply with the NRP Programmatic Agreement executed in 2011 in consultation with the State Historic Preservation Officer (SHPO) from the seven states in the TVA power service area, the

Advisory Council of Historic Preservation, and federally recognized Indian tribes. Additionally, TVA would complete any necessary consultation with the USFWS under Section 7 of the Endangered Species Act (ESA) prior to issuing a Final EA and making any agency decision on the proposed actions.

CHAPTER 2 - ALTERNATIVES

2.1 Development of Alternatives

RLMPs are used to guide land use approvals, private water use facility permitting, and resource management decisions on TVA-managed public land around its reservoirs. TVA is proposing to amend the 2009 RLMP, described in Section 1.5, for six parcels of public land surrounding Watts Bar Reservoir. TVA developed two alternatives to be evaluated in this EA, which are listed below.

- Alternative A – No Action Alternative
- Alternative B – Proposed Land Use Plan Amendment Alternative

Regardless of the alternative selected, the following conditions would apply:

Any proposed development or activity on public land will be subject to TVA approval pending the completion of an additional site-specific environmental review to evaluate the potential environmental effects of the proposal. As necessary, TVA would impose any necessary mitigation measures as conditions of approval for the use of public lands to minimize adverse environmental effects.

TVA land use allocations are not intended to supersede deeded land rights or land ownership. The TVA Act, TVA's Land Policy, SMP, NRP, and CVLP influence all activities and land use allocations.

2.2 Description of Alternatives

TVA has made initial land use zone allocations for six reservoir parcels after reviewing and considering suitable uses of the parcels. These allocations will be considered as the Proposed Land Use Plan Amendment Alternative. TVA will also consider not changing the allocation of the parcels under the No Action Alternative.

2.2.1 Alternative A – The No Action Alternative

Under the No Action Alternative, TVA would continue to manage Watts Bar Reservoir lands consistent with the 2009 RLMP and its supplements, the 2009 Errata Sheet and the 2012 Recovery Plan. TVA would not take any action to amend the 2009 RLMP for TVA-managed lands on Watts Bar Reservoir. The six parcels proposed for allocation changes would continue to be managed under the allocations in the 2009 RLMP and its supplements.

2.2.2 Alternative B – Proposed Land Use Plan Amendment Alternative

Under Alternative B, TVA would amend the 2009 RLMP by reallocating land use zones on six parcels, affecting 226 acres of TVA-managed public lands on Watts Bar Reservoir. Consistent with TVA lands planning methodology, the public lands managed by TVA on Watts Bar Reservoir would be placed into one of the seven land use zones consistent with existing land use and staff recommendations. TVA staff utilizes an internal lands planning process to determine land use allocation recommendations.

Under both alternatives:

- TVA would continue to conduct environmental reviews prior to the approval of any proposed development or activity on TVA public land to address site-specific issues.
- Future activities and land uses will be guided by the TVA Land Policy.
- TVA land use allocations are not intended to supersede deeded land rights or land ownership (See Section 2.1.2, Property Administration, for more information).

TVA's selected alternative would guide TVA's resource management and property administration decisions on the TVA public lands surrounding Watts Bar Reservoir until TVA determines that there is a need to revise the Land Plan in the future.

Watts Bar RLMP Amendment Proposed Allocation Changes

Under the Proposed Land Use Plan Amendment Alternative, the proposed changes to land use allocations are described in Table 2-1 below. Parcel location maps for the proposed allocation changes can be found in Appendix C.

Table 2-1. Description of Proposed Allocation Changes

Parcel Number	Parcel Acreage	Current Allocation	Proposed Allocation Change Description
89	35.0	Zone 4 – Natural Resource Conservation	Change 0.4-acre portion (new Parcel 89a) of the 35.0-acre Parcel 89 to Zone 7 – Shoreline Access to reflect a previous property exchange where shoreline access rights were gained under TVA's former Maintain and Gain program.
144	172.3	Zone 3 – Sensitive Resource Management	Change entire parcel to Zone 2 – Project Operations to support TVA's proposed use for this and several adjacent parcels for a potential power generation project.
153	40.6	Unplanned – Excluded from 2009 RLMP	Change entire parcel to Zone 7 to reflect the change in backlying property ownership from TVA to private residential with shoreline access rights and to reflect the current land use.
197	36.8	Zone 7 – Shoreline Access	Change 10.2-acre portion (new Parcel 197a) of the 36.8-acre Parcel 197 to Zone 6 – Developed Recreation to reflect a change in backlying property ownership from private residential to the State of Tennessee for public recreation purposes.
256	34.2	Zone 7 – Shoreline Access	Change 0.1-acre portion (new Parcel 256a) of the 34.2-acre Parcel 256 to Zone 4 – Natural Resource Conservation to reflect a previous property exchange where shoreline access rights were extinguished under TVA's former Maintain and Gain program.
271	14.0	Zone 4 – Natural Resource Conservation	Change 2.4-acre portion (new Parcel 271a) of the 14.0-acre Parcel 271 to Zone 6 – Developed Recreation to support public recreation access on the adjacent Parcel 270.

2.2.3 Alternatives Considered but Eliminated from Further Discussion

TVA considered analyzing zone reallocations for three additional parcels of public land surrounding Watts Bar Reservoir. However, during the programmatic review process, TVA determined that there was not a purpose or a need to support the reallocation of these three parcels at this time.

Additionally, TVA considered administratively transferring internal responsibility for Parcel 144 to the Nuclear group, which would take the parcel out of the land planning process. However, as the Small Modular Reactor project is too early in the planning process for Nuclear to make the decision to take on active management of the parcel, this option was rejected.

2.3 Property Administration

In the proposed amendment to the 2009 RLMP, each parcel of TVA land around the reservoir is categorized based upon a suitable use that is consistent with TVA policies and guidelines and applicable laws and regulations. Property administration procedures for all TVA lands are generally the same for both alternatives under consideration. As administrators of these public lands, TVA will use the final RLMP Amendment, if approved, along with TVA policies and guidelines to manage resources and to respond to requests for the use of TVA public land.

Pursuant to the TVA Land Policy (TVA 2006), TVA would consider changing a land use designation outside of the normal planning process (preparation of RLMPs for a portion of a reservoir, an entire reservoir, or a group of reservoirs) only for the purpose of implementing TVA's SMP or for allowing water access for industrial or commercial recreation operations on privately owned backlying land.

Additionally, there are some TVA parcels in the Valley that have deeded access rights for shoreline access that are currently utilized for uses such as commercial recreation. Should the private backlying land become residential, a request for a change of allocation of the TVA shoreline parcel to Zone 7 (Shoreline Access) would be subject, with appropriate environmental review, to action by the TVA Board of Directors or its designee. Furthermore, there are parcels in the 2009 RLMP over which the private backlying property owners currently have deeded access rights that are not allocated to Zone 7 (Shoreline Access) lands. These property owners could also request a change of allocation as described above.

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 under certain circumstances.

Public works/utility projects such as easements for pipelines, power or communication wires, roads, or other public infrastructure proposed on any TVA public land that do not affect the zoned land use or known sensitive resources can be approved without an allocation change as long as such projects are compatible with the use of the allocated zone. For example, a proposed construction of a water intake structure would be compatible with a reservoir parcel allocated for Zone 4 (Natural Resource Conservation), provided natural resource conservation activities could continue. Additionally, 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 the approval of the Board or its designee. Proposals consistent with TVA’s policies and the allocated use for that parcel would be subject to an environmental review under NEPA. Proposals must conform to the requirements of all applicable environmental regulations and legal authorities.

2.4 Environmental Review Process Update

Also included in the RLMP Amendment would be an environmental review process change for Parcel 109, which fronts Marble Bluff Subdivision. TVA proposes to abandon enforcement of an August 1995 letter (Appendix D) to prospective property owners in Marble Bluff Subdivision associated with special conditions for potential shoreline development on Parcel 109 on Watts Bar Reservoir. Parcel 109 is a 10.0-acre parcel allocated as Zone 7 (Shoreline Access) in the 2009 RLMP.

The special guidelines associated with Section 26a permitting practices that have been in place for Parcel 109 since August 1995 would no longer be required to address impacts to this parcel. TVA has reviewed the special conditions and determined that an environmental review was not conducted for the implementation of the 1995 special guidelines. Additionally, the current environmental review process for Section 26a permitting is as protective as the 1995 special conditions. Therefore, the restrictive language has been removed from the parcel description for Parcel 109 in the RLMP Amendment.

2.5 Comparison of Alternatives

The environmental impacts of the alternatives are summarized in Table 2-2. These summaries are derived from the information and analyses provided in Chapter 3 of this Supplemental EA.

Table 2-2. Summary and Comparison of Alternatives by Resource Area

Resource Area	Impacts From No Action Alternative	Impacts From Proposed Action Alternative
Land Use and Prime Farmland	No impacts to prime farmland.	Parcels would be allocated to reflect existing or proposed land uses. Possible insignificant impacts to prime farmland
Recreation	Minor impacts as current allocations on Parcel 197 and Parcel 271 do not allow development for recreation activities as supported by backlying property rights. No recreation impacts to the remaining parcels.	Greater amount of land allocated to Zone 6 resulting in minor beneficial impacts. Smaller amount of land allocated to Zone 3 and Zone 4, minor adverse impacts to dispersed recreation.
Terrestrial Ecology (Plants and Wildlife)	No impacts to common plant and wildlife communities	Minor impacts to common plant and wildlife communities due to shift of land allocated to Zones 2, 6, and 7.
Aquatic Ecology	No impacts to aquatic ecology	Greater amount of land allocated to Zones 6 and 7 resulting in a slightly higher potential for ground disturbing activities; possible degradation of aquatic habitats associated with development along the shoreline.
Threatened and Endangered Species	No impacts to threatened and endangered species.	Fewer acres allocated to Zones 3 and 4 could potentially result in minor impacts T&E species.
Water Quality	No impacts to water quality.	Greater amount of land allocated to Zone 2, Zone 6, and Zone 7 resulting in a slightly higher potential for ground disturbing activities.
Wetlands	No impacts to wetlands.	Minor impact. Any adverse impacts would be minimized by adherence to

Resource Area	Impacts From No Action Alternative	Impacts From Proposed Action Alternative
		EO 11988. Potential projects would be reviewed for consistency with EO 11988 on a case-by-case basis.
Floodplains	No impacts to floodplains.	Minor impact. Any adverse impacts would be minimized by adherence to EO 11988. Potential projects would be reviewed for consistency with EO 11988 on a case-by-case basis.
Air Quality and Climate Change	No impacts to air quality or climate change.	Potential minor increase in air quality and climate change impacts due to greater amount of land allocated to Zones 2, 6, and 7.
Historic and Archaeological Resources	No impacts to historic and archaeological resources.	For Parcel 144, impacts would be managed under a Programmatic Agreement with the SHPO and federally-recognized Indian Tribes. For the remaining five parcels, any impacts would be reviewed on a case-by-case basis by either (a) initiation of consultation under Section 106 of the NHPA, or (b) by following the guidelines of the NRP Programmatic Agreement.
Natural Areas and Ecologically Significant Sites	No impacts to natural areas or ecologically significant sites.	Possible minor indirect impacts to the Grassy Creek Habitat Protection Area related to the reallocation of Parcel 144 to Zone 2. No impacts to natural areas from the reallocation of the remaining five parcels.
Aesthetics and Visual Resources	No impacts to aesthetics and visual resources.	Smaller amount of land allocated to Sensitive Resource Management and Natural Resource Conservation, so a greater area potentially affected.
Noise	No impacts to noise.	Minor impacts possible from construction and operational noise.
Socioeconomics and Environmental Justice	No impacts to socioeconomics and environmental justice.	Minor short term beneficial economic impacts from construction activities. No environmental justice impacts.
Cumulative Effects	Minor cumulative effects as federal and state water quality regulators, municipal/local programs, and others including TVA's own environmental monitoring programs would combine in an effort to offset threats to environmental resources from uncontrolled economic growth and development.	Minor cumulative effects as federal and state water quality regulators, municipal/local programs, and others including TVA's own environmental monitoring programs would combine in an effort to offset threats to environmental resources from uncontrolled economic growth and development.

Currently, TVA public lands around Watts Bar Reservoir are managed in a manner that is consistent with the 2009 RLMP and EIS and its supplements (No Action Alternative). The allocation acreages and percentages for the No Action Alternative (Alternative A) and the Preferred Alternative (Alternative B) are shown in Table 2-3 below.

Table 2-3. Comparison of Land Uses by Alternatives

Current Land Use Zones	Alternative A		Alternative B	
	Acres	Percent	Acres	Percent
Zone 2 - Project Operations	1,697	12.7	1,869	13.9
Zone 3 - Sensitive Resource Management	3,748	28.0	3,576	26.6
Zone 4 - Natural Resource Conservation	3,754	28.0	3,752	28.0
Zone 5 - Industrial	392	2.9	392	2.9
Zone 6 - Developed Recreation	1,552	11.6	1,565	11.7
Zone 7 - Shoreline Access	2,242	16.8	2,271	16.9
"Unplanned"	40.6	.003	0	0
Total	**13,384**	**100.0**	**13,425**	**100.0**

A summary of the proposed changes to zone acreages and percentages as a proportion of all Watts Bar Reservoir land is provided below.

- **Zone 2 (Project Operations)** – The proposed allocation change from Zone 3 (Sensitive Resource Management) to Zone 2 for Parcel 144 would support TVA's business needs associated with the potential development of a proposed TVA power generation facility and would increase Zone 2 acreage by 172.3 acres (an increase from 12.7 percent to 13.9 percent of parcels allocated as Zone 2 on Watts Bar Reservoir). A potential power generation facility on the former Clinch River Breeder Reactor Site, now known as the Clinch River Site, is under consideration by TVA. The Clinch River Site consists of about 935 acres (Parcels 137a, 142, 143, 144, 145, and 148), and all parcels are allocated for Zone 2, except for Parcel 144. An early site plan shows that some infrastructure would likely cross portions of Parcel 144 to access the reservoir for process water intake and discharge, but much of the parcel would not be disturbed. The potential generation facility project is in the early planning phases, and the environmental impacts would be assessed during a project-specific environmental review.

- **Zone 3 (Sensitive Resource Management)** – The proposed allocation change for Parcel 144 would decrease Zone 3 acreage by 172.3 acres, decreasing the percentage of Zone 3 acreage from about 28.0 percent to 26.6 percent on Watts Bar Reservoir. The proposed allocation change from Zone 3 to Zone 2 would support the potential power generation facility project and would not result in changes to how TVA manages the reservoir property at this time. However, if TVA were to construct and operate the proposed electric generation facility, some changes would occur. The potential environmental effects of the proposed generation facility, including those that would occur on Parcel 144, would be assessed during a project-specific environmental review.

- **Zone 4 (Natural Resource Conservation)** – The proposed allocation changes on Parcels 89, 256, and 271 would decrease Zone 4 acreage by approximately 2.7

acres, a decrease from about 28.0 percent to 27.9 percent. The allocation changes are proposed to reflect changes in shoreline access rights (Parcels 89 and 256) and to support public recreation access (Parcel 271).

- **Zone 5 (Industrial)** – No changes are proposed for industrial use.

- **Zone 6 (Developed Recreation)** – The proposed allocation changes for Parcels 197 and 271 would increase Zone 6 acreage by approximately 12.6 acres, an increase from about 11.6 percent to 11.7 percent. The allocation changes are proposed to reflect changes in backlying property ownership and use (Parcel 197) and to support public recreation access (Parcel 271).

- **Zone 7 (Shoreline Access)** – The proposed allocation changes would increase Zone 7 acreage by approximately 30.7 acres, an increase from 16.7 percent to 16.9 percent. The allocation changes are proposed to reflect changes in backlying property ownership and use (Parcels 153 and 197) and to reflect changes in shoreline access rights (Parcels 89 and 256).

Consistency with the Comprehensive Valleywide Land Plan

Changes to land use allocations must be consistent with TVA's CVLP target allocation ranges. The CVLP target allocation ranges represent the desired percentage of land use allocations for each land use zone across all of TVA's approximately 293,000 acres of public land around its 46 reservoirs.

Table 2-4 below shows the CVLP target allocation ranges, the current actual allocation percentages for TVA's approximately 293,000 acres of public land (Valleywide), and the adjusted allocation percentages that incorporate the six proposed allocation changes under the RLMP Amendment. The proposed allocation changes would result in minor changes to the Valleywide allocation actual percentages, and the proposed allocation changes would continue to fall within the 2017 CVLP allocation ranges.

Table 2-4. Valleywide Land Use Allocation Information

	Allocation Designation	CVLP Allocation Ranges (Percent)	Current Valleywide Allocation (Percent)	With Proposed Allocation Changes (Percent)
Zone 2	Project Operations	7 to 10	8.7	8.8
Zone 3	Sensitive Resource Management	14 to 18	16.1	16.0
Zone 4	Natural Resource Conservation	56 to 63	60.0	60.0
Zone 5	Industrial	1 to 3	1.7	1.7
Zone 6	Developed Recreation	8 to 10	8.4	8.4
Zone 7	Shoreline Access	5 to 6	5.1	5.1

2.6 Identification of Mitigation Measures

Section 4.20 of the 2009 RLMP and EIS identified mitigation measures that were developed during the review of the EIS. Those mitigation measures continue to apply to any actions still ongoing with respect to that analysis. No new mitigation measures were developed from the analysis in this Supplemental EA. Future projects, when planned in detail, will be

evaluated to determine site-specific environmental impacts, and potential impacts to sensitive resources would be identified and avoided or minimized as appropriate and in a manner that would be consistent with applicable laws and regulations.

The mitigation measures that would be carried forward from the 2009 RLMP and EIS are listed below.

- All activities would be conducted in accordance with the stipulations defined in the Programmatic Agreement between TVA, the Tennessee SHPO, and the Advisory Council on Historic Preservation.

- The construction of water-use facilities and shoreline alterations within the marked limits of the safety landings and harbors would be prohibited.

- Requests for water-use facilities on the shoreline immediately upstream and downstream of the safety landings and harbors would continue to be reviewed to ensure that barge tows have sufficient room to maneuver in and out of the safety landings and harbors without the risk of damaging private property.

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

- As necessary and as practicable, visual buffers, between 50 feet and 100 feet wide, would be provided to screen timber harvest areas and commercial development from public thoroughfares and shorelines.

- Best management practices would be used on all soil-disturbing activities.

- Landscaping activities on developed properties would not include the use of plants listed as Rank 1, “Severe Threat,” Rank 2, “Significant Threat,” and Rank 3, “Lesser Threat,” on the Tennessee Exotic Pest Plant Council’s list of Invasive Exotic Pest Plants in Tennessee (Appendix E, Table D-7 of the 2009 RLMP and EIS).

- Revegetation and erosion control work would utilize seed mixes comprised of native species or noninvasive, nonnative species (Appendix E, Table D-8 of the 2009 RLMP and EIS).

- If TVA were to develop facilities at any Zone 5 (Industrial) or Zone 2 (Project Operations) site, the following measures would be employed to minimize the potential for effects on federally listed species:

    1. TVA would consult with the USFWS in order to determine if the proposed action could affect listed mussels present in the area.

    2. Pre-construction mussel surveys would be conducted in all areas of the Clinch River (Watts Bar Reservoir) that would be affected by construction and use of any future terminal associated infrastructure (e.g. barge terminal, water intakes or water outfalls).

3. Any listed mussels found during these surveys would be dealt with according to the terms and conditions imposed as a result of the USFWS consultation process; these could consist of minimization or avoidance measures implemented during construction and operation or relocation of the mussels encountered if effects are unavoidable.

2.7 The Preferred Alternative

TVA's preferred alternative is Alternative B, the Proposed Land Use Plan Amendment Alternative. Alternative A, the No Action Alternative, is discussed and analyzed as an alternative to the preferred alternative. Environmental impacts associated with Alternative B, though minor, would be slightly greater than the impacts associated with Alternative A due to the smaller amount of land allocated to Sensitive Resource Management (Zone 3) and Natural Resource Conservation (Zone 4). However, Alternative B is the preferred alternative because it updates the 2009 RLMP and EIS to reflect existing land rights and actual land uses and would allow for potential future uses on certain parcels.

CHAPTER 3 – AFFECTED ENVIRONMENT

This chapter includes descriptions of the affected environment, which documents the existing conditions of the parcels under review. These descriptions serve as a baseline for understanding the resources that could be impacted by the implementation of the alternatives described in Section 2.2.

The following resources have the potential to be affected by the proposed action:

3.1 Land Use and Prime Farmland

3.1.1 Land Use

Existing land use patterns along the shoreline and backlying land have been influenced by TVA's initial land acquisition and subsequent disposition via the sale, transfer of ownership, or retention of properties. TVA originally acquired about 55,000 acres of land in Loudon, Meigs, Rhea, and Roane counties. About 9,000 acres of this land has been sold for private use or transferred to other federal and state agencies for public use. Watts Bar Reservoir covers 38,600 acres and subsequent purchases for fossil and nuclear plants, transfers and/or sales of land to U.S. Department of Energy (USDOE), and for various commercial, industrial, residential, and recreational uses have resulted in a current balance of about 16,220 acres of TVA managed land. Of these 16,220 acres, approximately 2,796 acres are classified as power property (TVA fossil and nuclear plant property), and the remaining approximately 13,425 acres are the scope of TVA public lands on Watts Bar Reservoir.

Shoreline ownership data is presented in the SMI EIS (TVA 1998). Of the 721.4 miles of shoreline on Watts Bar, TVA owns 646.8 miles (90 percent), and 340 miles (47 percent) are available for Shoreline Access, which includes current development. Most of the residential development along the reservoir is on land TVA sold with shoreline access rights across the retained land below the maximum shoreline contour (MSC). These areas are allocated as Zone 7 (Shoreline Access) or as private land where TVA only has the right to flood up to a certain elevation (i.e., Zone 1 – Non-TVA Shoreline).

TVA manages public land on Watts Bar Reservoir to protect and enhance natural resources and to improve the quality of life in the Valley. TVA public land is used for public and commercial recreation, industrial development, natural resource management, and a variety of other community needs, often in connection with adjoining or nearby private lands. TVA implements land use agreements, such as licenses, leases, and easements, to authorize activities or certain land rights on TVA land to support TVA's various programmatic plans and goals; examples include agreements for utility or road rights-of-ways, agreements on sites for industrial uses such as barge terminals, easements for public works projects such as water intakes and water treatment facilities, licenses to commercial marinas, public parks and recreation areas, and licenses for the operation and protection of wildlife management areas.

3.1.2 Prime Farmland

The 1981 Farmland Protection Policy Act and its implementing regulations (7 Code of Federal Regulations [CFR] Part 658) require all federal agencies to evaluate impacts to prime and unique farmland prior to permanently converting land to a use that is incompatible with agriculture. Prime farmland is defined by the U.S. Department of Agriculture (USDA) as land that has the best combination of chemical and 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 in any case, it is not urban, developed, or covered by water.

The geographic extent of Watts Bar Reservoir reaches Loudon, Meigs, Rhea, and Roane counties. Agriculture census data shows that during its most recent 15 year reporting period (1997 to 2012), acreage in county farms within these counties has decreased by an average of about 1.3 percent. Additionally, the value of agricultural products sold has increased in three of the four counties, (Table 3-1). These four counties have a total of 125,964 acres of land with soil properties to be classified as prime farmland ranging from 14.1 percent of Roane County to 21.2 percent of Meigs County (Table 3-2).

Table 3-1. Change in Farm Size and Value of Agricultural Products from 1997 to 2012 in Counties Adjacent to Watts Bar Reservoir

County	1997	2002	2007	2012	Percent Change in 15 Years
Acres in farms					
Loudon	73,976	82,656	77,040	69,381	-6.2
Meigs	48,977	48,918	49,116	52,881	7.9
Rhea	56,049	60,762	56,182	57,671	2.9
Roane	53,110	63,378	52,582	49,953	-5.9
Market value of agricultural products sold ($1,000)					
Loudon	45,067	50,628	60,232	77,469	71.9
Meigs	4,783	5,642	6,384	6,862	43.5
Rhea	7,575	17,809	11,943	16,804	121.8
Roane	5,771	5,660	5,138	4,856	-15.8

Source: USDA 2012, Agriculture Census, http://agcensus.mannlib.cornell.edu/

Table 3-2. Acreage of Farmland in the Counties Adjacent to the Watts Bar Reservoir

County	Total Land in County[1]	Farm Size in 2012[2]	Farmland in County[2]	Total Prime Farmland[1]	Prime Farmland in County[1]
	Acres	Acres	Percent	Acres	Percent
Loudon	151,323	69,381	45.8	23,459	15.5
Meigs	122,240	52,881	43.3	25,905	21.2
Rhea	214,400	57,671	26.9	42,304	19.7
Roane	243,200	49,953	20.1	34,296	14.1
Total	731,163	229,886	31.4	125,964	17.2

Source: [1]TVA 2004
[2]USDA 2012, Agriculture Census, http://agcensus.mannlib.cornell.edu/

To evaluate the effects to prime farmland and farmland of state importance, TVA identified soil classifications using the USDA's Natural Resource Conservation Service Web Soil Survey (USDA 2018). The results of the survey are summarized in Table 3-3.

Table 3-3. Acres of Prime Farmland and Farmland of Statewide Importance within Review Area[1]

Parcel	Total Acres	Acres of Prime Farmland	Acres of Farmland of Statewide Importance
89a	0.4	None	None
144	172.3	135.8[2]	None
153	40.6	10.4	None
197a	10.2	None	None
256a	0.1	None	None
271a	2.4	None	None
Total	**226.0**	**146.2**	**-**

[1] Soils information sourced from USDA 2018, web soil survey. Accessed 4/19/2018
[2] Soils information gained from 1942 soil survey

Soil survey information was not available for Parcel 144 from the Web Soil Survey. TVA has previously analyzed the soils on and around the parcel in previous planning projects to support the proposed Clinch River Small Modular Reactor project. Based on results of consultation with the NRCS, Parcel 144 contains approximately 135.8 acres of second-class soils, which would be classified as Prime Farmland (TVA 2017).

There are 13,425 acres of land within the scope of TVA public lands on Watts Bar Reservoir. Of those lands, a total of 2,796 acres contain identified prime farmland or farmland of statewide importance. The six parcels being reviewed in this Supplemental EA consist of 226.0 acres, of which 146.2 acres contain prime farmland or farmland of statewide importance.

3.2 Recreation

Watts Bar Reservoir is a significant recreation resource that attracts a wide range of outdoor recreation activity including boating, fishing, swimming, camping, and picnicking. A variety of public and commercial recreation facilities have been developed to accommodate reservoir water surface and shoreline recreation activities. As regional population levels rise, recreation use levels and demands for additional recreation accommodations on Watts Bar reservoir are expected to also increase.

TVA-managed lands around the reservoir also offer opportunities for dispersed recreation. Dispersed recreation typically occurs on parcels allocated as Zone 2 (Project Operations), Zone 3 (Sensitive Resource Management), or Zone 4 (Natural Resource Conservation), and on undeveloped land allocated to Zone 6 (Developed Recreation) or areas of Zone 7 (Shoreline Access) where the land is not developed or posted. Dispersed recreation consists of passive, informal activities such as hunting, hiking, nature observation, primitive camping, and bank fishing. The Tennessee Wildlife Resources Agency (TWRA) manages hunting opportunities on Parcels 144 and 197.

3.3 Terrestrial Ecology (Plants and Wildlife)

3.3.1 Plant Communities

Watts Bar Reservoir is located within the Ridge and Valley ecoregion, which contains long stretches of ridges with adjacent valleys that run in a southwestern-to-northeastern direction (U.S. Environmental Protection Agency [USEPA] 2013). In this ecoregion, deciduous and mixed evergreen-deciduous forests are interspersed with agriculture and urban dominated areas. Vegetation classes commonly found around Watts Bar Reservoir include forestland,

open and agricultural land, shrub land, wetland, riparian and shallow overbank areas, and residential habitats and herbaceous vegetation.

Deciduous forests and woodlands are the most common and the most diverse vegetation classes found on lands surrounding Watts Bar Reservoir. Deciduous forests and woodlands cover approximately 64 percent of the vegetation within 25 feet of the shoreline and 59 percent of the vegetation between 25 feet and 100 feet from the shoreline. These forested areas are composed of diverse communities ranging from mesic (moist) cove hardwood forest to xeric (dry) upland oak forests. Mixed evergreen-deciduous forests primarily consist of moist mixed-hardwood forests and dry pine and pine-oak forests. Less than 5 percent of the land cover is evergreen forests and evergreen woodlands (TVA 1998).

Herbaceous vegetation in the form of grasslands, hay fields, and pasture are relatively uncommon on Watts Bar Reservoir properties and comprises only a few hundred acres. Lands licensed to individual farmers by TVA are being farmed exclusively to grow hay forage crops for livestock. Most of these fields are planted with cool season grasses, predominantly Kentucky fescue with some orchard grass and clover, and are mowed two to three times during the growing season to produce hay crops. Transition areas consisting of shrub-scrub habitat makes up 3 percent of the land cover.

Invasive, nonnative species of plants occur throughout the Valley. Executive Order (EO) 13751 defines an invasive species as one 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. Invasive, nonnative plants affect native terrestrial plant communities by competing for space and resources, which ultimately could degrade botanical diversity and wildlife habitat. Invasive terrestrial plant species typify disturbed, early successional vegetation throughout the Watts Bar Reservoir area. Several species such as Japanese honeysuckle and sericea lespedeza along with Chinese privet, multi-flora rose, kudzu, autumn olive, tree-of-heaven, nepalgrass, bush honeysuckle, and mimosa are widespread and common. Bottomlands, or periodically flooded narrow floodplain areas, are often dominated by Chinese privet and/or nepalgrass in the understory to the total exclusion of the native flora. Many of these invasive, nonnative plant species negatively affect some of the uncommon natural, native plant communities scattered around Watts Bar Reservoir. These negative effects do not go unnoticed by TVA, which has made strides to control these invasive plant species; for example, TVA has taken action in previous years to chemically control some kudzu growth at specific sites and plans to expand this work on several areas in the future.

3.3.2 Wildlife Communities

Wildlife species around Watts Bar Reservoir range from forest-dependent species to those that tolerate highly modified habitats. The reservoir and surrounding TVA lands support an extremely diverse assemblage of animals, including migratory birds of conservation concern. The diversity of these habitats is associated with high levels of species richness and the presence of species with limited geographic ranges.

Several forest types are found on TVA public lands adjacent to Watts Bar Reservoir. Deciduous forests found in these areas provide a variety of habitats for wildlife. Oak-hickory forests are the most abundant forest type in the eastern U.S. and are prevalent on much of the land associated with the reservoir. Numerous bird species nest in deciduous forests including wild turkey, whip-poor-will, ruby-throated hummingbird, red-eyed vireo, wood thrush, gray catbird, black-throated green warbler, black-and-white warbler, ovenbird, hooded warbler, and scarlet tanager. Several additional migratory bird species of concern

utilize these habitats including black-billed cuckoo, cerulean warbler, chuck-will's widow, Kentucky warbler, peregrine falcon, red-headed woodpecker, wood thrush, yellow-bellied sapsucker, and worm-eating warbler (USFWS 2018). Common mammal species found in deciduous forests include white-tailed deer, eastern red bat, eastern chipmunk, eastern gray squirrel, southern flying squirrel, white-footed mouse, southern red-backed and woodland voles, short-tailed shrew, gray fox, and bobcat.

Evergreen and evergreen-deciduous forests provide nesting habitat for woodland birds including pine and yellow-throated warblers and great crested flycatcher. Birds that winter in this forest type include white-breasted nuthatch and pine siskin. Several additional migratory bird species of concern utilize these habitats including black-billed cuckoo, black-capped chickadee, brown-headed nuthatch, Canada warbler, Chuck-will's-widow, Kentucky warbler, fox sparrow, northern saw-whet owl, olive-sided flycatcher, prairie warbler, and red crossbill (USFWS 2018). Other animals that inhabit evergreen and evergreen-deciduous forests, but are not restricted to them, include white-tailed deer, wild turkey, eastern mole, eastern kingsnake, smooth earth snake, eastern fence lizard, and six-lined racerunner. Additionally, streams, wetlands, and other seasonally wet areas in this forest type provide habitat for a variety of salamanders, frogs, and toads.

Non-forested habitat types in this area include agricultural fields like hay fields and pastures, grasslands, barrens, and transmission line right-of-way where tree clearing is required. These early successional habitats provide habitat for a variety of bird species including eastern bluebird, eastern meadowlark, American crow, and red- tailed hawk. Several additional migratory bird species of concern utilize these habitats in this area including American kestrel, bobolink, Bewick's wren, dickcissel, Henslow's sparrow, Le Conte's sparrow, sedge wren, short-eared owl, and willow flycatcher (USFWS 2018). Amphibians and reptiles that use these habitats include spring peeper, chorus frog, and common garter snake.

Bird and mammal diversity greatly increases at edge habitats, especially forested areas bordered by early successional habitats. Birds commonly found at these edge habitats include wild turkey, great crested flycatcher, white-eyed vireo, Carolina wren, blue-gray gnatcatcher, brown thrasher, blue-winged warbler, prairie warbler, common yellowthroat, yellow-breasted chat, eastern towhee, field and song sparrow, and orchard oriole. Several additional migratory bird species of concern utilize these habitats such as Bachman's sparrow, Bell's vireo, Bewick's wren, blue-winged warbler, dickcissel, loggerhead shrike, peregrine falcon, red-headed woodpecker, and willow flycatcher (USFWS 2018). Mammals expected at edges include eastern cottontail, woodchuck, eastern harvest mouse, red fox, coyote, long-tailed weasel, and striped skunk.

Riparian corridors along streams provide nesting habitat for Acadian flycatcher and northern parula. Many additional migratory bird species of concern utilize these habitats in this area including bald eagle, Bell's vireo, Bewick's wren, least bittern, Louisiana waterthrush, Mississippi kite, prothonotary warbler, and willow flycatcher (USFWS 2018). Common amphibians found in the riparian zones include green frog, American bullfrog, northern cricket frogs, eastern narrowmouth toad, and eastern red-spotted newt. Reptiles include northern water snake, common snapping turtle, and painted turtles. Common mammals include mink, muskrat, raccoon, and American beaver.

Seepages, streams, and temporary ponds in deciduous forests provide habitat for numerous amphibians including American and Fowler's toads, green, northern cricket and

other frogs, and spotted and other salamanders, including several species with limited ranges. Reptiles commonly found in deciduous forests, especially near water, include eastern fence lizard, ground skink, five-lined skink, eastern box turtle, eastern worm snake, black racer, and ring-necked snake.

The reservoir also provides wetlands, open water habitats, and associated riparian (shoreline) zones that are used by a variety of wildlife. Common wildlife species typically found in these wet habitats include osprey, great blue heron, green heron, belted kingfisher, common yellowthroat, and northern parula. Many additional migratory bird species of concern utilize these habitats including American bittern, bald eagle, least bittern, Louisiana waterthrush, prothonotary warbler, rusty blackbird, and willow flycatcher (USFWS 2018). Nineteen known heron colonies occur within 3 miles of the six parcels discussed in this Supplemental EA. Likewise, shallow embayments, especially those with emergent vegetation, in the area provide habitat for waterfowl; common waterfowl expected to utilize these habitats include wood ducks, Canada geese, and mallards. Other waterfowl present include American black duck, gadwall, green-winged teal, ring-necked duck, lesser scaup, common goldeneye, bufflehead, hooded merganser, and common merganser.

Shorebird use of the reservoirs is limited to shallow embayments or exposed mud flats that provide suitable areas for foraging. Species such as least sandpiper, which forage along the margins of reservoirs, and killdeer, which are not restricted to foraging on mudflats, are commonly observed on the TVA parcels. Other species observed on area mudflats include pectoral and spotted sandpipers and some uncommon species including ruddy turnstone, dowitchers, wimbrel, black-necked stilt, American avocet, and sanderling. Caves also provide unique habitat for certain insect and wildlife species that are present in the area.

In addition to the invasive or nonnative plant species discussed in Section 3.1.1, several exotic, nonnative, and/or pest terrestrial wildlife and insect species are known to occur within the counties encompassing the six parcels. These include Asian tiger mosquito (*Aedes albopictus*), feral cat (*Felis catus*), feral hog (*Sus scrofa*), and European starling (*Sturnus vulgaris*). These species have the potential to pose problems to native wildlife and ecosystems due to their ability to out-compete native species and spread quickly. Some species, such as feral hogs, feral cats, and Asian tiger mosquitoes can also pose a threat to human health and safety; Asian tiger mosquitoes, for example, are known to transmit various diseases to humans. Likewise, feral cats and hogs also transmit disease to humans and other wildlife as well as prey on native animals and, in the case of hogs, disturb soils, native plants, and degrade water quality.

3.4 Aquatic Ecology

TVA began a program to systematically monitor the ecological conditions of its reservoirs in 1990. Previously, reservoir studies were confined to the assessments conducted to meet specific needs as they arose. Reservoir (and stream) monitoring programs were combined with TVA's fish tissue and bacteriological studies to form an integrated Reservoir Ecological Health Monitoring Program (TVA 2016a) (formerly the TVA Vital Signs Program). The following descriptions of Watts Bar Reservoir's existing conditions are based primarily on results from this program.

3.4.1 Benthic Community

Benthic macroinvertebrate (e.g., lake bottom dwelling, readily visible aquatic worms, snails, crayfish, and mussels) samples were taken from four distinct areas of Watts Bar Reservoir during even numbered years beginning in 1994 as part of TVA's Reservoir Ecological

Health Monitoring Program (TVA 2016a). Areas sampled include the forebay (area of the reservoir nearest the dam) at Tennessee River miles (TRMs) 531.0 and 533.3, a mid-reservoir transition station at TRM 560.8, and inflows in both the Tennessee River at TRMs 600 and 601 and at Clinch River miles (CRMs) 19 and 20. Forebay sampling was moved to TRM 533.3 in 2000. Bottom dwellers are included in aquatic monitoring programs because of their importance to the aquatic food chain and due to the fact that they have a limited capability of movement, thereby preventing them from avoiding undesirable conditions. Sampling and data analysis were based on seven parameters (eight parameters prior to 1995) that indicate species diversity, abundance of selected species that are indicative of good (and poor) water quality, total abundance of all species except those indicative of poor water quality, and proportion of samples with no organisms present. Collection methods and rating criteria were different prior to 1994, so those results are not compared directly to samples taken using current methods and therefore are not presented in this document.

As shown in Table 3-4, the benthic community in Watts Bar Reservoir rates ranged from poor to excellent in comparison to other run-of-the-river reservoirs (TVA 2016b). The mid-reservoir station had the best overall benthic community rating, rating fair to excellent for each year, and in 2016, the benthic community rated good at this station. Otherwise, throughout Watts Bar Reservoir, benthic communities rated generally poor (TVA 2016b).

Table 3-4. Benthic Community Ratings, Ecological Health Monitoring Data

Station	1998	2000	2002	2004	2006	2008	2010	2012	2014	2016
Forebay (TRM 531)	Poor	-	-	-	-	-	-	-	-	-
Forebay (TRM 533.3)	-	Poor	Poor	Poor	Poor	Poor	Poor	Poor	Poor	V. Poor
Mid-Res (TRM 560.8)	Fair	Fair	Fair	Excel.	Fair	Fair	Good	Good	Excel.	Good
Inflow (TRM 600)	Poor	Poor	Fair	Fair	V. Poor	Poor	Poor	Poo	V. Poor	-
Inflow (TRM 601)	-	-	-	-	-	-	-	-	-	Good
Inflow (CRM 19)	Poor	Poor	Poor	Fair	Good	Fair	-	-	-	-
Inflow (CRM 21)	-	-	-	-	-	Good	Fair	Good	Good	Fair

Source: TVA 2016b

3.4.2 Fish Community

The Ecological Health Monitoring Program included fish sampling at Watts Bar Reservoir in even numbered years from 1999 through 2017 (TVA 2016a). The health ratings of the electrofishing and gill netting sampling stations correspond to those described for benthic sampling.

Fish are included in aquatic monitoring programs because they are important to the aquatic food chain and because they have a long life cycle that allows them to reflect conditions over time. Fish are also important to the public for aesthetic, recreational, and commercial reasons. Monitoring results for each sampling station are analyzed to arrive at a Reservoir Fish Assemblage Index rating, which is the percentage of the sample represented by omnivores and insectivores combined with the overall number of fish collected and the occurrence of fish with anomalies such as diseases, lesions, parasites, deformities, etc. (TVA 1997).

The ecological health stations fish community monitoring results are shown in Table 3-5. These data compare Watts Bar to other run-of-the-river reservoirs. Over the years, fish communities have rated 'good' or 'fair' in Watts Bar Reservoir, which indicates a consistently well-balanced fish assemblage over time. In 2012, TVA rescored all sites to reflect a change of redbreast sunfish from indigenous to non-indigenous. This resulted in some ratings differences between the current ratings and the ratings previously reported in the 2009 RLMP.

Table 3-5. Fish Community Ratings, Ecological Health Monitoring Data

Station	1998	2000	2002	2004	2006	2008	2010	2012	2014	2016
Forebay (TRM 531)	Fair	Good	Fair	Fair	Fair	Fair	Fair	Good	Fair	Fair
Mid-Res (TRM 560.8)	Good	Good	Fair	Good	Fair	Fair	Good	Fair	Good	Good
Inflow (TRM 601)	Fair	Good	Good	Fair	Fair	Good	Good	Good	Good	Good
Inflow (CRM 22)	Good	Good	Good	Good	Good	Good	Good	Good	Good	Fair

Source: TVA 2016b

TWRA creel data indicates that white bass is the species caught in the highest numbers, with largemouth bass trailing closely behind (TWRA 2017). Black bass are, however, the most sought after group of fish by Watts Bar anglers. Nearly 127,000 hours were spent in pursuit of them in 2016, which accounted for nearly one-half of all the estimated fishing pressure for Watts Bar that year. Other species caught in considerable numbers include bluegill, blue catfish, and black crappie.

In 2016, the TDEC recommended that the public limit consumption of catfish, striped bass, and hybrid (striped bass-white bass) to one meal per month due to elevated levels of polychlorinated biphenyls (PCBs). Additionally, there is a precautionary advisories for the consumption of white bass, sauger, carp, smallmouth buffalo, and largemouth bass. The precautionary advisory recommends that children, pregnant women, and nursing mothers should not consume the fish species named. Similar advisories associated with PCBs are in effect for other east Tennessee reservoirs. Additionally, TDEC recommends limiting the consumption of striped bass within the Clinch River arm of Watts Bar Reservoir and has issued a precautionary advisory for consuming catfish and sauger in the area due to PCBs.

3.5 Threatened and Endangered Species

The ESA (1973, as amended, 16 USC §§ 1531-1543) was passed to conserve the ecosystems upon which endangered and threatened species depend and to conserve and recover those species. An endangered species is defined by the ESA as any species in danger of extinction throughout all or a significant portion of its range, and a threatened species is likely to become endangered within the foreseeable future throughout all or a significant part of its range. The ESA establishes programs to conserve and recover endangered and threatened species and ensures that their conservation remains a mandate for federal agencies. Under Section 7 of the ESA, federal agencies are required to consider the potential effects of their proposed actions on endangered and threatened species and critical habitats. If the proposed action has the potential to affect these resources, the federal agency is required to consult with the USFWS.

The TVA Natural Heritage database was used to locate records of federally and state-listed species within the six parcels proposed for an allocation change and in the vicinity of the six parcels (Table 3-6) (TVA 2018). Accordingly, plants are assessed within a 5-mile radius, terrestrial animal species within a 3-mile radius, and aquatic animal species within a 10-mile radius.

Table 3-6. Federally and State-Listed Species in the Vicinity of the Proposed Allocation Changes on Watts Bar Reservoir

Common Name	Scientific Name	Status[1]	
		Federal	State (Rank)
Plants			
American ginseng	*Panax quinquefolius*	--	S-CE (S3S4)
Bay starvine	*Schisandra glabra*	--	T (S2)
Branching whitlow-wort	*Draba ramosissima*	--	SPCO (S2)
Butternut	*Juglans cinerea*	--	T (S3)
Dwarf milkwort	*Polygala nana*	--	E (S1)
Earleaf foxglove	*Agalinis auriculata*	--	E (S2)
Fetter-bush	*Leucothoe racemose*	--	T (S2)
Godfrey's thoroughwort	*Eupatorium godfreyanum*	--	SPCO (S1)
Heller's catfoot	*Pseudognaphalium helleri*	--	SPCO (S2)
Large-flowered Barbara's-buttons	*Marshallia grandiflora*	--	E (S2)
Loesel's twayblade	*Liparis loeselii*	--	T (S1)
Mountain bush-honeysuckle	*Diervilla sessilifolia* var. *rivularis*	--	T (S2)
Mountain honeysuckle	*Lonicera dioica*	--	SPCO (S2)
Naked-stem sunflower	*Helianthus occidentalis*	--	SPCO (S2)
Northern bush-honeysuckle	*Diervilla lonicera*	--	T (S2)
Northern white cedar	*Thuja occidentalis*	--	SPCO (S3)
Ozark bunchflower	*Veratrum woodii*	--	E (S1)
Pale green orchid	*Platanthera flava* var. *herbiola*	--	T (S2)
Prairie goldenrod	*Solidago ptarmicoides*	--	E (S1S2)
River bulrush	*Bolboschoenus fluviatilis*	--	SPCO (S1)
Schreber aster	*Eurybia schreberi*	--	SPCO (S1)
Shining ladies'-tresses	*Spiranthes lucida*	--	T (S1S2)

Common Name	Scientific Name	Status[1]	
		Federal	State (Rank)
Short-head rush	*Juncus brachycephalus*	--	SPCO (S2)
Slender blazing-star	*Liatris cylindracea*	--	T (S2)
Spreading false-foxglove	*Aureolaria patula*	--	SPCO (S3)
Swamp lousewort	*Pedicularis lanceolata*	--	SPCO (S1S2)
Tall larkspur	*Delphinium exaltatum*	--	E (S2)
Waterweed	*Elodea nuttallii*	--	SPCO (S2)
Western wallflower	*Erysimum capitatum*	--	E (S1S2)
Mammals			
Gray bat	*Myotis grisescens*	LE	E (S2)
Indiana bat	*Myotis sodalis*	LE	E (S1)
Northern long-eared bat	*Myotis septentrionalis*	LE	-- (S1S2)
Southeastern shrew	*Sorex longirostris*	--	D (S4)
Birds			
Bachman's sparrow	*Peucaea aestivalis*	--	E (S1)
Bald eagle	*Haliaeetus leucocephalus*	DM	D (S3)
Sharp-shinned hawk	*Accipiter striatus*	PS	D (S3S4)
Amphibians			
Berry Cave salamander	*Gyrinophilus gulolineatus*	C	T (S1)
Hellbender	*Cryptobranchus alleganiensis*	PS	D (S3)
Fish			
Blue sucker	*Cycleptus elongatus*	--	T (S2)
Flame chub	*Hemitremia flammea*	--	D (S3)
Lake sturgeon	*Acipenser fulvescens*	--	E (S1)
Laurel dace	*Chrosomus saylori*	LE	E (S1)
Snail darter	*Percina tanasi*	LT	T (S2S3)
Spotfin chub	*Erimonax monachus*	LT	T (S2)
Tangerine darter	*Percina aurantiaca*	--	D (S3)
Tennessee dace	*Chrosomus tennesseensis*	--	D (S3)
Mussels			
Alabama lampmussel	*Lampsilis virescens*	LE	E (S1)
Dromedary pearlymussel	*Dromus dromas*	LE	E (S1)
Fine-rayed pigtoe	*Fusconaia cuneolus*	LE	E (S1)
Purple bean	*Vilosa perpurpurea*	LE	E (S1)
Orange-foot pimpleback	*Plethobasus cooperianus*	LE	E (S1)
Shiny pigtoe pearlymussel	*Fusconaia cor*	LE	E (S1)
Spectaclecases	*Cumberlandia monodonta*	LE	-- (S2S3)

[1]**Federal status abbreviations**: LE = Listed endangered, LT = Listed threatened; PS = Partial status; C = Candidate; DM = Recovered, delisted, and being monitored

State status abbreviations: E = Endangered; T = Threatened; D = In need of management; NOST = No status; SPCO= Special concern; TRKD = Tracked by state natural heritage program; S-CE = Special concern - Commercially exploited

Common Name	Scientific Name	Status[1]	
		Federal	State (Rank)

State rank abbreviations: S1 = Critically imperiled, often with five or fewer occurrences, S2 =Imperiled, often with <20 occurrences; S3 = Rare or uncommon, often with <80 occurrences; S4 = Widespread, abundant, and apparently secure within the state, but with cause for long-term concern; SH= Of historical occurrence in Tennessee, e.g. formally part of the established biota, with the expectation that it may be rediscovered; SX = Believed to be extirpated from the state; S#S# = Denotes a range of ranks because the exact rarity of the element is uncertain (e.g., S1S2); S#B = Breeds in Tennessee; S#N = Occurs in Tennessee in a non-breeding status

Source: TVA 2018

3.5.1 Plants

The TVA Natural Heritage database indicated that there are no federally listed and 29 state-listed plant species are known to occur within 5 miles of the six parcels proposed for an allocation change (Table 3-6). Nine of these state-listed species have been recorded on TVA parcels and no populations are known to occur on the six parcels proposed for allocation changes. There are three federally listed plant species known to occur in Roane and Rhea counties (American Hart's tongue fern, white fringeless orchid, and Virginia spiraea), but these species have not been recorded within 5 miles of the proposed allocation change parcels. The nine state-listed plant species recorded on TVA parcels are described further below.

Thirty-four population occurrences of spreading false-foxglove have been reported on Watts Bar Reservoir TVA public land. Spreading false-foxglove grows on steep, dry, partially shaded calcareous slopes above large streams and rivers, and it is often found near water (NatureServe 2007).

Five populations of northern bush-honeysuckle have been found growing on limestone cliffs of Watts Bar Reservoir, though no populations are known to occur within the six parcels proposed for an allocation change. A member of the honeysuckle family, this plant grows in rocky woodlands often associated with limestone or sandstone bluffs (Kral 1983).

One population of mountain bush-honeysuckle has been reported on Watts Bar Reservoir property, yet no populations are known to occur within the six parcels proposed for an allocation change. Mountain bush-honeysuckle occurs in damp woods, rocky banks, and bluffs in full sun in disturbed areas (Wofford and Chester 2002).

Fetter-bush is member of the heath family, and one population is known to occur on Kingston Fossil Plant property across the reservoir from Parcel 153. However, no populations are known to occur within the six parcels proposed for an allocation change. According to Wofford and Chester (2002), this deciduous shrub grows in wet woods and gravel bars, and on stream banks.

A population of mountain honeysuckle is located in the Sugar Grove Habitat Protection Area (Parcel 152) on the Clinch River, but there are no populations known to occur within the six parcels proposed for an allocation change. Mountain honeysuckle is infrequently found in open woods and riverbanks (Wofford and Chester 2002).

There is a historic record for large-flowered Barbara's buttons in the upper Watts Bar Reservoir area near Emory River mile (ERM) 12, but no populations are known to occur within the six parcels proposed for an allocation change. This plant is known from only 11

watersheds throughout its range and occurs along rocky lakeshores, creek banks, bluffs, and floodplains. It tends to occur in moist to wet sandy soil, in sandy/cobbly alluvium, or in bedrock crevices along rivers (NatureServe 2007).

Northern white cedar is known to occur on upland sites, primarily in calcium-rich soils and clays and shallow loam overlying broken limestone (NatureServe 2007). Two populations of northern white cedar were found on Parcel 181a at ERMs 6.2 and 8.8. However, no populations are known to occur within the six parcels proposed for an allocation change.

Shinning ladies' tresses is primarily found in disturbed areas where the water supply is plentiful, such as open areas along creek banks, wet meadows, marshes, lakeshores, and sandbars of streams. According to Pyne and Shea (1994a), the plant is small and easily overlooked. One population has been recorded near Parcel 148, but no populations are known to occur within the six parcels proposed for an allocation change

Bay starvine has a widespread range, but there is only a small number of known secure populations in existence, including one recorded on Parcel 233. Though noted on Parcel 233, no populations are known to occur within the six parcels proposed for an allocation change.

3.5.2 Terrestrial Wildlife

The TVA Natural Heritage database was used to locate records of federally and state-listed terrestrial animal species within 3 miles of the six parcels proposed for an allocation change (Table 3-6). Searches were also performed for Indiana bat within 10 miles of the six parcels and northern long-eared bat within 5 miles of the six parcels. Finally, a database search of federally listed species from Roane and Rhea counties was performed. There are records of five federally listed and two state-listed terrestrial animal species within 3 miles of the six parcels proposed for an allocation change. The federally listed Indiana bat and northern long-eared bat could be present in this area, but have not been documented within 3 miles of the proposed allocation changes. These nine federally and state-listed terrestrial animal species are described below.

Bald eagles are protected under the Bald and Golden Eagle Protection Act. This species is associated with large, mature trees capable of supporting their massive nests and are usually found near large waterways where the eagles forage. Bald eagle records indicate that the species occurs within 3 miles of four of the six parcels, and the nearest bald eagle record indicates a presence that is 0.6 mile from Parcel 197.

Bachman's sparrow is a fire dependent species that primarily occupies open pine woods with a grassy understory, but they will also use replanted clear cuts, powerline cuts, and abandoned fields as habitat. Bachman's sparrow is state-listed and the nearest known record of this species is 1.8 miles from Parcel 144.

Sharp-shinned hawks are a state-listed species that primarily resides in coniferous or mixed deciduous-evergreen forests and open woodlots. They migrate along ridges, lakeshores, and coastlines and build nests in the canopy of evergreens, hidden by thick foliage. This species exhibits nest site fidelity, but will also build new nests or modify old bird and squirrel nests. The nearest known record is 1.5 miles from Parcel 144.

Berry Cave salamander is a candidate for federal listing. This amphibian is an aquatic, cave obligate species known only from four caves in Tennessee where it is critically imperiled. This species has likely been extirpated from two of these four locations.

Tennessee cave salamander are aquatic subterranean obligates that live in runs and pools of clear, sediment free streams. These salamanders eat amphipods, isopods, and insects and are associated sinkholes which allow detritus to enter caves. Both species have been recorded within 1.0 mile of Parcel 89.

Hellbenders are associated with clear, rocky creeks and rivers where water temperatures are at or below 20ºC. They are usually found in crevices under large shelter rocks and submerged logs. Sediment makes these crevices unavailable for cover and nesting, preventing recruitment. The nearest hellbender records occur approximately 1 mile from Parcel 144.

Gray bats are a federally listed species associated year-round with caves, roosting in different caves throughout the year. On summer nights, bats disperse from colonies adjacent to rivers and lakes and forage over these waterbodies. Gray bat records exist within 0.8 mile from Parcel 89 and 1.3 miles from Parcel 144. There are 12 known caves that could act as potential gray bat roosting areas within the 3 miles of the proposed allocation change areas.

Indiana bats inhabit caves during winter and migrate to roost under exfoliating bark and within cavities of trees during summer. Foraging occurs along riparian areas and along the tops of trees, such as along a forested edge or tree line. Some habitat requirements overlap between Indiana bats and northern long-eared bats, which roost in caves or cave-like structures in winter and utilize cave-like structures as well as live and dead trees with exfoliating bark and crevices in the summer. Indiana bats are federally endangered and have been captured within 8.8 miles of Parcel 144. Northern long-eared bats are federally threatened and have been captured 3.7 miles from Parcel 144 in Roane County and 4.4 miles from Parcel 153.

Southeastern shrews are found in a variety of habitats—from bogs to damp woods to upland shrubby or wooded habitat. This species prefers moist to wet areas and heavy ground cover. The nearest known record of the presence of this species is 1.5 miles from Parcel 144.

3.5.3 Aquatic Species

A review of data from the TVA Natural Heritage database indicated that there are several rare and sensitive aquatic animal species found in Watts Bar Reservoir or in its tributaries in Rhea and/or Roane counties (Table 3-6).

3.5.3.1 Fish

The federally and state-listed spotfin chub and the state-listed Tennessee dace do not occur in Watts Bar Reservoir, but these species are found in the tributary streams near lands allocated as Non-TVA Shoreland (Zone 1).

Additionally, the state-listed lake sturgeon is a bottom feeder that inhabits large rivers and lakes. TWRA along with federal and private partners began a reintroduction program in 2000. To date, over 220,000 lake sturgeon have been stocked into the Cumberland River

and the upper portion of the Tennessee River. Lake sturgeon have been collected within Watts Bar Reservoir.

Likewise, the remaining five fish species are primarily found in the tributary streams allocated as Non-TVA Shoreland (Zone 1). However, they are wide-ranging and are known to use the margins and embayment areas of the reservoir, although this is not their preferred habitat. For example, snail darter larvae drift downstream from tributary streams into reservoirs, and as the young develop, they migrate back upstream into tributary streams. Snail darters are also found below Watts Bar Dam in the tailwater.

3.5.3.2 Mussels

Four protected mussel species have been reported in Watts Bar Reservoir and its tributaries, but these species have not been found in the study area within the last 30 years. These species include the Alabama lampmussel, dromedary pearlymussel, fine-rayed pigtoe, and purple bean. These species were prevalent before the impoundment of the reservoir in 1942, but have likely been extirpated due to the loss of suitable habitat.

Three endangered mussel species have been observed relatively recently in Watts Bar Reservoir including the orange-foot pimpleback, shinypigtoe pearlymussel, and spectaclecase. These mussels are found within the waters of Watts Bar Reservoir, but not in its tributary streams.

3.6 Water Quality

Watts Bar is a main stem Tennessee River reservoir with an average annual discharge of about 27,000 cubic feet per second (cfs), average water residence time of 18 days, and a winter drawdown of about 6 feet from the summer pool level. Only 1,834 square miles of the total 17,310 miles of the watershed drains directly into Watts Bar Reservoir. Eighty six percent of the water entering Watts Bar Reservoir comes from outside the immediate drainage area. The Tennessee and Little Tennessee rivers (i.e., discharge from Fort Loudoun Dam, 18,200 cfs) account for approximately 67 percent of the flow into the Reservoir, the Clinch River (i.e., discharge from Melton Hill Dam, 5,000 cfs) accounts for about 19 percent of the flow into the reservoir, and the remaining 14 percent is contributed by local inflows.

There are five major tributaries—greater than 100-square-mile drainage area—that make up the majority of the local inflow to Watts Bar Reservoir: Poplar Creek (136-square-mile drainage area) joins the Clinch River at CRM 12, the Emory River (865-square-mile drainage area) joins the Clinch River at CRM 4 near the city of Kingston, Whites Creek (138-square-mile drainage area) joins the Tennessee River at TRM 545, and the Piney River (137-square-mile drainage area) enters the Tennessee River at TRM 532 near Spring City. The Little Tennessee River (2,630-square-mile drainage area) joins the Tennessee River at TRM 601 below Tellico Dam, but very little water is discharged through Tellico Dam. Instead, it is routed through a navigation canal to Fort Loudoun Reservoir and is controlled primarily by Fort Loudoun Dam and Navigation Locks.

Hydrologic unit codes (HUCs) are cataloging units assigned to each watershed by the U.S. Geological Survey for the purpose of assessment and management activities. Additionally, HUCs are standard units used by most state and federal agencies as reference for scientific study, sampling, and impact analysis. They are important to water quality efforts as they define land areas that drain into a specific stream. HUCs are based on watershed size,

ranging from 2-digit regional watershed codes (major rivers) to 12-digit cataloging units (creeks and streams) that represent the smaller sub-watersheds. The 1,834-square-mile local Watts Bar Reservoir watershed is comprised of three regional cataloging units: 06010201 for the Watts Bar Reservoir, 06010208 for the Emory and Obed river system, and 06010207 for the Clinch River tributaries that are part of Watts Bar Reservoir. This immediate drainage area contains a total of 31 smaller sub-watersheds with 11-digit cataloging units of their own. Land uses can contribute positively or negatively to the water quality of the stream in the drainage basin, and these smaller units of study can be used to determine causes and sources of water pollution and develop plans and projects to improve conditions.

3.6.1 General Water Quality Characteristics

The water quality in Watts Bar Reservoir is affected by many factors from TVA public lands along the reservoir and from land use practices throughout the reservoir's drainage area. Most of the water entering Watts Bar Reservoir originates outside the immediate watershed, so the overall water quality characteristics of the reservoir are strongly affected by waters outside the local watershed. The water quality characteristics of the embayments are, however, more apt to exhibit a response to pollutant loadings and changes in land use within the local area than the main river region.

Watts Bar is considered a productive (eutrophic) reservoir with an average chlorophyll concentration for the growing season (April through September, 1994-2016) of about 14 milligrams per cubic meter (mg/m_3) in the main channel with embayments ranging from 11 to 21 mg/m_3 (TVA 2016). Summertime thermal stratification does occur, but is generally limited to the downstream reach of the reservoir (TRMs 530 to 545) or embayments where velocity is sufficiently reduced to limit mixing of the water column, diminishing reaeration, and causing lower dissolved oxygen (DO) concentrations in the bottom waters. TVA has installed aeration equipment to add oxygen to the deep water above Watts Bar Dam and to improve conditions immediately downstream. The upstream reach above TRM 565 is essentially riverine and typically does not experience thermal stratification. In this area, algal productivity is suppressed due to greater concentration of suspended sediment and limited time in the photic zone (the area of the water column where light is sufficient for photosynthesis) for growth. The middle reach of the reservoir (TRMs 545 to 565) is termed the transition zone; this segment of the river has a greater volume and a longer residence time than the upper reach, and the water quality is more influenced by internal processes. Velocity is reduced in this reach, suspended sediment begins to settle from the water column, and algae remain in the photic zone for longer periods. This allows increased photosynthesis and results in higher algal productivity (i.e., higher chlorophyll concentrations). This reach of the reservoir typically experiences only weak thermal stratification except during low-flow conditions.

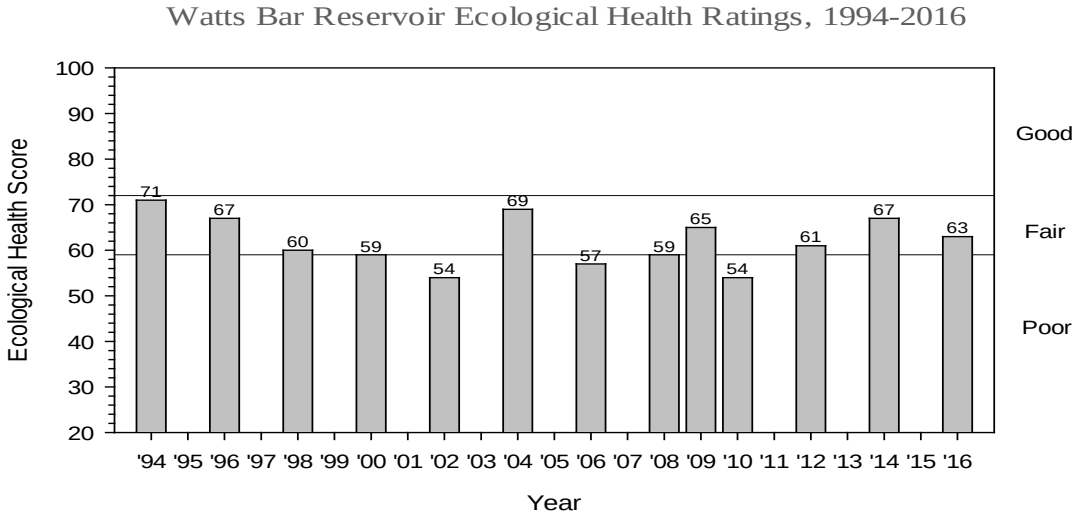
3.6.2 TVA Water Quality Monitoring and Results

The Reservoir Ecological Health Monitoring (TVA 2016a), also known as the Vital Signs Monitoring Program, was initiated by TVA in 1990. Watts Bar Reservoir has been monitored for water physical and chemical characteristics, sediment contaminants, benthic macroinvertebrates (bottom-dwelling animals such as worms, mollusks insects, and snails living in or on the sediments), and fish community assemblage as part of this monitoring program. Five key indicators (DO, chlorophyll, fish, bottom life, and sediment contaminants) are monitored and contribute to a final rating that describes the health and integrity of an aquatic ecosystem. TVA monitors two locations on Watts Bar Reservoir for physical and

chemical characteristics and sediment contaminants. The forebay region (the deep, still waters near the dam) is sampled at TRM 532.5. The midreservoir region or transition zone is sampled at TRM 560.8 downstream of the confluence of the Clinch and Tennessee rivers. Other components of the monitoring program include monitoring toxic contaminants in fish flesh to determine their suitability for consumption and sampling of bacteriological concentrations in recreational areas to evaluate their suitability for water contact recreation.

The overall Reservoir Ecological Health rating for Watts Bar Reservoir rated "fair" in 2016 (TVA 2016b). Ratings declined from "good" to "poor" between 1994 and 2002 and had additional years of "poor" ratings in 2006, 2008, and 2010 (Table 3-7). This was driven mostly by declining scores for chlorophyll and DO (Table 3-8). In reservoirs such as Watts Bar, which have short water residence time (the amount of time required to replace the reservoirs' volume of water with "new" water), DO and chlorophyll can be strongly influenced by reservoir flow. Periotic drought-like conditions across the Valley have led to lower flows, thereby allowing for more stagnant conditions and lower DO concentration in bottom waters. Improved rainfall and runoff greatly improves DO.

Table 3-7. Watts Bar Reservoir Ecological Health Overall Ratings, 1994-2016



Reservoir Ecological Health Scoring Ranges: <59="Poor," 59-72="Fair," >72="Good"
Source: TVA 2016b

Table 3-8. Watts Bar Reservoir Water Quality Ratings, 2009-2016

	Watts Bar Forebay			Watts Bar Midreservoir		
	Dissolved Oxygen	**Sediment**	**Chlorophyll**	**Dissolved Oxygen**	**Sediment**	**Chlorophyll**
1994	Fair	Fair	Fair	Good	Fair	Good

	Watts Bar Forebay			Watts Bar Midreservoir		
	Dissolved Oxygen	**Sediment**	**Chlorophyll**	**Dissolved Oxygen**	**Sediment**	**Chlorophyll**
1996	Good	Fair	Fair	Good	Fair	Fair
1998	Good	Fair	Poor	Good	Fair	Fair
2000	Poor	Fair	Fair	Good	Fair	Fair
2002	Poor	Fair	Poor	Good	Fair	Poor
2004	Good	Good	Fair	Good	Good	Poor
2006	Poor	Fair	Fair	Good	Good	Poor
2008	Poor	Good	Fair	Fair	Good	Poor
2009	Fair	Fair	Fair	Good	Fair	Poor
2010	Poor	Fair	Fair	Poor	Fair	Poor
2011	Poor	Fair	Fair	Good	Fair	Poor
2012	Poor	Fair	Fair	Good	Fair	Poor
2014	Poor	Good	Fair	Good	Good	Poor
2016	Poor	Fair	Fair	Good	Fair	Poor

Source: TVA 2016b

Sediment quality rated “fair” at the two locations at which this indicator is monitored: the forebay and mid-reservoir. Low levels of PCBs were detected in sediment samples collected at both locations, and no pesticides were detected. Additionally, concentrations of metals were within expected background levels. Sediment quality commonly rates “fair” at both locations due to one or more contaminants: typically, PCBs, chlordane and/or arsenic. The presence or absence of these chemicals is probably more due to sampling variability rather than an actual increase because of their historical, rather than current use. These chemicals are no longer manufactured because they have been linked to a variety of health concerns. Chlordane was mainly used to control termites. PCBs were commonly used in a variety of commercial products, including adhesives, hydraulic systems, transformers, electric motors, and other electrical equipment, as well as during past operations of the USDOE’s Oak Ridge Reservation.

Institutional controls (warning signs, fish consumption advisories, and monitoring) are in place to reduce health and environmental risk. TVA is required to take appropriate actions if a sediment-disturbing activity would threaten human health or the environment. The land planning process will not affect the established procedure for reviewing projects and proposals that may result in sediment disturbance.

In 2016, the Tennessee Department of Environment and Conservation (TDEC) recommended that the public limit consumption of catfish, striped bass, and hybrid (striped bass-white bass) to one meal per month due to elevated levels of polychlorinated biphenyls (PCBs). Additionally, there is a precautionary advisories for the consumption of white bass, sauger, carp, smallmouth buffalo, and largemouth bass. The precautionary advisory indicates pregnant women, nursing mothers, and children should not consume the fish species named, and all other individuals should limit their consumption to no more than one meal per month. Similar advisories associated with PCBs are in effect for other east Tennessee reservoirs. Additionally, TDEC recommends limiting the consumption of striped bass within the Clinch River arm of Watts Bar Reservoir and has issued a precautionary advisory for consuming catfish and sauger in the area due to PCBs

PCB concentrations have declined in fish tissue samples from Watts Bar and neighboring Fort Loudoun and Tellico reservoirs in recent years. To better understand the issue of PCB contamination, TVA coordinates with state agencies to sample these reservoirs annually. Additionally, there are state advisories against swimming in Cash Hollow Creek, Coal Creek, and East Fork Poplar Creek within Watts Bar Reservoir due to biological contamination (TDEC 2017).

TVA is signatory to a 1991 Interagency Agreement for Watts Bar Reservoir Permit Coordination (TDEC 1991). The Agencies are TVA, USACE, DOE, EPA and TDEC. The purpose of the agreement is to establish a procedure for interagency coordination and review of permitting and other use authorization activities by any of the agencies that could result in the disturbance, resuspension, removal or disposal of contaminated sediments resulting from the Department of Energy Operations at Oak Ridge, Tennessee.

The federal Clean Water Act requires all states to identify all waters where required pollution controls are not sufficient to attain or maintain applicable water quality standards and to establish priorities for the development of limits based on the severity of the pollution and the sensitivity of the established uses of those waters. States are required to submit reports to the USEPA. The term “303(d) list” refers to the list of impaired and threatened streams and water bodies identified by the state. The assessment of Tennessee’s waters was based on a water quality evaluation that took place during 2015 and early 2016 (TDEC 2016).

Water quality limited streams are those that have one or more properties that violate water quality standards. They are considered impaired and not fully meeting their designated uses. The impaired segments of streams in the Watts Bar Reservoir, corresponding hydrologic unit, cause and source of impairment are listed in Appendix E.

3.7 Wetlands

Wetlands are areas that are inundated or saturated by water at a frequency and duration sufficient to support, and under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions (USEPA regulations at 40 CFR § 230.3(t)). Wetlands generally include swamps, marshes bogs and similar areas. 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.

Wetlands are typically transitional ecosystems between terrestrial and aquatic communities. Watts Bar Reservoir is located in the Ridge and Valley physiographic province. Wetlands in this region are typically associated with low-lying, poorly drained areas, or linear in feature and associated with the floodplain areas of streams, rivers, and in the case of the Watts Bar project, the reservoir. In the six parcels proposed for an allocation change, wetlands represent a small percentage of the landscape relative to uplands, mainly due to the geology of the region (Hefner et al. 1994).

Wetlands in the vicinity of Watts Bar Reservoir consist of two main systems: palustrine wetlands such as marshes, swamps and bottomland forests dominated by trees, shrubs, and persistent emergent vegetation, and lacustrine wetlands associated with lakes such as aquatic bed wetlands (Cowardin et al. 1979). Forested wetlands are the most common wetland type and are typically found along tributary streams entering the reservoir. Emergent and scrub-shrub wetlands are often found associated with larger areas of forested wetlands, along the shoreline gradient, and in embayments across the reservoir. Aquatic bed habitats, those areas with rooted vascular plants, are very limited on Watts Bar.

The extent and types of wetlands present on the six parcels was determined using a combination of field survey data, Shoreline Management Inventory (SMIN) data (TVA 1998), and National Wetland Inventory (NWI) data (USFWS 2016):

- Field survey data includes wetlands delineated for parcel-specific environmental review projects, and a limited number of Zone 3 (Sensitive Resource Management), Zone 4 (Natural Resource Conservation), Zone 6 (Recreation) and Zone 7 (Shoreline Access) parcels.

- SMIN wetlands data includes general habitat types of shoreline wetlands that are field surveyed, mapped and entered into a GIS. These data provide wetland acreage, as well as mapped locations of extremely small linear wetland areas. These data include mixed habitat types, e.g., forested/scrub-shrub and scrub-shrub/emergent wetlands. SMI coverage does not include aquatic bed wetlands or flats.

- NWI data uses aerial photography data that is photo-interpreted to provide information about wetland types and acreage.

The extent of wetland resources on the six parcels proposed for land use changes is listed in Table 3-9.

Table 3-9. Summary of Wetlands by Parcel

Parcel	Wetland Type
89	No wetlands on this portion.
144	A total of 7.24 acres of wetlands has been identified on the parcel. Forested wetlands are present along the shoreline. Emergent and scrub-shrub wetlands occur in the Grassy Creek embayment.
153	A linear strip of forested wetlands occurs along the shoreline at the northern end of the parcel. A mix of emergent and scrub-shrub wetlands located along the shoreline at the southern end of the parcel.

Parcel	Wetland Type
197	Small (< 0.01 acre) scattered pockets of scrub-shrub wetlands
256	No wetlands in 0.1-acre area.
271	No wetlands in 0.2-acre area.

3.8 Floodplains

A floodplain is the relatively level land area along a stream or river that is subjected to periodic flooding. The area subject to a one percent chance of flooding in any given year is normally called the 100-year floodplain. The area subject to a 0.2 percent chance of flooding in any given year is normally called the 500-year floodplain. There are two main water courses in Watts Bar Reservoir, the Tennessee River and the Clinch River. The 100-year flood elevations for the Tennessee River vary from elevation 746.5 feet mean sea level (msl) at Watts Bar Dam (TRM 529.9) to elevation 760.0 feet msl at the upper end of Watts Bar Reservoir at TRM 602.3 (downstream of Fort Loudoun Dam). For the Clinch River, the 100-year flood elevations vary from elevation 747.4 feet msl at the mouth (CRM 0.0) to elevation 755.3 feet msl at the upper end of Watts Bar Reservoir at CRM 23.1 (downstream of Melton Hill Dam).

The flood risk profile (FRP) elevations for the Tennessee River vary from elevation 747.0 feet msl at Watts Bar Dam to elevation 769.3 feet msl at the upper end of Watts Bar Reservoir at TRM 602.3. For the Clinch River, the FRP elevations vary from elevation 748.4 feet msl at the mouth to elevation 759.2 feet msl at the upper end of Watts Bar Reservoir at CRM 23.1. The FRP elevations are based on the 500-year flood and are used to control flood damageable development for TVA projects on TVA Lands

The floodplain areas and flood elevations for Watts Bar Reservoir discussed in the 2009 RLMP are still valid today.

3.9 Navigation

Watts Bar Reservoir is one of the impoundments that make the commercially navigable Tennessee River System possible. This approximately 650-mile system connects Knoxville, Tennessee, at the upper end with Paducah, Kentucky, at the confluence of the Tennessee and the Ohio rivers and provides for year-round navigation the length of the Tennessee River, with an additional 150 miles of navigable tributaries. The Tennessee River system is in turn part of the interconnected National Inland Waterway System that links much of the eastern half of the U.S. by water transportation with coastal and Great Lakes links to the rest of the world.

Watts Bar Reservoir is bounded by three dams with navigation locks. Watts Bar Lock and Dam, at TRM 529.9, marks the southern (downstream) boundary of the reservoir and Fort Loudoun Lock and Dam defines the upstream limits of the reservoir at TRM 602.3. In addition, Watts Bar Reservoir extends into two navigable tributaries of the Tennessee River: the Emory River, navigable for 12 miles to the town of Harriman and the Clinch River. While the Clinch is navigable for 62 miles to the town of Clinton, Melton Hill Lock and Dam complex at CRM 23.1 marks the furthest extent of Watts Bar Reservoir on the Clinch River.

To support commercial waterway traffic, TVA and the U.S. Coast Guard (USCG) maintain a number of navigation aids either on the water or along the shoreline. These include main channel and secondary channel buoys; mooring cells, dolphins, and buoys; dayboards (navigation signs) and lighted beacons; and shoreline signs for safety harbors, landings, and secondary channels. A safety harbor is a cove or embayment off the main channel into which a tow may pull in high flow, inclement weather conditions, or an emergency; a safety landing marks a place on the shoreline of the main channel where a tow may tie off in a weather or operations emergency. The 2009 RLMP and EIS included the following commitments regarding safety landings:

- The construction of water use facilities and shoreline alterations within the marked limits of the safety landings and harbors would be prohibited.
- Requests for water use facilities on shoreline immediately upstream and downstream of the safety landings and harbors would continue to be reviewed to ensure that barge tows would have sufficient room to maneuver in and out of the safety landings and harbors without the risk of damaging private property.

Navigation aids also support recreational boat traffic, as do the locks at Watts Bar and Fort Loudoun dams. While it is impossible to know the actual number of recreational vessels on Watts Bar Reservoir at any one time, several indicators may provide useful information. For example, in 2015, 1,060 recreational vessels locked through at Watts Bar Lock, and 1,078 recreational vessels locked through at Fort Loudoun Lock (USACE 2015 LPMS data).

3.10 Air Quality and Climate Change

3.10.1 Air Quality

Under the Clean Air Act, the USEPA established National Ambient Air Quality Standards (NAAQS) (USEPA 2015) to protect and enhance the nation's air quality resources. The primary NAAQS were promulgated to protect the public health, including the health of "sensitive populations, such as people with asthma, children, and older adults." Secondary NAAQS protect public welfare by promoting ecosystems health, preventing decreased visibility, and damage to crops and buildings. A listing of the NAAQS is presented in Table 3-10.

Table 3-10. National Ambient Air Quality Standards

Pollutant	Primary / Secondary	Averaging Time	Level	Form
Carbon Monoxide (CO)	primary	8 hours	9 ppm	Not to be exceeded more than once per year
		1 hour	35 ppm	
Lead (Pb)	primary and secondary	Rolling 3 month average	0.15 µg/m^3 [1]	Not to be exceeded
Nitrogen Dioxide (NO_2)	primary	1 hour	100 ppb	98th percentile of 1-hour daily maximum concentrations, averaged over 3 years
	primary and secondary	Annual	53 ppb [2]	Annual mean

Pollutant	Primary / Secondary	Averaging Time	Level	Form
Ozone (O_3)	primary and secondary	8 hours	0.070 ppm [3]	Annual fourth-highest daily maximum 8-hour concentration, averaged over 3 years
Particulate Matter ($PM_{2.5}$)	primary	Annual	12.0 µg/m^3	Annual mean, averaged over 3 years
	secondary	Annual	15.0 µg/m^3	Annual mean, averaged over 3 years
	primary and secondary	24-hours	35 µg/m^3	98th percentile, averaged over 3 years
Particulate Matter (PM_{10})	primary and secondary	24-hours	150 µg/m^3	Not to be exceeded more than once per year on average over 3 years
Sulfur Dioxide (SO_2)	primary	1-hour	75 ppb [4]	99th percentile of 1-hour daily maximum concentrations, averaged over 3 years
	secondary	3-hours	0.5 ppm	Not to be exceeded more than once per year

Source: USEPA 2018a.

Ambient air monitors measures concentrations of criteria pollutants to determine attainment with these standards. The USEPA classifies geographic areas as being “attainment” areas, or “nonattainment” areas. A geographic area with air concentrations at or below the NAAQS is referred to as an “attainment” area. An area with air concentrations that exceed these standards is referred to as “nonattainment” area. New sources of air pollution in or near these areas may be subject to more stringent air permitting requirements.

All counties that surround Watts Bar Reservoir and their surrounding counties are in attainment.

3.10.2 Climate Change

Climate change refers to any substantive change in measures of climate, such as temperature, precipitation, or wind (USEPA 2018b). The 2017 National Climate Science Special Report (U.S. Global Change Research Program [USGCRP] 2017) concluded that global climate is project to continue to change over this century and beyond. The amount of warming projected beyond the next few decades, by these studies, is directly linked to the cumulative global emissions of greenhouse gases (e.g., carbon dioxide [CO_2], methane) emitted globally and on the remaining uncertainty in the sensitivity of Earth’s climate to those emissions. With significant reductions in the emissions of greenhouse gases, the global annually averaged temperature rise could be limited to 3.6°F (2°C) or less. Without major reductions in these emissions, the increase in annual average global temperatures relative to preindustrial times could reach 9°F (5°C) or more by the end of this century. (USGCRP 2017).

TVA has adopted a climate adaptation plan that establishes adaptation planning goals and describes the challenges and opportunities a changing climate may present to its mission and operations. The goal of TVA's adaptation planning process it to ensure that TVA continues to achieve its mission and program goals and to operation in a secure, effective, and efficient manner in a changing climate.

Activities that contribute CO2 emissions include industrial activities, manufacturing activities, barge, truck, and personal use; motorized watercraft traffic; and other construction involving the use of fossil-fuel-powered equipment (e.g., bulldozers, loaders, haulers, trucks, generators, etc.). Reservoir land use that generate CO2 emissions primarily occur in Zones 2, 5, and 6 (Project Operations, Industrial, and Developed Recreation). Activities that decrease CO2 emissions occur primarily on lands allocated for Zone 3 and 4 (Sensitive Resource Management and Natural Resource Conservation). For example, protected forested areas that absorb and store CO2 from the atmosphere via a process knows and carbon sequestration reduce CO2 in the atmosphere.

3.11 Historic and Archaeological Resources

Cultural resources include prehistoric and historic archaeological sites, districts, buildings, structures, and objects, and locations of important historic events that lack material evidence of those events. Cultural resources that are included or considered eligible for inclusion in the National Register of Historic Places (NRHP) maintained by the National Park Service are called historic properties. To be included or considered eligible for inclusion in the NRHP, a cultural resource must meet one of four criteria: (a) association with important historical events; (b) association with the lives of significant historic persons; (c) having distinctive characteristics of a type, period, or method of construction, or representing the work of a master, or having high artistic value; or (d) having yielded or having the potential to yield information important in history or prehistory. In addition, it must also possess integrity of location, design, setting, materials, workmanship, feeling, and association.

An undertaking may have effects on a historic property that are not adverse, if those effects do not diminish the qualities of the property that identify it as eligible for listing on the National Register. However, if the agency determines (in consultation) that the undertaking's effect on a historic property within the APE would diminish any of the qualities that make the property eligible for the National Register (based on the criteria for evaluation at 36 CFR Part 60.4), the effect is said to be adverse. Examples of adverse effects would be ground disturbing activity in an archaeological site, or erecting structures within the viewshed of a historic building in such a way as to diminish the structure's integrity of feeling or setting. Federal agencies are required to resolve the adverse effects of their undertakings on historic properties. Resolution may consist of avoidance (such as choosing a project alternative that does not result in adverse effects), minimization (such as redesign to lessen the effects), or mitigation. Adverse effects to archaeological sites are typically mitigated by means of excavation to recover the important scientific information contained within the site. Mitigation of adverse effects to historic structures sometimes involves thorough documentation of the structure by compiling historic records, studies, and photographs. Agencies are required to consult with SHPOs, tribes, and others throughout the Section 106 process and to document adverse effects to historic properties resulting from agency undertakings.

The area of potential effect (APE) is defined at 36 CFR Part 800.16(d) as "the geographic area or areas within which an undertaking may directly or indirectly cause alterations in the character or use of historic properties, if any such properties exist." For the currently proposed actions TVA determined the APE, for archaeological resources, to be the 226 acres associated with the proposed allocation changes on six parcels. TVA determined the APE for indirect (visual) effects to be the viewshed within a half-mile radius of each of the six parcels.

TVA conducted a desktop data review of the APE to determine which if any areas of the APE have been included in previous cultural resources surveys and to inventory any historic properties that have been identified. The desktop review included various sources including previous survey reports, TVA's site files database (which is incomplete), historic topographic maps, TVA's land acquisition maps for the Watts Bar Project (1939-1942), and modern satellite imagery. The desktop review indicates that all six parcels have previously been surveyed for cultural resources, and Table 3-11 below summarizes the previous archaeological surveys and previously recorded archaeological sites for each of the six segments of the APE.

Table 3-11. Summary of Previous Archaeological Surveys and Recorded Sites

Parcel	Previous Recorded Sites	Previous Surveys
89	None	Cannon (1986), Ahlman et al. (2000)
144	40RE104 (potentially eligible) 40RE105 (potentially eligible) 40RE106 (potentially eligible) 40RE107 (potentially eligible) 40RE108 (potentially eligible) 40RE128 (potentially eligible) 40RE165 (potentially eligible) 40RE166 (potentially eligible) 40RE167 (potentially eligible) 40RE549 (potentially eligible) 40RE595 (potentially eligible) 40RE600 (potentially eligible) 40RE601 (potentially eligible)	Barrett et al. (2011)
153	40RE416 (unevaluated) 40RE420 (unevaluated)	Ahlman et al. (2000)
197	40RE364 (unevaluated) 40RE366 (unevaluated) 40RE367 (unevaluated)	Ahlman et al. (2000)
256	None	Ahlman et al. (2000)
271	None	Ahlman et al. (2000)

Parcels 144, 153, 197, 256, and 271 were included in a Phase I archaeological resources survey performed by the University of Tennessee (UT) from 1993 to 1998 (Ahlman et al. 2000) and Parcel 89 was included in an earlier survey performed by UT (Cannon 1986). Additional surveys of Parcel 144 were performed in 2011 by TRC (Barrett et al. 2011). No archaeological sites were identified in Parcels 89, 256, and 271. For sites occurring on Parcels 153 and 197, the survey report authors listed all five sites (40RE364, 40RE366, 40RE367, 40RE416 and 40RE420) as "potentially eligible" for inclusion in the NRHP;

however, TVA has not completed Section 106 consultation regarding the NRHP eligibility of the sites identified by that survey and considers these five sites as being “unevaluated” for inclusion in the NRHP. Thirteen sites of undetermined eligibility (“potentially eligible”) were identified within Parcel 144 during the 2011 survey (Barrett et al. 2011). TVA consulted with the Tennessee SHPO and federally-recognized Indian tribes regarding the findings of the 2011 survey and the Tennessee SHPO agreed that the 13 sites should be considered “potentially eligible” for the NRHP.

TVA has performed historic architectural surveys in the viewshed of Parcel 144 and has not performed historic architectural surveys of the other five parcels. In 2015, TVA consulted with the Tennessee SHPO regarding historic architectural properties in the viewshed of Parcel 144. Based on a desktop review and a field review, TVA identified one potential historic structure within a one-half mile radius of Parcel 144, which is within the APE of the proposed undertaking for Parcel 144. This resource consists of a two-story frame house that was constructed prior to 1939 and appears to have good integrity. The Tennessee SHPO agreed with TVA’s finding that potential development for TVA project operations on Parcel 144 would result in no effects on historic architectural resources listed or eligible for listing in the NRHP.

3.12 Natural Areas and Ecologically Significant Sites

Managed areas and ecologically sensitive sites are lands set aside for a particular management objective or lands that are known to contain sensitive biological, cultural, or scenic resources. Such areas and sites within the seven-state TVA region are identified and recorded in the TVA Natural Heritage database. Managed areas and ecologically sensitive sites are typically established and managed to achieve one or more of the following objectives: species/habitat protection, recreation, resource production/harvest, scientific/educational resources, cultural resources protection, and visual/ aesthetic protection. Most managed areas and ecologically significant sites have multiple management objectives. If management objectives cannot be met, the integrity of the area may be lost or compromised.

TVA reviewed the Natural Heritage database and identified the following natural areas and ecologically significant sites within 3 miles of the subject parcels.

- Parcel 89 – Marble Bluff TVA Habitat Protection Area (HPA), Berry Cave, Paint Rock State Wildlife Refuge, and Pole Cat Creek Slopes HPA are within 3 miles of the parcel.

- Parcel 144 - The Grassy Creek HPA, Oak Ridge State Wildlife Management Area, the ORNL Research Park (and Biosphere Reserve), the Oak Ridge Reservation (ORR), the Campbell Bend Barrens Designated SNA, and the Crowder Cemetery Cedar Barrens Designate SNA are within 3 miles of Parcel 144. Additionally, three of the five state natural areas (the New Zion Unit Proposed SNA, the Copper Ridge Unit Proposed SNA and the Black Oak Ridge Unit Proposed SNA) are within the ORR proposed for future designation and protection under the Natural Areas Preservation Act are within 3 miles of Parcel 144.

- Parcel 153 – The Sugar Grove TVA HPA, the Rayburn Bridge TVA HPA, Stowe Bluff HPA, and the Kingston Refuge WMA are located within 3 miles of the parcel.

- Parcel 197 – The McGlotlin-Largen WMA is located within 3 miles of the parcel. The proposed allocation change for Parcel 197 would take place in McGlothlin-Largen WMA, which is a new natural area that was created after the 2009 RLMP. Located on Bowman's Bend Road, this 112-acre WMA has over 1.0 mile of shoreline frontage and is open to limited hunting and wildlife viewing.

- Parcel 256 – Fooshee Bend Islands HPA and Fooshee Peninsula Small Wild Area are within 3 miles of the parcel.

- Parcel 271 – Spring City Park and the Cumberland Trail State Park are located within 3 miles of the parcel. Spring City Park is immediately adjacent to the southern corner of the parcel.

3.13 Aesthetics and Visual Resources

TVA has adapted criteria for classifying the quality and value of scenery from a scenic management system developed by the U.S. Forest Service and integrated with planning methods used by TVA (U.S. Forest Service 1995). The process and criteria are used to compare the value of scenery to other resource values during inventory and land planning tasks. These are also used to evaluate the extent and magnitude of visual changes that could result from proposed projects. In addition, they can be useful to help establish management objectives for improving or maintaining the scenic quality of managed lands.

The physical, biological, and cultural features of an area combine to make the visual landscape character both identifiable and unique. Scenic integrity indicates the degree of unity or wholeness of the visual character. Scenic attractiveness is the evaluation of outstanding or unique natural features, scenic variety, seasonal change, and strategic location. Where and how the landscape is viewed would affect the more subjective perceptions of its aesthetic quality and sense of place.

Views of a landscape are described in terms of three distance contexts: (1) foreground, (2) middleground and (3) background. In the foreground, an area within 0.5 mile of the observer, details of objects are easily distinguished in the landscape. In the middleground, normally between 0.5 to 4 miles from the observer, objects may be distinguishable but their details are weak and they tend to merge into larger patterns. Details and colors of objects in the background, the distant part of the landscape, are not normally discernible unless they are especially large and standing alone or have a substantial color contrast. In this review, the background is measured as 4 to 10 miles from the observer. Visual and aesthetic impacts associated with a particular action may occur as a result of the introduction of a feature that is not consistent with the existing viewshed. Consequently, the character of an existing site is an important factor in evaluating potential visual impacts.

The land surrounding Watts Bar Reservoir includes islands, rock bluffs, secluded coves, wetlands, and agricultural lands, which are framed by high wooded ridges. Because the scenic features of the ridge and valley landscape are not limited by property boundaries, the attractive landscape character extends across TVA public and private land alike. The natural elements together with the communities and other cultural development provide a scenic, relatively harmonious, rural countryside. The reservoir offers abundant water-recreation opportunities; therefore the view of the landscape from on the water is important and can vary widely. Most creek embayments are broadly open at the mouth, while some wind over a mile to their headwaters.

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

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.

Slopes and ridgelines seen from the reservoir are generally heavily vegetated with mature hardwood and evergreen trees and provide positive visual contrast to the reservoir. Various combinations of development and land use patterns that are present in the viewed landscapes along the shoreline contribute to the overall visual character. 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. Transmission structures, including towers and lines, and fossil and nuclear plant structures generally can be seen up to middle-ground distances, depending on topography and viewer position. Farther away, closer to the borders on all sides, the landscape becomes natural appearing with slight human alterations. Residents and motorists along local roads have views up to middle-ground distances of the dam, depending on seasonal variations of vegetation and atmospheric conditions.

3.14 Noise

Noise is generally defined as unwanted sound that disrupts normal activities or that diminishes the quality of the environment. The USEPA defines noise pollution as “unwanted or disturbing sound” and noise pollution is regulated under the Noise Control Act of 1972 (USEPA 1972). Noise is usually caused by human activity that adds to the natural acoustic setting of a locale. Noise is commonly measured in decibels on the A-weighted scale (dBA) which represents the range of sounds that can be heard by the human ear. Noise is usually caused by the human activity that adds to the natural acoustic setting of a locale. The perceived loudness or intensity between a noise source and a receptor may change as a result of distance, topography, vegetation, water bodies, and structures. The closer a receptor is to a noise source, the louder the noise seems. For every doubling of distance from a source, the intensity drops by about 6dBA over land about 5 dBA over water. Topography, vegetation, and structure can change noise intensity through reflection, absorption, or deflection. Reflection tends to increase the intensity, while absorption and deflection tend to decrease the intensity. There is considerable variation in individual response to noise. Noise that one person would consider mildly annoying, another person may consider highly annoying or not annoying at all.

Sources of noise along the reservoir include development, power generation facilities, industrial activities, commercial facilities, construction sites, substations, developed recreation sites, recreational watercraft use, navigation uses and automobile traffic. Noise emission levels from sources that would be allocated to Zone 2 (Project Operations) for uses such as power generation, navigation locks and associated barge operations can

range from 70 dBA to 100 dBA (U.S. Department of the Interior 2008). Noise from generators at TVA facilities produce a constant, low frequency drone during generation. However, because they are housed in buildings, they are not audible at a distance. Noises that occur from barge traffic and when water is released would approach 100 dBA, but would be intermittent and would attenuate with distance.

Noise emissions associated with land uses allocated to Zone 6 (Developed Recreation) depend on the location of the facilities and the type and intensity of recreational use. For example, recreational facilities that support low-intensity uses, such as parks or open spaces, generate less noise than more intensive uses such as marinas and developed recreation areas. Noise levels and patters at developed recreation areas are typical of campground and day use recreation areas. These developed recreational use areas could be compared to residential areas with a range of about 50 dBA (quiet suburb, not close to major roads, and little nighttime activity) to about 65 dBA (relatively noisy residential area). The most conspicuous recreational noise producers are power boats and personal water craft (jet skis) on the reservoir. While power boats and jet skis may both have an average sound level of about 90 dBA, noise emissions from these sources can exceed 115 dBA depending on speed and other operational factors.

3.15 Socioeconomics and Environmental Justice

EO 12898 formally requires federal agencies to incorporate Environmental Justice as part of NEPA. Specifically, it directs them to address, as appropriate, any disproportionately high and adverse human health or environmental effects of their actions, programs, or policies on minority and low-income populations. Although TVA is not one of the agencies subject to this order, TVA routinely considers Environmental Justice impacts as part of the decision making process.

In compliance with EO 12989, “Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations,” TVA performed a searched for minority and low income populations in the vicinity of the six parcels addressed in this Supplemental EA.

Based on the 2010 Census, the total population in the state of Tennessee was 6,346,105 (Table 3-12). Populations increased in Loudon, Meigs, and Rhea counties, while Roane County saw a decrease in population since 2000. The counties surrounding Watts Bar Reservoir are generally lower in income than the state of Tennessee. Three of the four counties had median household incomes lower than the state average, with only Loudon County exceeding the state average.

Table 3-12. Environmental Justice Characteristics

Geography	2010 Population	Percent Minority	Percent in Poverty
Loudon	48,556	6.6	13.5
Meigs	11,753	3.5	18.8
Rhea	31,809	6.6	22.9
Roane	54,181	5.6	16.2
Tennessee	6,346,105	22.4	17.2

Source: USCB 2018 https://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?src=CF

CHAPTER 4 – ENVIRONMENTAL CONSEQUENCES

This chapter addresses the potential direct, indirect, and cumulative effects of adopting and implementing Alternatives A and B as they affect the identified resource areas. A direct impact is an effect caused by the action and occurring at the same place and time. 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.

This chapter is organized by resource area and provides the scientific, analytical, and technical basis for assessing the impacts on those resources. Measurement indicators were used to gauge the effects of the alternatives on each resource.

4.1 Land Use and Prime Farmland

4.1.1 Land Use

4.1.1.1 Alternative A

Under the No Action Alternative, TVA would not alter its land use zones on Watts Bar Reservoir. The public lands would continue to be managed in accordance with land use zones/categorizations made by TVA in the 2009 RLMP and its supplements, including the 2012 Recovery Plan (TVA 2009 and 2012). Proposed changes to land use allocations to reflect existing land uses and changes in backlying property ownership or land rights would not occur. The absence of this proposed amendment may result in the loss of land uses that do not meet the needs of the community and TVA's land management and stewardship goals at this time.

4.1.1.2 Alternative B

This land use impact analysis is based upon the proposed changes in the amount of land allocated to each zone. Under this alternative, lands within the six parcels under consideration in this EA would be placed into one of the seven land use zones that best fits existing and proposed land uses. Some of the changes are proposed to accurately reflect backlying lands encumbered with certain access rights. Under Alternative B, of the 13,425 acres of TVA public lands on Watts Bar Reservoir, TVA proposes to the change the land use allocation of approximately 226 acres (approximately 0.02 percent of the 13,425 acres).

The largest modification involves changing 172.3 acres (Parcel 144) from Zone 3 (Sensitive Resource Management) to Zone 2 (Project Operations). Watts Bar Reservoir Zone 2 acreage would increase from 12.7 percent to 13.9 percent of public land and land allocated to Zone 3 would decrease from about 28.0 percent to 26.6 percent. This proposed allocation change is for a potential future use for a project in the planning phase and would only change how TVA manages the property at some future time should TVA decide to move forward with the potential project. If TVA does decide to proceed with the potential project, environmental impacts from the construction and operation of the proposed facility would be assessed during a project specific environmental review.

In total, the proposed allocation changes would decrease Zone 4 (Natural Resource Conservation) acreage by approximately 2.7 acres (decrease from about 28.0 percent to 27.9 percent), would increase Zone 6 (Developed Recreation) acreage by approximately 12.6 acres (increase from about 11.6 percent to 11.7 percent), and would increase Zone 7 (Shoreline Access) acreage by approximately 30.7 acres (increase from 16.7 percent to

16.9 percent). The proposed changes in land use allocations are minor and generally correspond to a “re-alignment” to reflect current land uses and conditions on each parcel. Other changes in land use are proposed to reflect potential future uses and site-specific environmental reviews for a specific parcel or parcels would be completed prior to any proposed development or activity on TVA public land. Consequently, actual direct or indirect adverse impacts to land use are considered to be minor.

4.1.2 Prime Farmland

4.1.2.1 Alternative A

Under this alternative, TVA would not take any action to amend the 2009 RLMP for TVA managed lands on the Watts Bar Reservoir. Five of the parcels would continue to be managed under the 2009 RLMP allocations and one parcel near Kingston Fossil Plant would remain “Unplanned.” Potential impact to Prime Farmland would be as anticipated with their existing zone allocations as discussed in the 2009 RLMP and EIS

4.1.2.2 Alternative B

Under Alternative B, TVA proposes to amend the 2009 RLMP by reallocating land use zones on two parcels (Parcels 144 and 153) and portions of four parcels (Parcels 89, 197, 256, and 271), affecting 226 acres of TVA managed public lands on Watts Bar Reservoir.

The six parcels being reviewed in this Supplemental EA consist of 226.0 acres in total and 144.2 acres contain prime farmland or farmland of statewide importance. There are 135.8 acres on of prime farmland on Parcel 144 and 10.4 acres of prime farmland on Parcel 153 that could be impacted by the proposed land use allocation changes.

As Parcel 144 is proposed to be reallocated from Zone 3 (Sensitive Resource Management) to Zone 2 (Project Operations), there would be a possibility for conversion of prime farmland. TVA has previously analyzed the soils on and around the parcel in previous planning projects to support the potential Clinch River Small Modular Reactor (SMR) project. The analysis for the SMR project considered impacts to 178 acres of prime farmland over a 1,130 acre project site. In consultation with the USDA, it was determined that the impact rating score for the project was 102 points (TVA 2017). As the project did not exceed a score of 160 points, it was determined that the SMR project would not adversely impact prime farmland. However, that determination from the NRCS is project specific to the SMR project.

Any future requests for facilities on Parcel 144 that would have a different purpose and need would be subject to site specific reviews and farmland conversion requirements from the USDA. Of the 178 acres of prime farmland considered for conversion, 135.8 acres were located wholly on Parcel 144. A new prime farmland assessment on a different project footprint could result in a different outcome.

Similarly, Parcel 153 is proposed to be reallocated from “Unplanned” to Zone 7 (Shoreline Access).

This potential loss would account for a maximum of only 5 percent of the available prime farmland under TVA’s control on Watts Bar Reservoir. Any requests for facilities or improvements on Parcels 144 and 153 would be subject to site specific reviews and farmland conversion requirements from the USDA. Therefore, the impacts under Alternative B would be minor to prime farmland TVA lands on Watts Bar Reservoir and to the Valley.

4.2 Recreation

4.2.1.1 Alternative A

Under the No Action Alternative, TVA would not take any action to amend the 2009 RLMP for TVA managed lands on the Watts Bar Reservoir. Five of the parcels would continue to be managed under the 2009 RLMP allocations and one parcel near Kingston Fossil Plant would remain "Unplanned." Potential impact to plant communities would be as anticipated with their existing zone allocations discussed in the 2009 RLMP and EIS.

Maintaining existing allocations on Parcels 197 and 271 would constrain potential development of facilities such as boat-launching ramps and shoreline fishing accommodations in the middle and lower sections of the reservoir. Under the current allocations, no portions of these parcels would be potentially available for recreational development.

4.2.1.2 Alternative B

The proposed reallocations of a 10.2 acre section of Parcel 197 from Zone 4 (Natural Resource Conservation) to Zone 6 (Developed Recreation) would potentially make this area available to backlying property owner (State of Tennessee) for development of public boat launching and shoreline fishing facilities. Reallocation of a 2.4 acre portion of Parcel 271 could potentially allow this property to be used to support Spring City Park on adjacent Parcel 272. Both of these proposed allocation changes could result in additional opportunities for public access to Watts Bar Reservoir.

Because the proposed reallocations associated with Parcels 89, 144, 153, and 256 do not impact Zone 6 (Developed Recreation) allocations and are generally small in scope, no significant developed recreation related impacts associated with these parcels would be expected. Additionally, the impacts to dispersed recreation should be minimal as the acreage of land that could be developed across Watts Bar Reservoir would increase by only 2.6 percent. Further, the reallocation of Parcel 144 to Zone 2 (Project Operations) would not alter TWRA's ability to manage for hunting opportunities at this time.

4.3 Terrestrial Ecology (Plants and Wildlife)

This section addresses anticipated effects to terrestrial plant and wildlife communities. Potential effects to threatened and endangered plants and animals are addressed in Section 4.5.

Analysis of the effects to terrestrial plant and wildlife communities is based upon the potential for proposed allocation changes to result in clearing of vegetation or ground disturbance (e.g., grading, digging, trenching, drilling), which would be the primary sources of direct impacts to terrestrial ecology. Indirect effects to terrestrial ecology include fragmentation and isolation of suitable habitat and the spread of invasive, nonnative species that compete with native species. A greater magnitude of potential parcel development correlates to a greater potential for adverse impacts to terrestrial ecology. As such, lands proposed for allocation to Zones 3 and 4 (Sensitive Resource Management and Natural Resource Conservation, respectively) are the most protective of terrestrial plants and wildlife. Potential impacts would likely be greater for parcels proposed for allocation to Zone 2 (Project Operations) or Zone 6 (Developed Recreation) where more development and land use could occur. No parcel allocations to Zone 5 (Industrial) are proposed, which has the greatest potential to involve ground disturbance that may affect terrestrial ecology. Potential development on land proposed to be allocated to Zone 7 (Shoreline Access) could

result in a limited amount of ground disturbance. Many plant and wildlife species may become accustomed to facilities developed on Zone 7 lands, such that long-term effects to common plant and wildlife species of would be minor on lands allocated to these zones.

Based upon the proposed changes in allocations, the potential for impacts to common species of plants and wildlife on lands currently allocated to Zones 3 and 4 (Sensitive Resource Management and Natural Resource Conservation), would be considered minor to moderate depending on the overall amount of habitat potentially lost. Where acreages of forest and other plant and wildlife habitats are potentially reduced through the development of these areas to other potential uses, the overall impacts could be greater than their current land use allocation.

Under both alternatives, lands allocated to natural resources conservation are identified and measures to minimize impacts are implemented when projects are planned on those lands. Further, site-specific environmental reviews would be conducted when development projects are proposed in the future. Such reviews would evaluate the potential for project-specific effects to plant and wildlife communities.

Potential impacts to terrestrial ecology resulting from the proposed allocation changes are summarized in Table 4-1.

Table 4-1. Summary of Potential Impacts to Terrestrial Ecology

Parcel Number	Allocation Change Acreage	Current Allocation	Proposed Allocation	Potential Impact
89a	0.4 of 35.0 acres	Zone 4- Natural Resource Conservation	Zone 7- Shoreline Access	Minor
144	172.3 acres	Zone 3- Sensitive Resource Management	Zone 2- Project Operations	Minor to Moderate
153	40.6 acres	“Unplanned” Excluded from 2009 RLMP	Zone 7- Shoreline Access	Minor
197a	10.2 of 36.8 acres	Zone 7- Shoreline Access	Zone 6- Developed Recreation	Minor
256a	0.1 of 34.2 acres	Zone 7- Shoreline Access	Zone 4- Natural Resource Conservation	Minor
271a	2.4 of 14.0 acres	Zone 4- Natural Resource Conservation	Zone 6- Developed Recreation	Minor

4.3.1 Plant Communities

4.3.1.1 Alternative A

Under the No Action Alternative, TVA would not take any action to amend the 2009 RLMP for TVA managed lands on the Watts Bar Reservoir. Five of the parcels would continue to be managed under the 2009 RLMP allocations and one parcel near Kingston Fossil Plant

would remain “Unplanned.” Potential impact to plant communities would be as anticipated with their existing zone allocations discussed in the 2009 RLMP and EIS.

4.3.1.2 Alternative B

Under Alternative B, 175.0 fewer acres would be allocated to Zones 3 and 4 (Sensitive Resource Management and Natural Resource Conservation, respectively) which are the most protective of terrestrial habitat. Therefore, Alternative B would have a higher potential for impacts to plant communities when compared to Alternative A. Approximately 225.9 more acres would be allocated to Zone 2 (Project Operations), Zone 6 (Developed Recreation), or Zone 7 (Shoreline Access), where there is an increased potential to effect plant communities. The majority of the increase in these zone acreages is associated with the proposed allocation change on Parcel 144 from Zone 3 to Zone 2 to support a potential power generation facility that is under consideration by TVA on the former Breeder Reactor Site, now known as the Clinch River Site. Comprehensive site surveys were conducted in 2011 and 2014 and no uncommon plant species or plant habitats were identified within Parcel 144. An early site plan shows that some infrastructure (water intake and outfall) would cross portions of Parcel 144 to access the reservoir, but much of the parcel would not be disturbed. The potential generation facility project is in the early planning phases. Should the project advance, a site specific environmental review would be prepared before TVA issued a decision to proceed.

Given the substantial amount of common vegetation types around the reservoir, selection of Alternative B would not result in major direct or indirect effects to common terrestrial plant communities. Impacts to vegetation may be temporary or permanent but the vegetation known from the six parcel allocation areas have no conservation value. Project-specific surveys would be conducted prior to clearing vegetation to evaluate the presence of, and potential impacts to uncommon or rare plant communities. Therefore, the proposed allocation changes are not expected to affect rare terrestrial plant communities.

4.3.2 Wildlife Communities

4.3.2.1 Alternative A

Under Alternative A, TVA would not take any action to amend the 2009 RLMP for TVA managed lands on the Watts Bar Reservoir. Five of the parcels would continue to be managed under the 2009 RLMP allocations and one parcel near Kingston Fossil Plant would remain “Unplanned.” Potential impact to wildlife communities would be as anticipated with their existing zone allocations discussed in the 2009 RLMP and EIS.

4.3.2.2 Alternative B

Changes in allowable land uses resulting from the proposed allocation changes under Alternative B would potentially result in minor impacts to wildlife communities for the reasons described above for plant communities. Compared to Alternative A, approximately 175.1 fewer acres of land would be allocated to the two land use zones (Zones 3 and 4) with the least likelihood for adverse impacts to wildlife. Approximately 225.9 more acres would be allocated to Zones 2, 6 or 7, which have potential for more impacts. Only 0.1 acre (Parcel 256a) would be modified to an allocation that would result in lower impacts. Alternative B would have a slightly higher potential for adverse effects to wildlife communities when compared to Alternative A. Project-specific surveys would be conducted prior to clearing of potential habitats to evaluate the presence of, and potential impacts to wildlife and wildlife habitats. Therefore, the six proposed allocation changes are not expected to affect communities of common wildlife species.

4.4 Aquatic Ecology

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

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

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

4.4.1.1 Alternative A

Under the No Action Alternative, TVA would not take any action to amend the 2009 RLMP for TVA managed lands on the Watts Bar Reservoir. Five of the parcels would continue to be managed under the 2009 RLMP allocations and one parcel near Kingston Fossil Plant would remain “Unplanned.” Potential impact to aquatic communities would be as anticipated with their existing zone allocations discussed in the 2009 RLMP and EIS.

4.4.1.2 Alternative B

Alternative B includes a reduction in the portion of TVA-managed land allocated to Zone 3 and Zone 4 (Sensitive Resource Management and Natural Resource Conservation) and an increase in land allocated to Zones 2, 6, and 7 (Project Operations, Developed Recreation, and Shoreline Access, respectively). There would likely be some degradation of aquatic habitats associated with potential additional development along the reservoir shoreline. In some instances, construction of docks and associated pilings and structures such as rock aggregation can have potential short-term negative impacts during construction, but also enhances shoreline habitat by providing shade and cover for some fish and aquatic invertebrates. Future activities on planned parcels would undergo separate environmental reviews, at which time specific avoidance and mitigation measures needed to protect listed aquatic animal species would be determined. Therefore, while potential impacts to aquatic resources under Alternative B would be slightly greater than those under Alternative A, impacts would still be minor and presumably insignificant in the long-term.

4.5 Threatened and Endangered Species

This section addresses anticipated effects to federally and state-listed species. Impacts on common terrestrial plant and animal species are addressed in Section 4.3 and impacts on common aquatic species are addressed in Section 4.4.

Impacts to federally and state-listed species (also known as threatened and endangered species) are determined based on known existing populations and historical records within TVA parcels. Analysis of the effects to threatened and endangered species is based upon the potential for proposed activities to result in development that would clear vegetation or cause ground disturbance, which would be the primary sources of direct impacts to these species. Indirect effects to threatened and endangered species include habitat fragmentation and increased recreational use that may result in the spread of invasive, nonnative species that compete with threatened and endangered species.

Land allocated to Zone 3 and Zone 4 (Sensitive Resource Management and Natural Resource Conservation) would be the most protective of habitat as these areas have little potential for site development. The potential impacts to threatened and endangered species from land allocated to Zone 2 (Project Operations), Zone 6 (Developed Recreation), and Zone 7 (Shoreline Access) are dependent upon the existing condition of the land as well as the proposed future use.

Future actions on lands allocated to these zones may involve development such as water intake and outfall structures, boat-launching ramps and parking areas, and private water use facilities and, unlike relatively common plant and animal species, threatened and endangered species do not generally adapt well to development of this nature. Some land uses allowed in land allocated to these zones may not require extensive land disturbance (such as the development of pathways or implementation of shoreline stabilization efforts), which would only cause minor changes in overall existing conditions. Moreover, Section 7 of the ESA requires federal agencies to ensure that its activities do not jeopardize the continued existence of federally listed species or result in destruction or adverse modification of critical habitat. ESA Section 7(a)(2) requires minimization of the level of ‘incidental take’ through the use of reasonable and prudent measures. Table 3-6 provides the closest known record of each threatened and endangered species in the vicinity of the six parcels being considered for an allocation change.

Under both alternatives, any future development projects would require site-specific environmental reviews to evaluate the presence of and specific impacts to threatened and endangered species. These reviews would incorporate Section 7 consultation and/or existing programmatic agreements with USFW as needed and appropriate mitigation requirements to minimize impacts to any threatened and endangered species in the project vicinity.

4.5.1 Plants

4.5.1.1 Alternative A

Under the No Action Alternative, TVA would not take any action to amend the 2009 RLMP for TVA managed lands on the Watts Bar Reservoir. Five of the parcels would continue to be managed under the 2009 RLMP allocations and one parcel near Kingston Fossil Plant would remain “Unplanned.” There are no populations of federally or state-listed plants known to occur on the six parcels. Potential impact to threatened and endangered plants

would be as anticipated with their existing zone allocations discussed in the 2009 RLMP and EIS.

4.5.1.2 Alternative B

Adoption of the Action Alternative would have no effect on federally and state-listed plant species or designated critical habitat because neither occurs within the area that would be affected by the proposed allocation changes. Prior to any proposed on-site development, TVA would conduct additional site-specific environmental reviews and recommend appropriate site design and management practices at which time specific avoidance and mitigation measures needed to protect threatened and endangered plant species and their associated habitat would be determined. Potential impacts to threatened and endangered plant species on parcels proposed for an allocation change would be minor for the reasons listed above.

4.5.2 Terrestrial Wildlife

4.5.2.1 Alternative A

Under the No Action Alternative, TVA would not take any action to amend the 2009 RLMP for TVA managed lands on the Watts Bar Reservoir. Five of the parcels would continue to be managed under the 2009 RLMP allocations and one parcel near Kingston Fossil Plant would remain "Unplanned." There are no populations of federally or state-listed terrestrial wildlife species known to occur on the six parcels. Potential impact to threatened and endangered terrestrial animals would be as anticipated with their existing zone allocations discussed in the 2009 RLMP and EIS.

4.5.2.2 Alternative B

Under this alternative, 175.1 acres across Parcels 89, 144, and 271 would be reallocated from Zones 3 and 4 (Sensitive Resource Management and Natural Resource Conservation) which are protective of threatened and endangered species and their habitats to Zones 2, 6, and 7. These proposed allocation changes represent a minor decrease (1.4 percent) of land in Zones 3 and 4 as compared to the No Action Alternative (see Table 2-3).

There are no populations of federally or state-listed terrestrial animal species known from the 226 acres proposed for an allocation change. However, there are 22 occurrence records for five federally listed and two state-listed terrestrial animal species within 3 miles of the six parcels proposed for an allocation change. Prior to any on-site development, TVA would conduct additional site-specific environmental reviews and recommend appropriate site design and management practices to minimize or avoid potential impacts to threatened and endangered terrestrial animal species.

Section 3.5.2 describes some of the specific instances where listed species are known to occur in the vicinity of the six parcels. Potential impacts to threatened and endangered terrestrial animal species on each of the six parcels are described below.

Parcel 89 contains bottomland hardwood forest and pine snags which may provide foraging and roosting habitat for federally listed bat species and three eagle nests are known within 3 miles. Two nearby caves are occupied by federally listed gray bats, federal candidate for listing Berry Cave salamander, and state-listed Tennessee cave salamander. Northern long-eared bats have been captured within 5 miles of this parcel. Potential land uses resulting from changing 0.4 acre of this parcel from Zone 4 (Natural Resource Conservation) to Zone 7 (Shoreline Access) is not expected to have an effect on nearby bald eagle nests or caves. Potential tree clearing could affect some species but a site-

specific environmental review would be conducted prior to any new construction. Effects are expected to be absent or minor.

The proposed allocation change on Parcel 144 from Zone 3 (Sensitive Resource Management) to Zone 2 (Project Operations) could have the most potential for impacts to threatened and endangered species. Federally and state-listed species recorded in the vicinity of Parcel 144 include gray bat, Indiana bat, northern long-eared bat, Bachman's sparrow, hellbender, Sharp-shinned hawk, and southeastern shrew (see Section 3.5.2 for more information). If TVA were to proceed with future development of a power generation facility at the Clinch River Site, prior to any on-site development, TVA would conduct additional site-specific environmental reviews and recommend appropriate site design and management practices to minimize or avoid potential impacts to threatened and endangered terrestrial species. Effects are expected to be absent or minor.

Parcel 153 is categorized as "Unplanned" and was excluded from the 2009 RLMP. The proposed allocation to Zone 7 (Shoreline Access) is consistent with the parcel's existing use and would return the parcel to its Zone 7 allocation prior to the Kingston ash spill. The land use allocation change is not expected to result in impacts to terrestrial animal species as it would reflect the existing land use. Potential construction of new water use facilities would require a Section 26a permit and would undergo a site-specific environmental review to address potential habitat alterations such as clearing of trees suitable for roosting by federally listed bat species and bird nesting. No records of federally or state-listed terrestrial animal species or caves are known within 3 miles of this parcel; however northern long-eared bats have been captured within 5 miles. Effects are expected to be absent or minor.

One cave and one bald eagle occurrence have been recorded from within 3 miles of Parcel 197. Changing 10.2 acres of Parcel 197 from Zone 7 (Shoreline Access) to Zone 6 (Developed Recreation) would potentially have minor impacts on threatened and endangered species as allowable uses within both land use zones are similar. Effects are expected to be absent or minor.

There is one record for a bald eagle nest within 3 miles of Parcel 256. The proposed land use allocation change for 0.1 acre of this 34.2 acre parcel from Zone 7 (Shoreline Access) to Zone 4 (Natural Resource Conservation) would potentially result in minor benefits to listed species because the small parcel would remain undeveloped. Effects are expected to be absent or minor.

Bald eagle and Bachman's sparrow have been recorded within 3 miles of Parcel 271 and the proposed allocation change of a 2.4-acre portion from Zone 4 (Natural Resource Conservation) to Zone 6 (Developed Recreation) would potentially result in minor impacts to threatened and endangered terrestrial animal species.

4.5.3 Aquatic Species

4.5.3.1 Alternative A

Under the No Action Alternative, TVA would not take any action to amend the 2009 RLMP for TVA managed lands on the Watts Bar Reservoir. Five of the parcels would continue to be managed under the 2009 RLMP allocations and one parcel near Kingston Fossil Plant would remain "Unplanned." There are no populations of federally or state-listed aquatic species known to occur on the six parcels. Potential impact to threatened and endangered aquatic species would be as anticipated with their existing zone allocations discussed in the 2009 RLMP and EIS.

4.5.3.2 Alternative B

Consistent with Section 4.4.1.2, potential ground disturbance activities associated with the proposed zone allocation changes could have minor impacts to sensitive aquatic animal species found in the reservoir. However, future activities on planned parcels would undergo independent environmental reviews, at which time specific avoidance and mitigation measures needed to protect listed aquatic animal species would be determined.

Because the impacts to threatened and endangered species are relatively similar between alternatives, there is likely very little to no measurable difference in the extent of potential negative impacts to threatened and endangered species as a result of the proposed allocation changes. Additionally, any future development of lands potentially supporting habitat for sensitive species would be coordinated with both state and federal agencies, as appropriate. Therefore, relatively few additional impacts to threatened and endangered species by proposed changes in land allocation are anticipated.

4.6 Water Quality

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

4.6.1.1 Alternative A

Under the No Action Alternative, TVA would not take any action to amend the 2009 RLMP for TVA managed lands on the Watts Bar Reservoir. Five of the parcels would continue to be managed under the 2009 RLMP allocations and one parcel near Kingston Fossil Plant would remain “Unplanned.” Potential impact to water quality would be as anticipated with their existing zone allocations discussed in the 2009 RLMP and EIS.

4.6.1.2 Alternative B

Under Alternative B, the proposed allocation changes would result in an increase in acreage that could potentially be developed along the reservoir. Increased levels of development and intensive use in a watershed increase the potential for an adverse impact on water quality. Development and intensive land uses typically increase the amount of impervious surfaces (i.e., roofs, roads, paved areas), remove vegetation and expose soil to erosion, and increase the amount of NPS pollution. Results of increased development on a water body can include increased turbidity and sedimentation, increased levels of nutrients and bacteria from managed lawns and septic systems, increased levels of chemicals and substances toxic to aquatic life, and increased storm water pollution and velocity.

Although some of the proposed land use changes could have the potential to add development, thus increasing the potential for impacts to surface waters, the use of BMPs (such as adequate sediment control and the establishment of buffer zones), and low-impact design and management concepts (such as porous pavement and constructed wetlands) can help to reduce some of the negative impacts to water quality from increased levels of development. However, if careful design, construction, and maintenance practices are not followed, BMPs and low-impact design concepts would be less effective in protecting water quality. Prior to any proposed on-site development, TVA would conduct additional site-specific environmental reviews and recommend appropriate site design and management practices to minimize negative environmental impacts.

The use of vegetated buffer zones and other BMPs would reduce negative effects of riparian vegetation removal associated with development. In addition, protective measures presently in place under TVA's land use approval process, Section 26a General and Standard Conditions, and SMI (TVA 1998) would substantially offset impacts of development of private property. With appropriate environmental reviews and use of any identified impact reductions methods, including existing BMPs, future activities under Alternative B would not significantly impact the reservoir's water quality.

4.7 Wetlands

Potential adverse effects to or destruction of wetlands may result from land clearing/removal of vegetation, ground disturbance and changes in hydrology of an area. Adverse impacts to wetlands are regulated under state and federal wetland protection regulations under the Clean Water Act (CWA) and impacts to wetlands are mitigated under Section 404 of the CWA and EO 11990.

4.7.1.1 Alternative A

Under the No Action Alternative, TVA would not take any action to amend the 2009 RLMP for TVA managed lands on the Watts Bar Reservoir. Five of the parcels would continue to be managed under the 2009 RLMP allocations and one parcel near Kingston Fossil Plant would remain "Unplanned." Potential impact to wetlands would be as anticipated with their existing zone allocations discussed in the 2009 RLMP and EIS.

4.7.1.2 Alternative B

Under Alternative B, TVA would amend the 2009 Watts Bar RLMP by reallocating land use zones on six parcels, affecting 226 acres of TVA managed public lands on Watts Bar Reservoir. The proposed changes to Parcels 89 from Zone 4 (Natural Resource Conservation) to Zone 7 (Shoreline Access) and to Parcel 256 from Zone 7 to Zone 4 were the subject of an EA titled *Proposed Water-Access Rights Exchange and Water Use Facilities for the Cove at Blackberry Ridge* (TVA 2008). Impacts to wetlands from the proposed community dock and boat ramp were determined to be insignificant in the 2008 EA. These impacts were confirmed in a 2017 review of the same project.

In 2015, TVA identified 7.24 acres of wetlands on Parcel 144 during an early planning review for a potential power generation facility. While potential impacts to wetlands would be assessed during a separate site-specific environmental review, TVA would impose avoidance and mitigation measures to minimize impacts to wetlands to an insignificant level.

The proposed change in land use allocation to Parcel 153 from "Unplanned" to Zone 7 and to Parcel 197 from Zone 7 to Zone 6 (Developed Recreation) could lead to future requests for water use facilities. However, future requests would be assessed with an independent, site specific review

The proposed change in land use allocation to Parcel 271 from Zone 4 to Zone 6 would not result in impacts to wetlands as none were identified on the parcel.

During the Section 26a environmental review and permitting process, specific avoidance and minimization measures would be specified to reduce impacts to an insignificant level.

4.8 Floodplains

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" (U.S. Water Resource Council 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 the one-percent-annual-chance (100-year) floodplain unless there is no practicable alternative.

In 1981, TVA completed a class review of certain repetitive actions that could occur in floodplains. The purpose of the class review was to (1) determine, for the actions listed, if there are practicable alternatives to sitting in the floodplain; and (2) in no practicable alternative exists, establish review criteria that, if allowed, will minimize any adverse impacts that may be associated with the individual actions reviewed. A number of actions which could occur in floodplains were reviewed. As a result of the class review, TVA determined that there were no practicable alternative to the actions that would avoid sitting in the floodplain. This review was published in the Federal Register at 46 Fed. Reg. 22845-46 (Apr. 21, 1981).

4.8.1.1 Alternative A

Under the No Action Alternative TVA would not take any action to amend the 2009 Watts Bar RLMP for TVA managed lands on the Watts Bar Reservoir. Five of the parcels would continue to be managed under the 2009 RLMP allocations and one parcel near Kingston Fossil Plant would remain categorized as "Unplanned." Potential impact to floodplains would be as anticipated with their existing zone allocations discussed in the 2009 RLMP and EIS.

4.8.1.2 Alternative B

Activities on all seven land-use zones could have impacts on floodplains and their natural and beneficial values. The proposed allocation changes would increase the acreage of land surrounding Watts Bar Reservoir that allows for potential development by 2.6 percent. However, all proposed development within the 100-year floodplain or below the TVA Flood Risk Profile would be subject to review under EO 11988 or the TVA Flood Control Storage Loss Guideline, as appropriate, during a site-specific environmental review. Regardless of what actions are proposed, TVA would require measures appropriate to each facility, structure, and project to ensure floodplain resources and TVA's ability to operate the reservoir system would be protected. Therefore, the proposed allocation changes for the six

parcels would have no significant impact on floodplains and their natural and beneficial values.

4.9 Navigation

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

Commercial navigation is expected to remain at a fairly constant level of 600,000 to 800,000 tons per year on Watts Bar Reservoir under either alternative. This level would likely fluctuate, depending on the overall health of the nation's economy, fluctuations in transportation costs, and the weather (the volume of road salt delivered to upper east Tennessee terminals is dependent on the previous winter's depletion of supply and predictions of the coming winter's severity). Navigation traffic would likely increase if new waterway-using industries locate on Watts Bar Reservoir or upstream on Melton Hill, Fort Loudoun, or Tellico reservoirs.

A larger replacement lock downstream at Chickamauga Dam is being constructed and is scheduled to be completed in 2024. The existing lock can only handle one barge at a time. However, the replacement lock will allow nine barges to be locked through at one time, which will greatly reduce travel times and transportation costs, making upper Tennessee River industrial locations much more attractive to industries. However, any increase in barge traffic as a result of the new lock at Chickamauga Dam would likely be gradual and may or may not involve new industries and terminals on Watts Bar Reservoir.

4.9.1.1 Alternative A

Under the No Action Alternative, TVA would not take any action to amend the 2009 RLMP for TVA managed lands on the Watts Bar Reservoir. Five of the parcels would continue to be managed under the 2009 RLMP allocations and one parcel near Kingston Fossil Plant would remain "Unplanned." There would be no changes to parcels allocated as Zone 2 (Project Operations) and Zone 5 (Industrial) that support barge terminals and safety landings. Potential impact to navigation would be as anticipated with their existing zone allocations discussed in the 2009 RLMP and EIS.

4.9.1.2 Alternative B

Under Alternative B, there would be no potential effects to commercial navigation as a result of the proposed land use allocations for six parcels. No changes are proposed for Zone 5 (Industrial) parcels. The proposed Parcel 144 allocation change to Zone 2 (Project Operations) is adjacent to an existing safety landing at Parcel 137a (Zone 2) and would have no impact to commercial navigation, as Zone 2 allocations protect the use of the shoreline for safety landings. At any time in the future if TVA planned to remove the safety landing at that location in conjunction with the potential Clinch River Site project, consultation with the USCG and USACE would be required during the environmental

review. Proposed allocation changes to Zone 6 (Developed Recreation) and Zone 7 (Shoreline Access) for Parcels 89, 153, and 197 and 271 would have no impact to commercial navigation but would allow for minor growth of recreational boating. The proposed allocation changes on Parcel 271 to Zone 4 (Natural Resource Conservation) would not impact navigation.

For all proposed future development on the six parcels, TVA would require measures appropriate to each facility, structure, and project to ensure commercial navigation and TVA's ability to operate the reservoir system would be protected. Therefore, the proposed land allocation changes for the above parcels would have no significant impact on navigation.

4.10 Air Quality and Climate Change

4.10.1.1 Alternative A

Under the No Action Alternative, TVA would not take any action to amend the 2009 RLMP for TVA managed lands on the Watts Bar Reservoir. Five of the parcels would continue to be managed under the 2009 RLMP allocations and one parcel near Kingston Fossil Plant would remain "Unplanned." Potential impact to air quality or climate change would be as anticipated with their existing zone allocations discussed in the 2009 RLMP and EIS.

4.10.1.2 Alternative B

Under Alternative B, a slightly higher percent of land would be allocated to Zone 2 (Project Operations) and Zone 6 (Developed Recreation) as compared to Alternative A. The amount of land allocated for Zone 2 would increase by 1.0 percent and land allocated to Zone 6 would increase by 0.3 percent. Future projects on Parcel 144 would be subject to federal, state, and local air quality regulations to help control emissions and avoid impacts to air quality. Emissions from developed recreation are typically very minor and potential impacts would be negligible.

The proposed allocation changes would increase Zone 7 (Shoreline Access) acreage by approximately 30.7 acres or 1.3 percent. Construction activities associated with building private water use facilities may cause short term but insignificant air quality impacts. The types of activities and lack of development allowable on Zone 3 (Sensitive Resource Management) and Zone 4 (Natural Resource Conservation) land should not contribute to additional air quality impacts. TVA's proposed changes to current allocations and uses would result in a decrease in lands allocated for Zones 3 and 4, from 56.0 percent of all Watts Bar Reservoir lands to 54.6 percent. Fewer lands would be available for potential carbon sequestration. The proposed changes would also increase areas allocated to Zone 2 and Zone 6, thereby increasing the potential for greenhouse gas emissions. However, these impacts would be minor in relation to those analyzed in the 2009 RLMP and EIS.

4.11 Historical and Archaeological Resources

Federal agencies are required by the National Historic Preservation Act (NHPA) and by NEPA to consider the possible effects of their undertakings on historic properties. Undertaking means any project, activity, or program that is funded under the direct or indirect jurisdiction of a federal agency or is licensed, permitted, or assisted by a federal agency. An agency may fulfill its statutory obligations under NEPA by following the process outlined in the regulations implementing Section 106 of NHPA, at 36 CFR Part 800. Under these regulations, considering an undertaking's possible effects on historic properties is accomplished through a four-step review process: 1) initiation (defining the undertaking and

the area of potential effects, and identifying the consulting parties); 2) identification (studies to determine whether cultural resources are present and whether they qualify as historic properties); 3) assessment of adverse effects [determining whether the undertaking would damage the qualities that make the property eligible for the National Register of Historic Places (NRHP)]; and 4) resolution of adverse effects (by avoidance, minimization, or mitigation). Throughout the process the agency must consult with the appropriate SHPO, federally-recognized Indian tribes that have an interest in the undertaking, and any other party with a vested interest in the undertaking.

The proposed allocation changes could be considered an administrative action with no potential to affect historic properties. Each parcel would remain TVA land, and any proposed actions with potential to affect historic properties in the APE will be subject to appropriate review under the NHPA and NEPA. However, the allocation changes could be seen as having potential to result in cumulative (eventual) effects on any historic properties that may be located within the APE, resulting from the approval of activities that are not currently allowed and that could have potential for effects. For this reason, TVA is initiating consultation with the Tennessee SHPO and federally-recognized Indian tribes regarding the potential effects of the proposed land use allocation changes on historic properties.

A project may have effects on a historic property that are not adverse, if those effects do not diminish the qualities of the property that identify it as eligible for listing on the National Register. However, if the agency determines (in consultation) that the undertaking's effect on a historic property within the APE would diminish any of the qualities that make the property eligible for listing on the National Register (based on the criteria for evaluation at 36 CFR § 60.4), the effect is said to be adverse. Examples of adverse effects would be ground disturbing activity in an archaeological site, or erecting structures within the viewshed of a historic building in such a way as to diminish the structure's integrity of feeling or setting. Adverse effects must be resolved. Resolution may consist of avoidance (such as redesigning a project to avoid impacts or choosing a project alternative that does not result in adverse effects), minimization (such as redesign to lessen the effects, or planting visual screenings), or mitigation. Adverse effects to archaeological sites are typically mitigated by means of excavation to recover the important scientific information contained within the site. Mitigation of adverse effects to historic structures sometimes involves thorough documentation of the structure by compiling historic records, studies, and photographs. Agencies are required to consult with SHPOs, tribes, and others throughout the process and to document adverse effects to historic properties resulting from agency undertakings.

Actions can affect historic properties directly or indirectly at a later time, at a distance from the action, or cumulatively. While the proposed land plan amendment does not directly affect historic properties, the plan allocates land for certain uses which could affect historic properties as land use projects materialize. TVA will continue to conduct project related reviews of proposed activities in TVA controlled areas where such activities could affect historic properties. Historic properties within these areas would be avoided and protected whenever possible. If avoidance is not possible, proper procedures would be implemented to mitigate any potential effects on the historic property. Under either alternative, the adverse effects to significant archaeological resources would be mitigated through data recovery excavations or by other means pursuant to 36 CFR Part 800.

4.11.1.1 Alternative A

Under the No Action Alternative, TVA would not take any action to amend the 2009 RLMP for TVA managed lands on the Watts Bar Reservoir. Five of the parcels would continue to be managed under the 2009 RLMP allocations and one parcel near Kingston Fossil Plant

would remain “Unplanned.” Potential impact to cultural resources would be as anticipated with their existing zone allocations discussed in the 2009 RLMP and EIS.

Protections described in the 2009 RLMP and EIS would continue and site-specific activities proposed in the future would continue to be subject to review under 36 CFR 800 and approved, approved with conditions, or denied according to the presence/absence of historic properties and the potential of the activity to adversely affect historic properties.

TVA Cultural Resources staff would review any proposed site-specific development to determine whether the development would impact known and/or unknown historic properties. All projects and cultural resources would continue to be subject to the regulatory requirements of the NHPA.

4.11.1.2 Alternative B

Pursuant to Section 106 of the NHPA and its implementing regulations at 36 CFR Part 800, TVA initiated Section 106 consultation in 2011 as a result of cultural resources surveys conducted on Parcel 144 for the proposed Clinch River Site project. The Tennessee SHPO agreed with TVA’s determination that 13 potentially eligible sites are located within Parcel 144. TVA and the Tennessee SHPO executed a Programmatic Agreement for the management of historic properties affected by the potential Clinch River Site project in 2015 and amended the Programmatic Agreement in 2016. The Programmatic Agreement stipulates that TVA will conduct phase II evaluation studies for any archaeological sites of undetermined NRHP eligibility that would be adversely affected by the undertaking. The Programmatic Agreement also stipulates that TVA will seek ways to avoid adverse effects to any historic properties that would be affected by the proposed Clinch River Site project, and will consult with the Tennessee SHPO regarding minimization and/or mitigation measures for any such properties that could not be avoided. The change in allocation for Parcel 144, from Zone 3 (Sensitive Resource Management) to Zone 2 (Project Operations), would not result in changes in land use beyond those for which we consulted previously with Tennessee SHPO and federally-recognized Indian tribes. TVA’s management of historic properties in this parcel is guided by the existing NRP Programmatic Agreement, regardless of the zone allocation.

For the remaining five parcels, the proposed allocation changes could eventually lead to development of the parcels that would allow for the land uses and activities described in the land use zone definitions (Appendix A). Any such approval would be an undertaking subject to Section 106. Regardless of the proposed zone allocation, TVA Cultural Resources staff would review any proposed site-specific development to determine whether the development would impact known and/or unknown historic properties. If the resources cannot be avoided, then further investigations would be required to determine the resources’ eligibility for inclusion in the NRHP. For any proposed undertaking, TVA would take necessary steps to ensure compliance with the regulatory requirements under NHPA and consider the development’s effects as they are proposed. TVA would comply with the NRP Programmatic Agreement executed in 2011 in consultation with the SHPOs, Advisory Council of Historic Preservation and federally recognized Indian tribes which subsumes and governs all past and future land plans.

Therefore, prior to granting such approval TVA would either (a) initiate consultation under Section 106, or (b) follow the guidelines of the NRP Programmatic Agreement. In either case (for either Alternative A or B), TVA would seek the comments of others on the potential effects on historic properties or any such future undertaking in any of the six

parcels under consideration, prior to approving any action with potential to affect historic properties. TVA finds that the proposed allocation changes would not result in any effects on historic properties, and in a letter dated July 17, 2018, the Tennessee SHPO concurred with this determination.

4.12 Natural Areas and Ecologically Sensitive Sites

4.12.1.1 Alternative A

Under the No Action Alternative, no action would be taken by TVA to modify the original 2009 Watts Bar RLMP and the management of six parcels would continue to be guided by that document. Current environmental review measures for any project that is planned for Watts Bar Reservoir would ensure that TVA actions do not adversely affect Natural Areas on the reservoir or in the vicinity.

4.12.1.2 Alternative B

Under Alternative B, the proposed change to Parcels 89 from Zone 4 (Natural Resource Conservation) to Zone 7 (Shoreline Access) and to Parcel 256 from Zone 7 to Zone 4 were the subject to an EA titled *Proposed Water-Access Rights Exchange and Water Use Facilities for the Cove at Blackberry Ridg*e (TVA 2008). Impacts to natural areas from the proposed community dock and boat ramp were determined to be insignificant in the 2008 EA. These impacts were confirmed in a 2017 review of the same project.

The potential impacts to natural areas at Parcel 144 from the proposed change in land use allocation from Zone 3 (Sensitive Resource Management) to Zone 2 (Project Operations) could lead to indirect or cumulative impacts to adjacent natural areas if this parcel were developed, specifically to the adjacent Grassy Creek Habitat Protection Area. However, any impacts from proposed development of site-specific projects would be analyzed and mitigated.

It is unlikely that the proposed change in land use allocation to Parcel 153 from "Unplanned" to Zone 7 would lead to any adverse impacts to surrounding natural areas, including the Sugar Grove TVA Habitat Protection Area.

The proposed change in land use allocation for Parcel 197 from Zone 7 to Zone 6 (Developed Recreation) could lead to temporary insignificant adverse impacts due to the potential for construction of a boat-launching ramp and fishing pier. However, any impacts from proposed development of site-specific projects would be analyzed and mitigated during an environmental review.

The proposed change in land use allocation to Parcel 271 from Zone 4 to Zone 6 could lead to temporary insignificant impacts to surrounding natural areas, namely Spring City Park, if the parcel were used to support temporary public recreation access to the adjacent park. The proposed allocation change could lead to beneficial effects by increasing public recreation access in the immediate area.

4.13 Aesthetics and Visual Resources

4.13.1.1 Alternative A

Under Alternative A, TVA would not take any action to amend the 2009 RLMP for TVA managed lands on the Watts Bar Reservoir. Five of the parcels would continue to be managed under the 2009 RLMP allocations and one parcel near Kingston Fossil Plant

would remain “Unplanned.” Potential impact to cultural resources would be as anticipated with their existing zone allocations discussed in the 2009 RLMP and EIS.

4.13.1.2 Alternative B

Under Alternative B, the proposed change in land use allocation of Parcel 89 from Zone 4 (Natural Resource Conservation to Zone 7 (Shoreline Access) for a 0.4-acre portion of this parcel could lead to minor visual impacts as the allocation change could allow for the development of water use facilities. Additionally, the proposal would change land use allocation of Parcel 256 from Zone 7 to Zone 4 for a 0.1-acre portion of this parcel. Visual impacts from the proposed community dock and boat ramp were determined to be insignificant in the 2008 EA for The Cove at Blackberry Ridge (TVA 2008). These effects were confirmed in a 2017 review of the same project. Therefore, changing the use allocations on these two parcels would have no significant visual impacts to surrounding property owners or those recreating on the reservoir.

The proposal would change the land use allocation of Parcel 144 from Zone 3 (Sensitive Resource Management) to Zone 2 (Project Operations) for the entire 172.3 acres. Activities on Zone 2 land would include TVA operations and public works projects. This particular allocation change would support the potential construction and operation of power-generating facilities. The types of development allowed on Zone 2 properties could contribute to adverse visual impacts. However, due to the topography, dense vegetation, and limited visual receptors in the area terrain, visual impacts from this change would be minor to moderate. Additionally, impacts of any potential facilities would be the subject to their own environmental reviews and mitigation measures.

Alternative B would change the land use allocation of Parcel 153 from "Unplanned” back to Zone 7 (Shoreline Access) on 40.6 acres that fronts property that TVA acquired after the 2008 Kingston ash spill. This change could have impacts on the visual surrounding as the Zone 7 allocation allows for the construction of private water use facilities, grading, filling, access corridors, and other shoreline uses. These potential impacts would be visually consistent with the surrounding shoreline. Individual requests for private water sue facilities would be analyzed as permit requests for water use facilities are submitted to TVA.

The land use allocation for Parcel 197 would change from Zone 7 to Zone 6 (Developed Recreation) for 10.2 acres of the parcel to reflect a change in the backlying property ownership. The types of activities which may occur on Zone 6 lands include public recreation areas such as campgrounds, marinas and fishing piers. These types of facilities have potential to decrease aesthetic value. The project would be analyzed for visual impacts when an individual request for developed recreation facilities is submitted to TVA.

The land use allocation of Parcel 271 would change from Zone 4 to Zone 6 for a 2.4-acre portion of this parcel. The types of activities which may occur on Zone 6 lands include public recreation areas such campgrounds, marinas and fishing piers. These types of facilities have potential to decrease aesthetic value. The project would be analyzed for visual impacts when an individual request for developed recreation facilities is submitted to TVA.

4.14 Noise

4.14.1.1 Alternative A

Under Alternative A, TVA would not take any action to amend the 2009 RLMP for TVA managed lands on the Watts Bar Reservoir. Five of the parcels would continue to be managed under the 2009 RLMP allocations and one parcel near Kingston Fossil Plant would remain "Unplanned." Potential noise impacts would be as anticipated with their existing zone allocations discussed in the 2009 RLMP and EIS.

4.14.1.2 Alternative B

Under Alternative B, the proposed change in land use allocation for Parcel 89 from Zone 4 (Natural Resource Conservation) to Zone 7 (Shoreline Access) for a portion of this parcel could lead to minor noise impacts as the allocation change could allow for the development of water use facilities. The proposed change to Parcel 256 from Zone 7 to Zone 4 would prevent additional development on the parcel. However, some activities such as vegetation and timber management could cause short term noise impacts. Due to the relatively small size of Parcel 256, it is anticipated that the reallocation would result in minimal to no noise impacts. Noise impacts associated with these two parcels was reviewed and determined to be insignificant in the 2008 EA for the Cove at Blackberry Ridge. These effects were confirmed in a 2017 review of the same project.

The proposed change of the land use allocation on Parcel 144 from Zone 3 (Sensitive Resource Management) to Zone 2 (Project Operations) is for the entire 172.3 acres. This particular allocation change would support the potential construction and operation of a new power-generating facility which could contribute to small to moderate noise impacts during construction and operation of the facilities. Noise impacts would be studied further in a site-specific review.

The proposed allocation change for Parcel 153 to Zone 7 (Shoreline Access) from "Unplanned" could lead to temporary minor noise impacts as it could allow the construction of private water use facilities. Individual requests for private water use facilities would include a site-specific environmental review.

The proposed allocation change for Parcel 197 from Zone 7 to Zone 6 (Developed Recreation) could result in potential minor noise impacts associated with development and operation of public recreation facilities.

The proposal would change the land use allocation of Parcel 271 from Zone 4 to Zone 6 for a 2.4-acre portion of this parcel. The types of activities which may occur on Zone 6 lands include public recreation areas such campgrounds, marinas and fishing piers. These types of facilities have may lead to short term, increased noise impacts during the construction of the facility. Additionally, recreation facilities may lead to minor increased noise impacts during their operations. Project specific impacts would be analyzed when a request for developed recreation facilities is submitted to TVA.

4.15 Socioeconomics and Environmental Justice

Potential socioeconomic impacts of the proposed reallocation of the six parcels would be associated with the direct effects of jobs created by development on TVA managed lands which would support future development. Effects to socioeconomics could also occur because of changes in developed and dispersed recreation opportunities, as well as changes in the overall attractiveness of the area as a place to live or visit. Additionally,

there could be indirect effects associated with population growth in response to new development and changes in tax revenues, employment and property values.

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

4.15.1.1 Alternative A

Under Alternative A, TVA would not take any action to amend the 2009 RLMP for TVA managed lands on the Watts Bar Reservoir. Five of the parcels would continue to be managed under the 2009 RLMP allocations and one parcel near Kingston Fossil Plant would remain "Unplanned." Potential socioeconomic and environmental justice impacts would be as anticipated with their existing zone allocations discussed in the 2009 RLMP and EIS.

4.15.1.2 Alternative B

Under Alternative B, TVA would amend the 2009 RLMP by reallocating land use zones on six parcels affecting 226 acres of TVA managed public lands on Watts Bar Reservoir. The amount of land reallocated to Zone 2 (Project Operations) and Zone 6 (Developed Recreation) is slightly higher under this alternative. Activities which may occur on these reallocated parcels may lead to an increase in short term construction jobs immediately surrounding the parcels. However, any changes to socioeconomic conditions would be negligible. As the changes reflect minor portions of land and only impact what the land could be used for, the changes would have no substantive impact on the local economy or economic development opportunities. Site specific reviews for future development would analyze the economic impacts for those projects.

Although poverty levels are higher in some of the counties where the proposed reallocations would take place, the proposed changes are not expected to impact the region's economy or recreation opportunities. Therefore, no disproportionate impacts to disadvantaged populations are expected to occur.

4.16 Cumulative Impacts

Cumulative impacts are defined in the Council on Environmental Quality's regulations at 40 CFR § 1508.7 as follows:

> Cumulative impact is the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time.

Past actions that have already occurred and present actions are integrated into the existing baseline conditions discussed above. The reallocation of the six parcels constitutes less than one percent of the lands TVA manages on Watts Bar Reservoir. Additionally, the reallocations fall within the existing CVLP ranges. Therefore, cumulative impacts from the reallocation are expected to be minimal.

4.17 Unavoidable Adverse Environmental Impacts

Because of the requirement that site-specific environmental reviews would be conducted prior to implementation, there are currently few, if any, adverse environmental effects that cannot be avoided should any alternative be implemented.

4.18 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 RLMPs, short-term uses generally are those that occur within a 10-year period, and long-term uses refers to later decades. Productivity is the capability of the land to provide beneficial outputs and values for future generations (e.g., industrial/business, recreational, or natural resource protection opportunities).

Generally, the land planning process results in few actions that adversely affect long-term productivity. Where practicable, TVA manages public lands for multiple uses, including recreation, natural resources, and protection of sensitive resources, for the goal of protecting these values for the public. The change under the proposed action has been the reallocation of land to the new zone definition to accurately reflect current use. The allocation changes include additional land to be potentially developed for Zone 2 (Project Operations) and Zone 6 (Developed Recreation). The potential developments permitted on these two zones could decrease the productivity of land for agricultural, forest, wildlife, and other natural resource management. However, those same developments could spur increased long term recreational and economic opportunities.

4.19 Irreversible and Irretrievable Commitments of Resources

An irreversible or irretrievable commitment of resources refers to impacts on or losses to resources that cannot be recovered or reversed. A decision on the proposed alternatives in this planning document would not in itself result in irreversible and irretrievable commitments. TVA zone allocations are not irreversible or irretrievable commitments as zone allocations can be changed.

Potential effects may occur later when specific future projects are proposed and implemented. Project-specific NEPA reviews will be conducted for proposed projects and irreversible and irretrievable commitments would be determined at that time. However, irreversible impacts would be potentially greater under Alternative B as the majority of the parcels are being changed from Zone 3 and Zone 4 (Sensitive Resource Management and Natural Resource Conservation, respectively) which allow limited development to Zone 2 and Zone 6 which allow more development (Project Operations and Developed Recreation, respectively).

CHAPTER 5 – LIST OF PREPARERS

5.1 NEPA Project Management

Kelly Baxter, Land Planning Project Manager, M.S. in Plant Science and Landscape Systems and B.S. in Botany, 15 years of experience in NEPA compliance and natural resource planning and land management.

W. Douglas White, NEPA Compliance, Document Development, B.S. in Forestry, 15 years of experience in water resource permitting and management and NEPA compliance.

5.2 Other Contributors

Todd Amacker, Natural Areas, M.S. in Wildlife and B.S. in Environmental Science, 9 years of experience in ecological restoration, fisheries management, and geographic information systems.

Nicole Berger, Navigation, M.S. in Engineering Management and B.S. in Civil/Environmental Engineering, 14 years of experience in river forecasting and 2 years in navigation.

Steve Cole, Cultural Compliance, Ph.D. in Archaeology and M.A. and B.A. in Anthropology, 12 years in cultural resources compliance and 4 years teaching at a university level.

Travis Giles, Environmental Support, M.S. in Environmental Science and B.S. in Environmental Policy, 17 years of experience in environmental compliance and project planning.

Robert Marker, Recreation, B.S. in Recreation Resources Management, 45 years of experience in recreation planning and management.

David Nestor, Botany and Threatened and Endangered Species, M.S. in Botany and B.S in Aquaculture, Fisheries & Wildlife Biology; 21 years of experience in field botany including wetland delineations, invasive plant management, and threatened and endangered species analysis.

Kim Pilarski-Hall, Wetlands, M.S. and B.S. in Geography, Minor in Ecology, 22 years of experience in wetland assessments and delineations.

Craig Philips, Aquatic Ecology and Threatened and Endangered Species, M.S. and B.S. in Wildlife and Fisheries Science, 7 years of experience in sampling and hydrologic determinations, 5 years in environmental reviews.

Jesse Troxler, Terrestrial Ecology and Threatened and Endangered Species, M.S. and B.S. in Wildlife Science, 9 years of experience in biological data collection and environmental reviews.

Chevales Williams, Surface Water, B.S. in Environmental Engineering, 12 years of experience in water quality monitoring and compliance, 11 years in NEPA planning and environmental services.

Carrie Williamson, Flood Risk, Program Manager, M.S. in Civil Engineering and B.S. in Civil Engineering, Professional Engineer, Certified Floodplain Manager, 5 years in Floodplains and Flood Risk, 3 years in River Forecasting, 11 years in Compliance Monitoring.

CHAPTER 6 – ENVIRONMENTAL ASSESSMENT RECIPIENTS

6.1 Federal Agencies

Department of the Army, Corps of Engineers

Environmental Protection Agency

U.S. Fish and Wildlife Service

U.S. Geological Survey

6.2 Federally Recognized Tribes

Absentee-Shawnee Tribe of Oklahoma

Cherokee Nation

Coushatta Tribe of Louisiana

Eastern Band of Cherokee Indians

Eastern Shawnee Tribe of Oklahoma

Kialegee Tribal Town

Muscogee (Creek) Nation

Shawnee Tribe

Thlopthlocco Tribal Town

United Keetoowah Band of Cherokee Indians in Oklahoma

6.3 State Agencies

Tennessee Department of Agriculture

Tennessee Department of Economic and Community Development

Tennessee Department of Environment and Conservation

Tennessee Department of Tourism Development

Tennessee Department of Transportation

Tennessee State Historic Preservation Officer

Tennessee Wildlife Resources Agency

6.4 Individuals and Organizations

Appalachian Chapter of Trout Unlimited	Chattanooga, Tenn.
Appalachian Mountain Bike Club	Knoxville, Tenn.
Archaeological Institute of America, East Tennessee Society	Knoxville, Tenn.
Arndts and Landis Enterprises Campground on the Lakeshore	Ten Mile, Tenn.
Arrowhead Resort	Spring City, Tenn.
Bayside Marina and Resort	Ten Mile, Tenn.
Blue Springs Marina, Inc.	Ten Mile, Tenn.
Camp John Knox	Ten Mile, Tenn.
Caney Creek Marina	Harriman, Tenn.
Caney Creek RV Resort	Harriman, Tenn.
CEP Eden Marina	Spring City, Tenn.
Chattanooga Bicycle Club	Chattanooga, Tenn.
City of Harriman (Harriman City Ramp)	Harriman, Tenn.
City of Harriman (Harriman Riverfront Park)	Harriman, Tenn.
City of Loudon Parks and Recreation	Loudon, Tenn.
City of Oak Ridge	Oak Ridge, Tenn.
City of Spring City (Veteran's Park)	Spring City, Tenn.
CM&L Corporation (Lakeside Golf Course)	Kingston, Tenn.
Conservation Fisheries, Inc.	Knoxville, Tenn.
Discover Life in America Organization	Gatlinburg, Tenn.
Ducks Unlimited	Athens, Tenn.
Ducks Unlimited	Harriman, Tenn.
East Tennessee Development District	Alcoa, Tenn.
East Tennessee Riding Club	Oak Ridge, Tenn.
East TN Quality Growth	Knoxville, Tenn.
Emory River Watershed Assoc.	Wartburg, Tenn.
Euchee Marina	Ten Mile, Tenn.
Fooshee Pass Campground	Ten Mile, Tenn.
Fooshee Pass Recreation Area	Ten Mile, Tenn.
Foothills Land Conservancy	Rockford, Tenn.
Foundation for Global Sustainability	Knoxville, Tenn.
Fred's Bait and Tackle	Lenoir City, Tenn.
Harbour Point Marina	Rockwood, Tenn.
Keep Roane Litter Free	Harriman, Tenn.
Kingston, Tenn. Parks & Rec Department (Kingston, Tenn. City Park)	Kingston, Tenn.
Kingston, Tenn. Parks & Rec Department (Ladd Park)	Kingston, Tenn.
Kingston, Tenn. Parks and Recreation 58 Landing Park	Kingston, Tenn.
Klinker Management LLC (Hornsby Hollow)	Ten Mile, Tenn.
Lakeside Resort	Spring City, Tenn.

Legacy Parks Foundation	Knoxville, Tenn.
Little River Watershed Association	Maryville, Tenn.
Living Lands & Waters	East Moline, Ill.
Long Island Marina and Yacht Club	Kingston, Tenn.
National Parks Conservation Association	Knoxville, Tenn.
National Wild Turkey Federation	Athens, Tenn.
Oak Ridge Boat Club	Oak Ridge, Tenn.
Oak Ridge Heritage & Preservation Association	Oak Ridge, Tenn.
Oak Ridge Kennel Club	Oak Ridge, Tenn.
Oak Ridge Power Squadron	Oak Ridge, Tenn.
Piney Point Resort	Spring City, Tenn.
Pond Creek Watershed Project	Knoxville, Tenn.
Quail Forever	Lenoir City
Rhea County (Rhea Springs)	Spring City, Tenn.
Rhea County, TN	Dayton, Tenn.
Rhea Economic and Tourism Council, Inc.	Dayton, Tenn.
Rhea Harbor Resort & Marina	Spring City, Tenn.
RiverLink Inc.	Asheville, N.C.
Roane County Parks & Rec (Roane County Park)	Harriman, Tenn.
Roane County Parks & Recreation (Riley Creek)	Kingston, Tenn.
Roane County, TN	Harriman, Tenn.
Roane Development Company, LLC (Swann Harbour)	Kingston, Tenn.
Rockwood Parks & Rec (Rockwood Park)	Rockwood, Tenn.
Save Our Cumberland Mountains	Knoxville, Tenn.
Scenic City Velo	Chattanooga, Tenn.
Sierra Club of Tennessee	Knoxville, Tenn.
Simpson Properties, Inc. Cherokee Point Campground	Ten Mile, Tenn.
Smoky Mountain Wheelmen	Knoxville, Tenn.
Smoky Mountains Hiking Club	Knoxville, Tenn.
Soaring Eagle Campground and RV Park, Inc.	Lenoir City, Tenn.
Southeast Tennessee Development District	Chattanooga, Tenn.
Southwest Point Golf Course	Kingston, Tenn.
Spring City Kiwanis Club	Spring City, Tenn.
Spring City Resort and Marina	Spring City, Tenn.
Tennessee Bass Federation Club, Region III	Loudon, Tenn.
Tennessee Bass Federation Club, Region IV	Powell, Tenn.
Tennessee Citizens for Wilderness Planning	Oak Ridge, Tenn.
Tennessee Clean Water Network	Knoxville, Tenn.
Tennessee Environmental Council	Nashville, Tenn.
Tennessee Healthy Watershed Initiative	Humboldt, Tenn.
Tennessee Marina Association	Providence, Ky.
Tennessee Ornithological Society, Knoxville Chapter	Knoxville, Tenn.
Tennessee River Keeper	Decatur, Ala.

Tennessee Water Resource Research Center	Knoxville, Tenn.
Tennessee Wildlife Federation	Nashville, Tenn.
Terrace View Marina and Resorts, LLC	Spring City, Tenn.
The Land Trust for Tennessee	Nashville, Tenn.
The Nature Conservancy	Abingdon, Va.
The Nature Conservancy (Tennessee)	Nashville, Tenn.
The Southeast Watershed Forum	Ocean Springs, Miss.
University of Tennessee	Knoxville, Tenn.
University of Tennessee Arboretum Society	Oak Ridge, Tenn.
University of Tennessee McClung Museum of Natural and Cultural History	Knoxville, Tenn.
Water Quality Forum	Knoxville, Tenn.
Watts Bar Lake Association	Spring City, Tenn.
Watts Bar Landing, Inc. (The Landing)	Oak Ridge, Tenn.
Watts Bar Properties, LLC (Sam's Boat Dock)	Ten Mile, Tenn.
Whitestone Country Inn	Kingston, Tenn.
Earl and Norma Allred	Kingston, Tenn.
Darren and Tracie Baker	Kingston, Tenn.
Freida Bandy	Lenoir City, Tenn.
Steven Bandy	Lenoir City, Tenn.
David Barron	Lenoir City, Tenn.
Teresa Bell	Kingston, Tenn.
Glenn & Geraldine Brown	Lenoir City, Tenn.
Jeff & Diana Burnette	Kingston, Tenn.
Thomas Burns	Kingston, Tenn.
Camelot International Corp	Kingston, Tenn.
John Philip Cavanaugh	Kingston, Tenn.
Bradbury Methodist Church	Kingston, Tenn.
Lewis & Linda Coffman	Kingston, Tenn.
Michael Collins	Lenoir City, Tenn.
Sarah Cox	Lenoir City, Tenn.
Robert & Janet Culton	Kingston, Tenn.
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John Robert Dickens, Jr.	Kingston, Tenn.
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Energy Solutions LLC	Oak Ridge, Tenn.
Samuel & Stacey Fritts	Kingston, Tenn.
Daniel Gelb	Kingston, Tenn.
G Scott Green	Lenoir City, Tenn.
Jack Frank Guettner	Kingston, Tenn.
Steven & Melissa Hall	Lenoir City, Tenn.
Molly Amanda & James Hartup	Kingston, Tenn.
Mark Edward Head	Kingston, Tenn.
Gerald & Janet Hendrix	Kingston, Tenn.
Edward & Marlene Henry	Kingston, Tenn.

Steven & Cynthia Henry	Kingston, Tenn.
Dorothy Hensley	Lenoir City, Tenn.
Dean & Sandra Hensley	Lenoir City, Tenn.
Sam & Norma Jean Hensley	Kingston, Tenn.
Wayne & Beverly Holloway	Lenoir City, Tenn.
Greg & Tina Hood	Kingston, Tenn.
Boa Industrial Development	Lenoir City, Tenn.
Jimmy & Barbara Jackson	Kingston, Tenn.
Robert & Nell Jago	Kingston, Tenn.
Jake & Sally Almond	Kingston, Tenn.
John Lee Johnson	Lenoir City, Tenn.
Denise Ladd	Kingston, Tenn.
Steven Bruce Lane	Kingston, Tenn.
Douglas Thomas Littleton	Kingston, Tenn.
Bradley Keith Luttrell	Kingston, Tenn.
Larry Eugene Mailhos	Lenoir City, Tenn.
Barry Lynn & Kelli Marlow	Lenoir City, Tenn.
Ralph Marlow	Lenoir City, Tenn.
Dennis McMahan	Kingston, Tenn.
Michael & Lora Collins	Lenoir City, Tenn.
Norman & Mary Morgan	Kingston, Tenn.
John Wright	Kingston, Tenn.
Mr. and Mrs. Billy Newman	Lenoir City, Tenn.
Mr. and Mrs. Clarence Hensley	Lenoir City, Tenn.
Mr. and Mrs. Clay Linkuos	Lenoir City, Tenn.
Mr. and Mrs. Darrell Griffis	Lenoir City, Tenn.
Mr. and Mrs. David Thomas	Lenoir City, Tenn.
Mr. and Mrs. Donald Fike	Kingston, Tenn.
Mr. and Mrs. Donnie Headrick	Lenoir City, Tenn.
Mr. and Mrs. Ernest Conrad	Lenoir City, Tenn.
Mr. and Mrs. Garvin Morris	Lenoir City, Tenn.
Mr. and Mrs. Gary Rogers	Lenoir City, Tenn.
Mr. and Mrs. James Biddix	Kingston, Tenn.
Mr. and Mrs. Jeff Bale	Kingston, Tenn.
Mr. and Mrs. Jimmie Carr	Lenoir City, Tenn.
Mr. and Mrs. John Dorrans	Lenoir City, Tenn.
Mr. and Mrs. John Mayton	Lenoir City, Tenn.
Mr. and Mrs. Leonard Holloway	Kingston, Tenn.
Mr. and Mrs. Ray Robbins	Kingston, Tenn.
Mr. and Mrs. Robert Stinnett	Lenoir City, Tenn.
Mr. and Mrs. Ronald Couch	Kingston, Tenn.
Mr. and Mrs. Teddy Raby	Kingston, Tenn.
Mr. and Mrs. Tony Stamey	Lenoir City, Tenn.
Mr. and Mrs. Troy Arwood	Kingston, Tenn.
Mr. and Mrs. Walter Petty	Kingston, Tenn.
Mr. and Mrs. Wesley McCroskey	Kingston, Tenn.

Mr. and Mrs. William Arwood	Kingston, Tenn.
Mr. and Mrs. William Duncan	Lenoir City, Tenn.
Anthony Presley	Lenoir City, Tenn.
Charles Smith	Kingston, Tenn.
David Groves	Lenoir City, Tenn.
Dennis Beeler	Lenoir City, Tenn.
Gustove Easter	Kingston, Tenn.
Jack Bierman	Kingston, Tenn.
James Moyer	Lenoir City, Tenn.
Leonard Holloway	Kingston, Tenn.
Mark Taylor	Kingston, Tenn.
Ralph Marlow	Lenoir City, Tenn.
Russell Haskins	Lenoir City, Tenn.
Sean Gallagher	Lenoir City, Tenn.
Wayne Brooks	Kingston, Tenn.
Russell Haskins	Lenoir City, Tenn.
Sean Gallagher	Lenoir City, Tenn.
Wayne Brooks	Lenoir City, Tenn.
Bonnie Tucker	Lenoir City, Tenn.
Carrie Akins	Lenoir City, Tenn.
Catherine Huheey	Kingston, Tenn.
Darlene Settles	Kingston, Tenn.
Kelley Thomas	Kingston, Tenn.
Sally Almond	Lenoir City, Tenn.
Sandra Haire	Lenoir City, Tenn.
Sheila Collins	Kingston, Tenn.
Tammy Crass	Kingston, Tenn.
Benny Allen Mullin	Kingston, Tenn.
Kenneth Nester	Lenoir City, Tenn.
Jerry & Brenda Norton	Lenoir City, Tenn.
Lars & Barrie Paulson	Kingston, Tenn.
Albert Perez	Kingston, Tenn.
George Phillips	Kingston, Tenn.
Mary Annette Pickel	Lenoir City, Tenn.
Sue Hart Prestwood	Kingston, Tenn.
Proton Power	Lenoir City, Tenn.
Frances & Robert Puckett	Lenoir City, Tenn.
William Donald Ray	Kingston, Tenn.
Richard & Teresa Vest	Lenoir City, Tenn.
Leonard Guy Robinette	Lenoir City, Tenn.
Melinda Saneda	Lenoir City, Tenn.
Anthony Wayne & Susa Seals	Lenoir City, Tenn.
Bonnie Hutchinson Sexton	Kingston, Tenn.
Randall & Kimberly Sexton	Kingston, Tenn.
Gregory & Kristie Sims	Kingston, Tenn.
Mark Smith	Kingston, Tenn.

Rupert & Cynthia Smith	Kingston, Tenn.
Winford & Omega Spangler	Kingston, Tenn.
Shirley Stafford	Kingston, Tenn.
The HT Hackney Company	Lenoir City, Tenn.
Keith Townsend	Lenoir City, Tenn.
Dennis Urban & Nicho Ovens	Lenoir City, Tenn.
John & Kathy Verble	Kingston, Tenn.
William Roger & Barbara Vinson	Kingston, Tenn.
Nancy Katherine Walden	Lenoir City, Tenn.
Ashley Wilde	Kingston, Tenn.
Timothy & Carol Wing	Kingston, Tenn.
George Woodard	Lenoir City, Tenn.
Ryan & Holly Woodlee	Kingston, Tenn.
William Wright	Lenoir City, Tenn.
Obie & Elizabeth Young	Kingston, Tenn.

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GLOSSARY

100-year floodplain	The area inundated by the 1 percent annual chance (or 100- year) flood.
agricultural licensing	TVA land licensed to a private individual for the production of agricultural crops; the land use is an interim use of TVA land.
attainment areas	Those areas of the U.S. that meet NAAQS as determined by measurements of air pollutant levels.
benthic	Refers to the bottom of a stream, river, or reservoir.
cumulative impacts	Impacts that result from the incremental impact of the action when added to other past, present, and reasonably foreseeable actions, regardless of what agency or person undertakes such actions (40 CFR § 1508.7).
dam reservation	Lands generally maintained in a park-like setting by TVA to protect the integrity of the dam structure, hydroelectric facilities, and navigation lock. The reservation also provides for public visitor access to the TVA dam facilities and recreation opportunities, such as public boat access, bank fishing, camping, picnicking, etc.
deciduous	Vegetation that sheds leaves in autumn and produces new leaves in the spring.
direct impacts	Effects that are caused by the action and occur at the same time and place (40 CFR § 1508.8).
dissolved oxygen (DO)	The oxygen dissolved in water, necessary to sustain aquatic life. It is usually measured in milligrams per liter or parts per million.
drawdown	Area of reservoirs exposed between full summer pool and minimum winter pool levels during annual drawdown of the water level for flood control.
ecoregion	A relatively homogeneous area of similar geography, topography, climate, and soils that supports similar plant and animal life.
embayment	A bay or arm of the reservoir.
emergent wetland	Wetlands dominated by erect, rooted herbaceous plants, such as cattails and bulrush.
endangered species	A species in danger of extinction throughout all or a significant portion of its range or territory. Endangered species recognized by the ESA or similar state legislation have special legal status for their protection and recovery.
evergreen	Vegetation with leaves that stay green and persist all year.
evergreen-deciduous	Vegetation consisting of a mixture of plants that are both evergreen and deciduous, often referred to as mixed deciduous.
floodplains	Any land area susceptible to inundation by water from any source by a flood of selected frequency. For purposes of the National Flood Insurance Program, the floodplain, as a minimum, is that area subject

	to a 1 percent or greater chance of flooding (100-year flood) in any given year.
flowage easement tracts	Privately owned lakeshore properties where TVA has (1) the right to flood the land as part of its reservoir operations, (2) no rights for vegetation management, and (3) the authority to control structures, under Section 26a of the *TVA Act*.
forest	Vegetation having tree crowns overlapping, generally forming 60-100 percent cover (Grossman et al. 1998).
fragmentation	The process of breaking up a large area of relatively uniform habitat into smaller disconnected areas.
herbaceous vegetation	Dominated by forbs, generally forming at least 25 percent cover; other life-forms with less than 25 percent cover (Grossman et al 1998).
historic property	Defined in 36 CFR § 800.16(l) as "any prehistoric or historic district, site, building, structure, or object included in, or eligible for inclusion in, the National Register of Historic Places."
indirect impacts	Effects that are caused by the action and are later in time or farther removed in distance but are still reasonably foreseeable (40 CFR § 1508.8).
macroinvertebrates	Bottom-dwelling aquatic animals without vertebrae (skeletal spine), such as mollusks and arthropods.
mainstream reservoirs	Impoundments created by dams constructed across the Tennessee River.
marginal strip	The narrow strip of land retained by TVA between the summer operating pool and back-lying tracts that are owned or controlled by private or other public entities.
maximum shoreline contour (MSC)	An elevation typically 5 feet above the top of the gates of a TVA Dam. It is often the property boundary between TVA marginal strip property and adjoining private property.
NatureServe	An international network of biological inventories (natural heritage programs or conservation data centers) that provides information about the location and status of animals, plants, and habitat communities, and establishes a system for ranking the relative rarity of those resources
National Ambient Air Quality Standards (NAAQS)	Uniform national air quality standards established by the USEPA that restrict ambient levels of certain pollutants to protect public health (primary standards) or public welfare (secondary standards). Standards have been set for ozone, carbon monoxide, particulate matter, sulfur dioxide, nitrogen dioxide, and lead.
physiographic provinces	General divisions of land with each area having characteristic combinations of soil materials and topography.
phytoplankton	Aquatic organisms, often microscopic, capable of generating their own food via photosynthesis, e.g., algae.
polychlorinated biphenyls (PCBs)	PCBs are organic compounds historically used for many applications, especially as dielectric fluids in transformers and capacitors and coolants. PCBs are toxic and classified as persistent organic

	pollutants. PCB production was banned by the U.S. in 1976.
prime farmland	Generally regarded as the best land for farming, these areas are flat or gently rolling and are usually susceptible to little or no soil erosion. Prime farmland produces the most food, feed, fiber, forage, and oil seed crops with the least amount of fuel, fertilizer, and labor. It combines favorable soil quality, growing season, and moisture supply and, under careful management, can be farmed continuously and at a high level of productivity without degrading either the environment or the resource base. Prime farmland does not include land already in or committed to urban development, roads, or water storage.
riprap	Stones placed along the shoreline for bank stabilization and other purposes.
riparian zone	An area of land that has vegetation or physical characteristics reflective of permanent water influence. Typically a streamside zone or shoreline edge.
riverine	Having characteristics similar to a river.
row crops	Agricultural crops, such as corn, wheat, beans, cotton, etc., which are most efficiently grown in large quantities by planting and cultivating in lines or rows.
Section 26a review process	Section 26a of the *TVA Act* requires TVA review and approval of plans for obstructions, such as docks, fills, bridges, outfalls, water intakes, and riprap, before they are constructed across, in or along the Tennessee River and its tributaries. Applications for this approval are coordinated appropriately with TVA programs and USACE. USACE issues a joint public notice for those applications that are not covered by a USACE nationwide, general, or regional permit. The appropriate state water pollution control agency must also certify that the effluent from outfalls meets the applicable water quality standards.
scrub-shrub	Woody vegetation less than about 20 feet tall. Species include true shrubs, young trees, and trees or shrubs that are small or stunted because of environmental conditions.
shoreline	The line where the water of a TVA reservoir meets the shore when the water level is at the normal summer pool elevation.
shrublands	Vegetation consisting of shrubs generally greater than about 1.5 feet tall with individuals or clumps not touching or overlapping, generally forming less than 25 percent cover; tree cover generally less than 25 percent (Grossman et al. 1998).
stratification	The seasonal layering of water within a reservoir due to differences in temperature or chemical characteristics of the layers.
substrates	The base or material to which a plant is attached and from which it receives nutrients.
summer pool elevation	The normal upper level to which the reservoirs may be filled. Where storage space is available above this level, additional filling may be made as needed for flood control.
threatened species	A species threatened with extinction throughout all or a significant portion of its range or territory. Threatened species recognized by the

	ESA or similar state legislation have special legal status for their protection and recovery.
tributary reservoirs	Impoundments created by dams constructed across streams and rivers that eventually flow into the Tennessee River.
turbidity	All the organic and inorganic living and nonliving materials suspended in a water column. Higher levels of turbidity affect light penetration and typically decrease productivity of water bodies.
upland	The higher parts of a region, not closely associated with streams or lakes.
wetlands	As defined in *TVA Environmental Review Procedures*, wetlands are "those areas inundated by surface or ground water 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."
Wildlife Management Area	Land and/or water areas designated by state wildlife agencies, such as the Tennessee Wildlife Resources Agency (TWRA), for the protection and management of wildlife. These areas typically have specific hunting and trapping regulations as well as rules regarding appropriate uses of these areas by the public.
woodland	Open stands of trees with crowns not usually touching, generally forming 25 to 60 percent cover (Grossman et al. 1998).
zooplankton	Microscopic aquatic organisms that drift in the water column. Unlike phytoplankton, zooplankton are unable to generate food through photosynthesis and must instead consume other organisms.

Appendix A – Land Planning Zone Definitions

RESERVOIR LAND MANAGEMENT PLANNING ZONES

Zone 1: Non-TVA Shoreland

This is shoreland located above summer pool elevation that TVA does not own in fee, or land that was never purchased by TVA. TVA does not allocate private or other non-TVA land. This category is provided to assist in any comprehensive evaluation of potential environmental impacts of TVA's allocation decisions.

Zone 2: Project Operations

This category includes all TVA reservoir land currently used for TVA operations and public works projects. It includes:

- 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 used for 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 fire halls, public water intakes, public treatment plants, etc.
- Land planned for any of the above uses in the future

Zone 3: Sensitive Resource Management

This land is 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 on or eligible for listing on 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

- Habitat Protection Areas: these TVA Natural Areas are managed to protect populations of species identified as threatened or endangered by the USFWS, 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

- Small Wild Areas: these TVA Natural Areas are managed by TVA alone 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: 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

- Significant scenic areas: these are 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

Zone 4: Natural Resource Conservation

This is 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 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

- TVA public land managed for wildlife or forest management projects

- Informal 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

- Islands of 10 acres or less

Zone 5: Industrial

This is land managed for economic development, including businesses in distribution-processing-assembly and light manufacturing. Preference will be given to businesses requiring water access. Parcel descriptions should describe the primary type of use and discuss potential for infrastructure, access and development; access for water supply or structures associated with navigation such as barge terminal, mooring cell, etc.; and land-based development potential. Areas included are:

- TVA public land under easement, lease or license to other agencies/individuals for purposes described above

- TVA public land fronting land owned by other agencies/individuals for industrial for purposes described above

- Sites planned for future use supporting sustainable development

- Types of development that can occur on this land are:

- Business parks (not including retail, service-based businesses like laundry, fast food, grocery stores, gas stations, day cares or any walk-in type 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 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

Zone 6: Developed Recreation

The designations below are based on levels of development and the facilities available to the public, graduating from informal use to more developed use. Parcel descriptions should describe the primary type of use and discuss potential for infrastructure, access, and development.

- Water access: small parcels of land, generally less than 10 acres, and typically shoreline areas conveyed to public agencies for access

- Public: more recreational opportunities, some facilities, more than just launching a boat and typically generally greater than 10 acres including areas that have been conveyed for public recreation

- Commercial: property suitable and capable to support commercial water-based operations including areas that have been conveyed for commercial recreation

All reservoir land managed for concentrated, active recreational activities that require capital improvement and maintenance, including:

- TVA public land under easement, lease or license to other agencies/individuals for recreational purposes.

- TVA public land fronting land owned by other agencies/individuals for recreational purposes.

- TVA public land developed for recreational purposes, such as campgrounds, day use areas, etc.

- Land planned for any of the above uses in the future.

Types of development that can occur on this land are:

- Water access: e.g., areas that tend to be informal and can include launching ramps, courtesy piers, canoe access, parking areas, picnic areas, trails, etc.

- Public recreation: recreation on publicly owned land with facilities developed by a public agency and providing amenities open to the general public. Facilities at “public recreation” (municipalities/communities) areas typically include playgrounds/play structures, picnic facilities, tennis courts, horseshoe areas, play courts, recreation center, athletic fields, trails, 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/or overnight (developed) camping.

- Commercial recreation: defined as recreation amenities that are provided for a fee to the public intending to produce a profit for the owner / operator. These primarily water-based facilities typically include marinas and affiliated support facilities like restaurants and lodges; campgrounds; cabins; military vessel attractions, excursion tour vessels (restaurant on the water), etc.

- Greenways: linear parks or developed trails located along natural features, such as lakes or ridges, or along man-made features, including abandoned railways or utility rights-of-way, which link people and resources together

Zone 7: Shoreline Access

This is TVA-owned land where Section 26a applications and other land use approvals for shoreline alterations are considered. Requests for 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 general public. Types of development/management that can occur on this land are:

- Water use facilities, e.g., docks, piers, launching ramps/driveways, marine railways, boathouses, enclosed storage space and nonpotable water intakes

- Access corridors, e.g., pathways, wooden steps, walkways or mulched paths, which can include portable picnic tables and utility lines

- Shoreline stabilization, e.g., bioengineering, riprap and gabions and retaining walls

- Shoreline vegetation management on TVA-owned access shoreland

- Conservation easements for protection of the shoreline

- Other activities, e.g., fill, excavation, grading, etc.

Appendix B – Response to Comments

RESPONSE TO COMMENTS

The Draft Supplemental EA for the proposed Watts Bar Reservoir Land Management Plan Amendment was released to the public on November 16, 2018. TVA accepted comments submitted by mail and email through December 18, 2018. During the comment period, TVA received 2 comments on the Draft Supplemental EA from the State of Tennessee Department of Environment and Conservation (TDEC). The comments were reviewed by TVA with responses provided below.

Table B-1. TDEC Comments and TVA Responses

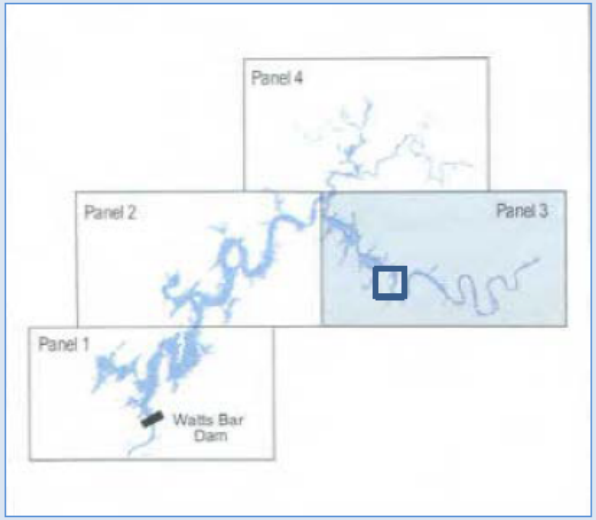
Comment Statement	TVA Response
TDEC believes the Draft SEA adequately addresses potential impacts to cultural and natural resources within the proposed project area.	Thank you for your comment.
TDEC advises that any activities which will disturb more than one acre of land must have a National Pollution Discharge Elimination System Stormwater Construction Permit; any activities affecting streams or wetlands must have an Aquatic Resource Alteration Permit, including an increase [in] water withdrawals; and depending on the activity and the size of the disturbance, a hydrologic determination by a certified hydrologic professional might be necessary to identify all of the aquatic resources within the project limits of disturbance to determine the impact to water resources.	Thank you for your comment. TVA is committed to compliance with applicable environmental laws and regulations. The allocation changes analyzed in this EA do not authorize any specific action/activity on TVA property. Activities requiring TVA approval will be evaluated to determine site-specific environmental impacts, identify potential impacts to sensitive resources for avoidance or minimization as appropriate, and ensure consistency with applicable laws and regulations.

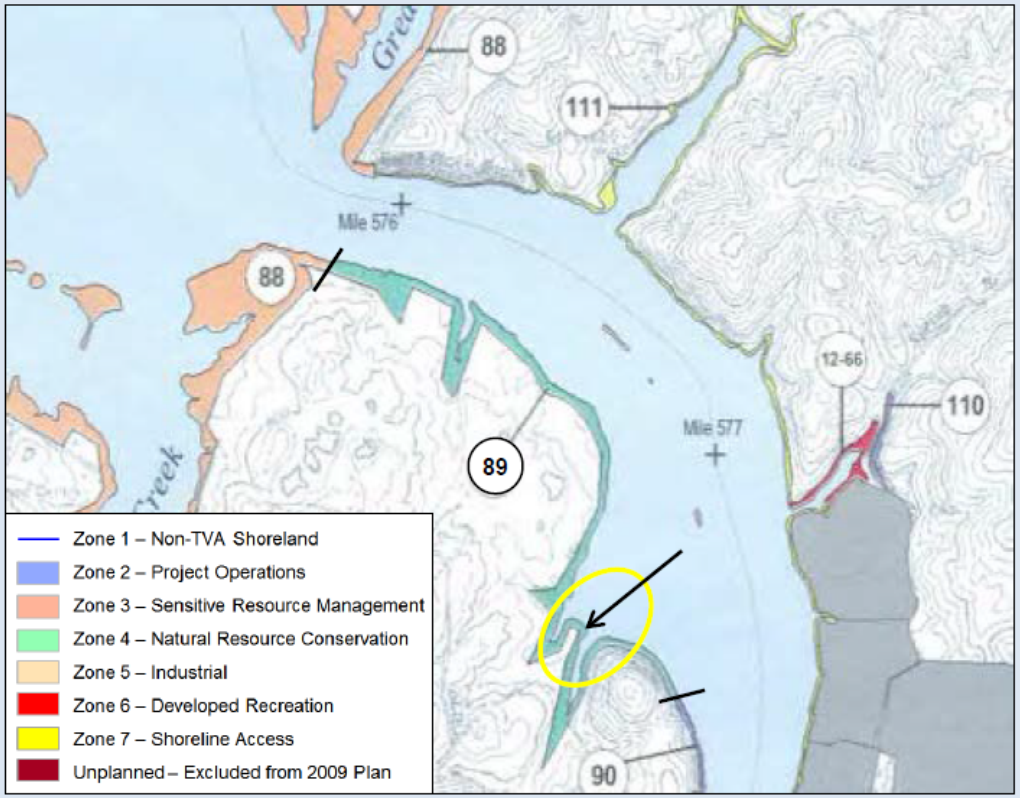
Appendix C – Proposed Allocation Change

Watts Bar Reservoir Proposed Allocation Change

PARCEL 89

(35.0 acres)





Location: Panel 3; Roane Co.;
Tennessee River Mile (TRM) 577.3L

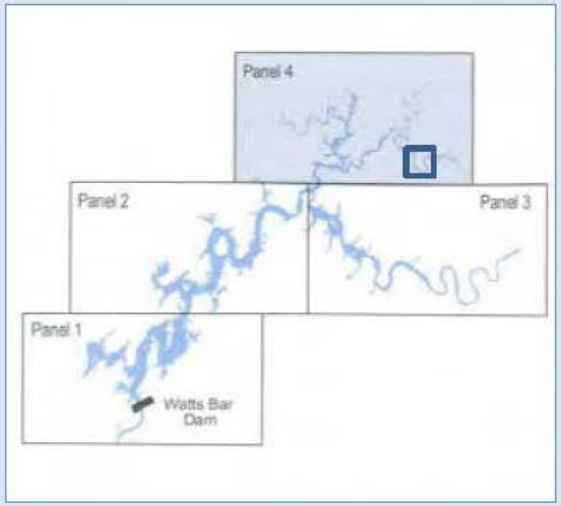
TVA Proposed Action:

TVA proposes to change the land use allocation of a 0.4-acre portion of Parcel 89 from its current allocation of Zone 4 (Natural Resource Conservation) to Zone 7 (Shoreline Access).

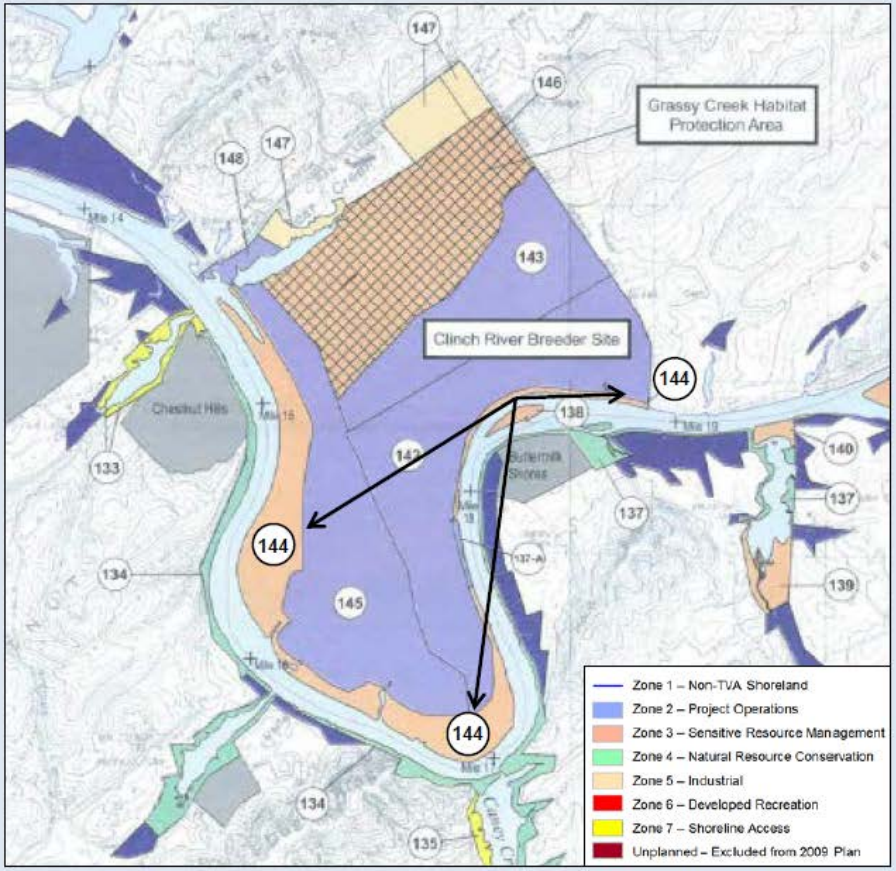
Watts Bar Reservoir Proposed Allocation Change

PARCEL 144

(172.3 acres)



Location: Panel 4; Roane Co.;
Tennessee River Miles (TRMs)
14.6 to 17.5R



TVA Proposed Action:

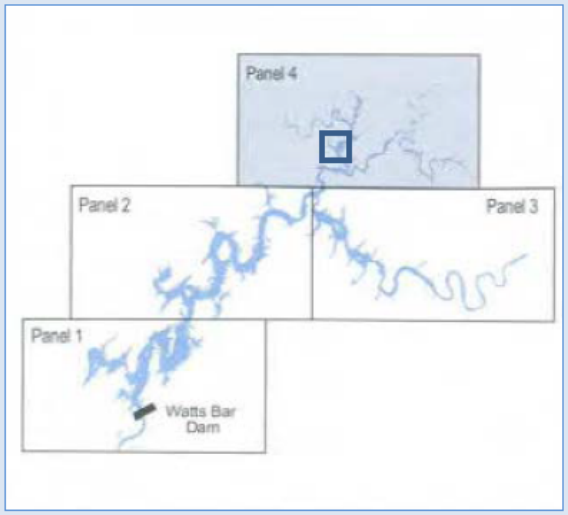
TVA proposes to change the land use allocation of Parcel 144 from its current allocation of Zone 3 (Sensitive Resource Management) to Zone 2 (Project Operations).

1

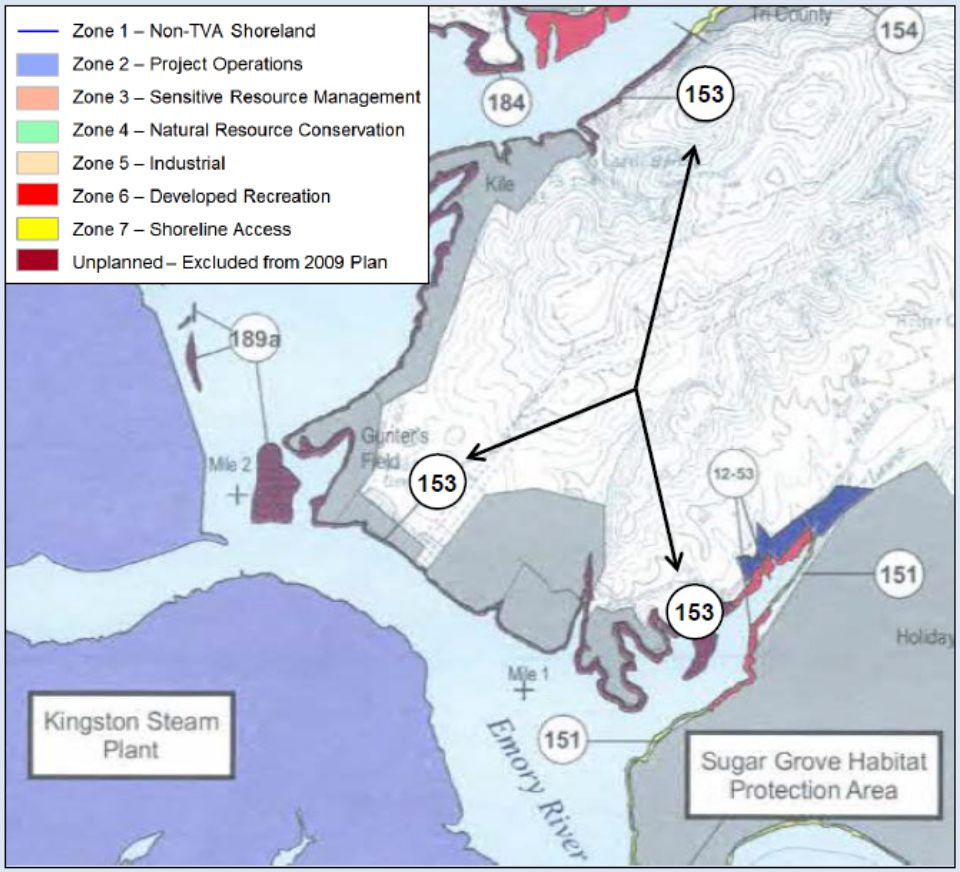
Watts Bar Reservoir Proposed Allocation Change

PARCEL 153

(40.6 acres)



Location: Panel 4; Roane Co.;
Emory River Miles 0.8 to 3.9L



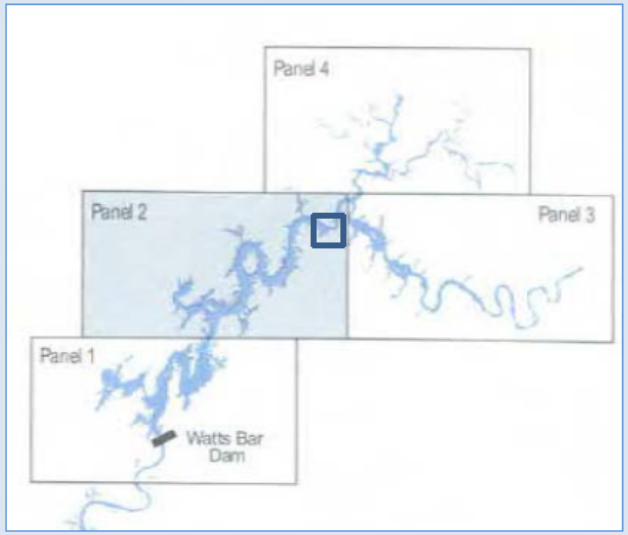
TVA Proposed Action:

TVA proposes to change the land use allocation of the entire 40.6-acre Parcel 153 from "Unplanned" to Zone 7 (Shoreline Access).

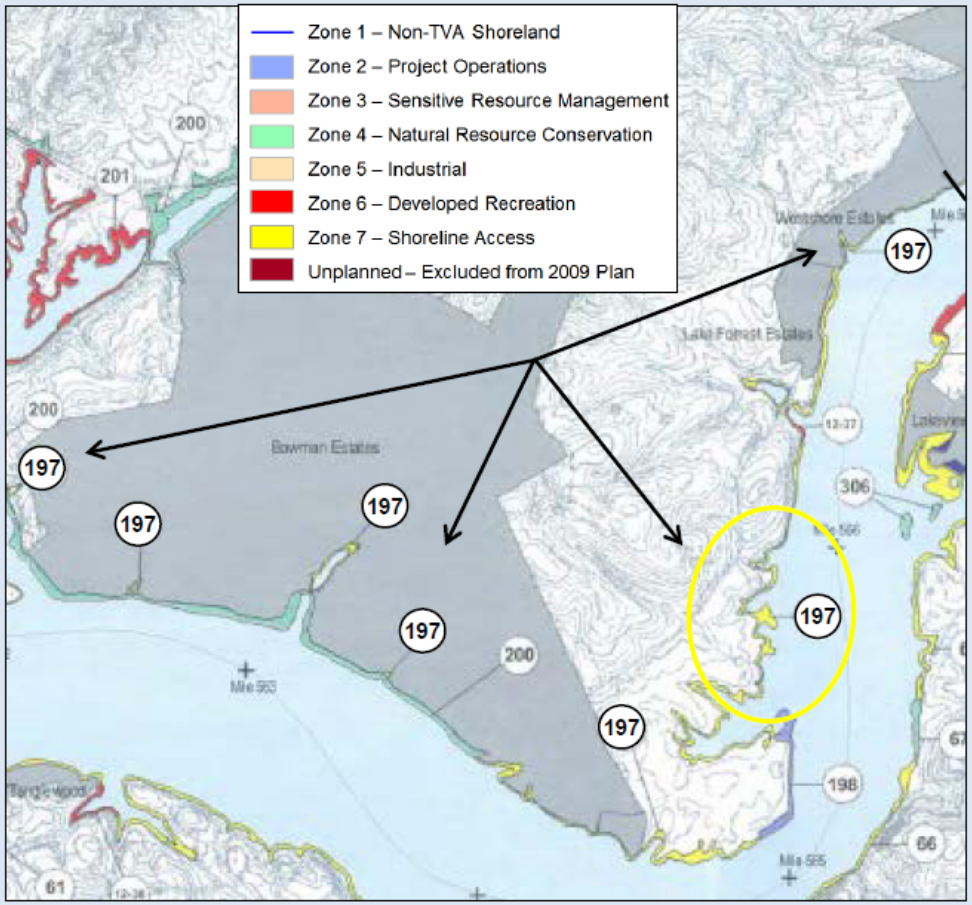
Watts Bar Reservoir Proposed Allocation Change

PARCEL 197

(36.8 acres)



Location: Panel 2; Roane Co.;
Tennessee River Miles (TRMs)
562.2R to 567.1R



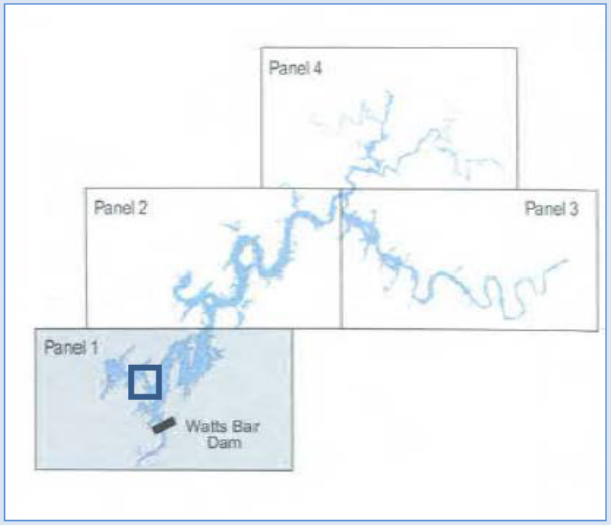
TVA Proposed Action:

TVA proposes to change the land use allocation of a 10.2-acre portion of Parcel 197 from its current allocation of Zone 7 (Shoreline Access) to Zone 6 (Developed Recreation).

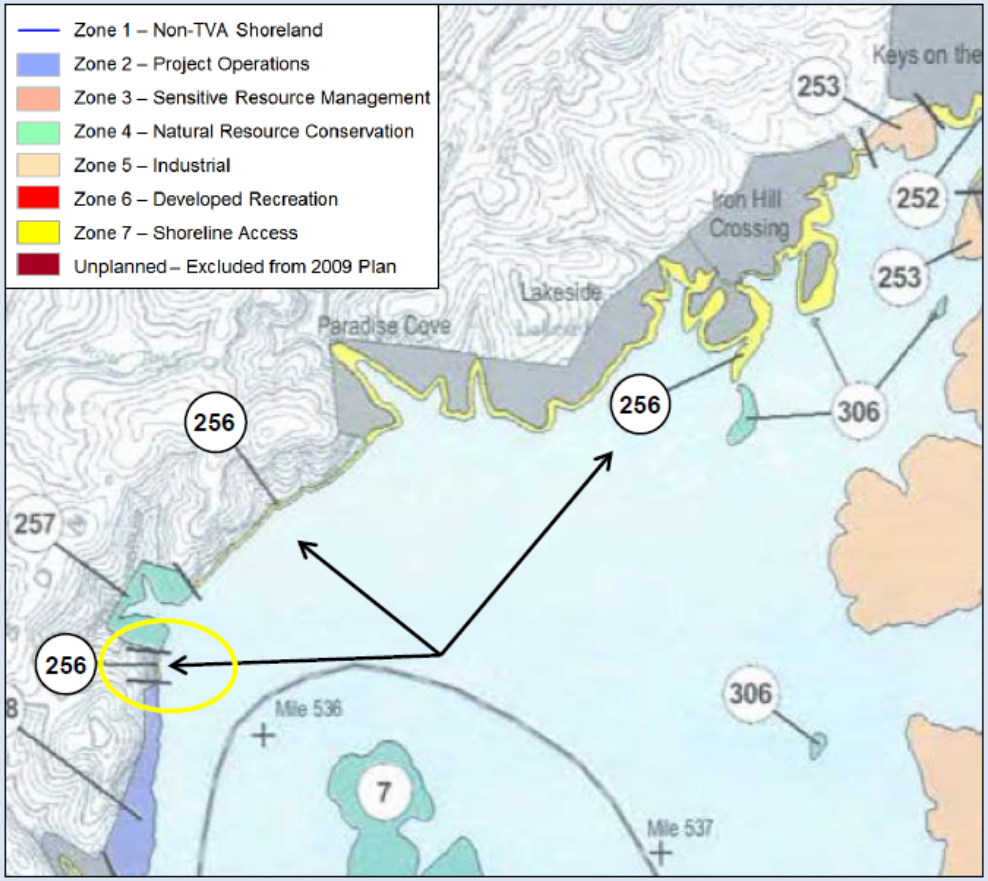
Watts Bar Reservoir Proposed Allocation Change

PARCEL 256

(34.2 acres)



Location: Panel 1; Rhea Co.;
Tennessee River Mile (TRM) 536.0R



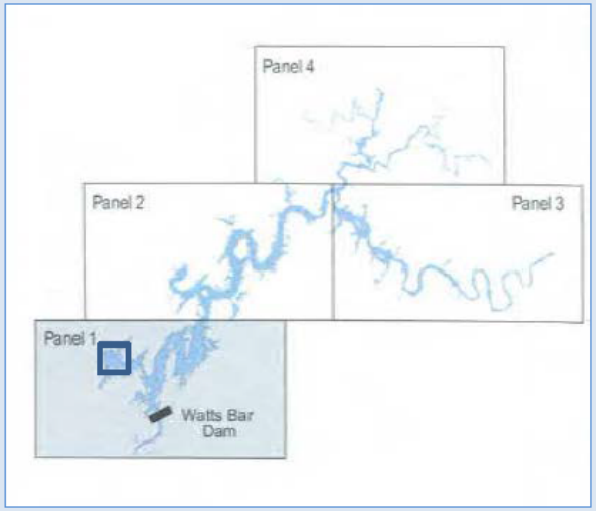
TVA Proposed Action:

TVA proposes to change the land use allocation of a 0.12-acre portion of Parcel 256 from its current allocation of Zone 7 (Shoreline Access) to Zone 4 (Natural Resource Conservation).

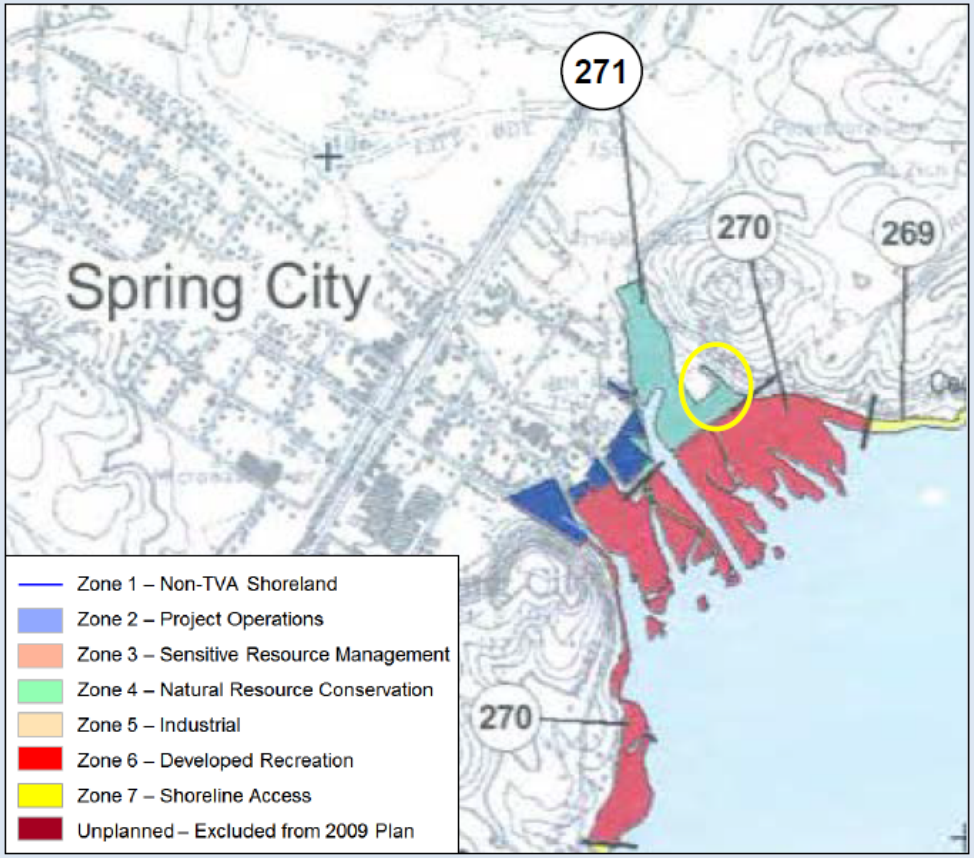
Watts Bar Reservoir Proposed Allocation Change

PARCEL 271

(14.0 acres)



Location: Panel 1; Rhea Co.;
Piney River Mile 6.0 – Upper Piney



TVA Proposed Action:

TVA proposes to change the land use allocation of a 2.4-acre portion of Parcel 271 from its current allocation of Zone 4 (Natural Resource Conservation) to Zone 6 (Developed Recreation).

Appendix D – Parcel 109 (Marble Bluff Subdivision)
Special Permitting Conditions

August 25, 1995

Prospective Lot Owners in Marble Bluff Subdivision

This fact sheet is to inform you of TVA's interim guidelines for any activity on public lands along the shoreline of Watts Bar Reservoir. Please note that advanced written approval from TVA is required before altering the public lands adjacent to lots at Marble Bluff Subdivision. This includes any removal of vegetation, and mowing. In this subdivision, the special warranty deed for TVA Tract No. XWBR-411 contains the following covenants: that portion of the land that lies below the 759 contour was sold subject to any flooding that may result from the erection and operations of any dam, and the rights of the general public to hunt, fish, land, and picnic are reserved on the lands between the 741 and 745 contour. No buildings or other structures except water use facilities constructed in accordance with plans approved by TVA are allowed below the 750-foot contour.

Forested shorelines play an important role in controlling shoreline erosion, preserving shoreline aesthetics, improving water quality, providing a habitat for wildlife, and many other benefits. TVA is presently developing a new policy for private use of public shorelines along TVA lakes. During recent meeting on Watts Bar Lake area, we heard strong public commitment for protection of the natural beauty of TVA lakes, good water quality, and control of shoreline erosion. Additionally, the public supports stronger enforcement by TVA of existing regulations. Consistent with public opinion, we are trying to minimize removal of shoreline vegetation, and are asking for your help and cooperation by reporting incidences of unauthorized clearing to our office.

The reservoir shoreline in conjunction with the existing shoreland vegetation provides habitat for resident and migrant waterfowl, wading birds, shorebirds, osprey and wintering bald eagles These areas are also used by wetland mammals, amphibians, reptiles, and numerous songbird species. At least one active osprey nest is located in the shallow water area along the shoreline. Ospreys are currently listed in need of management by the State of Tennessee. Wintering bald eagles, listed as federally endangered, have been recorded in 1994 and 1995 using the shoreline adjacent to Marble Bluff Subdivision and the bluffs across the lake.

Also to be considered are the shallow water conditions along the reservoir shoreline that will preclude boat access to any shoreline facilities during winter drawdown, and limit boat access in some areas during summer pool.

Maintaining shoreline buffers are critical for the health of our reservoirs and the decision to deny the following activities/facilities is a joint decision among resource managers. The following activities will be denied: boat access dredging, boat launching ramps, driveways to shoreline, land based recreational facilities, bank stabilization with retaining walls, any major earth disturbance involving riprap and

removal of the shoreland vegetation in excess of a six-foot access path for each abutting property owner. We will approve shoreland facilities such as fixed or floating docks, pedestrian access to private shoreland facilities with a 6-foot path, bank stabilization with hand placed natural rock, and electric service.

We ask that you remember the land adjacent to your property is public-owned and is managed to provide a diversity of benefits to lake users and adjoining property owners. Shorelands are a finite resource that must be managed wisely to protect natural/cultural resources and provide appropriate public use and enjoyment of the reservoir system.

If you are interested in a copy of "TVA River Neighbors" newsletter that gives additional information about TVA lake levels, current activities along the reservoirs and additional information about public shorelands, please write to:

TVA River Neighbors
400 West Summit Hill Dive
Knoxville, Tennessee 37902-1499

Original issued 8/25/95
Updated 11/16/98

Appendix E – Tennessee Department of Environment and Conservation 303(d) List of Impaired Streams

Waterbody ID	Impacted Waterbody	County	Miles/Acres Impaired	CAUSE	Pollutant Source	COMMENTS
TN060102010 01_1000	WATTS BAR RESERVOIR	Rhea Roane Meigs	34075 ac	PCBs	Contaminated sediments	Fishing advisory due to PCBs. Category 4a. EPA approved a PCB TMDL for the known pollutant on 3/18/10.
TN060102010 01_2000	UPPER WATTS BAR RESERVOIR Sweetwater Creek to Fort Loudoun Dam.	Loudon	1971 ac	Low Dissolved Oxygen PCBs	Upstream Impoundment Contaminated Sediment	Fishing advisory due to PCBs. Category 5. (One or more uses impaired.) TMDL needed. EPA approved a PCB TMDL for some of the known pollutants on 3/18/10. Provides habitat for the federally listed fish, snail darter (Percina tanasi) and the following mussels: orange-foot pimpleback pearly mussel (Plethobasus cooperianus) and pink mucket pearly mussel (Lampsilis abrupta).
TN060102010 01T_0100	CRACKER CREEK	Rhea	2.0	Alteration in stream-side or littoral vegetative cover	Pasture Grazing	Category 5. (One or more uses impaired.) TMDL needed.
TN060102010 01T_0200	WOLF CREEK	Rhea	2.49	Alteration in stream-side or littoral vegetative cover L Escherichia coli	Pasture Grazing	Category 5. (One or more uses impaired.) TMDL needed. EPA approved pathogens TMDL that addresses some of the known pollutants on 8/15/14.
TN060102010 09_1000	RILEY CREEK	Roane	22.8	Loss of biological integrity due to siltation L Alteration in stream-side or littoral vegetative cover L Escherichia coli	Pasture Grazing	Category 5. (One or more uses impaired.) TMDL needed.
TN060102010 11_1000	PAINT ROCK CREEK	Roane Loudon	12.2	Escherichia coli	Pasture Grazing	Category 4a. EPA approved a pathogen TMDL for the known pollutant on 8/15/14. .
TN060102010 13_0100	MUD CREEK	McMinn Monroe	7.2	Escherichia coli	Pasture Grazing	Category 4a. EPA approved a pathogen TMDL for the known pollutant on 8/15/14.
TN060102010 13_0200	GREASY BRANCH	Loudon Monroe	7.3	Escherichia coli	Pasture Grazing	Category 4a. EPA approved a pathogen TMDL for the known pollutant on 8/15/14.
TN060102010 13_1000	POND CREEK	Loudon Monroe	13.57	Escherichia coli	Pasture Grazing Unrestricted Cattle Access	Category 4a. EPA approved a pathogen TMDL for the known pollutant on 8/15/14.

Waterbody ID	Impacted Waterbody	County	Miles/Acres Impaired	CAUSE	Pollutant Source	COMMENTS
TN060102010 13_2000	POND CREEK	Loudon Monroe	4.18	Loss of biological integrity due to siltation Alteration in stream-side or littoral vegetative cover Total Phosphorus Nitrate+Nitrite Escherichia coli	Pasture Grazing Unrestricted Cattle Access	Category 5. (One or more uses impaired.) TMDLs needed. EPA approved a pathogen TMDL for some of the known pollutants on 8/15/14.
TN060102010 15_0100	BACON CREEK	Loudon Monroe	10.2	Nitrate+Nitrite Alteration in stream-side or littoral vegetative cover Loss of biological integrity due to siltation Physical Substrate Habitat Alteration Escherichia coli	Pasture Grazing Animal Feeding Operations (NPS) Channelization	Category 5. (One or more uses impaired.) TMDLs needed. EPA approved a pathogen TMDL for some of the known pollutants on 8/15/14.
TN060102010 15_1000	SWEETWATER CREEK	Loudon	7.75	Escherichia coli	Pasture Grazing Animal Feeding Operation (NPS)	Category 4a. EPA approved a pathogen TMDL for the known pollutant on 8/15/14.
TN060102010 15_3000	SWEETWATER CREEK	McMinn Monroe	8.68	Loss of biological integrity due to siltation Alteration in stream-side or littoral vegetative cover Escherichia coli	Urbanized High Density Area Pasture Grazing	Category 4a. EPA approved pathogen and siltation/habitat TMDLs for the known pollutants on 8/15/14 and 4/19/07.
TN060102010 20_1000	FORT LOUDOUN RESERVOIR	Knox Loudon	14066 ac	PCBs	Contaminated Sediment	Fishing advisory due to PCBs. Category 4a. EPA approved a PCB TMDL for the known pollutant on 3/3/10.
TN060102010 20_2000	FORT LOUDOUN RESERVOIR	Knox	534 ac	Mercury PCBs	Atmospheric Deposition Contaminated Sediment	Fishing advisory due to mercury and PCBs. Category 5. (One or more uses impaired.) TMDL needed.
TN060102010 32_0700	DRY BRANCH	Blount	3.31	Escherichia coli	Pasture Grazing	Category 5. (One or more uses impaired.) TMDL needed.
TN060102010 32_0800	SHORT CREEK	Blount	10.7	Nitrate+Nitrite Alteration in stream-side or littoral vegetative cover Loss of biological integrity due to siltation	Channelization Undetermined Source	Category 5. (One or more uses impaired.) TMDLs needed. EPA approved a pathogen TMDL that addresses some of the known pollutants on 11/21/05.

Waterbody ID	Impacted Waterbody	County	Miles/Acres Impaired	CAUSE	Pollutant Source	COMMENTS
				Escherichia coli		
TN060102010 32_0820	TIPTON BRANCH	Blount	2.5	Alteration in stream-side or littoral vegetative cover Loss of biological integrity due to siltation	Upstream Impoundments	Category 4a. EPA approved a siltation/habitat TMDL that addresses some of the known pollutants on 2/1/06. (This segment was identified as _0810 in TMDL.)
TN060102010 33_0100	LITTLE ELLEJOY CREEK	Blount	14.7	Nitrate+Nitrite Alteration in stream-side or littoral vegetative cover Loss of biological integrity due to siltation Escherichia coli	Pasture Grazing	Category 5. (One or more uses impaired.) TMDLs needed. EPA approved a pathogen TMDL that addresses some of the known pollutants on 11/21/05.
TN060102010 33_0200	PITNER CREEK	Blount	13.5	Escherichia coli	Pasture Grazing	Category 4a. EPA approved a pathogen TMDL that addresses the known pollutant on 11/21/05.
TN060102010 33_1000	ELLEJOY CREEK	Blount	14.78	Escherichia coli	Pasture Grazing	Category 4a. EPA approved a pathogen TMDL that addresses known pollutant on 11/21/05.
TN060102010 33_2000	ELLEJOY CREEK	Blount	5.37	Alteration in stream-side or littoral vegetative cover Loss of biological integrity due to siltation Escherichia coli	Pasture Grazing	Category 4a. EPA approved siltation/habitat alteration and pathogen TMDLs that address some of the known pollutants on 2/1/06 and 11/21/05.
TN060102010 34_0200	WILDWOOD BRANCH	Blount	6.26	Escherichia coli	Pasture Grazing	Category 4a. EPA has approved pathogen TMDLs that address the known pollutants on 11/21/05.
TN060102010 34_1000	NAILS CREEK	Blount Sevier	24.5	Escherichia coli	Pasture Grazing	Category 4a. EPA approved a pathogen TMDL that addresses the known pollutant 11/21/05.
TN060102010 37_1000	LITTLE TURKEY CREEK	Knox	14.0	Loss of biological integrity due to siltation	Discharges from MS4 area	Category 4a. EPA has approved a siltation TMDL that addresses the known pollutant on 2/1/06.
TN060102010 38_1000	TOWN CREEK	Loudon	12.9	Loss of biological integrity due to siltation	Discharges from MS4 area	Category 5. (One or more uses impaired.) TMDL needed. EPA

Waterbody ID	Impacted Waterbody	County	Miles/Acres Impaired	CAUSE	Pollutant Source	COMMENTS
				Escherichia coli		approved a pathogen TMDL for some of the known pollutants on 8/15/2014.
TN060102010 40_0600	BLACK CREEK	Roane	16.7	Total Phosphorus Physical Substrate Habitat Alterations Escherichia coli	Municipal Point Source Urbanized High Density Area Pasture Grazing Collection System Failure Channelization	Category 5. (One or more uses impaired.) TMDLs needed.
TN060102010 41_2000	PINEY CREEK	Rhea	12.8	Loss of biological integrity due to siltation	Nonirrigated Crop Production	Category 5. (One or more uses impaired.) TMDL needed.
TN060102010 64_1000	STAMP CREEK	Roane	13.4	Escherichia coli	Pasture Grazing	Category 5. (One or more uses impaired.) TMDL needed.
TN060102010 65_1000	STEEKEE CREEK	Loudon	11.0	Escherichia coli	Pasture Grazing	Category 4a. TMDL approved a pathogen TMDL on 08/15/2014.
TN060102010 83_1000	FLOYD CREEK	Loudon Blount	7.7	Loss of biological integrity due to siltation Escherichia coli	Pasture Grazing	Category 4a. EPA approved siltation and pathogen TMDLs for the known pollutants on 1/26/06.
TN060102010 87_1000	HINES CREEK	Loudon Roane	20.3	Loss of biological integrity due to siltation Escherichia coli	Pasture Grazing	Category 5. (One or more uses impaired.) TMDL needed. EPA approved a pathogen TMDL for some of the known pollutants on 08/15/2014.
TN060102011 015_1000	CLOYD CREEK	Loudon	11.3	Escherichia coli	Pasture Grazing Unrestricted Cattle Access	Category 4a. EPA approved a pathogen TMDL that addresses pathogens on 8/3/05.
TN060102011 149_1000	POLECAT CREEK	Loudon	13.1	Nitrate+Nitrite Loss of biological integrity due to siltation Escherichia coli	Pasture Grazing	Category 5. (One or more uses impaired.) TMDLs needed.
TN060102014 62_0100	LAUREL FORD BRANCH	Rhea	1.75	Escherichia coli	Pasture Grazing	Category 5. (One or more uses impaired.) Impaired. TMDL needed.
TN060102014 62_1000	TOWN CREEK	Rhea	7.7	Escherichia coli	Pasture Grazing	Category 5. (One or more uses impaired.) Impaired. TMDL needed.

Waterbody ID	Impacted Waterbody	County	Miles/Acres Impaired	CAUSE	Pollutant Source	COMMENTS
TN060102015 26_1000	MUDDY CREEK	Rhea	7.0	Loss of biological integrity due to siltation Escherichia coli	Pasture Grazing	Category 5. (One or more uses impaired.) Impaired. TMDLs needed.
TN060102016 20_1000	CARDIFF CREEK	Roane	3.8	Chrome, hexavalent pH	CERCLA site	Category 5. (One or more uses impaired.) TMDLs needed. Category 4b for Hexavalent Chromium. A TMDL would not be helpful at the CERCLA ROD is the enforceable control strategy. Hexavalent chrome levels exceed acute criteria in this stream.
TN060102016 21_1000	CANEY CREEK	Roane	18.2	Physical Substrate Habitat Alteration Loss of biological integrity due to siltation Escherichia coli	Pasture Grazing Collection System Failure	Category 5. (One or more uses impaired.) TMDLs needed. EPA has approved a pathogen TMDL on 08/15/2014.
TN060102070 16 – 1000	HINDS CREEK	Anderson	6.7	Siltation Riparian Alteration	Pasture Grazing	Hinds Creek was listed for siltation and riparian alteration following a 1999 biorecon that scored poorly (7). A follow-up SQSH in 2003 also failed with a SQSH score of 28. In 2008, Hinds Creek attained the passing score of 32. Staff biologists wanted to see the stream pass another cycle. In 2010 and 2014, TVA biorecons scored 13. Also in 2014, a TDEC SQSH at mile 0.7 (Brushy Valley Road) documented 11 EPT genera and 33 total genera for a TMI score of 36. Since the stream has passed biological tests since 2008, criteria are being met. The stream will need to remain listed for E. coli. Some NRCS BMP installation in the watershed.

Waterbody ID	Impacted Waterbody	County	Miles/Acres Impaired	CAUSE	Pollutant Source	COMMENTS
TN06010207 020 – 0400	INDIAN CREEK	Roane	6.8	Siltation Riparian Alteration	Channelization Pasture Grazing	Indian Creek was listed for siltation and riparian alteration following a 1999 biorecon that scored poorly (7). A follow-up biorecon in 2003 also failed badly with a score of 3. In 2009, a SQSH on Hinds Creek received the score of 28. In 2013, a TDEC SQSH at mile 2.4 (Ford past Archie Raby Bridge) documented 11 EPT genera and 31 total genera for the excellent TMI score of 38. There have been a number of BMPs installed in this watershed.
TN06010208 001_1000	WATTS BAR RESERVOIR, EMORY RIVER ARM	Roane	283.36 ac	Mercury PCBs Chlordane	Industrial Point Source Atmospheric Deposition Contaminated Sediments	Fishing advisory. Category 5. (One or more uses impaired.) TMDL needed. EPA approved PCB and chlordane TMDLs that address some of the known pollutants on 3/18/10. (This segment was included in _1000 in TMDL.)
TN06010208 001_2000	WATTS BAR RESERVOIR, EMORY RIVER ARM	Roane	454.98 ac	Mercury PCBs Chlordane	Atmospheric Deposition Contaminated Sediments	Fishing advisory is due to PCBs. Category 5. (One or more uses impaired.) TMDL needed. EPA approved PCB and chlordane TMDLs that address some of the known pollutants on 3/18/10. (This segment was included in _1000 in TMDL.)
TN06010208 001_3000	WATTS BAR RESERVOIR, EMORY RIVER ARM	Roane	362.64 ac	Mercury PCBs Chlordane	Atmospheric Deposition Contaminated Sediments	Fishing advisory. Category 5. (One or more uses impaired.) TMDL needed. Approved chlordane and PCB TMDLs address some of the known pollutants on 3/18/10. (This segment was included in _1000 in TMDL.)
TN06010208	EMORY RIVER	Roane Morgan	13.93	Mercury	Atmospheric	Fishing advisory. Category 5.

Waterbody ID	Impacted Waterbody	County	Miles/Acres Impaired	CAUSE	Pollutant Source	COMMENTS
001_4000					Deposition	One or more uses impaired.) TMDL needed.
TN060102080004_0100	MUD CREEK	Morgan	5.4	Alteration in stream-side or littoral vegetative cover	Pasture Grazing	Category 4a. EPA approved a habitat alteration TMDL that addresses the known pollutant on 07/31/06.
TN060102080004_0200	FLAT FORK	Morgan	3.7	Nitrate+Nitrite Physical Substrate Habitat Alterations Loss of biological integrity due to siltation	Pasture Grazing Channelization	Category 5. (One or more uses impaired.) TMDL needed. EPA approved a siltation/habitat alteration TMDL that addresses some of the known pollutants on 7/31/06. **TMDL Vision Priority Watershed**
TN060102080004_0400	SUMMERS BRANCH	Morgan	5.0	Loss of biological integrity due to siltation	Abandoned Mining	Category 4a. EPA approved a siltation/habitat TMDL that addresses the known pollutants on 7/31/06.
TN060102080004_1000	CROOKED FORK	Morgan	6.9	Nitrate+Nitrite Low Dissolved Oxygen	Municipal Point Source Pasture Grazing	Category 5. (One or more uses impaired.) TMDLS needed. **TMDL Vision Priority Watershed**
TN060102080004_2000	CROOKED FORK	Morgan	16.7	Physical Substrate Habitat Alterations Loss of biological integrity due to siltation	Abandoned Mining Channelization	Category 4a. EPA approved a siltation/habitat TMDL that addresses the known pollutants on 7/31/06.
TN060102080007_0210	SCANTLING BRANCH	Cumberland	1.98	Low Dissolved Oxygen Flow Alteration	Upstream Impoundment	Category 5. (One or more uses impaired.) TMDL needed. Flow alteration is 4c (Impairment not caused by a pollutant.)
TN060102080007_2000	OBED RIVER	Morgan Cumberland	15.4	Total Phosphorus Nitrate+Nitrite	Municipal Point Source Discharges from MS4 area Pasture Grazing	Category 5. (One or more uses impaired.) TMDLS needed. Outstanding National Resource Water and National Wild and Scenic River now impacted by excessive nutrients from Crossville area. Provides habitat for the listed Tangerine darter (Percina aurantiaca) and Spotfin chub (Cyprinella monacha).
TN060102080	CLEAR CREEK	Morgan	1.41	Oil	Petroleum	Category 5. (One or more uses

Waterbody ID	Impacted Waterbody	County	Miles/Acres Impaired	CAUSE	Pollutant Source	COMMENTS
008_2000					Activities	impaired.) TMDL needed. Provides habitat for the listed Spotfin chub (Cyprinella monacha) and Tangerine darter (Percina aurantiaca). Oil spill in this section of the Obed National Wild and Scenic River.
TN060102080 13_0200	LITTLE OBED RIVER	Cumberland	7.96	Total Phosphorus Nitrate+Nitrite Loss of biological integrity due to siltation Escherichia coli	Discharges from MS4 area Collection System Failure	Category 5. (One or more uses impaired.) TMDLS needed
TN060102080 13_0400	DROWNING CREEK	Cumberland	13.1	Loss of biological integrity due to siltation	Pasture Grazing	Category 4a. EPA approved a siltation TMDL that addresses the known pollutants on 7/31/06.
TN060102080 13_0420	COPELAND CREEK	Cumberland	20.4	Loss of biological integrity due to siltation	Pasture Grazing	Category 5. (One or more uses impaired.) TMDLs needed. .
TN060102080 13_1000	OBED RIVER	Cumberland	14.5	Nitrate+Nitrite Total Phosphorus	Municipal Point Source Discharges from MS4 area	Category 5. (One or more uses impaired.) TMDLS needed. Federally-listed species have been documented downstream of this section, in the Wild and Scenic River section.
TN060102080 13_2000	OBED RIVER	Cumberland	1.48	Flow Alteration Physical Substrate Habitat Alterations	Discharges from MS4 area Upstream Impoundment	Category 4a. Flow alteration is 4c (Impairment not caused by a pollutant). EPA approved a habitat alteration TMDL that addresses the known pollutant on 7/31/06. Below Lake Holiday near Crossville.
TN060102080 15_0600	LICK CREEK	Cumberland	12.5	Low Dissolved Oxygen Flow Alteration	Upstream Impoundment	Category 5. (One or more uses impaired.) TMDL needed. Flow alteration is 4c (Impairment not caused by a pollutant).
TN060102080 15_0610	LONG BRANCH	Cumberland	2.2	Loss of biological integrity due to siltation Flow Alterations	Sand/Gravel/Rock Mining Upstream Impoundment	Category 4a. EPA approved a siltation TMDL that addresses the known pollutant on 7/31/06. (This segment was identified as _0510 in TMDL.) Flow alteration is 4c (Impairment not

Waterbody ID	Impacted Waterbody	County	Miles/Acres Impaired	CAUSE	Pollutant Source	COMMENTS
						caused by a pollutant).
TN060102080150900	BYRD CREEK	Cumberland	32.01	Low Dissolved Oxygen	Upstream Impoundment	Category 5. (One or more uses impaired.) TMDL needed.
TN060102080150930	ONE MILE CREEK	Cumberland	8.5	Loss of biological integrity due to siltation Escherichia coli	Land Development Collection System Failure	Category 5. (One or more uses impaired.) TMDL needed. EPA approved a siltation TMDL that addresses some of the known pollutants on 7/31/06. (This segment was identified as _0810 in TMDL.)
TN060102080151111	BAGWELL BRANCH	Cumberland	3.32	Flow Alteration	Upstream Impoundment	Category 4c. (Impairment not caused by a pollutant.)
TN060102080151150	NORTH CREEK	Cumberland	1.83	Flow Alteration	Upstream Impoundment	Category 4c. (Impairment not caused by a pollutant)
TN060102080151410	BLACK GUM BRANCH	Cumberland	1.41	Flow Alteration	Upstream Impoundment	Category 4c. (Impairment not caused by a pollutant.)
TN060102080200100	SMITH BRANCH	Morgan	5.4	pH	Abandoned Mines	Category 4a. EPA approved a pH TMDL that addresses the known pollutant on 12/17/01.
TN060102080200400	GOLLIHER CREEK	Morgan	5.6	Aluminum Manganese Iron pH	Abandoned Mines	Category 5. (One or more uses impaired.) TMDL needed. EPA approved pH, manganese and iron TMDLs that address some of the known pollutants on 12/17/01.
TN060102080200500	FAGAN MILL CREEK	Morgan	2.6	Aluminum Manganese pH	Abandoned Mines	Category 5. (One or more uses impaired.) TMDL needed. EPA approved pH and manganese TMDLs that address some of the known pollutants on 12/17/01.

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