

CHAPTER 2 - RESOURCE MANAGEMENT PROGRAMS

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

2.1. Biological Resources Management

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

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

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

2.1.1. Sensitive Biological Resources Management

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

Threatened and Endangered Species Program

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

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

Table 2-1. Summary of Biological Resources Management Programs

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

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

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

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

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

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

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

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

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

¹Federally listed as endangered or threatened

²State-listed as endangered or threatened

³Formerly federally listed as threatened, protected under Bald and Golden Eagle Protection Act

Wetlands Management

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

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

Sensitive Resources Data Management

TVA maintains two databases to assist in its management of sensitive resources.

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

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

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

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

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

Natural Areas Management

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

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

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

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

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

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

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

Conservation Planning

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

Migratory Bird Management

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

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

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

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

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

2.1.2. Terrestrial Habitat Management

Terrestrial habitat management programs and activities are described below.

Grasslands and Agricultural Lands Management

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

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

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

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

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

Dewatering Projects Management

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

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

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

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

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

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

Forest Resource Management

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

Forest Access Roads and Parking Areas

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

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

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

Forest Resource Protection

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

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

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

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

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

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

Forest Vegetation Management

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Watershed Protection and Other Public Benefits

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

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

Nonnative Invasive Plant Management

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Nuisance Animal Control

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

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

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

Examples of impacts from nuisance animals include:

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

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

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

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

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

Terrestrial Greenhouse Gas Sequestration Management

Carbon sequestration is the capture and storage of carbon dioxide (CO₂) that would otherwise be emitted to or remains in the atmosphere. Terrestrial carbon sequestration is carbon stored in the biomass created by perennial vegetations such as root systems and tree trunks. Transformation of atmospheric carbon into a fixed state largely occurs through forest management activities such as planting trees and perennial grasses. These projects result in sequestration of emissions that, if achieved by a specific protocol, could earn a CO₂ reduction credit applicable toward a future mandatory CO₂ cap-and-trade program (described below).

Mandatory reductions of GHGs, mainly CO₂, may be required for the electricity sector. These reduction requirements may be in the form of a cap-and-trade program, which is a market-based approach of achieving emissions reductions. At the essence of the program are emissions caps and the distribution of allowances equal to the cap. An allowance authorizes the release of a specific amount of the regulated emission(s). CO₂ reduction credits, as discussed above, are expected to be equivalent to an allowance and would be applicable toward a compliance program. As such, TVA would review options to acquire CO₂ reduction credits by implementing emission-reduction projects either on TVA land or through bilateral contracts on land owned by others. Another option would be to consider purchasing credits from a market. The types of terrestrial carbon sequestration projects that TVA would consider are as follows:

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

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

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

- Soil and/or above ground measurement techniques

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

Wildlife Habitat Council – Third-Party Certifications

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

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

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

Wildlife Habitat Enhancement Partnerships

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

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

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

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

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

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

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

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

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

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

2.1.3. Land Management and Stewardship

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

Boundary Maintenance

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

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

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

Land Conditions Assessment and Land Stewardship Maintenance

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

2.1.4. Public Outreach Programs

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

Resource Stewardship Campaigns

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

2.1.5. Dispersed Recreation Management

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

Dispersed Recreation Assessments

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

Dispersed Recreation Improvements

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

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

Dispersed Recreation Key Opportunities

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

Table 2-5. Activities Associated With Dispersed Recreation Improvements

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

Dispersed Recreation Management Plans

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

Dispersed Recreation User Surveys

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

Dispersed Recreation Regulations

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

Dispersed Recreation Outdoor Clinics

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

Leave No Trace

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

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

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

Trails Management

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

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

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

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

2.2. Cultural Resources Management

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

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

Table 2-6. Summary of Cultural Resources Management Programs

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

Archaeological Monitoring and Protection Program

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

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

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

Archaeological Resources Protection Act Program

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

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

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

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

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

Native American Consultation

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

Native American Graves Protection and Repatriation Act

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

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

National Historic Preservation Act Section 106

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

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

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

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

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

Preservation Program

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

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

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

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

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

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

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

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

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

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

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

Preserve America

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

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

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

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

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

Cultural Resources Partnerships

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

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

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

Archaeological Outreach (Thousand Eyes Program)

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

Corporate History Program

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

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

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

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

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

2.3. Recreation Management

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

Table 2-7. Summary of Recreation Management Programs

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

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

2.3.1. Campground Management

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

2.3.2. Day Use Areas Management

Day Use Areas

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

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

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

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

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

Greenways

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

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

Stream Access Sites

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

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

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

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

2.3.3. Public Outreach Programs

Annual Tours

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

Tennessee Valley Camp-Right Campground Program

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

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

Recreation Information Management

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

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

Recreation Management Regulations

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

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

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

2.3.4. Recreation Assessment and Design Tools

Boating Capacity Studies

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

Boating Density Assessments

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

Reservoir Lands Recreation Inventory Management

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

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

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

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

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

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

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

Visitor Assessments

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

Recreation Design Principles

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

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

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

Recreation Planning, Assistance, and Technical Support

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

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

2.4. Reservoir Lands Planning

2.4.1. Reservoir Lands Planning Methodologies

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

Forecast System

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

Multiple Use Tract Allocations

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

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

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

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

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

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

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

Single Use Parcel Allocations

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

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

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

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

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

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

Rapid Lands Assessment

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

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

Comprehensive Valleywide Land Plan

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

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

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

*Not applicable.

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

Table 2-10. Comprehensive Valleywide Land Plan Allocation Baseline

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

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

Note: Zone 1 – Non-TVA Shoreland is not represented because the parcels are private land (on which TVA owns flowage rights) and will not change as a result of the land planning process. Figures in this table have been rounded to the nearest whole number.

*Includes narrow strip of TVA-retained land along shoreline; acreage not calculated.

**Includes TVA lands only. Tims Ford Reservoir contains an additional 67 acres allocated to Zone 8 or a conservation partnership. The allocation of public lands to Zone 8 has been discontinued. However, TVA would continue to manage lands allocated to Zone 8 per Agency policy.

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

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

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

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

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

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

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

2.4.2. Property Administration

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

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

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

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

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

2.5. Water Resource Management

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

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

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

2.5.1. Aquatic Monitoring and Management

Aquatic Ecology Management

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

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

Stream and Tailwater Monitoring

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

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

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

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

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

Climate Change Sentinel Monitoring

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

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

2.5.2. Partnership Programs

Case Studies / Research Initiatives

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

Strategic Partnership Planning

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

2.5.3. Public Outreach Programs

Tennessee Valley Clean Marina Initiative

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

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

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

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

Water Efficiency Program

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

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

Water Resource Outreach Campaigns

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

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

Quality Growth Program

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

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

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

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

2.5.4. Water Resource Improvement Programs

Reservoir Shoreline Stabilization / Riparian Management

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

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

Targeted Watershed Initiatives

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

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

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

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

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

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

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

Current goals of the TWI program are as follows:

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

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

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

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

Water Resource Grant Program

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

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

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

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

Nutrient Source - Watershed Identification and Improvement

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

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

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

2.5.5. National Water Resource Recovery Programs

Northern Gulf of Mexico / Mississippi River Basin Nutrient Load Reductions

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

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

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

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

2.5.6. Water Resource Improvement Tools

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

Access Controls and Lands Protection

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

Agricultural Assistance

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

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

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

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

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

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

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

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

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

Construction and Maintenance of Access Roads and Parking Areas

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

Mine Land Reclamation

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

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

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

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

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

Urban Storm Water Assistance

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

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

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

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

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

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

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

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

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

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

Runoff Retention and Detention

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Stream and Riparian Management and Restoration

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

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

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

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

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

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

Wetlands Restoration, Creation, and Enhancement

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

Water Pollutant Trading

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

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

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

Water Resource Communications

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

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

Water Resource Management Assistance

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

Technical Assistance

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

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

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

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

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

Water Resource Organizational Assistance

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

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

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

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

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

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

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

Water Resource Standard Best Management Practices

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

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

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

2.6. Public Engagement

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

Environmental Education Program

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

Volunteer Program

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

Foundation and Trust Fund

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