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APPENDIX A

EXISTING GUIDELINES

MARGINAL STRIP PERMIT GUIDELINES

Description

To be eligible for consideration to receive a permit for a private dock or other water-use facility, the applicant must own private property (or leasehold interest in private land with sufficient tenure to cover the normal useful life of the proposed facility) that directly adjoins TVA marginal strip land at the proposed mooring location. Marginal strip land is defined as public shoreland owned by TVA and encumbered with deeded or implied rights (Provisions 10a, 13, 13a, 23, and 23a in the TVA Register of Deed Provisions) held by adjacent property owners qualifying them to construct docks and other private water-use facilities upon receipt of TVA's written approval of plans. Examples of these rights are listed below:

Deeded Right

. . . the right to construct, operate, and maintain, at locations and in accordance with plans approved in advance by TVA, water-use facilities on and over the adjoining land lying between the maximum shoreline contour elevation and the adjacent waters of the lake. . . .

Implied Right

. . . will not construct or maintain any building or other structures except water-use facilities constructed in accordance with plans approved by TVA. . . .

. . . ingress to and egress from the water. . . .

A neighboring landowner who owns these landrights may submit an application for TVA's approval of plans for private water-use facilities and other shoreline alterations included in the attached private facility guidelines.

NOTE: TVA, in cooperation with the Tellico Reservoir Development Agency, has developed guidelines for permitting of private water-use facilities on Tellico Lake. These guidelines are defined in Contract No. TV-60000A between TVA and Tellico Reservoir Development Agency.

To obtain a permit for private use of encumbered public shoreline (marginal strip), neighboring landowners with the necessary (deeded or implied) landrights must agree to abide by the standards and requirements contained in the attached guidelines as well as other conditions embodied in: (1) TVA's Section 26a regulations, (2) nationwide and general permits issued by the USACE for TVA lakes, and (3) specific conditions attached to the TVA permit.

How and Where Applied

These marginal strip guidelines are applied by the Land Management Offices (LMOs) in reviewing applications to place private water-use facilities on public shoreland owned and managed by TVA. Proposals involving earth disturbance are coordinated with the cultural resources specialist. Applications that might impact wetlands or threatened or endangered species are coordinated with the LMO resource management specialist. Proposals along navigation channels are coordinated with a navigation specialist (except for those actions precleared by TVA's review of subdivision plats or other mapped data).

Approvable marginal strip actions and facilities may require specific environmental decision documentation. The attached guidelines provide information on what level of documentation is required. These marginal strip guidelines are also generally followed in issuing permits for water-based structures on developed shoreline segments on unplanned reservoirs designated as "Reservoir Operations" tracts on TVA's forecast maps. They are also followed in issuing water-use permits on flowage easement land. Landrights possessed by TVA, flood risk data, and other factors

heavily influence decisions about land-based development of flowage easement areas. Therefore, guidelines about land-based development in this section apply only to marginal strip lands.

Enforcement Emphasis

LMOs strive to ensure that all activities on marginal strip lands conform to the attached standards and guidelines. In dealing with unauthorized private structures, facilities, and shoreline alterations, primary enforcement emphasis is generally placed on unauthorized and nonpermittable private activities on TVA multipurpose fee lands and on marginal strip activities that deviate substantially from the attached standards and guidelines.

Rationale

TVA strives to balance public and private use of its shoreline. To meet this goal, TVA adopts and follows guidelines that protect the shoreline from overuse, misuse, and abuse. These guidelines are designed to keep structures to a reasonable size that accommodates normal recreational needs while minimizing impacts to public lands and waters.

TVA GUIDELINES FOR PERMITTING PRIVATE FACILITIES ON MARGINAL STRIP LAND

The Land Management Offices (LMOs) determine exactly what facilities or uses are justified and permissible after examining site conditions, such as topography, vegetation cover, erosion potential, adjacent uses, and resource conditions. The following guidelines should direct LMO decisions. Any unusual circumstances that LMOs believe warrant deviating from these guidelines will be discussed with a land management policy specialist before a team decision is made. Questions about the level of environmental review required should be directed to the environmental policy specialist.

Detailed guidance on processing steps is contained in TVA's instruction manual for informal 26a permits. In addition, this manual defines special permit conditions such as flood risk criteria. In cases where development is proposed in a published floodway, the applicant should be advised to contact local floodplain management officials to obtain any required local permits. Names of local contacts can be obtained from National Flood Insurance Program coordinators in each state.

Private facilities which TVA will consider along marginal strip land have been divided into three categories based on potential for soil disturbance. For those facilities, LMOs initiate an environmental review. The level of environmental review is based on the facility, its location, and its projected environmental impacts on natural resources.

CATEGORY I

Category I actions are those activities that typically involve little or no soil disturbance.

Docks (Piers) and Open Slips

- Only one dock (pier) per abutting property owner of a lot, parcel, or tract.
- The dock (pier) shall be limited to the size determined by TVA to be necessary to meet the applicant's needs for mooring, fishing, and other water-oriented recreational activities, but generally should not exceed 400 square feet of platform area excluding access walkways.
- If needed to accommodate additional boats and if site conditions are suitable for additional moorage, boatslips with no more than two boat wells may be permitted in addition to the dock (pier) provided the decking around the boat well(s) does not exceed 4 feet in width and the water surface area within the boat well(s) does not exceed 700 square feet.
- Maximum length of dock (pier) shall be dependent upon physical characteristics such as topography, water depths, proximity to navigation channel, and placement of existing facilities. Length of dock and walkway(s) shall not exceed 150 feet, and it shall not extend more than one-third the distance from the bank at normal summer pool (NSP) at the proposed location to the opposite shore. A boardwalk or a dock or pier directly abutting the shoreline (generally due to navigation restrictions) shall not occupy more than 40 linear feet of shoreline if constructed parallel to the shore or 20 linear feet of shoreline if constructed perpendicular to the shore.
- Access walkways shall not exceed 6 feet in width.
- Fixed piers should have deck elevations at least one foot above normal summer pool level.
- Toilets, sinks, fish cleaning stations, or other facilities creating discharge into the lake are not permitted.
- Flotation devices for floating structures must be foam blocks, pontoons, or other material commercially manufactured specifically for flotation. Metal or plastic barrels, drums, or other containers that are not made for flotation are prohibited.
- Whenever possible, facilities will be placed at the location that is the shortest possible distance to the shore from the applicant's adjacent private property. It may be necessary, particularly in coves, to angle the facility in front of a neighbor's viewshed.

- In narrow cove situations where available water surface is limited, it may not be possible to accommodate individual docks for each abutting property. In these situations, it may be necessary for neighbors to cooperatively construct community slips at a mutually agreed upon location. In especially constrained cove situations, it may be necessary to permit only one temporary landing dock/fishing pier for shared use by several property owners or to otherwise limit or prohibit facility construction.
- Adverse impacts to public access across land will be avoided.
- The effect of the facilities on the neighboring landowners' ability to install and use water-use facilities will be considered.
- Floating dock platforms should be attached to the shore with a walkway whenever possible. If unattached platforms are permitted, they must be anchored to the bank within 25 feet of the water's edge as the reservoir fluctuates.
- In congested areas it may be necessary to establish special permit conditions requiring dry-docking of floating structures at a specific elevation to prevent these structures from interfering with navigation, boating access, or adjacent structures.

Nonnavigable Houseboats

- The facility must have been located on a TVA reservoir prior to February 15, 1978; have a permit and a TVA-assigned number or proof of construction prior to February 15, 1978, that qualifies for an "after-the-fact" permit and number; and otherwise comply with Sections 1304.201 and 1304.203, 18 C.F.R. No other nonnavigable houseboats can be moored, anchored, or installed on any TVA reservoir.

Navigable Houseboats

- The facility must conform to standards established in Section 1304.201 of TVA's Section 26a regulations.

Water-Based Boathouses/Covered Boatslips

- Boathouses/covered boatslips sited on water must conform to standards established in Sections 1304.108, 1304.204, and 1304.205 of TVA's Section 26a regulations. Boathouses/covered boatslips may have no more than two boat wells; the water surface area occupied by the boat well(s) shall not exceed 700 square feet.

Mooring Buoys/Posts

- Mooring buoys/posts are permitted in association with docks, piers, and waterfront structures in cases where anchorage presents no hazard to navigation. The posts should not extend farther into the lake than the associated waterfront structure. The posts will be high enough to be visible above the 100-year flood elevation.
- Buoys must conform to the Uniform State Waterway Marking System (white buoys with a blue band at the top).

Enclosed Storage Space

- The enclosed storage space shall be used solely for storage of water-use equipment.
- Floor area within the completely enclosed storage space shall not exceed 25 square feet.
- The floor of the enclosed space must be at least one foot above NSP.
- The enclosed space may be located either on land or on an approved dock, pier, or other water-use facility.

Power Lines and Poles

- The facilities must be installed above NSP in such a way that they will not be hazardous to the public or interfere with TVA operations.
- The facilities must be installed solely to serve water-use facilities, and power lines must be aligned with and made part of the water-use facilities.
- All electrical service must be installed with an electrical disconnect located above the structure profile or the flood risk profile, whichever is higher. It must be accessible during flood events.
- Buried electrical lines must be installed with minimal earth disturbance.

Water Supply or Intake Lines

- Aboveground lines must be aligned with approved pathways and water-use facilities and installed in such a manner that it will not be hazardous to health or interfere with TVA operations.
- Buried waterlines must be installed with minimal earth disturbance.

Fences

- Fences crossing the marginal strip will be considered only where outstanding agricultural or fencing rights exist.
- Agricultural fences must have a built-in means for easy crossing by the public.

Temporary Portable Facilities

- Temporary portable facilities, such as picnic tables, benches, and grills, may be permitted.

Vegetation Management

- Clearing of vegetation less than 3 inches in diameter at ground level within a pathway that is 6 feet wide or less is a Category I action. More extensive vegetation management is a Category II action and is typically discouraged.

Walkways, Steps, and Landings

- These facilities must be installed in such a way that they will not restrict pedestrian access across the land by the public. Handrails are permitted only where needed for safety reasons and (such as steep slopes) shall not impede or otherwise restrict public access. If grading is required, these facilities are treated as Category III actions.
- They may not exceed 6 feet in width.

General Conditions

- Especially in cases where the applicant owns or controls a very narrow amount of shoreline or abutting lot frontage (less than 20 feet), the overall width of the facilities permitted along the shore may have to be severely limited to ensure that sufficient space will be available to accommodate other property owners. A community facility may be necessary in these situations.
- Because of the wide variation between normal summer pool on Kentucky Reservoir and the 100-year flood elevation, roofs are not practical on fixed piers or on other fixed structures located within the 100-year floodplain on Kentucky Reservoir.
- In community lot situations where the applicant owns an undivided interest in the lot, all other parties holding an interest in the lot must consent to plans to build and/or moor a boathouse or

houseboat (as defined in TVA's Section 26a regulations) or other water- or land-based facilities along the shared or community water frontage. Permits for community lot development may be issued:

- To an individual for the benefit of all those who own an interest in the lot provided the applicant submits a written statement signed by the other lot owners concurring with the activity proposed in the permit application.
- To a homeowner's association for the benefit of all those who own an interest in the lot provided the application is signed by an officer of the association or a person designated in the bylaws of the association as the association's spokesperson.
- To an individual for the individual's private use provided the application is accompanied by a letter of consent signed by all those who own an interest in the lot.

NOTE: If individual facilities are permitted, care must be exercised to ensure adequate water frontage is available to accommodate facilities for each individual with rights to use the lot. Where community frontage is limited, it may be necessary to limit shoreline development to community slips or some other shared facility.

CATEGORY II

Category II actions typically involve moderate earth disturbance.

Boat Launching Ramps and Marine Railways

- Only one launching ramp or marine railway will be considered for each abutting property owner.
- Marine railways must be designed to allow convenient public access across the facility.
- These facilities will be discouraged if public access exists within five miles of the site.
- Asphalt ramp surfaces are prohibited.

Land-Based Shelters for Storage of Boats and Accessories

- Land-based boat shelters are considered only if the structures are located on land outside the limits of the 100-year floodplain and have no sides and no completely enclosed floor space in excess of 25 square feet. Wire mesh or similar screening is permissible.
- The structure may be used solely for the storage of boating accessories and no more than two vessels.
- Dry-land boathouses or boat garages are not permitted on TVA land.

Driveways

- Only driveways directly serving boat launching ramps shall be considered.

Shoreline Stabilization

- TVA will permit riprap or retaining walls where there is active shoreline erosion as determined by TVA and where other methods are determined by TVA to be impractical or ineffective. When the severity of the erosion and the physical conditions warrant an engineered solution, riprap is preferred over retaining walls unless it is not available or practical to use.

Riprap for Erosion Control and Shoreline Protection

- The riprap material shall be quarry stone or other material deemed by TVA to be equivalent to quarry stone.

- Concrete rubble or other debris salvaged from construction sites may not be used to stabilize shoreline.
- The material shall be placed along the general contour of the bank.
- Site preparation shall be limited to the work necessary to obtain adequate slope and stability of the material.

Retaining Walls for Erosion Control and Shoreline Protection

- The wall shall be constructed of stone, concrete blocks, poured concrete, or other materials acceptable to TVA. Railroad ties, vehicle tires, creosote timbers, and asphalt are not permitted.
- The base of the wall shall not be located more than an average of two horizontal feet lakeward of the existing NSP elevation.
- Retaining walls are not allowed on multipurpose TVA fee property.

Terraces, Covered or Uncovered Patios, and Gazebos

- The applicant is required to evaluate alternatives for placement of these facilities on the adjacent private property and above the 100-year floodplain.
- If justification exists for placement of the facilities on TVA land, the facilities must not have side enclosures (except screen wire or mesh).

CATEGORY III

Category III actions typically result in more extensive soil disturbance.

Fills on Land

- Fills are prohibited within the limits of a published floodway unless compensatory adjustments or other mitigation measures deemed appropriate by a water management specialist are included.
- Fills outside published floodways may be authorized provided
    - They comply with the requirements of Executive Order 11988 (Floodplain Management).
    - They do not alter a contour property boundary.
    - Any lost flood storage capacity is mitigated consistent with TVA's flood control requirements.
- Fills shall be installed solely to eliminate unsafe terrain conditions, to control erosion, or to improve drainage of surface water.
- The disturbed area must be promptly seeded and otherwise stabilized to prevent erosion and nonpoint source pollution.

Boat Channels and Harbors

- Excavation and dredging will be avoided whenever possible.
- The length, width, and depth of approved boat channels shall not exceed the dimensions necessary to reach adequate water depths for navigation of the vessel at the minimum winter pool elevation.
- Only one boat channel or harbor may be considered per abutting property owner.
- The grade of the channel must be adequate to allow drainage of water during lake drawdown periods.

- Recessed boatslips will be considered only within restricted areas identified by a navigation specialist.
- Dredge spoil will be disposed of properly in accordance with local, state, and federal regulations at an inland site outside the limits of the 100-year floodplain and/or floodway.
- Each side of the channel shall have a slope ratio of 3:1.

Grading on TVA Land

- Grading that will result in fill within the limits of a published floodway is prohibited unless compensatory adjustments or other mitigation measures deemed appropriate by a water management specialist are included.
- Other grading may be authorized provided it does not alter a contour property boundary.
- Hay bales, silt fences, or other control measures must be used to minimize erosion and sedimentation.

APPENDIX B

RESPONSES TO REMAINING PUBLIC ISSUES RAISED DURING SCOPING

RESPONSES TO REMAINING PUBLIC ISSUES RAISED DURING SCOPING

This is a summary of issues raised during the scoping process that were not addressed as primary SMI issues. This appendix provides information on each of these issues. When raised as a comment on the DEIS, appropriate responses appear in the comment/response volume.

Fluctuating Water Levels (1.10.1)

Some participants preferred more stable water levels for longer periods of time. Fluctuating water levels were believed to cause shoreline erosion, impede recreational pursuits, and inconvenience private water facility owners.

Response

TVA multipurpose tributary storage reservoirs provide most of the annual flow regulation for the Tennessee River system. Lake levels are low in the winter to provide flood storage space, and then are gradually allowed to fill in the spring as the threat of major floods subsides. These projects typically reach their highest levels around the first of June, just in time for the peak recreation season, and to augment flows for water quality, power generation, and other downstream uses. Late in the summer, the drawdown is accelerated to return the lakes to the winter flood guide level for the next flood season. Smaller tributary lakes typically have lesser annual fluctuations and will vary only a few feet because the reservoirs are too small for seasonal flow regulation. TVA mainstream reservoirs have some storage capacity, and most are operated similar to the tributary storage reservoirs. However, because of their design, the annual fluctuations are much smaller, usually only 6 feet or less. This is mostly due to topography and navigation requirements.

The issue of more stable reservoir levels was addressed in TVA's *Lake Improvement Plan* FEIS (TVA, 1990b). The recommendations were adopted by the TVA Board in February 1991 and are now being implemented. One of the recommendations was to maintain higher lake levels during the summer and this has been included in lake operating policy since 1991. Others, like minimum flow and DO levels of releases, are still being implemented. No system-wide reevaluation has been considered since the original plan is not yet fully functional and has not been evaluated for effectiveness.

TVA provides toll-free telephone lines to give callers 24-hour access to current information on lake levels, streamflows, and water release schedules. Operations staff are also available during normal working hours to answer specific questions about TVA lake operation policy. TVA publishes *TVA River Neighbors*, a quarterly newsletter to keep lake users informed about such topics as seasonal changes in lake levels, special reservoir operations, and environmental issues. TVA also publishes annual watershed reports (formerly *River Pulse* [TVA, 1995a]) on the condition of the Tennessee River system, using colorful graphics to make technical information more understandable.

TVA meets with lake users and conducts public meetings during which suggestions are made for changes to reservoir operations. These requests are reviewed and (consistent with other priority operating purposes) investigated to determine tradeoffs and possible environmental consequences. Where opportunity exists, trial changes may be implemented to gather more data. Individual suggestions are important. Continuous contact through lake-user groups is an effective way to request information about lake operations policy and potential changes.

For more information contact TVA Water Management at (423) 632-6065.

Litter/Trash Prevention and Control (1.10.2)

It was suggested that TVA provide cleanup programs to remove trash/litter along the shoreline and waterways.

Response

TVA shares public concern over the presence of litter and trash on TVA lakes and shorelines and has been actively involved in supporting shoreline cleanup efforts for several years. To help groups effectively plan and implement cleanup campaigns, TVA has developed the manual *Organizing and Conducting a Cleanup on Public Lands and Waterways* (TVA, 1992). This is a free publication which can be obtained by calling (423) 751-3164. In addition, TVA's appropriate Land Management Office can provide planning assistance, including identification of shoreline areas in need of cleanup, and can also provide materials, such as garbage bags and gloves to support cleanup efforts. The following examples highlight the cooperative spirit between TVA and other organizations in cleaning up reservoir shorelines:

- TVA Police on Cherokee Reservoir have worked with the local probation and community service organizations in cleaning up TVA lands.
- TVA's Cherokee/Douglas LMO has worked with the Tennessee Conservation Camp of Hamblen County to present the program *Public Lands/Handle With Care* to 400 fourth-graders over a three-day period. The aim of this program is to sensitize young people to our shared public land stewardship responsibilities.
- TVA has provided equipment and supplies to aid the Wilderness Scouts of America in regular cleanups of North Georgia reservoirs and streams. This nonprofit group has also helped conduct water quality monitoring in this region.
- TVA's Melton Hill and Lenoir City LMOs combined forces and worked with over 50 Cub Scouts to clean up Meigs County Park in Decatur. Not only did this activity accomplish TVA goals, but it reinforced the benefits of working cooperatively.
- A partnership with the Boone Lake Association has been developed which includes TVA support of association activities, including general shoreline cleanup, litter removal from selected TVA-owned shoreline tracts, and removal of derelict structures (i.e., dilapidated docks).

For more information, contact the appropriate TVA Land Management Office *(Table B-1).*

Industrial Development, Commercial Recreation, and Public Recreation Land Use Decisions (1.10.3)

Some people were concerned about the adverse impacts caused by increasing industrial/commercial development. Support for increased commercial recreation was also expressed.

Response

Industrial and commercial lands along reservoir shoreline are identified during the lands planning process (Section 1.4.4). Specific industrial and commercial land use requests are addressed on a case-by-case basis and their potential effects, including cumulative impacts, are appropriately evaluated. For more information contact the appropriate TVA Land Management Office *(Table B-1)*. Cumulative effects from such actions have been addressed in this document.

Table B-1. TVA Land Management Offices and Phone Numbers.		
Land Management Office	**Phone Number**	**Reservoir(s)**
Upper Holston	423-239-2000	Boone Fort Patrick Henry South Holston Watauga Wilbur
Morristown	423-632-3791	Cherokee Douglas
Norris	423-632-1539	Norris
Melton Hill	423-988-2440	Melton Hill Watts Bar
Lenoir City	423-988-2420	Fontana Fort Loudoun Tellico
Murphy	828-837-7395	Apalachia Blue Ridge Chatuge Hiwassee Nottely Ocoee Project
Chickamauga	423-954-3800	Chickamauga Nickajack
Guntersville	256-571-4280	Guntersville
Wheeler	256-386-2560	Normandy Tims Ford Wheeler
Muscle Shoals	256-386-2228	Bear Creek Project Pickwick Wilson
Paris	901-641-2000	Beech River Project Kentucky

Natural Resource Management Along Nonresidential Shoreline (1.10.4)

Some of the public were concerned about current agricultural practices and clearcutting forests along reservoir shoreline. Participants also stated that TVA should provide more hunting opportunities and control nuisance wildlife species on its lands.

Response

TVA manages natural resources (forests and wildlife) on approximately 150,000 acres of property (excluding LBL). A wide array of management techniques are used to achieve TVA's goals of diverse, healthy, and productive natural resources. These techniques range from protecting resources from invasive species and other agents (i.e., kudzu, privet, fire, unauthorized grazing, and dumping) to thinning and regeneration of forests. In general, TVA regenerates less than one-tenth of 1 percent of its forested lands in a given year. In all cases, steps are taken to protect water quality and other resources during forestry operations. Land management activities are appropriately reviewed under the National Environmental Protection Act.

For shoreline with agricultural licenses, TVA has a comprehensive effort to prevent excessive erosion. In most cases, SMZs have been identified in which mowing and plowing are prohibited. These strips are generally revegetating from natural seed sources. In other (usually more critical) cases, woody vegetation is planted to accelerate stabilization of these buffer strips.

Hunting is generally permitted on TVA land except on dam reservations, developed recreation areas, power plant sites, wildlife refuges, designated natural areas, and posted safety zones. All federal, state, and local laws governing hunting apply on TVA land.

Nuisance animals on TVA lands are usually handled under contract between TVA and the USDA Animal Damage Control. Many state wildlife agencies also contract with USDA for the same services. For more information contact the appropriate TVA Land Management Office *(Table B-1)*.

Aquatic Plant Management (1.10.5)

Some participants called for TVA to control milfoil and other aquatic vegetation.

Response

It is not within the scope of the SMI to define where or how aquatic plants are treated. However, because most herbicide use is along developed shorelines, the alternatives that increase the amount of shoreline open for residential development may increase the demand for aquatic plant control. TVA no longer controls aquatic plants around private and commercial property, although it continues to manage them in public use areas. TVA still provides information and technical assistance to homeowners, governments, and businesses on controlling aquatic plants in an environmentally responsible manner. For additional information regarding aquatic plant control, e-mail TVA for a copy of our a*quatic Plant Handbook*. Several private groups provide aquatic plant control on a fee basis. For additional information regarding licenses or herbicide enforcement, please contact the state

departments of agriculture.

Water-Surface Zoning (1.10.6)

Some participants requested that TVA establish special use zones to accommodate such activities as boating, fishing, skiing, and hunting.

Response

Zoning of water surface areas is a state responsibility. While some Valley states have initiated efforts to zone water surface areas, this is a highly controversial issue that does not appear to have widespread public support. For example, several years ago the state of Alabama considered restricting boating in water discharge areas below dams to alleviate boating safety concerns. Many fishermen objected to potential boating restrictions in these popular fishing spots. As a result, no restrictions on boat access were implemented, although the state did pass a law requiring boaters in these areas to wear personal flotation devices. Kentucky prohibits boating within 100 feet of the turbine discharge below dams.

No-Wake Zones (1.10.7)

Some participants requested that TVA establish no-wake zones to protect the shoreline from erosion due to wave action from motor boats and to increase public safety.

Response

Establishment of no-wake or no-boating zones is a state responsibility. Although boat wakes contribute to shoreline erosion problems in some areas, no-wake or no-boating zones as currently established by the states are related to public safety concerns rather than shoreline erosion or other issues. For example, waters in the immediate vicinity of developed public swimming beaches are often zoned as no-boating areas to protect swimmers. Also, highly congested areas—such as commercial marina harbor limits and public boat ramps—are zoned as no-wake areas to reduce the potential for accidents. Each state provides for enforcement of all boating regulations, including patrol of no-wake and no-boating zones. TVA provides support to the states in the boating safety arena and would also be a willing participant in cooperative efforts to introduce changes that would have a positive impact on shoreline erosion.

Incompatible Recreational Uses (1.10.8)

Some persons were concerned about improper or incompatible recreational uses. The examples mentioned were large, fast-moving watercraft, unregulated informal camping, jet skis, and off-road motor vehicles.

Response

TVA has taken steps to control incompatible water uses around its developed recreation areas by requesting states to designate waters in the immediate vicinity of heavily used swimming beaches and boat ramps as no-boating and no-wake zones, respectively. All Valley states have laws defining proper and safe use of watercraft that apply to waterways within their jurisdiction. Boat operators who do not adhere to boat guidelines or who operate their craft in a reckless manner are subject to arrest and/or fining.

Informal camping and such activities as bank fishing, swimming, picnicking, and walking are permitted on most TVA fee-owned lands. Many undeveloped TVA tracts receive heavy, concentrated public use because of their accessibility, physical characteristics, or other factors. Some of these areas have been subjected to abuse, including dumping of trash and damage to trees, and to inappropriate activities, such as alcohol abuse. TVA has regulations prohibiting these abuses of public land, and enforcement is provided by TVA Police as well as some local law enforcement personnel. In some areas, specific use restrictions have been implemented to control abuse. The restrictions most often applied are prohibiting alcohol, firearms, and night use, including camping. These special restrictions are enforced primarily by TVA Police. In a few instances, road access to TVA land has been physically blocked to control persistent abuse problems.

Public Recreational Facilities (1.10.9)

Some participants asked that TVA provide additional public recreational facilities and improve existing ones.

Response

TVA recreational facilities include boat ramps, day-use areas, stream access sites, trails, and campgrounds that have been developed to help meet public demand for increased recreational use of the river system. TVA recognizes the need for facility expansion and improvements at some of its areas, and efforts to gradually improve these facilities will continue as funds become available.

Public Land Boundaries Marking (1.10.10)

It was noted that TVA should mark its boundaries so that people would know when they were on public land.

Response

TVA conducts limited boundary marking, primarily associated with resolution of encroachments on TVA property. The cost of a more comprehensive program has prevented TVA from routinely marking all boundaries.

Navigation Hazards (1.10.11)

Some respondents were concerned about partially submerged and floating debris and asked that TVA remove and/or mark these hazards.

Response

TVA installs and maintains navigation aids used by recreational boaters on TVA reservoirs (Section 3.17.5). On the Tennessee River system, the crew of TVA's navigation service boat travels the length of the river at least once a year to inspect buoys marking the secondary (recreational) channels, to replace missing buoys, and to reposition buoys that have been moved off station. The U.S. Coast Guard installs and maintains buoys marking the main (commercial) navigation channels on the Tennessee River waterway used by barge tows. TVA marks underwater boat hazards such as submerged islands or large rock outcroppings with standard hazard buoys. Pipe with reflectorized tape is used where water depths are not adequate for buoys.

Tributary reservoirs (most of which are located in the mountainous areas of East Tennessee, North Carolina, and Georgia) are very deep and experience wide fluctuations in water levels between summer pool and winter drawdown for flood storage. Water depths and fluctuations make these reservoirs unsuitable for marking boat channels. However, TVA does install and maintain boat hazard buoys or pipe with reflectorized tape to warn boaters of the most critical underwater hazards. Because of the fluctuation in water levels, which can be as much as 90 feet, it is impossible to mark all underwater hazards that can occur at the varying pool levels. To help boaters navigate the system and determine their location on the reservoirs, TVA has installed and maintains numbered onshore signs or daymarks that reference mile points and correspond to locations shown on TVA navigation maps.

The decision to mark individual underwater hazard areas on TVA reservoirs is based on the nature of the hazard and use of the area. The public can call (423) 632-7156 and (423) 632-7157 to report maintenance needs and potential hazards. Large floating hazards, particularly trees, are common in most of the reservoirs and can be hazardous to boaters. However, equipment and sufficient staff are not available to remove floating trees.

Mosquito Control (1.10.12)

Some persons were concerned about the health hazards posed by mosquitoes and asked that TVA provide more control of these insects.

Response

TVA has operated a mosquito management program since the 1930s. The purpose of this program is to safeguard public health and the well-being of Valley inhabitants by controlling mosquitoes capable of transmitting diseases and causing allergic reactions to humans and animals. Historically, TVA has used an integrated management approach, including water level management, vegetation control, larvicides and adulticides, to control mosquitoes that are produced on TVA lands or a result of TVA activities. However, due to declining revenues and changes in the types of mosquitoes found near TVA reservoirs, TVA has eliminated many of its mosquito control activities including insecticide application.

TVA provides information and technical assistance to help local officials, businesses, homeowners, and other private sector groups control mosquitoes in an environmentally responsible manner. TVA scientists are also investigating alternatives to conventional mosquito control methods to assist homeowners in controlling their own mosquito problems. For more information, e-mail TVA.

Nonresidential Pollution Sources (1.10.13)

Some participants were concerned about and wanted to know what TVA was doing to prevent and control nonresidential sources of pollution (i.e., industrial, agricultural, commercial).

Response

TVA requires those occupying TVA lands, such as commercial marinas and agricultural lands, to comply with pertinent federal, state, and local environmental regulation. All requests for facilities that involve discharge into TVA reservoirs are reviewed carefully for environmental impacts. Recipients of 26a permits must meet all state and federal regulations and have all necessary permits. On TVA-owned agricultural lands, standard conditions are included in license agreements to control pollution. Most existing and all new agricultural license agreements also require establishment and maintenance of a 50-foot buffer of natural vegetation, which helps filter nonpoint source pollutants. In addition, cows are fenced from accessing the reservoir on TVA lands licensed for livestock purposes.

TVA has also formed River Action Teams (RATs) that are involved in a Valleywide effort to improve water quality in the Tennessee River system. Pollution control efforts include demonstrations of waste pump-out systems for marinas using TVA reservoirs. Demonstrations have been put in place on Blue Ridge Reservoir in northern Georgia and on Norris Reservoir in eastern Tennessee. Other projects designed to control or minimize nonpoint source pollution include:

- Installation of streambank stabilization structures.
- Protection and replacement of riparian vegetation.
- Establishment of best management practices (BMPs) on agricultural lands.
- Technical assistance to builders and developers.
- Production of educational materials to help make the public aware of nonpoint source pollution and how to prevent it.

Virtually all of these projects include coalition-building, developing partnerships, and the participation of landowners and the general public.

APPENDIX C

PROPOSED SHORELINE CATEGORIZATION SYSTEM

PROPOSED SHORELINE CATEGORIZATION SYSTEM

Under Alternatives C1, C2, D, or the Blended Alternative, TVA would add a shoreline categorization system to land management plans prepared for each reservoir. Maps would be prepared during the planning process to identify the location of residential shoreland (TVA-owned residential access shoreland and flowage easement shoreland). In addition, the plans would identify protection, mitigation, and management issues that would be taken into account in considering permit requests for docks and other shoreline alterations.

TVA's goal would be to first complete within one year of the SMI Record of Decision an ongoing baseline inventory of resource conditions along TVA-owned residential access shoreland and flowage easement shoreland. This inventory data would be used during individual permit reviews in evaluating the environmental effects of proposed actions. Shoreline inventory data would also be used during the land management planning process to categorize the residential shoreline into at least three categories:

- Shoreline Protection,
- Residential Mitigation,
- Managed Residential.

The **Shoreline Protection** category would be applied to shoreline segments that support sensitive ecological resources, such as federally listed threatened or endangered species, high-priority state-listed species, wetlands with high function and value, and archaeological or historical sites of national significance. It would also be applied to shoreline segments where navigation restrictions, such as safety harbors, exist. Docks and other shoreline development would not be permitted on lands in the Shoreline Protection category.

Shoreline segments where resource conditions or navigation issues would require special analysis of individual development proposals and perhaps specific mitigation measures before a permit decision could be made would be allocated to a **Residential Mitigation** category. This category would also include shoreline segments where additional data (such as an archaeological survey) about resource conditions are needed before a permit decision could be made.

Shorelines where no wetlands, threatened or endangered species, or cultural resources are known to exist would be allocated to a **Managed Residential** category. Shoreline segments with existing permitted residential shoreline alterations would be distinguished from undeveloped segments.

Before issuing permits for shoreline development, TVA would examine shoreline categorization data; take into account any new information about resource conditions on the site; and conduct any needed environmental review of the specific proposal. The shoreline categorization system would improve the protection of sensitive resources, enhance the effectiveness of TVA's permit review process, and help developers plan adjacent subdivisions on private land that are compatible with identified resource conditions on TVA land and shorelines.

APPENDIX D

PROPOSED RESIDENTIAL DEVELOPMENT STANDARDS FOR ALTERNATIVE C1: MANAGED DEVELOPMENT ALONG OPEN SHORELINE AND ADDITIONAL AREAS AND ALTERNATIVE C2: MANAGED DEVELOPMENT ALONG OPEN SHORELINE ONLY

PROPOSED RESIDENTIAL DEVELOPMENT STANDARDS FOR ALTERNATIVE C1: MANAGED DEVELOPMENT ALONG OPEN SHORELINE AND ADDITIONAL AREAS AND ALTERNATIVE C2: MANAGED DEVELOPMENT ALONG OPEN SHORELINE ONLY

NOTE: *Standards for Alternatives C1 and C2 are the same with the following exception: Under Alternative C1, TVA would consider applications for the construction of individual water-use facilities on those shoreline segments presently defined as "open" (38 percent of the shoreline, Valleywide). As a general rule, community/group docks and facilities would normally be required on additional shoreline opened for residential access. Under Alternative C2, consideration of applications for shoreline alterations would be limited to shoreline segments presently defined as open. TVA would replace existing permitting guidelines (see Appendix A) with a comprehensive set of shoreline development standards. These standards are further explained below.*

Access Across TVA-Owned Residential Access Shoreland

- Landowners with property adjoining TVA-owned residential access shoreland could apply for TVA permission to install a 6-foot-wide access path to the water. A 6-foot-wide path would be wide enough for two people to walk side by side. (TVA uses a size standard of 5-foot-wide access paths at its recreational facilities.) Access paths would start at a point along the common property line and end at a point of TVA's choosing along the shoreline. Additionally, the route of the path would be selected by TVA.
- Adjacent property owners with more than 100 feet of frontage along their common boundary with TVA would have the option of applying for expanded use of public lands in the form of a vegetation management corridor, provided that the shoreland outside the corridor would be managed to provide a minimum shoreline management zone (SMZ) depth of 100 feet. (Refer to the following section on vegetation management for a discussion of SMZs.)
- In those situations where TVA's shoreland ownership is less than 100 feet deep, TVA would limit access pathways to 6 feet in width, unless the adjacent property owner agreed to manage enough of his or her property as an SMZ so that the total SMZ depth would equal or exceed 100 feet when combined with the TVA property.
- Allowable corridor widths would be calculated by multiplying the property owner's actual frontage (as measured along the common boundary) by a factor of 0.20. In no instance, however, would the corridor exceed a maximum allowable width of 50 feet. This allowable width would let adjacent homeowners have a more open view of the lake than that provided by the 6-foot pathway. Vegetation thinning would be limited to the defined corridor.
- To help control density of shoreline development and establish SMZs, the vegetation management corridor option would not be available to owners of lots with less than 100 feet of frontage (as measured along the common boundary). These property owners could only apply for a permit to install a 6-foot path to the shoreline.

Vegetation Management

- As undeveloped shorelines located within the TVA-owned residential access shoreland are developed, TVA would protect water quality and preserve visual aesthetic values by maintaining or restoring (as the case might be) a 100-foot (minimum depth) SMZ. The agency would require 100-foot-deep SMZs where TVA land is at least 100 feet deep (Section 3.4.7) from the normal summer pool elevation.
- Where TVA property is less than 100 feet deep (Section 3.4.7), the SMZ would be at least the same depth as the property. For example, if depth of the TVA property equals 65 feet, then the SMZ depth would equal 65 feet. TVA would encourage adjacent property owners to extend the SMZ onto their property so that a total depth of 100 feet could be established and maintained.

- When planting of trees is required to establish an SMZ, native trees would be used.
- Any clearing of vegetation would be confined to the access pathway or vegetation management corridor. Within this area, cutting of trees or other vegetation up to 5 inches in diameter at breast height could be permitted.

Docks and Other Residential Water-Use Facilities

- A maximum allowable footprint of 1,000 square feet would be established for all private water-use facilities (fixed piers, floating docks, boatslips, walkways, etc.). This size standard has been adopted by Duke Power Company in managing shoreline permitting on its reservoirs, as a means of balancing private and public use of the shoreline and in managing the amount of recreational water surface displaced by residential shoreline alterations. Duke Power Company has advised TVA that the majority of waterfront property owners' needs are actually accommodated within a 700-square-foot area. Numerous moorage configurations would be possible within a 1,000-square-foot area. For example, this footprint would accommodate:
    - A 4-by-100-foot walkway; a 20-by-20-foot dock, and a 10-by-20-foot boatslip.
    - A 6-by-100-foot fixed pier and a 16-by-24-foot boatslip.
    - A 4-by-40-foot walkway; a 20-by-20-foot dock; and a 16-by-24-foot boatslip.
- Water-use facilities could not extend more than 150 feet from the shoreline or more than one-third the distance from the originating shoreline to the opposite bank.
- An individual property owner's permitted water-use facilities would have to be clustered in front of the permitted access path/vegetation management corridor.
- To reduce the visual impacts of covered boatslips, no side panels would be allowed, and roofing materials would have to be of a color that blends with the natural surroundings. These standards have been adopted by Cooper Communities on Tellico Reservoir, and they are meeting the boating and recreational needs of homeowners, while also protecting the visual quality of the shoreline.
- To encourage consistency in the design and construction of private water-use facilities, TVA would provide standardized designs for docks, piers, and boatslips. Utilization of these "preapproved" designs would expedite the approval process for proposed water-use facilities. However, property owners would be allowed to use custom designs as long as they conformed to TVA standards.
- Individual boat-launching ramps would be considered only within flowage easement areas. On TVA land, only community water-use facilities would be allowed.
- As a density control measure, TVA would, wherever practical, require that a property owner's facilities be placed at least 50 feet from the neighboring property owner's facilities.
- Floating facilities would be required to use commercially manufactured, encased flotation.

Channel Excavation

- For TVA-owned shorelines, excavation for individual boat channels would be discouraged or approved on a limited basis. No more than 150 cubic yards of material could be removed for individual boat channels. Various channel sizes would be possible. TVA would require installation of fish-spawning structures, if needed to offset channel excavation impacts.
- In every instance, spoil material would have to be removed (immediately) from the channel excavation site and deposited on an environmentally suitable site away from the reservoir, and outside the limits of the 100-year floodplain.
- All execavated materials would be spoiled consistent with TVA flood control requirements and applicable local floodplain regulations.
- Channel excavation would have to be completed by March 1 of each year to ensure that no spoil materials were left on the lake bed.

- Channel excavation would have to be accomplished within two years of the date of issuance of the dredging permit.
- Requirements to install fish habitat structures would be imposed as needed to offset impacts to aquatic habitat or other resources.

Community Facilities

- Reservoir management plans would help define whether individual facilities would be allowed or community facilities would be required. In cases where a portion of the TVA-owned residential access shoreland adjoining a subdivision is in a protected category and the remaining portion does not have sensitive resources present, TVA would consider proposals for community facilities along the remaining shoreline. In these cases, a maximum of one slip space would be allowed for each 100-foot lot, if site conditions were suitable for this amount of development. Community facilities would generally be required in additional areas opened for residential access, unless TVA identifies in the reservoir land management plan that individual facilities are more suitable.

Land-Based Structures

- Land-based structures would not be allowed on TVA-owned residential access shorelands.

Bank Stabilization

- For control of eroding shorelines, TVA would assess shoreline erosion conditions and determine whether vegetative plantings, riprap, retaining walls, or some combination of these treatment methods would be permitted. TVA would require biostabilization (i.e., the use of vegetative plantings to control erosion) wherever technically feasible.

Construction Standards

Construction standards would be imposed for all new water-use facilities. Additionally, a package of preapproved dock designs would be offered as an incentive for selection of standardized formats. The following standards (dock dimensions and configurations, construction materials, roof restrictions, utilities, etc.) would be imposed for construction of new water-use facilities:

- Where floating structures are allowed, all flotation would be encased within commercially manufactured water-impervious materials (e.g., plastic or aluminum). Covered boatslips could not be enclosed or have sides of any kind. No sewer lines would be allowed on TVA land.
- Storage lockers could be located on docks; however, no more than 25 square feet of storage would be allowed on any structure.
- Removable spring/spud poles would be allowed (as necessary) for stabilization, with prior approval by TVA.
- Decking would consist of treated wood, concrete, or other types of durable, water/weather resistant materials.
- A roof would be allowed over boatslips only. Roofing color must blend with natural surroundings.
- Sides would not be allowed on slips.
- Steps and/or swim ladders would be permitted.
- Consistent with applicable local codes, outdoor lighting and electrical outlets would be allowed. At a minimum, however, such connections would have to include cutoffs (i.e., ground fault breakers) located at or above the 500-year flood elevation, or TVA flood risk profile elevation (whichever is applicable). These cutoffs would have to be accessible during flooding.

- Water and electrical connections would be allowed. However, lines must be buried within the width (i.e., 6 feet) of the access pathway, or placed beneath an elevated boardwalk. Where soil disturbance is necessary, additional fees may be required to cover the cost of environmental surveys.
- All development must be consistent with TVA's flood control requirements and applicable local floodplain regulations.

General Use Restrictions

For areas of public land allocated for private use (i.e., through shoreline use agreements), TVA would impose general use restrictions as outlined below:

- Permanent or habitable structures would not be allowed. However, placement of portable picnic tables, swing sets, lawn furniture, etc., would be permissible.
- Outbuildings (storage, utility, etc.), swimming pools, tennis or basketball courts, or other permanent recreation facilities would not be allowed.
- Septic tanks or drain fields would not be allowed.
- Structures and/or physical connections (i.e., porches, decks, patios, etc.) with houses/dwellings would not be allowed.
- Concrete slabs, footers, or poured/masonry patios would not be allowed.
- Satellite dishes, radio antennae, etc., would not be allowed.
- No structures (i.e., tree houses, decks, etc.), including electric wires, outdoor lighting, irrigation/plumbing, etc., could be nailed or otherwise affixed to trees.
- Gardens (vegetable/ornamental) or orchards (fruit/nut) would not be allowed.
- Use of herbicides, pesticides, fertilizers, or lawn chemicals would be strictly prohibited.
- Placement of signs or advertising, other than those installed by TVA, would not be allowed.
- Grazing or stabling of livestock would not be allowed.
- Storage or stockpiling of construction materials, lumber, woodpiles, automobile bodies or parts, or debris (natural or manmade), including brush piles (except where approved for use as fish attractors or wildlife habitat enhancements) would not be allowed.
- No storage of boats, canoes, rafts, jet skis, and other watercraft would be allowed on TVA property. However, watercraft could be moored to approved docks and boatslips.
- Adjacent property owners would not be allowed to remove soil, rock, or woody debris (stumps, snags, etc.) without prior written approval by TVA.
- Where topographically and geographically feasible, the minimum distance between docks would be maintained at 50 feet. All docks, access pathways, etc., located on TVA shorelands would be sited and approved by TVA. Docks and pathways would not be approved along steep shoreline slopes or where other site limitations (e.g., highly erodible soils) exist. (Note: Under these circumstances, water-use facilities may have to be sited at locations other than directly in front of adjacent private lots.)
- Individual docks, pathways, etc., would be sited where shoreline use/development has been approved and consistent with shoreline development standards. Such development would be excluded from segments identified for shoreline protection.

Shorelines Under Flowage Easements

- When developing reservoir land management plans, TVA would evaluate the feasibility of lifting flowage easement restrictions over property lying above the flood risk profile elevation or 500-year floodplain (whichever is applicable) in exchange for fee, or less than fee, interest over lands within the 100-foot buffer.
- Where flowage easements are involved, TVA would permit docks and other private water-use facilities consistent with applicable shoreline development standards.
- Within flowage easement shoreland, uninhabitable land-based structures and facilities would be allowed if:
    - They are not prohibited by the terms of the TVA flowage easement, and
    - They would not adversely affect flood control operations.

APPENDIX E

PROPOSED RESIDENTIAL DEVELOPMENT STANDARDS FOR ALTERNATIVE D: MINIMUM DISTURBANCE ALONG OPEN SHORELINE ONLY

PROPOSED RESIDENTIAL DEVELOPMENT STANDARDS FOR ALTERNATIVE D: MINIMUM DISTURBANCE ALONG OPEN SHORELINE ONLY

NOTE: *TVA would replace existing permitting guidelines (see Appendix A) with a comprehensive set of shoreline development standards. These standards are further explained below.*

Access Across TVA-Owned Residential Access Shoreland

- Property owners adjoining TVA-owned residential access shoreland would be allowed to install an access path up to 6 feet wide.
- TVA would define the route of access pathways to ensure that vegetation removal and aesthetic impacts were appropriately considered, and help reduce the potential for adverse water quality impacts.
- Access paths would be for pedestrian use only.
- Pathways would be surfaced with natural materials (grass, wood, bark chips, gravel, etc.) to eliminate the need for mowing and trimming of vegetation within the pathway.
- Minimal soil disturbance (by prior approval only) would be allowed during installation of pathways. Paths would be installed using hand tools (including chain saws and weed-eaters).
- In lieu of access paths, elevated boardwalks (including steps, etc.) could be permitted. However, such structures would be constructed of treated wood (no metal or poured/masonry footers, etc.). Handrails would be allowed as required for pedestrian safety. No excavations or grade modifications would be allowed for siting and construction of access paths or boardwalks.

Vegetation Management

- As undeveloped shorelines located within TVA-owned residential access shoreland are developed, TVA would maintain or restore (as the case might be) a vegetative SMZ. Because of differences in shoreline ownership patterns, the actual depth of this zone would vary among reservoirs.
- In cases where the depth of TVA's property is less than 100 feet (Section 3.4.7) as measured landward from the normal summer pool elevation, TVA would encourage adjacent property owners to extend the SMZ onto their land to attain a total depth of 100 feet.
- Where TVA ownership extends more than 100 feet deep (Section 3.4.7), the entire depth of shoreland property owned by TVA would be managed as an SMZ.
- When planting of trees is necessary to establish an SMZ, native trees would be used.
- Except as necessary for installation of access paths, no vegetation removal or soil disturbance would be allowed on properties adjacent to the shoreline. Within the access pathway, cutting of trees or other vegetation up to 5 inches in diameter at breast height could be permitted.

Docks and Other Residential Water-Use Facilities

- To influence density of shoreline development, an applicant would be required to own a lot with a minimum of 200 feet of common boundary with TVA in order to qualify for an individual dock. Lots that adjoined TVA-owned residential access shoreland and that were platted prior to implementation of this requirement would be exempt, and the owners could submit applications, regardless of the width of their lot.
- In issuing permits for docks, TVA would strive to maintain a distance of 100 feet between facilities of different property owners.
- Water-based development would be limited to one dock or boatslip per qualifying lot.

- The dock or slip could not have walls, sides, or a roof, and the footprint of the facility could not cover more than 300 square feet of water surface area.
- Floating facilities would be required to have commercially manufactured, encased flotation.
- Boathouses, houseboats, yachts, cabin cruisers, or other boats with live-aboard accommodations would not be permitted to moor along undeveloped open shorelines but could be moored within the TVA-assigned harbor limits of commercial marinas.
- On TVA-owned residential access shorelands, boat-launching ramps would be considered only at community lots where there were no public ramps within a 20-mile radius of the community lot.
- As an incentive for adherence to standardized designs, TVA would offer preapproved, minimal-disturbance dock designs.

Channel Excavation

- Channel excavation would be considered on TVA-owned residential access shoreland only when necessary to accommodate community facilities.
- In every instance where channel excavation is permitted, spoil material would have to be removed (immediately) from the dredge site and deposited on an environmentally suitable site away from the reservoir and outside the limits of the 100-year floodplain.
- All execavated materials would be spoiled consistent with TVA flood control requirements and applicable local floodplain regulations.
- Channel excavation would have to be completed by March 1 of each year to ensure that no spoil materials were left on the lake bed.
- Channel excavation would have to be accomplished within two years of the date of issuance of the dredging permit.
- Requirements to install fish spawning structures would be imposed as needed to offset impacts to aquatic habitat or other resources.

Community Facilities

- Reservoir management plans would help define whether community facilities would be required or individual facilities would be allowed. In cases where a portion of the TVA-owned residential access shoreland adjoining a subdivision is in a protected category and the remaining portion does not have sensitive resources present, TVA would consider proposals for community facilities along the remaining shoreline.
- Community facilities would be limited to a community ramp and courtesy pier where site conditions were suitable.
- No boatslips or permanent moorage would be allowed at community facilities.

Land-Based Structures

- Land-based structures would not be allowed on TVA-owned residential access shorelands.

Bank Stabilization

- For control of eroding shorelines, TVA would assess shoreline erosion conditions and determine whether vegetative plantings, riprap, retaining walls, or some combination of these treatment methods would be permitted. The agency would require use of biostabilization (i.e., vegetative plantings) wherever technically feasible. TVA would develop treatment plans for severely eroded shoreline areas.

Construction Standards

Construction standards would be imposed for all new water-use facilities. Additionally, a package of preapproved, minimal disturbance dock designs would be offered at no charge as an incentive for selection of standardized formats. The following standards (dock dimensions and configurations, construction materials, roof restrictions, utilities, etc.) would be imposed for construction of new water-use facilities:

- Where floating structures are allowed, all flotation would be encased within commercially manufactured water-impervious materials (e.g., plastic or aluminum). Boatslips could not have roofs or side enclosures of any kind. No water intakes, outfalls, or sewer lines would be allowed on TVA land.
- Storage lockers could be located on docks; however, no more than 25 square feet of storage would be allowed on any structure.
- Removable spring/spud poles would be allowed (as necessary) for stabilization, with prior approval by TVA.
- Decking would consist of treated wood, concrete, or other types of durable, water/weather resistant materials.
- Roofs would not be allowed.
- Steps and/or swim ladders would be permitted; however, no diving boards or slides would be allowed.
- Consistent with applicable local codes, outdoor lighting and electrical outlets would be allowed. At a minimum, however, such connections would have to include cutoffs (i.e., ground fault breakers) located at or above the 500-year flood elevation, or TVA flood risk profile elevation (whichever is applicable). These cutoffs would have to be accessible during flooding.
- Water and electrical connections would be allowed. However, lines must be buried within the width (i.e., 6 feet) of the access pathway or placed beneath an elevated boardwalk. Where soil disturbance is required, additional fees may be required to cover the cost of environmental surveys.
- All development would have to be consistent with TVA's flood control requirements and applicable local floodplain regulations.

General Use Restrictions

For areas of public land allocated for private use (i.e., through shoreline use agreements), TVA would impose general use restrictions as outlined below:

- Permanent or habitable structures would not be allowed.
- Placement of portable picnic tables, swing sets, lawn furniture, etc., would not be permissible.
- Aside from elevated walkways, steps, and access paths, no other structures would be allowed on TVA-owned public lands fronting private development.
- Outbuildings (storage, utility, etc.), swimming pools, tennis or basketball courts, or other permanent recreation facilities would not be allowed.
- Septic tanks or drain fields would not be allowed.
- Structures and/or physical connections (i.e., porches, decks, patios, etc.) with houses/dwellings would not be allowed.
- Concrete slabs, footers, or poured/masonry patios would not be allowed.
- Satellite dishes, radio antennae, etc., would not be allowed.

- No structures (i.e., tree houses, decks, etc.), including electric wires, outdoor lighting, irrigation/ plumbing, etc., could be nailed or otherwise affixed to trees.
- Gardens (vegetable/ornamental) or orchards (fruit/nut) would not be allowed.
- Use of herbicides, pesticides, fertilizers, or lawn chemicals would be strictly prohibited.
- Placement of signs or advertising, other than those installed by TVA, would not be allowed.
- Grazing or stabling of livestock would not be allowed.
- Storage or stockpiling of construction materials, lumber, woodpiles, automobile bodies or parts, or debris (natural or manmade), including brush piles (except where approved for use as fish attractors or wildlife habitat enhancements) would not be allowed.
- No storage of boats, canoes, rafts, jet skis, and other watercraft would be allowed on TVA property. However, watercraft could be moored to approved docks and boatslips.
- Adjacent property owners would not be allowed to remove soil, rock, or woody debris (stumps, snags, etc.) without prior written approval by TVA.
- No houseboats (navigable or nonnavigable) would be moored at minimum access docks (i.e., 300 square feet or less). However, other watercraft could be moored to these docks.
- Where topographically and geographically feasible, the minimum distance between docks would be maintained at 100 feet. All docks, access pathways, etc., located on TVA shorelands would be sited and approved by TVA. Docks and pathways would not be approved along steep shoreline slopes or where other site limitations (e.g., highly erodible soils) exist. (Note: Under these circumstances, water-use facilities may have to be sited at locations other than directly in front of adjacent private lots.)
- Individual docks, pathways, etc., would be sited where shoreline use/development has been approved and consistent with shoreline development standards. Such development would be excluded from segments identified for shoreline protection (Appendix C).

Shorelines Under Flowage Easements

- When developing reservoir land management plans, TVA would evaluate the feasibility of lifting flowage easement restrictions over property lying above the TVA flood risk profile elevation or the 500-year floodplain (whichever is applicable) in exchange for fee, or less than fee, interest over lands within the 100-foot buffer.
- Where flowage easements are involved, TVA would permit docks and other private water-use facilities consistent with applicable shoreline development standards.
- Within flowage easement shoreland, uninhabitable land-based structures and facilities would only be allowed if:
    - They were not prohibited by the terms of the TVA flowage easement, and
    - They would not adversely affect flood control operations.

APPENDIX F

PROPOSED RESIDENTIAL DEVELOPMENT STANDARDS FOR THE BLENDED ALTERNATIVE: MAINTAIN AND GAIN PUBLIC SHORELINE

PROPOSED RESIDENTIAL DEVELOPMENT STANDARDS FOR THE BLENDED ALTERNATIVE: MAINTAIN AND GAIN PUBLIC SHORELINE

Shoreline Development Standards

Some of TVA's existing permitting guidelines (Alternatives B1/B2) for vegetation management, docks, erosion control, and other uses would be combined with features of other alternatives. These upgraded standards would promote the use of best management practices for sound stewardship of shoreline resources, while allowing flexibility for a wide range of shoreline uses by adjacent property owners. TVA review and approval of permit requests would be required before construction activities and uses described in the following standards could be initiated. The following standards would be applied in review of permit requests where there are no navigation, flood control, power generation, or sensitive resource concerns. Where special concerns do exist, TVA would work with the applicant to determine if there are options to the proposed action. Existing shoreline alterations (docks, established lawns, retaining walls, etc.) that are either already permitted or that are authorized through issuance of after-the-fact permits under TVA's existing guidelines could continue to be used and would not have to be modified to conform to new standards. The grandfathering provisions applicable to existing facilities and uses are more fully explained in Section 2.8.6.

The following sections define how the standards would apply to vegetation management, water-use facilities, shoreline stabilization, and other shoreline uses of TVA-owned residential access shoreland. A separate section addresses which standards would apply to flowage easement shoreland.

Vegetation Management on TVA-Owned Residential Access Shoreland

The vegetation management standards would conserve the important benefits of existing forests and important understory plants, while allowing some management of vegetation on TVA-owned residential access shoreland. These standards would help to ensure that the following benefits are continued as shoreline development occurs.

- A healthy stand of forested vegetation along the shoreline contributes to the ecology of reservoirs by providing food and habitat for diverse populations of plants and animals.
- Trees and understory vegetation protect water quality by filtering sediments and pollutants from runoff before they reach the lake. Root systems of trees and other shoreline vegetation help bind soil particles together and minimize soil erosion.
- Shoreline vegetation also provides shade and cover for fish and habitat for aquatic invertebrates, which are a source of food for fish.
- Understory vegetation contributes to continued growth and health of the forest.
- Vegetation contributes to shoreline aesthetics.

When an adjacent property owner (applicant) requests TVA's permission for a dock or other shoreline alterations on TVA-owned residential access shoreland, TVA would work with the landowner to ensure that the application includes a plan for management of the vegetation on TVA land. This would not be necessary if an approved vegetation management plan already exists. The plan would meet the following vegetation management standards.

- Clearing of trees and other vegetation would be allowed to create and maintain an access/view corridor that could be up to 20 feet wide. The corridor would extend from the common boundary between TVA and the adjacent landowner to the water at normal summer pool.
- The access/view corridor would be located in a way that minimizes removal of trees or other vegetation with high wildlife value on the TVA land. Grass could be planted and mowed within the access/view corridor, and stone, brick, concrete, mulch or wooden paths, walkways, and/or steps would be allowed.

- A 25-foot SMZ would be retained along the shoreline at locations where TVA owns property that is at least 25 feet deep. The SMZ would begin at the normal summer pool elevation and would extend 25 feet inland. Where TVA ownership is less than 25 feet, the SMZ would only be required on TVA property and would not extend onto private property.
- TVA's goal in establishing the SMZ would be to conserve trees and other woody vegetation to the maximum practical extent. To accomplish this goal, cutting of trees within the SMZ would only be allowed to clear the access/view corridor and to make sites suitable for erosion control projects. If trees are allowed to be removed in preparation for erosion control projects, planting of replacement native trees would be required.
- Within the 25-foot SMZ and elsewhere on TVA land, clearing of some specified understory plants (poison ivy, Japanese honeysuckle, kudzu, and other plants on a list to be prepared by TVA) would be allowed.
- On TVA land situated above the SMZ (more than 25 feet from normal summer pool), selective thinning of trees or other vegetation under 3 inches in diameter at the base would be allowed.
- Pruning of side limbs of trees to enhance the view of the lake would also be allowed within the SMZ and elsewhere on TVA land.
- The forest floor would be left undisturbed except for removal of specified plants and/or planting of native vegetation.
- Planting of native trees, shrubs, wildflowers, and ground covers would be allowed to improve or enhance the vegetative cover. TVA would be available, upon request, to assist applicants in selecting the right plants for the site.
- Vegetation disturbance associated with shoreline stabilization and other shoreline development would be minimized. If removal of trees outside the access/view corridor but within the shoreline management zone is required for bank stabilization projects or other permitted shoreline development, TVA would require replacement with native species.
- Application of fertilizers and herbicides would not be allowed within the shoreline management zone and would be permitted elsewhere on TVA land only in accordance with an approved plan. Herbicides would be limited to those approved by EPA and the appropriate state for use near water. The applicator would have to be licensed by the state and would be required to follow all label requirements.

Docks and Other Water-Use Facilities on TVA-Owned Residential Access Shoreland

Standards for the size and type of docks permitted by TVA help fulfill TVA's responsibility under Section 26a of the TVA Act to promote the unified development and regulation of the Tennessee River and its tributaries. These standards define the maximum size of docks and other water-use facilities that would be approved by TVA. Unless there are sensitive resource concerns; navigation, flood control, or power generation concerns; or physical site constraints (such as a narrow cove), decisions about the size and type of docking facilities to be proposed would be made by the applicant, provided the maximum standards are not exceeded. When site limitations are present and the maximum-size facilities cannot be built, TVA would determine if a smaller individual facility could be approved and, if so, what size. TVA would work with the applicant to explore options.

Adjacent property owners would be responsible for submitting drawings of proposed facilities for TVA review and approval. TVA would make available sample drawings for docks, piers, and boat slips. Property owners could either use these drawings or create their own drawings to reflect personal preferences.

Docks enhance the adjacent property owner's enjoyment of the lake, and they provide cover for fish. However, they can disturb shoreline resources, especially during construction. They also can affect shoreline aesthetics. When built too large, they can obstruct boating traffic. The following dock standards of the Blended Alternative are designed to allow different shapes, sizes, and combinations of facilities.

- A maximum allowable footprint of 1,000 square feet would be established for all residential water-use facilities. The docks, slips, boathouses, and other water-use facilities associated with a particular lot would be contained within a 1,000-square-foot rectangular or square area at the lakeward end of the access walkway that extends from shore to dock. The space occupied by the access walkway would not be included as part of the 1,000-square-foot allowance.
- The length of the water-use facility and access walkway would not exceed 150 feet and would not extend more than one-third the distance from the bank at normal summer pool (NSP) to the opposite shore.
- Either fixed or floating water-use facilities could be permitted (fixed piers, floating docks, and fixed or floating boat slips). All fixed facilities must have deck elevations at least 18 inches above normal summer pool level. On Chickamauga, Watts Bar, Fort Loudoun, and Tellico Reservoirs, decks shall be a minimum of 24 inches above normal summer pool.
- Because of the wide variation between normal summer pool on Kentucky Reservoir and the 100-year flood elevation and the associated likelihood that flood waters could damage boats by forcing them against roofs of fixed structures, roofs are not permitted on fixed boat slips or on other fixed boat storage structures on Kentucky Reservoir. Roofs over docks to provide shaded deck space could be permitted on Kentucky or any other reservoir.
- On other reservoirs, fixed boat slips could have a roof or they could be uncovered. Covered boat slips could have open sides or could be covered with exterior siding to form a boathouse. Covered docks, boat slips, and boathouses would not exceed one story in height. The roof of these facilities could be used as an open deck with a railing, but the roofed area could not be enclosed with siding, screening, or be covered by a second roof.
- Floating facilities would be required to use commercially manufactured flotation. If Styrofoam is used, it must be the commercially manufactured, encased type.
- Access walkways constructed over water and walkways inside boathouses could not exceed 6 feet in width. The access walkway to a dock or other facility must connect from land to dock by the most direct route. When connecting to TVA-owned residential access shoreland, the access walkway would connect to the access/view corridor.
- Enclosed storage space would be allowed only for the storage of water-use equipment. The outside dimensions of the completely enclosed space would not be allowed to exceed 32 square feet, and it must be located on an approved dock, pier, or boathouse, not on TVA land.
- Docks, piers, and boathouses must not contain living space, sleeping areas, or any type of enclosed floor space in excess of 32 square feet. Floor space would not be considered enclosed if three of the four walls were constructed of wire or screen mesh from floor to ceiling, and if the wire or screen mesh left the interior of the structure open to the weather.
- Docks proposed in subdivisions platted after the effective date of the new SMI policy would be constructed at least 50 feet from neighboring docks. When this density requirement could not be met, only grouped or community facilities would be allowed. Where the applicant owns less than 50 feet of common boundary with TVA, the overall width of facilities along the shore would be limited to ensure that sufficient space would be available to accommodate other adjacent landowners. Water-use facilities would not be allowed to be wider than the width of common boundary.
- In congested areas, TVA would establish special permit conditions requiring dry docking of floating structures at a specific elevation to prevent these structures from interfering with navigation traffic, recreational boating access, or adjacent structures during the winter drawdown of the reservoir.
- All anchoring cables or spud poles would be anchored in a way that would not accelerate bank erosion. Anchoring to trees would not be permitted.

- Mooring buoys or posts would be allowed in association with docks and other water-use facilities. Posts must be at least 36 inches above the 100-year flood elevation.
- A marine railway or concrete boat-launching ramp with an associated access driveway would be allowed within the 20-foot access/view corridor. Construction would be scheduled during the reservoir drawdown when the lake bottom is exposed and dry. Associated excavation and fill activities would be kept to a minimum. Any excavated material would be properly disposed of at an upland site as provided for in the channel excavation standards. The construction and use of the marine railway or ramp would be not be allowed to interfere with the public's right to use TVA property. Concrete surfaces for ramps would be allowed; asphalt would be prohibited.

Community Water-Use Facilities

- Any community facilities that exceed the 1,000-square-foot footprint would be subject to the harbor limit requirements for commercial marinas.
- In situations where there are physical or environmental constraints that would preclude the development of multiple individual docks, TVA would only allow community water-use facilities. No more than one slip would be approved for each lot adjoining the TVA shoreland. In narrow coves or other situations where shoreline frontage is extremely limited, shoreline development would be limited to one landing dock for temporary moorage of boats not to exceed the 1,000-square-foot footprint requirement, and/or a boat launching ramp, if the site would accommodate such development.
- The community facility would be sited at a location where sensitive resources would not be impacted. In cases where a portion of the TVA-owned residential access shoreland adjoining a subdivision is in a protected category and the remaining portion does not have sensitive resources present, TVA would consider proposals for community facilities along the remaining shoreline.
- When community facilities are requested at jointly owned community lots, the plans must be submitted by a developer of the subdivision or by a state-chartered homeowner's association that represents everyone with an interest in the community lot where the facilities are proposed. The size and amount of community slips permitted would be determined by the size of the community lot, the amount of parking it can accommodate, the amount of shoreline frontage available for the facilities, the number of property owners with access rights to be accommodated, and other site-specific conditions.
- The plan for community water-use facilities would provide for a shoreline management zone.
- Vegetation management standards would be met, except that community access corridor could, at TVA's discretion, exceed 20 feet in width if necessary to accommodate approved shoreline development. Any proposed thinning of vegetation outside the corridor to enhance access to the lake or improve lake views from individual lots would be included in the plan. Potential impacts from proposed vegetation management activities would be minimized.

Shoreline Stabilization on TVA-Owned Residential Access Shoreland

Shoreline erosion is a problem along certain shorelines. As funding permits, TVA is stabilizing critically eroded sites, using biostabilization techniques (vegetative plantings) where possible to control erosion. Biostabilization techniques are typically less expensive than riprap or retaining walls and provide environmental benefits by enhancing vegetative cover along the shoreline.

When requested by the homeowner, TVA would assess shoreline erosion conditions and advise whether biostabilization, riprap, gabions, retaining walls, or some combination of these treatments would work best. TVA would address shoreline stabilization as follows:

- Because of the ecological benefits of biostabilization, TVA would continue to increase awareness of this approach, with the expectation that biostabilization would become more widely adopted by lakefront property owners.

- In the interest of working with homeowners for the control of eroding shorelines, TVA would allow homeowners to choose between riprap, biostabilization, gabions, or a combination of the three approaches for erosion control.
- Retaining walls typically require extensive site disturbance; generally reduce aquatic habitat conditions; often are not properly designed; and result in further site disturbance if they fail. For these reasons, retaining walls would be permitted only in instances where TVA determines:
    - The proposed wall would connect to an existing wall, with permission of the wall owner.
    - The erosion is severe and TVA determines that a retaining wall is the most effective erosion control option.

Once the method of treatment is selected, the following standards would apply.

Biostabilization of Eroded Shorelines

- Moderate bank contouring would be allowed to provide conditions suitable for planting of vegetation.
- Tightly bound bundles of coconut fiber, logs, or other approved materials would be placed at the base of the eroded site to deflect waves.
- Willow stakes and bundles, live cuttings of silky dogwood or other suitable native plant materials would be planted along the surface of the eroded area. Native vegetation could also be planted elsewhere on TVA property, if needed, to provide more root structure.

Riprap and Gabions to Stabilize Eroded Shorelines

- Quarry run stone, natural stone, or other material approved by TVA would be required. Concrete rubble and tires would not be allowed.
- The material must be placed along the existing contour of the bank.
- Site preparation must be limited to the work necessary to obtain adequate slope and stability of the material.

Retaining Walls to Stabilize Eroded Shorelines

- Stone, concrete blocks, poured concrete, or other material approved by TVA would be required. Railroad ties, tires, concrete rubble, and asphalt would not be permitted.
- The base of the wall would not be located more than an average of 2 horizontal feet lakeward of the normal summer pool elevation.
- Riprap or other approved material would be required at least 2 feet in depth along the footer of the wall to deflect wave action and reduce undercutting.

Channel Excavation on TVA-Owned Residential Access Shoreland

Excavation of boat channels can impact water quality and aquatic communities, especially when large areas are involved. In addition to substrate removal of shallow, fish-spawning habitat, areas adjacent to the excavated site are often subjected to excessive siltation. Excavation can also result in the improper disposal of excavated material in ways that create obstructions or affect flood control storage. The standards for channel excavation are designed to minimize these impacts and to improve habitat. Narrow channels and those with fish habitat improvement structures can enhance habitat conditions.

- Excavation of individual boat channels on TVA land would be approved only when TVA determines that there is no practicable alternative to reaching deeper water and the proposed action would not adversely impact sensitive resources.

- No more than 150 cubic yards of material would be removed for an individual boat channel.
- Channels would not be deeper, wider, or longer than necessary to achieve 3-foot water depths for navigation of a vessel at the minimum winter drawdown elevation.
- A 3:1 slope ratio would be required for each side channel.
- Only one boat channel per abutting property owner would be considered.
- The grade of the channel would be sloped to allow drainage of water during reservoir drawdown periods.
- TVA would require installation of fish habitat improvement structures, if needed, to offset impacts of approved channel excavation.
- Channel excavations would be scheduled during the reservoir drawdown when the lake bottom is exposed and dry.
- Spoil material from channel excavations would be deposited at an inland site above the TVA flood risk profile elevation. For reservoirs that have no flood control storage, dredge spoil would be disposed of and stabilized above the limits of the 100-year floodplain.

Fish Habitat Improvement Structures on TVA-Owned Residential Access Shorelands

When properly installed, fish habitat improvement structures provide substrate, feeding location, and shelter for young fish and other small aquatic animals.

- Fish attractors constructed of anchored brush piles, log cribs, and/or spawning benches, stake beds, vegetation, or rock piles would be allowed, provided they meet TVA design criteria.
- Fish attractors would not be allowed to project more than 30 feet out from any portion of an approved dock.
- Any floatable materials would be permanently anchored.
- Other general provisions of *TVA Guidelines for Fish Attractor Placement in TVA Reservoirs* (TVA, 1997f) would be required.

Land-Based Structures on TVA-Owned Residential Access Shorelands

Land-based development along the shoreland requires the removal of vegetation and typically results in construction of structures that are not water-use facilities. Such structures are most appropriately located on the private lot and not on the TVA-owned residential access shoreland.

- With the exception of steps, paths, utility lines, boat-launching ramps, or marine railways located in the access corridor; bank stabilization along the shoreline; and other uses noted in this section, TVA would not allow permanent land-based structures, fills, or grading. Permanent land-based structures such as picnic pavilions, gazebos, septic tanks, and drain fields, must be sited on the private lot, not on TVA land.
- Utility lines (electric, water-intake lines, etc.) would be allowed within the access corridor. Power lines and poles to serve water-use facilities would be installed above normal summer pool in a way that would not be hazardous to the public or interfere with TVA reservoir operations. Electrical service would be required to have an electrical disconnect located above the 500-year floodplain or the flood risk profile, whichever is higher, and would be accessible during flood events.
- Fences crossing TVA property would be allowed only where outstanding agricultural rights or fencing rights exist and the land is used for agricultural purposes. Fences must have a built-in means for easy pedestrian passage by the public and they must be clearly marked.
- Portable items such as picnic tables and hammocks would be allowed on TVA land.

General Conditions

- During construction activities, appropriate erosion and sedimentation control measures would be required to prevent disturbed soil from entering the waters of the reservoir. Such measures would include hay bales, silt fences, and other proven techniques.
- All sediment that accumulates behind sedimentation control devices would be removed and redistributed at an inland site. All disturbed areas would be promptly stabilized. Grass could be used within the access/visual corridor. Native plants would be required for stabilization of disturbed sites elsewhere on the TVA property. Seed and soil would be protected with erosion control netting and/or hay or some other mulch material.

Residential-Related Use on TVA Flowage Easement Shoreland

This section addresses construction of residential-related facilities along or across privately owned shoreland on TVA reservoirs where TVA owns and maintains a flowage easement (right-to-flood the land subject to the terms of the easement). TVA's written approval is required before constructing structures or obstructions on this flowage easement shoreland. Activities involving development within the flood control zones of TVA reservoirs would be reviewed to ensure compatibility with terms of the flowage easement, consistency with TVA flood control operations, and compliance with applicable environmental laws and executive orders.

Except for the standards addressing land-based structures, vegetation management, and channel excavation, all of the preceding standards applicable to TVA-owned residential access shoreland would apply to proposed development on TVA flowage easement shoreland. When reviewing proposals for docks or other obstructions on flowage easement land, TVA would address potential impacts to sensitive resources and seek to have these avoided or minimized consistent with applicable laws and executive orders. Land-based structures, vegetation management, and channel excavation within flowage easement shoreland would be addressed as described below.

- Land-based structures that would not obstruct flood control (such as decks) could be constructed within the flowage easement area upon receipt of TVA approval of plans.
- Removal, modification, or establishment of vegetation on privately owned shoreline subject to a TVA flowage easement would not require TVA approval. To promote good stewardship, TVA would provide information to landowners about how to enhance or maintain native vegetation.
- Channel excavation, which would occur on privately owned property subject to a TVA flowage easement in association with construction of a shoreline or water-based structure, would be subject to TVA review and approval. Other channel excavation on flowage easement properties would not require TVA approval under Section 26a, as long as all dredged material is placed above the limits of the 100-year floodplain or the TVA flood risk elevation, whichever is applicable. TVA would encourage owners of flowage easement property to adopt the standards for channel excavation applicable to TVA-owned residential access shoreland.

Exceptions to Shoreline Development Standards

In order to fairly and equitably enforce these standards, TVA would grant exceptions to the standards only in limited but justifiable circumstances. Examples include:

- Special facilities to accommodate the needs of a disabled person.
- Additional development within preexisting developments (areas where permitted shoreline development existed prior to the effective date of the SMI policy) consistent with the grandfathering provisions of Section 2.8.6.
- Removal of a tree, regardless of size, that TVA determines might fall on a structure (in these cases TVA would require that an acceptable tree species replace the tree removed).

APPENDIX G

SHORELINE AQUATIC HABITAT INDEX (SAHI)

SHORELINE AQUATIC HABITAT INDEX (SAHI)

To determine impacts of various types of shoreline development on aquatic habitat, it was necessary to develop a system capable of distinguishing differences in habitat quality between shoreline areas adjacent to various land uses. Using the general format developed by Plafkin et al. (1989), TVA established seven physical habitat parameters important to Tennessee Valley reservoir resident sport fish populations, which rely heavily on shoreline areas for reproductive success, juvenile development, and/or adult feeding. Habitat requirements for three species of black bass (largemouth, spotted, and smallmouth), white and black crappie, bluegill, and redear sunfish were used to develop conditions "expected" from a high quality environment for each parameter *(Table G-1).* Habitat Suitability Indexes (Edwards et al., 1982a, 1982b, 1983; McMahon et al., 1984; Stuber et al., 1982a, 1982b; Twomey et al., 1984), along with other sources of information on the biology and habitat requirements of these species (Etnier and Starnes, 1993; and Robinson and Buchanan, 1984), were consulted. Some generalizations were necessary in setting up scoring criteria to incorporate requirements of the various species into one index.

Individual parameters were scored by comparing observed conditions with "reference" conditions and then assigning a corresponding value: good=5; fair=3; or poor=1. The scores for each metric were summed to obtain the SAHI value. The range of potential SAHI values (7-35) was divided into thirds to provide some descriptor of habitat quality (good=27-35; fair=17-26; and poor=7-16). However, there is not much difference between sites that have similar scores.

SAHI data was collected for four reservoirs (two-thirds of Chatuge, one-third of Kentucky, Fort Loudoun, and Tellico) from January through April 1995, and the information was used to determine if

Table G-1. Shoreline Aquatic Habitat Index Metrics and Scoring Criteria.

Metrics	Criteria	Score
Riparian Zone	Width buffered >18 meters	5
	Width buffered 6-18 meters	3
	Width buffered <6 meters	1
Canopy Cover	Tree or shrub canopy >60 percent along adjacent shoreline	5
	Tree or shrub canopy 30-60 percent along adjacent shoreline	3
	Tree or shrub canopy <30 percent along adjacent shoreline	1
Bank Stability	No evidence of bank erosion or failure	5
	Areas of erosion include 0-30 percent of the shoreline	3
	Areas of erosion include >30 percent of the shoreline	1
Substrate	Percent of substrate gravel >40	5
	Percent of substrate gravel 10-40	3
	Percent of substrate gravel <10	1
Cover	Percent of drawdown zone with stable cover >25 percent	5
	Percent of drawdown zone with stable cover 10-25 percent	3
	Percent of drawdown zone with stable cover <10 percent	1
Habitat	>4 major habitats present, ready access to deeper sanctuary areas	5
	2-4 major habitats present, no deep-water access	3
	<2 major habitats present, no deep-water access	1
Dredging	<10 percent of shoreline dredged	5
	10-40 percent of the shoreline dredged	3
	>40 percent of shoreline dredged	1

there were reasonable correlations between land use and quality of adjacent aquatic habitat quality. Results from these reservoirs were then used to project impacts from shoreline development on the aquatic environment for each of the seven SMI alternatives.

Field sampling involved traveling parallel to the shoreline in a boat during the winter drawdown period and recording onshore land uses and vegetation types from the water's edge at full pool to 25 feet upland. When land use and/or vegetation parameters changed, boundaries of the section were marked on a map, and adjacent habitat visible in the drawdown zone (submerged at full pool) was scored using the previously described criteria. TVA's GIS was used to calculate the number of shoreline miles of aquatic habitat impacted.

APPENDIX H

METHODOLOGY FOR ANALYSIS OF AESTHETIC RESOURCES

METHODOLOGY FOR ANALYSIS OF AESTHETIC RESOURCES

Viewing Tennessee Valley Shoreline - Survey Methodology

In the spring of 1995, TVA initiated a research project to focus on how residential shoreline development affects public perceptions of shoreline aesthetics. Working in conjunction with The University of Tennessee (Knoxville) Sociology Department, TVA designed and conducted a mail survey (*Viewing Tennessee Valley Shoreline*) including both visual and written components.

This is the first time TVA has used this method for evaluating aesthetic resources. Traditionally, TVA has assessed aesthetic impacts based on a modified USDA Forest Service visual rating system, which evaluates natural landscape scenes without soliciting public input. Although this rating system is useful in certain situations, TVA felt that more public involvement was needed for this effort.

Aesthetic resources are not as easily measured, sampled, or evaluated as many other environmental resources. One approach is to rely "upon 'expert' opinion, but the values of the expert may well differ from those of the public" (Nasar, 1987). Brush and Shafer (1975) argue that the ability to make the right choices "depend(s) a great deal on the public's reaction."

TVA used a "judgment" or purposive sample drawn from several lists of persons judged to be most interested in shoreline management issues. This judgment was based on their known interest in TVA reservoirs, lands, and/or management activities. Therefore, they may not be representative of all segments of the general public.

Relying on purposive sampling to describe aesthetic preferences is supported by other researchers. Nasar (1987) noted the importance of sampling "from populations of interest." For example, Blair et al. (1982) used their survey instrument in public meetings over the Seattle port redevelopment. Brown et al. (1989) focused their study of the relationship between forest characteristics and scenic beauty on campground users. Stressing that research should be meaningful, useful, and interpretable, Kaplan and Kaplan (1982) noted that "in the real world," nonrandom sampling techniques may, in fact, be useful and can provide valuable, meaningful results. By focusing on citizens with a known interest in TVA-managed reservoirs and lands, random sampling techniques were not applicable because the total population interested in those areas could not be determined. This study supplements other SMI public participation mechanisms and should not be interpreted as a survey of all Tennessee Valley residents.

In compiling the survey mailing list, TVA focused on individuals who had previously expressed an interest in one or more Tennessee Valley reservoirs. The mailing list included:

- All previous SMI participants.
- Individuals who participated in the 1993 Gallup poll — *TVA Lake Users Study* (Larsen, 1993b).
- A random sample of visitors to TVA-managed public use areas.

All previous SMI participants (2,003) were sent a letter inviting them to take part in this study. This invitation was accepted by 700 persons who were then sent a questionnaire. The Gallup mailing list and a list of recreational visitors were used to select an additional 250 people.

Viewing Tennessee Valley Shoreline - Survey Instrument

Visual Component

Selection of the images used in preference studies is of utmost importance. To better represent possible future appearances of the shoreline under the policy alternatives, TVA used computer-enhanced photographs of existing conditions. This visual component included two sets of five images representing the variability of water-use facilities and shoreline vegetation in residential settings

(Figures 4.12-1 and *4.12-5)*. These two sets of scenes illustrate the aesthetic differences between the alternatives based on the proposed standards for water-use facility designs and shoreline vegetation alterations. Below is a brief description of how the photos relate to the alternatives *(Table H-1)*.

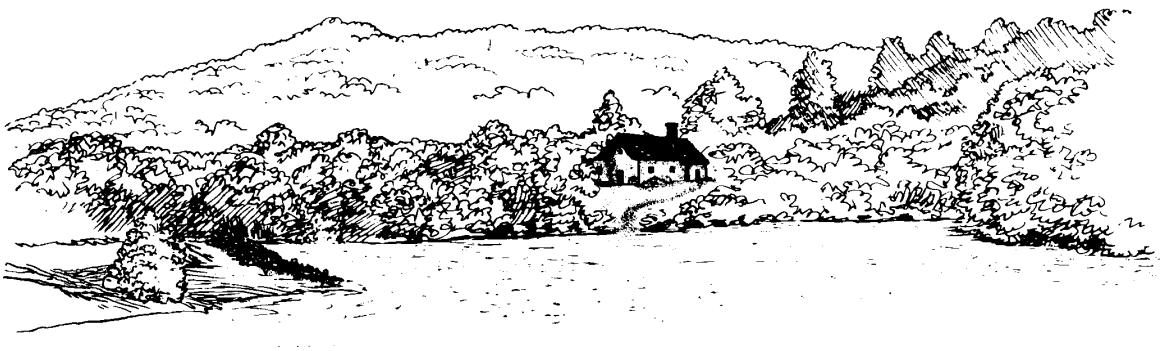
***Table H-1. Description of Photographs Used in* Viewing Tennessee Valley Shoreline.**

Standards	Alternative			
	A	B1 and B2	C1 and C2	D
Water-use facility design	26a permit requests would generally be approved unless the proposed activity would block a navigation channel, result in construction of a habitable structure in the floodplain, or adversely affect endangered or threatened species. No standards would be imposed to limit the size of docks, boathouses, dredged channels, or land-based structures.	Individual docks are limited to 400 square feet of platform area excluding access walkways, and boatslips are limited to 700 square feet in the boat well. Existing guidelines do not restrict the maximum square footage of land/water surface area that can be displaced per lot. Existing guidelines do not promote certain types of facility designs.	Water-use facilities would be limited to a maximum footprint of 1,000 square feet. Covered boatslips without sides would be permitted.	Water-based development would be limited to one uncovered dock or slip per qualifying lot, not to exceed 300 square feet of surface area.
Shoreline vegetation alterations on TVA-owned shoreland	There would generally be no restrictions on clearing of vegetation unless necessary for mitigation. In other words, it would be permissible to clear a residential lot of all vegetation and plant grass to the water's edge.	Existing guidelines state that clearing of vegetation will be minimized and cutting of trees over 3 inches in diameter will not be allowed. This alternative allows intensive understory management.	TVA would maintain or restore a minimum distance vegetated Shoreline Management zone (SMZ). The depth of the SMZ would vary, but an effort would be made to maintain a depth of at least 100 feet. Property owners with rights to use TVA-owned residential access shoreland would be allowed an access path from a minimum 6-foot width to a maximum 50-foot width, depending on the property owner's lot frontage.	TVA would maintain or restore a minimum distance vegetated Shoreline Management zone (SMZ). The depth of the SMZ would vary, but the entire depth of shoreline property owned by TVA would be managed as a SMZ. Property owners with rights to use the TVA-owned residential shoreland could be permitted an access path 6 feet wide for pedestrian use only.

Written Component

In addition to the computer-enhanced photographs, participants were given the following questionnaire. This survey asked participants about the images and other visual aspects of residential shoreline development.

Viewing Tennessee Valley Shoreline



Shoreline Management Initiative
17 Ridgeway Road
Norris, TN 37828

T E N N E S S E E V A L L E Y A U T H O R I T Y

INTRODUCTION

Thank you for agreeing to participate in this visual assessment of shoreline development.

Your time and thoughts are very important to us in honestly and fully representing the range of opinions and values that exist. It is vital that you complete and return this survey, which has been distributed only to those who have volunteered to complete it.

This visual assessment will assist TVA in evaluating the impacts of shoreline development on visual resources. This data is an important part of an Environmental Impact Statement that is being prepared as part of TVA's Shoreline Management Initiative (SMI). To date, SMI participants have expressed interest in protecting scenic beauty. This survey aims to develop a better understanding of what you prefer to see along TVA shorelines.

Since most of the recent developments along the lakeshore have been residential, the primary focus of this study will be ***residential shoreline development***. Residential shoreline development refers to water use facilities (docks), vegetation clearing, and other alterations that lie between the water and lakefront residences.

This questionnaire, developed in consultation with the Sociology Department at the University of Tennessee - Knoxville, is strictly confidential. Your name will never be linked to any of your answers.

The study should take a short time to complete, but some respondents will choose to spend more time on it than others. ***To have your preferences reflected in the analysis, please complete this booklet and return it in the enclosed postage-paid envelope within two weeks of its arrival.*** You may keep or dispose of the pictures. If you have any questions, please call me at (423) 632-1636.

Thank you for your assistance.

Sincerely, -

David B. Harrell

David B. Harrell
TVA
Land Management
Shoreline Management Initiative Team

Section I

1. How important is the **appearance** of residential shoreline development to your enjoyment of TVA lakes? Please check the **one** response that best reflects your feelings.

   ○ Very Important
   ○ Moderately Important
   ○ Unsure/No Opinion
   ○ Somewhat Unimportant
   ○ Not at all Important

For the following three (3) questions, please refer to the color pictures included in this packet. Each picture is labeled with a corresponding letter and number located in the bottom center. The pictures represent three (3) sets: water use facilities (labeled F1-F5), shoreline appearances (labeled S1-S5), and residential vegetation management (labeled R1-R5).

2. Please check **one** box for **each** scene, **F1 - F5**, that best reflects your preference for each **water use facility** (dock, boathouse, etc.).

F1 - F5 Preference - Water Use Facility							
Water Use Facility Scenes	Highly Preferred	Moderately Preferred	Somewhat Preferred	No Preference	Somewhat Disliked	Moderately Disliked	Highly Disliked
F1							
F2							
F3							
F4							
F5							

3. Please check **one** box for **each** scene, **S1 - S5**, that best reflects your preference for the appearance of each **shoreline**.

S1 - S5 Preference - Shoreline Appearance							
Shoreline Scenes	Highly Preferred	Moderately Preferred	Somewhat Preferred	No Preference	Somewhat Disliked	Moderately Disliked	Highly Disliked
S1							
S2							
S3							
S4							
S5							

4. This question focuses on a series of scenes (R1-R5) representing vegetation associated with residential development. Because the emphasis is on vegetation management, we purposely omitted water use facilities to focus your attention on the shoreline vegetation.

   Please check **one** box for **each** scene, **R1 - R5**, that best reflects your preference for the appearance of each **residential vegetation management scene.**

R1 - R5 Preference - Residential Vegetation Management							
Residential Scenes	Highly Preferred	Moderately Preferred	Somewhat Preferred	No Preference	Somewhat Disliked	Moderately Disliked	Highly Disliked
R1							
R2							
R3							
R4							
R5							

2

SECTION II

Scenic beauty is an important characteristic of TVA lakes. Does the appearance of residential shorelines affect your **participation** in lake related activities? Please answer the following questions.

1. Of the scenes representing water use facilities (F1-F5), shorelines (S1-S5), and residential vegetation management (R1-R5), which depict conditions that **would encourage or attract** you to use TVA lakes more frequently? Please check **all** scenes that apply.

○ F1	○ S1	○ R1
○ F2	○ S2	○ R2
○ F3	○ S3	○ R3
○ F4	○ S4	○ R4
○ F5	○ S5	○ R5

2. Of the scenes representing water use facilities (F1-F5), shorelines (S1-S5), and residential vegetation management (R1-R5), which depict conditions that **would discourage or deter** you from using TVA lakes as frequently? Please check **all** scenes that apply.

○ F1	○ S1	○ R1
○ F2	○ S2	○ R2
○ F3	○ S3	○ R3
○ F4	○ S4	○ R4
○ F5	○ S5	○ R5

Section III

Note: This section does not refer to the scenes in Section I, but you may consider them as you select your preferences.

1. Please check **one** box for **each** characteristic that best reflects its importance as you judge the scenic quality of water use facilities.

	Importance				
Facility Characteristic	Very Important	Moderately Important	Unsure/ No Opinion	Somewhat Unimportant	Not At All Important
Design					
Size					
Color					
Intrusiveness*					
Maintenance/ Upkeep					
Building Materials					
Density/ Closeness of One to Another					

*Intrusiveness is defined as the degree to which a facility blocks, interferes with, or fails to blend with its surroundings.

2. Buffer strips of shoreline vegetation, especially trees, may screen the view of developments along the lakeshore. The amount of screening is dependent in part on the depth of the buffer. What depth of buffer would you prefer to see maintained around TVA lakes?

- ○ No buffers
- ○ Less than 25 feet
- ○ 25 to 50 feet
- ○ 51 to 100 feet
- ○ 101 to 150 feet
- ○ 151 to 200 feet
- ○ More than 200 feet
- ○ Other (please specify) _____

3. Please check the **one** box for **each** category that best reflects your preference for the following shoreline conditions.

Shoreline Condition	Preference						
	Highly Preferred	Moderately Preferred	Somewhat Preferred	No Preference	Somewhat Disliked	Moderately Disliked	Highly Disliked
Mowed/Landscaped Lawn to the Water Line							
Vegetative Buffer Strip*							
Riprap (stones)							
Retaining Wall/ Sea Wall							
Other (please specify) _____							

*Defined as a strip of vegetation along the lakeshore that separates developments from the lake itself.

4. TVA is also interested in your preferences concerning shoreline development on a larger scale. How much of the lakeshore should be committed to:

Residential Areas (docks and other shoreline uses associated with lakeside homes)	(_____)% (1 to 100)
Commercial Recreation Areas (commercially operated marinas, resorts, campgrounds, etc.)	(_____)% (1 to 100)
Public Recreation Areas (campgrounds, parks, etc., operated by local, state, federal agencies)	(_____)% (1 to 100)
Industrial Areas (barge terminals, ports, etc.)	(_____)% (1 to 100)
Agriculture Areas (crop production, livestock grazing, etc.)	(_____)% (1 to 100)
Natural Resource Areas (forests, wildlife areas, etc.)	(_____)% (1 to 100)
Other Purposes (please specify)	(_____)% (1 to 100)
(Total should equal 100%)	100%

5

5. What minimum distance should be maintained between private docks fronting lakeshore homes?

- ○ No minimum distance; docks should be as close as possible
- ○ Less than 25 feet
- ○ 25-50 feet
- ○ 51-100 feet
- ○ 101-150 feet
- ○ 151-200 feet
- ○ More than 200 feet
- ○ Other (please specify) _____

SECTION IV

Section IV intends to identify your association with TVA lakes in order to understand which user groups and geographical areas are represented in the study.

1. Which **one** TVA lake from the list below do you visit most often or do you consider your "home" lake?

_____

2. Which other TVA lakes do you visit? Check **all** that apply.

- ○ Apalachia
- ○ Bear Creek Project
- ○ Beech River Project
- ○ Blue Ridge
- ○ Boone
- ○ Chatuge
- ○ Cherokee
- ○ Chickamauga
- ○ Douglas
- ○ Fontana
- ○ Fort Loudoun
- ○ Fort Patrick Henry
- ○ Guntersville
- ○ Hiwassee
- ○ Kentucky
- ○ Melton Hill
- ○ Nickajack
- ○ Normandy
- ○ Norris
- ○ Nottely
- ○ Ocoee Project
- ○ Pickwick
- ○ South Holston
- ○ Tellico
- ○ Tims Ford
- ○ Watauga
- ○ Watts Bar
- ○ Wheeler
- ○ Wilbur
- ○ Wilson
- ○ Other (please specify) _____

3. Overall, how would you rate the visual character or scenic beauty of the shorelines of your "home" lake?

Lake	Highly Preferred	Moderately Preferred	Somewhat Preferred	No Preference	Somewhat Disliked	Moderately Disliked	Highly Disliked

4. Do you own property on a TVA lake? If so, what type of property is it? Please check **all** that apply.

- ○ **No**, I do not own property on a TVA lake.
- ○ **Yes**, I own the following type of property;
  - ○ Primary place of residence
  - ○ Second home/cottage/retreat
  - ○ Commercial recreation (marinas, resorts, campgrounds, parks, etc.)
  - ○ Industrial (barge terminals, ports, etc.)
  - ○ Agricultural (crop production, livestock grazing, etc.)
  - ○ Natural resource area (forests, wildlife areas, etc.)
  - ○ Other (specify) _____

5. What are your primary uses of TVA lakes and adjoining properties? Please check all that apply.

- ○ Overnight camping in undeveloped areas
- ○ Overnight camping in developed areas
- ○ Swimming/sunbathing
- ○ Boating for pleasure/cruising/sightseeing
- ○ Wildlife observation
- ○ Day use land activities (picnicking, hiking, sightseeing, etc.)
- ○ Others (please specify) _____
  _____
- ○ Hunting
- ○ Fishing from bank
- ○ Fishing from boat
- ○ Waterskiing
- ○ Sailing
- ○ Riding jet ski
- ○ Photography

APPENDIX I

MILES OF DEVELOPED AND UNDEVELOPED SHORELINE BY RESERVOIR AND OWNERSHIP CATEGORY

Table I-1. Miles of Developed Shoreline by Reservoir and Ownership Category With Totals for Undeveloped and All Shoreline.[1]

Reservoir	Developed Flowage Easement Shoreland		Developed TVA-Owned Residential Access Shoreland		Developed TVA-Owned-and-Jointly-Managed Shoreland		Developed TVA-Owned-and-Managed Shoreland		Total Developed Shoreline Miles		Total Undeveloped Shoreline Miles		Total Shoreline Miles
	Miles	% of Total Shore.	Miles	% of Total Shore.	Miles	% of Total Shore.	Miles	% of Total Shore.	Miles	% of Total Shore.	Miles	% of Total Shore.	Miles
Apalachia	0.0	0	0.0[2]	0	0.0	0	0.0	0	0.0[2]	0	31.5	100	31.5
Bear Creek Project	0.0	0	0.0[3]	0	10.5	4	0.0	0	10.5	4	261.1	96	271.6
Beech River Project	0.0	0	10.7	13	1.6	2	0.3	0	12.6	15	69.7	85	82.3
Blue Ridge	7.6	11	7.9	12	1.8	3	0.0	0	17.3	25	50.8	75	68.1
Boone	64.0	51	0.3	0	1.4	1	1.4	1	67.1	53	59.5	47	126.6
Chatuge	42.2	33	9.9	8	1.5	1	0.8	1	54.4	43	73.6	57	128.0
Cherokee	0.0	0	59.9	15	32.4	8	5.7	1	98.0	25	296.5	75	394.5
Chickamauga	0.0	0	88.7	11	19.8	3	1.8	0	110.3	14	673.4	86	783.7
Douglas	77.2	15	0.9	0	7.1	1	1.2	0	86.4	17	426.1	83	512.5
Fontana	2.6	1	0.0	0	45.0	19	0.0	0	47.6	20	190.2	80	237.8
Fort Loudoun	180.5	48	4.3	1	8.8	2	5.0	1	198.6	53	179.6	47	378.2
Fort Patrick Henry	4.1	13	3.7	12	1.9	6	0.7	2	10.4	34	20.6	66	31.0
Guntersville	41.0	5	46.3	5	63.8	7	19.4	2	170.5	19	718.6	81	889.1
Hiwassee	0.0	0	12.0	7	0.8	0	0.0	0	12.8	8	152.0	92	164.8
Kentucky	31.4	2	89.1	4	33.1	2	13.9	1	167.5	8	1,896.8	92	2,064.3
Melton Hill	0.0[4]	0	17.1	9	8.2	4	10.1	5	35.4	18	158.0	82	193.4
Nickajack	13.4	7	0.0	0	10.0	6	1.4	1	24.8	14	153.9	86	178.7
Normandy	0.0	0	0.0	0	0.0	0	4.6	6	4.6	6	70.5	94	75.1
Norris	31.6	4	59.4	7	13.1	2	2.9	0	107.0	13	702.2	87	809.2
Nottely	21.4	21	4.5	4	1.0	1	1.6	2	28.5	28	73.6	72	102.1
Ocoee Project	0.0	0	0.0[2]	0	8.1	7	0.0	0	8.1[2]	7	101.4	93	109.5
Pickwick	1.3	0	62.4	13	17.8	4	10.0	2	91.5	19	399.1	81	490.6
South Holston	16.8	9	1.3	1	5.5	3	1.4	1	25.0	14	156.9	86	181.9
Tellico	0.0	0	19.7	6	4.6	1	1.2	0	25.5	7	331.5	93	357.0
Tims Ford	0.0	0	43.2	14	13.9	5	1.4	0	58.5	19	250.2	81	308.7
Watauga	18.9	18	0.5	0	2.2	2	0.7	1	22.3	21	82.6	79	104.9
Watts Bar	1.6	0	140.2	19	8.4	1	9.0	1	159.2	22	562.5	78	721.7
Wheeler	4.2	0	55.5	5	20.3	2	7.9	1	87.9	9	939.3	91	1,027.2
Wilbur	0.0	0	0.0	0	0.1	2	0.6	13	0.7	15	4.1	85	4.8
Wilson	85.2	51	0.7	0	0.6	0	3.6	2	90.1	54	76.1	46	166.2
Total Miles	**645.0**		**738.2**		**343.3**		**106.6**		**1,833.1**		**9,161.9**		**10,995.0**
% of Total Shoreline		**6**		**7**		**3**		**1**		**17**		**83**	**100**

[1]The sum of individual percentages may differ from the total by ±1 percent due to rounding. Percentages less than 0.5 are shown as 0 percent, unless otherwise noted.

[2]A negligible amount of residential shoreline exists.

[3]Complete data was not available for this study; it is estimated that residential shoreland encompasses less than 15 miles.

[4]Approximately 53 miles of Melton Hill shoreline is federal land managed by the Department of Energy as part of the Oak Ridge Reservation; although flowage easement rights exist, it is classified in the TVA-owned-and-jointly-managed category because of the federal ownership.

Table I-2. Miles of Undeveloped Shoreline by Reservoir and Ownership Category With Totals for Developed and All Shoreline.

Reservoir	Undeveloped Flowage Easement Shoreland		Undeveloped TVA-Owned Residential Access Shoreland		Undeveloped TVA-Owned-and-Jointly-Managed Shoreland		Undeveloped TVA-Owned-and-Managed Shoreland		Total Undeveloped Shoreline Miles		Total Developed Shoreline Miles		Total Shoreline Miles
	Miles	% of Total Shore.	Miles	% of Total Shore.	Miles	% of Total Shore.	Miles	% of Total Shore.	Miles	% of Total Shore.	Miles	% of Total Shore.	Miles
Apalachia	0.0	0	0.0[2]	0	28.3	90	3.2	10	31.5	100	0.0[2]	0	31.5
Bear Creek Project	0.0	0	0.0[3]	0	261.1	96	0.0	0	261.1	96	10.5	4	271.6
Beech River Project	0.0	0	45.7	56	22.8	28	1.2	1	69.7	85	12.6	15	82.3
Blue Ridge	7.0	10	3.5	5	35.6	52	4.7	7	50.8	75	17.3	25	68.1
Boone	38.3	30	0.0	0	0.9	1	20.3	16	59.5	47	67.1	53	126.6
Chatuge	18.6	15	8.9	7	30.3	24	15.8	12	73.6	57	54.4	43	128.0
Cherokee	2.1	1	110.3	28	114.9	29	69.2	18	296.5	75	98.0	25	394.5
Chickamauga	7.2	1	152.8	19	311.7	40	201.7	26	673.4	86	110.3	14	783.7
Douglas	371.3	72	5.5	1	15.3	3	34.0	7	426.1	83	86.4	17	512.5
Fontana	16.7	7	0.0	0	171.6	72	1.9	1	190.2	80	47.6	20	237.8
Fort Loudoun	123.8	33	8.6	2	32.6	9	14.6	4	179.6	47	198.6	53	378.2
Fort Patrick Henry	4.1	13	3.5	11	7.5	24	5.5	18	20.6	66	10.4	34	31.0
Guntersville	9.5	1	16.5	2	348.9	39	343.7	39	718.6	81	170.5	19	889.1
Hiwassee	0.0	0	8.3	5	140.2	85	3.5	2	152.0	92	12.8	8	164.8
Kentucky	679.3	33	137.1	7	428.8	21	651.6	32	1,896.8	92	167.5	8	2,064.3
Melton Hill	0.0[4]	0	45.0	23	71.6	37	41.4	21	158.0	82	35.4	18	193.4
Nickajack	84.6	47	0.0	0	25.6	14	43.7	24	153.9	86	24.8	14	178.7
Normandy	0.0	0	11.2	15	6.1	8	53.2	71	70.5	94	4.6	6	75.1
Norris	98.8	12	171.0	21	193.3	24	239.1	30	702.2	87	107.0	13	809.2
Nottely	32.4	32	0.5	0	35.4	35	5.3	5	73.6	72	28.5	28	102.1
Ocoee Project	0.0	0	0.0[2]	0	101.4	93	0.0	0	101.4	93	8.1	7	109.5
Pickwick	3.0	1	51.6	11	145.5	30	199.0	41	399.1	81	91.5	19	490.6
South Holston	26.6	15	3.5	2	117.7	65	9.1	5	156.9	86	25.0	14	181.9
Tellico	0.0	0	90.7	25	142.7	40	98.1	27	331.5	93	25.5	7	357.0
Tims Ford	0.0	0	4.5	1	245.7	80	0.0	0	250.2	81	58.5	19	308.7
Watauga	28.6	27	2.2	2	47.5	45	4.3	4	82.6	79	22.3	21	104.9
Watts Bar	73.3	10	125.3	17	74.6	10	289.3	40	562.5	78	159.2	22	721.7
Wheeler	7.1	1	98.6	10	539.8	53	293.8	29	939.3	91	87.9	9	1,027.2
Wilbur	0.0	0	0.0	0	1.8	38	2.3	48	4.1	85	0.7	15	4.8
Wilson	67.9	41	4.0	2	0.7	0	3.5	2	76.1	46	90.1	54	166.2
Total Miles	**1,700.2**		**1,108.8**		**3,699.9**		**2,653.0**		**9,161.9**		**1,833.1**		**10,995.0**
% of Total Shoreline		**15**		**10**		**34**		**24**		**83**		**17**	**100**

[1]The sum of individual percentages may differ from the total by ±1 percent due to rounding. Percentages less than 0.5 are shown as 0 percent, unless otherwise noted.

[2]A negligible amount of residential shoreline exists.

[3]Complete data was not available for this study; it is estimated that residential shoreland encompasses less than 15 miles.

[4]Approximately 53 miles of Melton Hill shoreline is federal land managed by the Department of Energy as part of the Oak Ridge Reservation; although flowage easement rights exist, it is classified in the TVA-owned-and-jointly-managed category because of the federal ownership.

APPENDIX J

TYPES AND NUMBER OF LAND- AND WATER-BASED RESIDENTIAL SHORELINE ALTERATIONS

Table J-1. Number of Land-Based Residential Shoreline Alterations by Reservoir and Type.

Reservoir	Type of Alteration											
	Landscaping	Decks, Patios, Boardwalks, Sidewalks	Steps	Picnic Tables	Fences	Retaining Walls	Gazebos, Picnic Shelters	Dryland Boathouses/ Boatsheds	Barbecue Pits	Sattelite Dishes	Fills	
Apalachia[1]	-	-	-	-	-	-	-	-	-	-	-	-
Bear Creek Project	NA[2]	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Beech River Project	NA[2]	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Blue Ridge	160	66	145	59	13	32	15	2	5	16	0	513
Boone	1,161	361	310	138	84	72	16	22	0	19	26	2,209
Chatuge	606	70	179	40	57	41	26	3	17	27	21	1,087
Cherokee	9	47	47	44	24	1	23	6	3	11	1	216
Chickamauga	57	327	279	318	9	150	125	72	8	2	14	1,361
Douglas	40	200	159	99	56	14	45	43	7	33	2	698
Fontana	0	5	9	1	2	2	1	1	0	0	0	21
Fort Loudoun	489	389	204	288	296	87	219	76	90	68	38	2,244
Fort Patrick Henry	53	27	53	8	6	5	0	1	0	1	0	154
Guntersville	1,629	312	44	96	180	4	42	26	83	3	104	2,523
Hiwassee	30	7	32	0	0	2	0	0	0	5	0	76
Kentucky	755	193	235	212	13	71	24	38	28	26	16	1,611
Melton Hill	91	36	72	30	48	0	1	11	4	1	3	297
Nickajack	3	22	12	20	30	6	10	1	2	8	9	123
Normandy	NA[2]	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Norris	41	91	201	62	25	6	11	1	10	3	4	455
Nottely	261	82	90	44	35	42	8	3	6	15	0	586
Ocoee Project[1]	-	-	-	-	-	-	-	-	-	-	-	-
Pickwick	279	47	118	48	7	33	5	25	3	0	1	566
South Holston	276	212	67	20	42	12	4	1	0	7	8	649
Tellico	137	118	69	21	33	18	11	1	2	1	2	413
Tims Ford	499	91	152	9	0	7	22	26	1	3	9	819
Watauga	211	86	120	41	18	21	5	0	0	0	8	510
Watts Bar	323	299	384	317	239	96	21	11	19	19	5	1,733
Wheeler	743	121	198	1	27	15	16	29	0	8	2	1,160
Wilbur	0	0	0	0	0	0	0	0	0	0	0	0
Wilson	7	23	6	2	18	5	0	0	0	2	0	63
Total	**7,860**	**3,232**	**3,185**	**1,918**	**1,262**	**742**	**650**	**399**	**288**	**278**	**273**	**20,087**
% of Total	**39.1**	**16.1**	**15.9**	**9.5**	**6.3**	**3.7**	**3.2**	**2.0**	**1.4**	**1.4**	**1.4**	**100.0**

[1]The shoreline area is managed by TVA and other agencies for purposes other than residential development. A few residential alterations exist as as a result of special use permits, but these are not included in the totals.

[2] NA - Not available

Table J-2. Number of Water-Based Residential Shoreline Alterations by Reservoir and Type.

Reservoir	Type of Alteration													Total
	Fixed Piers, Docks, Boat-slips, Decks	Floating Piers, Docks, Boat-slips, Decks	Retaining Walls	Riprap	Launching Ramps	Fixed Boathouses	Mooring Posts	Steps	Water Intakes	Floating Boathouses	Marine Railways	Dredging	Breakwater	
Apalachia[1]	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bear Creek Project	NA[2]	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Beech River Project	NA[2]	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Blue Ridge	41	226	50	30	16	1	4	197	4	146	1	4	0	720
Boone	1,209	1,498	507	369	269	42	260	134	13	36	28	8	0	4,373
Chatuge	80	763	40	122	47	0	10	111	22	6	1	24	0	1,226
Cherokee	15	547	18	3	120	29	17	0	0	7	0	0	0	756
Chickamauga	1,905	291	908	176	454	77	660	142	199	53	97	0	0	4,962
Douglas	136	793	35	17	145	0	0	64	1	3	5	4	0	1,203
Fontana	3	43	1	3	12	1	1	0	0	1	0	0	0	65
Fort Loudoun	2,457	456	870	1,141	505	231	329	323	164	67	63	93	3	6,702
Fort Patrick Henry	97	149	43	27	21	11	11	9	2	4	1	0	0	375
Guntersville	440	4	780	266	111	1,210	52	147	274	12	17	2	0	3,315
Hiwassee	15	72	5	5	2	2	5	27	0	2	0	0	0	135
Kentucky	305	1,168	139	805	347	0	101	132	71	65	166	119	5	3,423
Melton Hill	151	102	90	154	30	11	26	8	69	4	15	37	0	697
Nickajack	131	45	49	131	61	9	107	1	14	2	5	0	0	555
Normandy	NA[2]	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Norris	14	1,021	0	3	99	0	0	86	5	26	4	0	0	1,258
Nottely	12	344	7	22	16	1	8	46	1	29	1	10	0	497
Ocoee Project[1]	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pickwick	565	441	280	186	166	29	58	139	3	288	126	10	1	2,292
South Holston	11	271	4	25	35	0	16	56	0	4	5	2	0	429
Tellico	349	110	93	236	50	2	25	25	70	0	0	1	0	961
Tims Ford	399	340	86	152	60	52	0	19	1	153	6	0	0	1,268
Watauga	12	199	5	5	28	0	10	45	0	9	1	7	0	321
Watts Bar	2,221	251	1,029	752	363	81	339	338	451	18	56	51	0	5,950
Wheeler	708	6	625	94	261	426	150	38	58	3	41	26	0	2,436
Wilbur	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Wilson	904	10	1,118	113	136	811	85	83	315	4	37	68	2	3,686
Total	**12,180**	**9,150**	**6,782**	**4,837**	**3,354**	**3,026**	**2,274**	**2,170**	**1,737**	**942**	**676**	**466**	**11**	**47,605**
% of Total	**25.6**	**19.2**	**14.2**	**10.2**	**7.0**	**6.4**	**4.8**	**4.6**	**3.6**	**2.0**	**1.4**	**1.0**	**0.0**	**100.0**

[1] The shoreline area is managed by TVA and other agencies for purposes other than residential development. A few residential alterations exist as as a result of special use permits, but these are not included in the totals.

[2] NA - Not available

APPENDIX K

TVA RESERVOIR SHORELINE SOIL EROSION INVESTIGATION

TVA RESERVOIR SHORELINE SOIL EROSION INVESTIGATION

1. VEGETATION TYPE - Dominant vegetative cover of the land

    a. None - Bare ground/bank, paved road, parking lot, rock outcrop, bluff
    b. Grass/Forb - Herbaceous plants are nonwoody and are classified as grasses or forbs. *Grasses* all belong to the Gramineae (grass) family. Most species have a fibrous root system that helps bind together soil particles and prevent erosion. *Forbs* are herbaceous plants other than those in the grass, sedge, and rush families. They generally are broad-leaved plants that have a tap root or branching tap root system. The forbs are further classified as *legumes* or *nonlegumes*.
    c. Shrub/Brush - Shrubs are woody plants that have more than one stem, each less than 2 inches in diameter, a height of less than 10 feet and an undefined crown. If you can walk under it, it is a tree, but if you have to walk around it, it is a shrub. Brush is a growth of bushes or shrubs. Bushes are any low, branching, woody plants smaller than a tree or shrub. This includes land that is starting to return to forest through natural succession.
    d. Tree - A tree is a woody plant having one well-defined trunk at least 2 inches in diameter, a height of at least 10 feet and a somewhat definitely formed crown of foliage.
    e. Shrub/Grass
    f. Tree/Grass
    g. Tree/Shrub
    h. Emergent Wetland - The emergent wetland is characterized by erect, rooted, herbaceous hydrophytes, excluding mosses and lichens. This vegetation is present for most of the growing season in most years. These wetlands are usually dominated by perennial plants. All water regimes are included except subtidal and irregularly exposed.
    i. Scrub/Shrub Wetland- The scrub-shrub wetland includes areas dominated by woody vegetation less than 20 feet tall. The species include true shrubs, young trees, and trees or shrubs that are small or stunted because of environmental conditions. All water regimes except subtidal are included.
    j. Forested Wetland - The forested wetland is characterized by woody vegetation that is 20 feet tall or taller. All water regimes are included except subtidal.

2. LAND USE - Means specific uses or management-related activities, rather than the vegetation or cover of the land.

    a. Agriculture
        1. Cropland/Cultivated - Land used for the production of adapted crops for harvest, alone or in rotation with grasses and legumes, that include row crops, small grain crops, hay crops, nursery crops, orchard crops, and other similar crops.
        2. Pastureland/Hay - Land used primarily for the long-term production of adapted, domesticated forage plants to be grazed by livestock or occasionally cut and cured for livestock feed.
    b. Commercial/Industrial
        1. Business - Retail or trade of goods or services, including hotels, motels, stores, restaurants, and other commercial establishments.
        2. Manufacturing - Land used for the transformation of materials for fabrication of products, wholesaling of products, or long-term storage of products. This includes all heavy and light manufacturing facilities.
        3. Marina - a boat basin that has docks, moorings, supplies, and other facilities for small boats.
    c. Developed Water Resources - Land used for storing water for beneficial uses, such as stockponds, irrigation, fire protection, flood control, and water supply.
    d. Forest land - Characterized by a more or less dense and extensive upland forest tree species 20 feet tall or taller with other plants.
    e. Recreation - Land used for public or private leisure-time activities, including developed recreation facilities such as parks, camps, and amusement areas, as well as areas for less intensive uses and other undeveloped recreational uses.
        1. Developed - Facilities, improvements, designated recreation areas.
        2. Informal - Informal recreational use.
    f. Residential - Land used for single- and multiple-family housing, mobile home parks, or other residential lodgings.
    g. Riprap - Aggregate (broken rock, cobbles, or boulders) placed on erodible sites for protection against the action of water.

h. Road/Parking
   1. Improved - Paved.
   2. Unimproved - Nonpaved/gravel.

i. Undeveloped land or no current use or land management - Land that is undeveloped or, if previously developed, land that has been allowed to return naturally to an undeveloped state or is returning to forest through natural succession. The woody vegetation is less than 20 feet tall.

j. Wetland - Wetlands are areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, under normal circumstances, a prevalence of vegetation typically adapted for life in saturated soil conditions.

k. Other - Railroad, transmission/pipeline right-of-way, retaining wall; note other land use under comments.

3. VEGETATION IMPACTS

a. None - No impacts.
b. Clearing - Woody plant removal >70%.
c. Grubbing - To clear of roots and stumps by digging.
d. Herbicide - A chemical substance used to destroy plants, especially weeds.
e. Livestock Grazing - Cattle, horses, swine.
f. Mowing - Cutting down grass or similar growth with a scythe or a mechanical device such as a lawn mower or mowing machine; this includes bushhogging.
g. Recreation - Foot traffic, intensive use areas.
h. Thinning - Woody plant removal up to 70%.
i. Other - Note impact under comments.

4. SOIL EROSION

a. None - Paved road, parking lot, rock outcrop, bluff.
b. Minimal - Acceptable erosion rate, adequate vegetative cover, no stabilization needed.
c. Moderate - Bank vertical height <2', slope <20%, limited vegetative cover, stabilization needed.
d. Severe - Bank vertical height 2-6', slope >20%, limited to no vegetative cover, bank sloughing likely, rills and gullies possible, intensive stabilization needed.
e. Critical - Bank vertical height 6-10', limited to no vegetative cover, bank sloughing likely, rills and gullies possible, critical stabilization needed.
f. Extremely Critical - Bank vertical height >10', limited to no vegetative cover, bank sloughing likely, rills and gullies possible, extremely critical stabilization necessary.

5. COMMENTS

a. Describe special soil erosion characteristics, i.e., rills, gullies (depth, width).
b. Is erosion impacting structures, improvements, archeological sites?
c. Any land or vegetation disturbance activities, i.e., timber harvesting, road construction.
d. Site physical characteristics, i.e., slope, soil type.
e. Overland surface waterflow problems.
f. Other agriculture information, i.e., confined cattle, poultry, swine feeding operations, dairy/horse farm, kennels.
g. Point and nonpoint source pollution problems.

Table K-1. Summary of Shoreline Soil Erosion Investigation of Chatuge Reservoir.				
	Zone 1 (0'-25')		**Zone 2 (26'-100')**	
	Miles	**Percent**	**Miles**	**Percent**
Vegetation Type				
a. None	2.2	2.0	5.7	5.0
b. Grass/Forb	7.5	6.7	8.9	7.9
c. Shrub/Brush	0.0	0.0	0.0	0.0
d. Tree	57.5	51.4	53.7	47.6
e. Shrub/Grass	9.0	8.1	0.3	0.3
f. Tree/Grass	35.4	31.7	44.3	39.2
g. Tree/Shrub	0.0	0.0	0.0	0.0
h. Emergent Wetland	0.1	0.1	0.0	0.0
i. Scrub/Shrub Wetland	0.0	0.0	0.0	0.0
j. Forested Wetland	0.0	0.0	0.0	0.0
Total[1]	**111.7**	**100.0**	**112.9**	**100.0**
Land Use				
a. Agriculture				
1. Cropland/Cultivated	0.3	0.3	0.2	0.2
2. Pastureland/Hay	4.8	4.3	5.1	4.5
b. Commercial/Industrial				
1. Business	0.0	0.0	0.0	0.0
2. Manufacturing	0.0	0.0	0.0	0.0
3. Marina	0.8	0.7	0.2	0.2
c. Developed Water Resources	0.0	0.0	0.0	0.0
d. Forest Land	55.8	49.9	49.7	44.0
e. Recreation				
1. Developed	3.0	2.7	4.1	3.6
2. Informal	0.1	0.1	0.2	0.2
f. Residential	43.1	38.6	46.3	41.0
g. Riprap	1.9	1.7	0.6	0.5
h. Road/Parking				
1. Improved	0.2	0.2	4.8	4.3
2. Unimproved	0.0	0.0	0.1	0.1
i. Undeveloped Land/No Current Use	1.1	1.0	1.5	1.3
j. Wetland	0.1	0.1	0.0	0.0
k. Other	0.5	0.4	0.1	0.1
Total[1]	**111.7**	**100.0**	**112.9**	**100.0**
Vegetation Impacts				
a. None	61.5	55.0	59.8	53.0
b. Clearing	0.0	0.0	0.1	0.1
c. Grubbing	0.1	0.1	0.0	0.0
d. Herbicide	0.0	0.0	0.0	0.0
e. Livestock Grazing	1.0	0.9	3.4	3.0
f. Mowing	48.7	43.6	49.4	43.7
g. Recreation	0.1	0.1	0.0	0.0
h. Thinning	0.0	0.0	0.0	0.0
i. Other	0.3	0.3	0.2	0.2
Total[1]	**111.7**	**100.0**	**112.9**	**100.0**
Soil Erosion				
a. None	2.2	2.0	5.6	5.0
b. Minimal	105.3	94.3	107.0	94.7
c. Moderate	4.1	3.6	0.3	0.3
d. Severe	0.1	0.1	0.0	0.0
e. Critical	0.0	0.0	0.0	0.0
Total[1]	**111.7**	**100.0**	**112.9**	**100.0**

[1]Shoreline mileage totals vary slightly between Zones 1 and 2 because numbers were truncated during calculation instead of rounded.

Table K-2. Summary of Shoreline Soil Erosion Investigation of Fort Loudoun Reservoir.				
	Zone 1 (0'-25')		Zone 2 (26'-100')	
	Miles	**Percent**	**Miles**	**Percent**
Vegetation Type				
a. None	3.7	1.5	20.2	8.1
b. Grass/Forb	21.9	8.8	62.2	25.0
c. Shrub/Brush	1.7	0.7	1.2	0.5
d. Tree	103.2	41.3	90.8	36.4
e. Shrub/Grass	4.7	1.9	2.9	1.2
f. Tree/Grass	100.6	40.2	68.0	27.3
g. Tree/Shrub	14.2	5.6	3.9	1.5
h. Emergent Wetland	0.0	0.0	0.0	0.0
i. Scrub/Shrub Wetland	0.0	0.0	0.0	0.0
j. Forested Wetland	0.0	0.0	0.0	0.0
Total[1]	**250.0**	**100.0**	**249.2**	**100.0**
Land Use				
a. Agriculture				
1. Cropland/Cultivated	0.0	0.0	0.5	0.2
2. Pastureland/Hay	31.4	12.6	36.2	14.5
b. Commercial/Industrial				
1. Business	0.6	0.2	6.5	2.6
2. Manufacturing	0.8	0.3	2.0	0.8
3. Marina	1.6	0.6	0.9	0.4
c. Developed Water Resources	0.0	0.0	0.0	0.0
d. Forest Land	102.2	40.9	88.3	35.4
e. Recreation				
1. Developed	7.9	3.2	8.4	3.4
2. Informal	0.0	0.0	0.4	0.2
f. Residential	76.8	30.7	80.3	32.2
g. Riprap	3.1	1.2	0.3	0.1
h. Road/Parking				
1. Improved	0.0	0.0	10.9	4.4
2. Unimproved	0.0	0.0	0.0	0.0
i. Undeveloped Land/No Current Use	23.4	9.4	8.1	3.3
j. Wetland	0.0	0.0	0.0	0.0
k. Other	2.2	0.9	6.4	2.5
Total[1]	**250.0**	**100.0**	**249.2**	**100.0**
Vegetation Impacts				
a. None	131.1	52.5	117.1	47.0
b. Clearing	0.2	0.1	3.5	1.4
c. Grubbing	0.1	0.0	0.2	0.1
d. Herbicide	0.0	0.0	0.0	0.0
e. Livestock Grazing	1.1	0.4	12.8	5.1
f. Mowing	117.5	47.0	115.6	46.4
g. Recreation	0.0	0.0	0.0	0.0
h. Thinning	0.0	0.0	0.0	0.0
i. Other	0.0	0.0	0.0	0.0
Total[1]	**250.0**	**100.0**	**249.2**	**100.0**
Soil Erosion				
a. None	3.6	1.4	20.1	8.1
b. Minimal	223.6	89.4	229.0	91.9
c. Moderate	5.5	2.2	0.1	0.0
d. Severe	15.2	6.1	0.0	0.0
e. Critical	2.1	0.9	0.0	0.0
Total[1]	**250.0**	**100.0**	**249.2**	**100.0**

[1]Shoreline mileage totals vary slightly between Zones 1 and 2 because numbers were truncated during calculation instead of rounded.

Table K-3. Summary of Shoreline Soil Erosion Investigation of Kentucky Reservoir.[1]	Zone 1 (0'-25')		Zone 2 (26'-100')	
	Miles	**Percent**	**Miles**	**Percent**
Vegetation Type				
a. None	2.9	1.3	2.6	1.2
b. Grass/Forb	8.4	3.9	20.4	9.3
c. Shrub/Brush	0.0	0.0	0.3	0.1
d. Tree	113.3	51.9	161.3	73.5
e. Shrub/Grass	0.5	0.2	0.0	0.0
f. Tree/Grass	51.4	23.6	30.0	13.7
g. Tree/Shrub	34.0	15.6	2.3	1.0
h. Emergent Wetland	1.2	0.6	0.0	0.0
i. Scrub/Shrub Wetland	5.6	2.6	2.7	1.2
j. Forested Wetland	0.7	0.3	0.0	0.0
Total[2]	**218.0**	**100.0**	**219.6**	**100.0**
Land Use				
a. Agriculture				
1. Cropland/Cultivated	0.0	0.0	0.0	0.0
2. Pastureland/Hay	4.6	2.1	3.8	1.7
b. Commercial/Industrial				
1. Business	0.2	0.1	1.3	0.6
2. Manufacturing	0.6	0.3	0.0	0.0
3. Marina	2.9	1.3	3.6	1.6
c. Developed Water Resources	0.0	0.0	0.0	0.0
d. Forest Land	128.7	59.0	151.2	68.9
e. Recreation				
1. Developed	18.3	8.4	15.3	7.0
2. Informal	1.4	0.6	5.4	2.5
f. Residential	21.4	9.9	22.1	10.1
g. Riprap	0.2	0.1	0.5	0.2
h. Road/Parking				
1. Improved	1.1	0.5	0.0	0.0
2. Unimproved	0.0	0.0	0.0	0.0
i. Undeveloped Land/No Current Use	29.8	13.7	13.0	5.9
j. Wetland	7.2	3.3	2.5	1.1
k. Other	1.6	0.7	0.9	0.4
Total[2]	**218.0**	**100.0**	**219.6**	**100.0**
Vegetation Impacts				
a. None	170.1	78.0	177.3	80.7
b. Clearing	1.6	0.7	2.1	1.0
c. Grubbing	0.0	0.0	0.0	0.0
d. Herbicide	0.0	0.0	0.0	0.0
e. Livestock Grazing	0.0	0.0	0.0	0.0
f. Mowing	45.7	21.0	40.2	18.3
g. Recreation	0.4	0.2	0.0	0.0
h. Thinning	0.0	0.0	0.0	0.0
i. Other	0.2	0.1	0.0	0.0
Total[2]	**218.0**	**100.0**	**219.6**	**100.0**
Soil Erosion				
a. None	7.1	3.3	0.9	0.4
b. Minimal	181.8	83.3	210.6	95.9
c. Moderate	22.2	10.2	6.1	2.8
d. Severe	5.7	2.6	1.6	0.7
e. Critical	1.2	0.6	0.4	0.2
Total[2]	**218.0**	**100.0**	**219.6**	**100.0**

[1]Only a representative portion of this reservoir was investigated.

[2]Shoreline mileage totals vary slightly between Zones 1 and 2 because numbers were truncated during calculation instead of rounded.

Table K-4. Summary of Shoreline Soil Erosion Investigation of Melton Hill Reservoir.				
	Zone 1 (0'-25')		**Zone 2 (26'-100')**	
	Miles	**Percent**	**Miles**	**Percent**
Vegetation Type				
a. None	2.2	1.4	19.9	12.4
b. Grass/Forb	10.4	6.5	30.0	18.7
c. Shrub/Brush	5.8	3.6	4.5	2.8
d. Tree	99.5	61.9	75.9	47.4
e. Shrub/Grass	13.1	8.1	6.7	4.2
f. Tree/Grass	16.8	10.5	18.2	11.4
g. Tree/Shrub	12.6	7.8	4.9	3.1
h. Emergent Wetland	0.0	0.0	0.0	0.0
i. Scrub/Shrub Wetland	0.0	0.0	0.0	0.0
j. Forested Wetland	0.4	0.2	0.0	0.0
Total[1]	**160.8**	**100.0**	**160.1**	**100.0**
Land Use				
a. Agriculture				
1. Cropland/Cultivated	0.0	0.0	0.4	0.2
2. Pastureland/Hay	8.4	5.2	22.4	14.0
b. Commercial/Industrial				
1. Business	2.3	1.4	1.9	1.2
2. Manufacturing	0.5	0.3	2.5	1.6
3. Marina	0.0	0.0	0.0	0.0
c. Developed Water Resources	0.0	0.0	1.0	0.6
d. Forest Land	102.0	63.4	76.7	47.9
e. Recreation				
1. Developed	6.3	3.9	3.2	2.0
2. Informal	0.0	0.0	0.0	0.0
f. Residential	12.0	7.5	17.5	10.9
g. Riprap	1.6	1.0	0.0	0.0
h. Road/Parking				
1. Improved	1.0	0.7	12.1	7.6
2. Unimproved	0.0	0.0	0.8	0.5
i. Undeveloped Land/No Current Use	24.9	15.5	14.5	9.1
j. Wetland	0.4	0.2	0.0	0.0
k. Other	1.4	0.9	7.1	4.4
Total[1]	**160.8**	**100.0**	**160.1**	**100.0**
Vegetation Impacts				
a. None	129.5	80.5	113.5	70.9
b. Clearing	0.1	0.1	0.8	0.5
c. Grubbing	0.2	0.1	0.2	0.1
d. Herbicide	0.0	0.0	0.0	0.0
e. Livestock Grazing	4.6	2.9	5.8	3.6
f. Mowing	25.6	15.9	38.9	24.3
g. Recreation	0.8	0.5	0.0	0.0
h. Thinning	0.0	0.0	0.3	0.2
i. Other	0.0	0.0	0.6	0.4
Total[1]	**160.8**	**100.0**	**160.1**	**100.0**
Soil Erosion				
a. None	4.2	2.6	16.3	10.2
b. Minimal	138.1	85.9	143.3	89.5
c. Moderate	13.4	8.3	0.0	0.0
d. Severe	5.0	3.1	0.5	0.3
e. Critical	0.1	0.1	0.0	0.0
Total[1]	**160.8**	**100.0**	**160.1**	**100.0**

[1]Shoreline mileage totals vary slightly between Zones 1 and 2 because numbers were truncated during calculation instead of rounded.

Table K-5. Summary of Shoreline Soil Erosion Investigation of Tellico Reservoir.				
	Zone 1 (0'-25')		**Zone 2 (26'-100')**	
	Miles	**Percent**	**Miles**	**Percent**
Vegetation Type				
a. None	14.4	4.6	24.2	7.8
b. Grass/Forb	19.5	6.3	32.8	10.5
c. Shrub/Brush	0.8	0.3	0.0	0.0
d. Tree	204.1	65.6	203.4	65.4
e. Shrub/Grass	15.1	4.9	4.2	1.4
f. Tree/Grass	38.4	12.3	35.5	11.4
g. Tree/Shrub	14.1	4.5	10.9	3.5
h. Emergent Wetland	0.8	0.3	0.0	0.0
i. Scrub/Shrub Wetland	0.0	0.0	0.0	0.0
j. Forested Wetland	3.8	1.2	0.0	0.0
Total[1]	**311.0**	**100.0**	**311.0**	**100.0**
Land Use				
a. Agriculture				
1. Cropland/Cultivated	0.0	0.0	3.6	1.2
2. Pastureland/Hay	15.1	4.9	17.7	5.7
b. Commercial/Industrial				
1. Business	0.0	0.0	0.0	0.0
2. Manufacturing	1.0	0.3	1.4	0.5
3. Marina	1.3	0.4	1.0	0.3
c. Developed Water Resources	0.4	0.1	0.0	0.0
d. Forest Land	203.8	65.5	203.3	65.4
e. Recreation				
1. Developed	5.1	1.7	5.8	1.9
2. Informal	0.7	0.2	0.1	0.0
f. Residential	13.2	4.2	15.6	5.0
g. Riprap	13.8	4.4	0.0	0.0
h. Road/Parking				
1. Improved	0.0	0.0	23.3	7.4
2. Unimproved	0.0	0.0	0.0	0.0
i. Undeveloped Land/No Current Use	51.8	16.7	39.1	12.6
j. Wetland	4.6	1.5	0.0	0.0
k. Other	0.2	0.1	0.1	0.0
Total[1]	**311.0**	**100.0**	**311.0**	**100.0**
Vegetation Impacts				
a. None	275.5	88.6	268.6	86.4
b. Clearing	0.6	0.2	0.5	0.2
c. Grubbing	0.0	0.0	0.0	0.0
d. Herbicide	0.0	0.0	0.0	0.0
e. Livestock Grazing	10.9	3.5	12.9	4.1
f. Mowing	23.9	7.7	28.9	9.3
g. Recreation	0.0	0.0	0.0	0.0
h. Thinning	0.1	0.0	0.1	0.0
i. Other	0.0	0.0	0.0	0.0
Total[1]	**311.0**	**100.0**	**311.0**	**100.0**
Soil Erosion				
a. None	19.4	6.2	23.3	7.5
b. Minimal	275.9	88.7	287.0	92.2
c. Moderate	9.1	3.0	0.5	0.2
d. Severe	6.3	2.0	0.2	0.1
e. Critical	0.3	0.1	0.0	0.0
Total[1]	**311.0**	**100.0**	**311.0**	**100.0**

[1]Shoreline mileage totals vary slightly between Zones 1 and 2 because numbers were truncated during calculation instead of rounded.

Table K-6. Summary of Shoreline Soil Erosion Investigation of Watts Bar Reservoir.[1]				
	Zone 1 (0'-25')		Zone 2 (26'-100')	
	Miles	Percent	Miles	Percent
Vegetation Type				
a. None	0.7	0.3	5.7	2.1
b. Grass/Forb	13.0	4.7	18.7	6.7
c. Shrub/Brush	0.5	0.1	0.0	0.0
d. Tree	177.5	64.1	162.9	58.8
e. Shrub/Grass	1.9	0.7	2.8	1.0
f. Tree/Grass	78.0	28.1	85.4	30.8
g. Tree/Shrub	5.5	2.0	1.6	0.6
h. Emergent Wetland	0.0	0.0	0.0	0.0
i. Scrub/Shrub Wetland	0.0	0.0	0.0	0.0
j. Forested Wetland	0.0	0.0	0.0	0.0
Total[2]	**277.1**	**100.0**	**277.1**	**100.0**
Land Use				
a. Agriculture				
1. Cropland/Cultivated	0.0	0.0	0.0	0.0
2. Pastureland/Hay	8.9	3.2	10.3	3.7
b. Commercial/Industrial				
1. Business	1.0	0.4	0.9	0.3
2. Manufacturing	0.0	0.0	0.0	0.0
3. Marina	1.6	0.6	1.7	0.6
c. Developed Water Resources	0.0	0.0	0.0	0.0
d. Forest Land	171.8	62.0	161.8	58.4
e. Recreation				
1. Developed	9.9	3.6	10.7	3.9
2. Informal	1.0	0.4	0.5	0.2
f. Residential	73.8	26.6	79.7	28.7
g. Riprap	0.4	0.1	0.0	0.0
h. Road/Parking				
1. Improved	0.2	0.0	5.3	1.9
2. Unimproved	0.0	0.0	0.0	0.0
i. Undeveloped Land/No Current Use	8.5	3.1	5.7	2.1
j. Wetland	0.0	0.0	0.0	0.0
k. Other	0.0	0.0	0.5	0.2
Total[2]	**277.1**	**100.0**	**277.1**	**100.0**
Vegetation Impacts				
a. None	183.1	66.1	174.8	63.1
b. Clearing	0.9	0.3	0.0	0.0
c. Grubbing	0.0	0.0	0.0	0.0
d. Herbicide	0.0	0.0	0.0	0.0
e. Livestock Grazing	4.8	1.7	5.7	2.1
f. Mowing	88.2	31.8	96.5	34.8
g. Recreation	0.1	0.1	0.1	0.0
h. Thinning	0.0	0.0	0.0	0.0
i. Other	0.0	0.0	0.0	0.0
Total[2]	**277.1**	**100.0**	**277.1**	**100.0**
Soil Erosion				
a. None	0.5	0.2	5.9	2.1
b. Minimal	253.4	91.4	266.6	96.2
c. Moderate	14.4	5.2	4.6	1.7
d. Severe	3.3	1.2	0.0	0.0
e. Critical	5.5	2.0	0.0	0.0
Total[2]	**277.1**	**100.0**	**277.1**	**100.0**

[1]Only a representative portion of this reservoir was investigated.

[2]Shoreline mileage totals vary slightly between Zones 1 and 2 because numbers were truncated during calculation instead of rounded.

APPENDIX L

WETLAND TYPES AND ASSOCIATED WETLAND WILDLIFE/ WATERFOWL SPECIES

WETLAND TYPES AND ASSOCIATED WETLAND WILDLIFE/WATERFOWL SPECIES

Aquatic Bed Wetland

Plants. These wetlands are dominated by plants that grow on or below the water surface for most of the growing season in most years. These plant communities are best developed in relatively permanent water or under conditions of repeated flooding (Zone 1, as described in Section 3.9.3). These conditions are most common on mainstream reservoirs, especially those where the summer to winter pool drawdown is 5 feet or less. Typically, reservoirs in the southern and western Valley support the greatest amount of aquatic bed wetland habitat. However, these amounts can vary significantly from year to year because of a variety of environmental factors, principally dictated by rainfall amounts and water flow in the system (TVA, 1995b). The most common rooted vascular plants are Eurasian watermilfoil, pondweeds, southern and spinyleaf naiads, and elodea. Muskgrass is a common, large, green alga found anchored to the bottom. Common floating vascular plants that float freely in the water or on the surface include coontail, watermeal, and duckweeds. Also, several filamentous algal species form large bottom and surface mats in some reservoirs.

Wildlife. Common waterfowl species that use aquatic bed wetlands for foraging habitat include the mallard, black duck, gadwall, green-winged teal, American widgeon, northern shoveler, blue-winged teal, wood duck, ring-necked duck, bufflehead, and hooded merganser. Common waterbirds typically associated with aquatic beds include the American coot and pied-billed grebe. Common wading birds that use aquatic bed wetlands as foraging habitat include the great blue heron, green-backed heron, and great egret.

Mammals that use aquatic beds as foraging habitat include the muskrat, beaver, and raccoon. White-tailed deer are known to sometimes consume aquatic bed vegetation. Numerous reptile and amphibians may use this habitat, including the river cooter and red-eared turtle that use aquatic vegetation both as cover and food.

Emergent Wetland

Plants. This wetland class is characterized by erect, rooted herbaceous hydrophytes. This vegetation is present for most of the growing season in most years and is commonly dominated by perennial plants. On TVA reservoirs these wetlands typically occur from approximately 1.5 feet below summer pool elevation to 1.5 feet above summer pool (Zones 1 and 2). The extent of emergent wetlands along reservoir shorelines is dictated by slope, water depth at summer pool, and reservoir operations schedules and can vary over time as a result of environmental factors or changes in reservoir operations. Most emergent wetlands, especially those comprised of perennial species, occur on mainstream reservoirs, principally from Chickamauga downstream. Common emergent plants include common cattail, soft stem bulrush, arrowhead, giant cutgrass, rice cutgrass, panic grass, smartweed, lizard's tail, woolgrass, alligatorweed, water willow, and American lotus.

Some tributary and mainstream reservoirs support wetlands similar to the emergent type but are more appropriately classified as vegetated unconsolidated shores or flats (Zone 1). These areas are characterized by substrates lacking vegetation except for plants that become established during periods when growing conditions are favorable. For these pioneering plants, the period of time when growing conditions are favorable is generally dictated by the operation (drawdown) schedule for the reservoir. Drawdown zones are typically colonized by herbaceous annuals or seedling herbaceous perennials. The most common species growing under these conditions are teal lovegrass, spikerush, white-edge flatsedge, toothcup, purple ammania, tufted foxtail, and several other grasses and sedges.

Wildlife. Common waterfowl species that use emergent wetland habitats include the Canada goose, mallard, black duck, green-winged teal, blue-winged teal, wood duck, and ring-necked duck. Waterbirds typically associated with emergent wetlands include the American coot, king rail, and sora.

Wading birds that use emergent wetlands as foraging and/or nesting habitat include the least bittern, yellow-crowned night-heron, green-backed heron, great egret, and great blue heron. Red-winged blackbirds use emergent wetlands during the spring/summer period, while swamp sparrows use this habitat during the fall and winter.

Mammals that use emergent wetland habitat include muskrat, beaver, mink, otter, and raccoon. Several reptile and amphibians use emergent wetlands, including the northern water snake, garter snake, red-eared turtle, snapping turtle, bullfrog, green frog, southern leopard frog, and upland chorus frog.

Scrub-Shrub Wetland

Plants. This wetland class includes areas dominated by woody vegetation less than 20 feet tall. Vegetation includes true shrubs, young trees, and trees or shrubs that are small or stunted because of environmental conditions. On TVA reservoirs scrub-shrub wetlands typically occur from approximately 3 feet below summer pool elevation to 1.5 feet above summer pool (Zones 1 and 2). Like emergent wetlands, the extent of scrub-shrub areas is dictated by shoreline/drawdown zone slope, water depth at summer pool, and reservoir operations. The most extensive scrub-shrub wetlands occur on mainstream reservoirs from Chickamauga downstream. Relatively large areas of scrub-shrub have developed on several tributary lakes, especially in the upper ends of larger embayments. These wetlands have developed on suitable substrate during periods of extended reservoir drawdown, probably during periods of drought when reservoirs did not reach summer pool levels. Common scrub-shrub vegetation includes black willow, buttonbush, river alder, and silky dogwood. Young trees of species such as river birch, boxelder, silver maple, sycamore, red maple, green ash, and black gum also commonly occur in this wetland type.

Wildlife. Common waterfowl species that use scrub-shrub wetlands include the wood duck, mallard, and black duck. Water and wading birds that use scrub-shrub areas as foraging, protective cover, or nesting habitat include the American coot, least bittern, yellow-crowned night-heron, green-backed heron, great egret, and great blue heron. Red-winged blackbirds and yellow warblers nest in scrub-shrub habitat, while prothonotary warblers and tree swallows nest in cavities that form in scrub-shrub vegetation.

Mammals such as beaver, muskrat, mink, and raccoon feed on or forage within scrub-shrub wetlands. Several reptile and amphibians use scrub-shrub habitats, including the northern water snake, rough green snake, as well as some frogs and salamanders.

Forested Wetland

Plants. This wetland class is characterized by woody vegetation that is 20 feet tall or taller. In the TVA reservoir system, forested wetlands typically occur in lowlands above summer pool elevation (Zone 2) or behind man-made dikes/levees where water levels are managed. Some forested wetlands occur below summer pool elevation (Zone 1) with most of these being in the southern and western Valley. This wetland type normally possesses an overstory of trees, an understory of young trees or shrubs, and a herbaceous layer and is typically referred to as bottomland hardwoods in the Tennessee Valley. Common broad-leaved deciduous species include red maple, sweetgum, green ash, American elm, sugarberry, black gum, overcup oak, swamp chestnut oak, cherrybark oak, willow oak, and water oak. Tupelo gum, though not common, is an important dominant species in semi-to-permanently-flooded forested wetlands in the southern and western Valley. The dominant needle-leaved deciduous species is bald cypress, which sometimes shares the same semi-to-permanently-flooded water regimes.

The long-term flooding of TVA reservoirs during the growing season has resulted in the development of a riparian zone of tree species along much of the shoreline. The width of this zone is largely dictated by shoreline slope, which allows for substrate saturation preferred by some tree species. Over time, the mesic species that occurred near the shoreline have been replaced by species better

adapted to growing in saturated soil conditions (Amundsen, 1994). Some of the common riparian species include sycamore, green ash, blackgum, elm, blue beech, boxelder, black willow, sweetgum, silver maple, red maple, and river birch. In many situations these reservoir-influenced riparian zones are mapped as, and tend to function as, forested wetlands.

Wildlife. Common waterfowl species that use forested wetlands and forested riparian habitats include the wood duck, mallard, and black duck. Wading birds that use forested wetlands as nesting or foraging habitat include the green-backed heron, yellow-crowned night-heron, great egret, and great blue heron. Raptors that commonly nest in forested wetlands include the red-shouldered hawk and barred owl. Summer resident and migratory osprey and bald eagles use forested riparian zones as loafing/perch sites and increasingly as nesting habitat. Riparian zones are commonly used by belted kingfishers and numerous songbirds as foraging and nesting habitat. Several reptile and amphibian species use forested wetlands and forested riparian zones at least seasonally. These include northern water snake, black rat snake, gray tree frog, American toad, dusky and slimy salamanders. Mammals using these habitat types include beaver, mink, otter, white-tailed deer, squirrel, and raccoon. The Indiana bat also forages within forested riparian habitats.

APPENDIX M

DEVELOPMENT OF WINTERING WATERFOWL HABITAT SUITABILITY MODEL

DEVELOPMENT OF WINTERING WATERFOWL HABITAT SUITABILITY MODEL

In order to quantitatively describe the quality of near-shore portions of the reservoir for wintering waterfowl, a habitat suitability model was developed. Several widely available, well-documented waterfowl habitat models, such as the Habitat Suitability Index Models developed by the USF&WS (e.g., Allen, 1986; Sousa and Farmer, 1983), were reviewed for possible use. These models were unsuitable because they were developed for habitats not found in the Tennessee Valley or required detailed habitat measurements that were not readily available.

SMI Model. The model described here was developed as an index of habitat suitability for dabbling ducks, such as the mallard, American black duck, American widgeon, and gadwall, which frequent shallow water and shoreline areas. The model incorporates many of the habitat parameters found in other models with the exception of the presence of croplands of cultivated grains, such as corn. Although cultivated grains are important food sources for dabbling ducks (Allen, 1986; Johnson and Montalbano, 1989), they were not included because current distribution maps were not available.

Habitat suitability for wintering waterfowl was determined for the reservoir drawdown zone (the region between normal summer and winter pool levels) on Chatuge, Chickamauga, Tellico, Watts Bar, and the downstream third of Kentucky Reservoirs. Spatial analyses were conducted with a GIS. Scores for segments of the drawdown zone were determined from:

- The presence and diversity of wetlands.
- The degree of human presence and disturbance along the shoreline.
- The proximity to wildlife refuges and management areas.

Wetlands. Wetlands are important to waterfowl for feeding and escape and loafing cover (Allen, 1986; Johnson and Montalbano, 1989). Wetlands were mapped as described in Section 3.9, and then each individual wetland was surrounded by a buffer one-eighth mile (660 feet) wide. If the buffer surrounded a single wetland type, it was given a wetlands score of 0.5. Because the presence of more than one wetland type results in a greater variety of food items (Allen, 1986), areas with more than one wetland type present were given a wetlands score of 1.0.

Human Presence and Disturbance. The degree of human presence and disturbance was determined from the type of development along the shoreline. Areas within the drawdown zone fronting undeveloped shoreline were assigned a disturbance score of 1.0, indicative of little disturbance. Most areas fronting developed shoreline (Section 3.4) were assigned a disturbance score of 0.1, indicative of a high level of disturbance. The exception was for areas fronting developed industrial shoreline, which were assigned a disturbance score of 1.0. Compared to other types of developed shoreline, the level of human presence and disturbance to nearby waterfowl along developed industrial shoreline is low and predictable, and waterfowl often occur in such areas (TVA unpublished data).

Wildlife Refuges and Management Areas. The third component of the model is the proximity to wildlife refuges and management areas. These areas, often intensively managed for waterfowl, are important for foraging and escape and roosting cover. While they frequently provide most waterfowl habitat requirements, waterfowl often fly from them to use other parts of the reservoirs. Waterfowl typically move up to 5 miles between roosting and foraging areas (Allen, 1986), and the probability of waterfowl regularly visiting an area declines with its distance from a roosting or foraging area. Shoreline segments within 1 mile of refuges and management areas were given the highest possible score (1.0), and those over 5 miles away were given the lowest possible score (0). For segments between 1 and 5 miles, the score is a linear function of distance, converted into three distance classes to simplify the analyses. The proximity scores assigned to shoreline segments in these three classes were based on the midpoints of the corresponding range of numerical scores (e.g., 1 to 2.3 mile class with a corresponding range of 0.67 to 1.0, or score of 0.83). The proximity scores are as follows:

- Up to 1 mile from wildlife refuge or management area, score = 1.0
- 1 to 2.3 miles, score = 0.83
- 2.3 to 3.7 miles, score = 0.50
- 3.7 to 5 miles, score = 0.17
- Over 5 miles, score = 0.0

This analysis was carried out by buffering wildlife refuges and management areas at distances of 1, 2.3, 3.7, and 5 miles from boundaries and assigning the appropriate scores to the area within the different zones. Buffer lines paralleling and close to refuge and management area boundaries were manually adjusted when necessary to prevent splitting the areas into narrow, elongated slivers.

The scores for wetlands, human disturbance, and proximity to wildlife refuges and management areas were then summed to derive the overall habitat suitability score. Portions of the drawdown zone fronting developed or undeveloped shoreline were differentiated by extending boundary lines from the shoreline at the border of developed and undeveloped shoreline segments across the drawdown zone to the winter pool level. These lines were usually extended perpendicular to the shoreline. This provided acreage of areas in each of the habitat suitability categories.

APPENDIX N

POPULATION OF COUNTIES ALONG TVA RESERVOIRS

Table N-1. Population of Counties Along TVA Reservoirs, 1980-1994.[1]

Reservoir	State	County	Population			Percent Increase	
			1980	1990	1994	1980-1994	1990-1994
Eastern Commercially Navigable Waterway Reservoirs							
Melton Hill	TN	Anderson	67,346	68,250	71,216	5.7	4.3
	TN	Roane	48,425	47,227	48,507	0.2	2.7
	TN	Loudon	28,553	31,255	35,078	22.9	12.2
	TN	Knox	319,694	335,749	357,447	11.8	6.5
Total			**464,018**	**482,481**	**512,248**	**10.4**	**6.2**
Ft. Loudoun	TN	Knox	319,694	335,749	357,447	11.8	6.5
	TN	Blount	77,770	85,969	94,565	21.6	10.0
	TN	Loudon	28,553	31,255	35,078	22.9	12.2
Total			**426,017**	**452,973**	**487,090**	**14.3**	**7.5**
Tellico	TN	Blount	77,770	85,969	94,565	21.6	10.0
	TN	Loudon	28,553	31,255	35,078	22.9	12.2
	TN	Monroe	28,700	30,541	32,409	12.9	6.1
Total			**135,023**	**147,765**	**162,052**	**20.0**	**9.7**
Watts Bar	TN	Loudon	28,553	31,255	35,078	22.9	12.2
	TN	Roane	48,425	47,227	48,507	0.2	2.7
	TN	Rhea	24,235	24,344	26,282	8.4	8.0
	TN	Meigs	7,431	8,033	8,942	20.3	11.3
Total			**108,644**	**110,859**	**118,809**	**9.4**	**7.2**
Chickamauga	TN	Bradley	67,547	73,712	77,570	14.8	5.2
	TN	McMinn	41,878	42,383	44,476	6.2	4.9
	TN	Meigs	7,431	8,033	8,942	20.3	11.3
	TN	Rhea	24,235	24,344	26,282	8.4	8.0
	TN	Hamilton	287,643	285,536	292,772	1.8	2.5
Total			**428,734**	**434,008**	**450,042**	**5.0**	**3.7**
Nickajack	TN	Marion	24,416	24,860	26,116	7.0	5.1
	TN	Hamilton	287,643	285,536	292,772	1.8	2.5
Total			**312,059**	**310,396**	**318,888**	**2.2**	**2.7**
Eastern Tributary Reservoirs[2]							
South Holston	TN	Sullivan	143,968	143,596	147,655	2.6	2.8
	VA[3]	Washington	65,529	64,313	65,700	0.3	2.2
Total			**209,497**	**207,909**	**213,355**	**1.8**	**2.6**
Ft. Patrick Henry	TN	Sullivan	143,968	143,596	147,655	2.6	2.8
	TN	Washington	88,755	92,315	97,411	9.8	5.5
Total			**232,723**	**235,911**	**245,066**	**5.3**	**3.9**
Boone	TN	Sullivan	143,968	143,596	147,655	2.6	2.8
	TN	Washington	88,755	92,315	97,411	9.8	5.5
Total			**232,723**	**235,911**	**245,066**	**5.3**	**3.9**
Wilbur	TN	Carter	50,205	51,505	52,823	5.2	2.6
Total			**50,205**	**51,505**	**52,823**	**5.2**	**2.6**
Watauga	TN	Carter	50,205	51,505	52,823	5.2	2.6
	TN	Johnson	13,745	13,766	15,940	16.0	15.8
Total			**63,950**	**65,271**	**68,763**	**7.5**	**5.4**
Norris	TN	Anderson	67,346	68,250	71,216	5.7	4.3
	TN	Campbell	34,923	35,079	36,445	4.4	3.9
	TN	Claiborne	24,595	26,137	28,114	14.3	7.6
	TN	Grainger	16,751	17,095	18,177	8.5	6.3
	TN	Union	11,707	13,694	14,607	24.8	6.7
Total			**155,322**	**160,255**	**168,559**	**8.5**	**5.2**

[1]Source: U.S. Department of Commerce, Bureau of the Census (1995).

[2]Not commercially navigable.

[3]Includes Washington County and independent city of Bristol.

Table N-1 (Cont.). Population of Counties Along TVA Reservoirs, 1980-1994.[1]

Reservoir	State	County	Population			Percent Increase	
			1980	1990	1994	1980-1994	1990-1994
Eastern Tributary Reservoirs (Cont.)[2]							
Cherokee	TN	Grainger	16,751	17,095	18,177	8.5	6.3
	TN	Hamblen	49,300	50,480	52,553	6.6	4.1
	TN	Hawkins	43,751	44,565	47,082	7.6	5.6
	TN	Jefferson	31,284	33,016	36,945	18.1	11.9
Total			**141,086**	**145,156**	**154,757**	**9.7**	**6.6**
Douglas	TN	Cocke	28,792	29,141	30,801	7.0	5.7
	TN	Hamblen	49,300	50,480	52,553	6.6	4.1
	TN	Jefferson	31,284	33,016	36,945	18.1	11.9
	TN	Sevier	41,418	51,043	58,184	40.5	14.0
Total			**150,794**	**163,680**	**178,483**	**18.4**	**9.0**
Fontana	NC	Graham	7,217	7,196	7,572	4.9	5.2
	NC	Swain	10,283	11,268	11,726	14.0	4.1
Total			**17,500**	**18,464**	**19,298**	**10.3**	**4.5**
Ocoee Project	TN	Polk	13,602	13,643	14,028	3.1	2.8
Total			**13,602**	**13,643**	**14,028**	**3.1**	**2.8**
Apalachia	NC	Cherokee	18,933	20,170	21,089	11.4	4.6
Total			**18,933**	**20,170**	**21,089**	**11.4**	**4.6**
Hiwassee	NC	Cherokee	18,933	20,170	21,089	11.4	4.6
Total			**18,933**	**20,170**	**21,089**	**11.4**	**4.6**
Chatuge	GA	Towns	5,638	6,754	7,350	30.4	8.8
	NC	Clay	6,619	7,155	7,623	15.2	6.5
Total			**12,257**	**13,909**	**14,973**	**22.2**	**7.6**
Nottely	GA	Union	9,390	11,993	13,606	44.9	13.4
Total			**9,390**	**11,993**	**13,606**	**44.9**	**13.4**
Blue Ridge	GA	Fannin	14,748	15,992	17,047	15.6	6.6
Total			**14,748**	**15,992**	**17,047**	**15.6**	**6.6**
Western Commercially Navigable Waterway Reservoirs							
Guntersville	AL	Jackson	51,407	47,796	49,551	-3.6	3.7
	AL	Marshall	65,622	70,832	76,715	16.9	8.3
	TN	Marion	24,416	24,860	26,116	7.0	5.1
Total			**141,445**	**143,488**	**152,382**	**7.7**	**6.2**
Wheeler	AL	Marshall	65,622	70,832	76,715	16.9	8.3
	AL	Morgan	90,231	100,043	106,177	17.7	6.1
	AL	Madison	196,966	238,912	258,035	31.0	8.0
	AL	Limestone	46,005	54,135	58,099	26.3	7.3
	AL	Lawrence	30,170	31,513	32,439	7.5	2.9
	AL	Lauderdale	80,546	79,661	83,152	3.2	4.4
Total			**509,540**	**575,096**	**614,617**	**20.6**	**6.9**
Wilson	AL	Colbert	54,519	51,666	52,535	-3.6	1.7
	AL	Lauderdale	80,546	79,661	83,152	3.2	4.4
	AL	Lawrence	30,170	31,513	32,439	7.5	2.9
Total			**165,235**	**162,840**	**168,126**	**1.7**	**3.2**
Pickwick	TN	Hardin	22,280	22,633	24,337	9.2	7.5
	MS	Tishomingo	18,434	17,683	18,161	-1.5	2.7
	AL	Colbert	54,519	51,666	52,535	-3.6	1.7
	AL	Lauderdale	80,546	79,661	83,152	3.2	4.4
Total			**175,779**	**171,643**	**178,185**	**1.4**	**3.8**

[1]Source: U.S. Department of Commerce, Bureau of the Census (1995).

[2]Not commercially navigable.

Table N-1 (Cont.). Population of Counties Along TVA Reservoirs, 1980-1994.[1]							
Reservoir	**State**	**County**	**Population**			**Percent Increase**	
			1980	**1990**	**1994**	**1980-1994**	**1990-1994**
Western Commercially Navigable Waterway Reservoirs (Cont.)							
Kentucky	TN	Hardin	22,280	22,633	24,337	9.2	7.5
	TN	Perry	6,111	6,612	6,892	12.8	4.2
	TN	Decatur	10,857	10,472	10,618	-2.2	1.4
	TN	Humphreys	15,957	15,813	16,267	1.9	2.9
	TN	Benton	14,901	14,524	15,512	4.1	6.8
	TN	Houston	6,871	7,018	7,478	8.8	6.6
	TN	Henry	28,656	27,888	29,015	1.3	4.0
	TN	Stewart	8,665	9,479	10,326	19.2	8.9
	TN	Wayne	13,946	13,935	15,525	11.3	11.4
	KY	Calloway	30,031	30,735	32,193	7.2	4.7
	KY	Trigg	9,384	10,361	11,195	19.3	8.0
	KY	Marshall	25,637	27,205	28,740	12.1	5.6
	KY	Lyon	6,490	6,624	7,570	16.6	14.3
	KY	Livingston	9,219	9,062	9,255	0.4	2.1
Total			**209,005**	**212,361**	**224,923**	**7.6**	**5.9**
Western Tributary Reservoirs[2]							
Bear Creek Project	AL	Franklin	28,350	27,814	29,023	2.4	4.4
	AL	Marion	30,041	29,830	30,230	0.6	1.3
	AL	Winston	21,953	22,053	23,128	5.4	4.9
Total			**80,344**	**79,697**	**82,381**	**2.5**	**3.4**
Beech River Project	TN	Decatur	10,857	10,472	10,618	-2.2	1.4
	TN	Henderson	21,390	21,844	22,084	3.2	1.1
Total			**32,247**	**32,316**	**32,702**	**1.4**	**1.2**
Normandy	TN	Bedford	27,916	30,411	32,484	16.4	6.8
	TN	Coffee	38,311	40,339	42,853	11.9	6.2
Total			**66,227**	**70,750**	**75,337**	**13.8**	**6.5**
Tims Ford	TN	Franklin	31,983	34,725	35,999	12.6	3.7
	TN	Moore	4,510	4,721	5,113	13.4	8.3
Total			**36,493**	**39,446**	**41,112**	**12.7**	**4.2**

[1]Source: U.S. Department of Commerce, Bureau of the Census (1995).
[2]Not commercially navigable.

APPENDIX O

PER CAPITA PERSONAL INCOME AND TOTAL EMPLOYMENT IN COUNTIES ALONG TVA RESERVOIRS

Table O-1. Per Capita Income in Counties Along TVA Reservoirs, 1980-1992 (1992 $).[1]					
Reservoir	**State**	**County**	**1980**	**1992**	**Percent Increase**
Eastern Commercially Navigable Waterway Reservoirs					
Melton Hill	TN	Anderson	15,103	18,587	23.1
	TN	Roane	14,175	16,016	13.0
	TN	Loudon	12,733	15,569	22.3
	TN	Knox	14,859	19,601	31.9
Average			**14,692**	**18,845**	**28.3**
Ft. Loudoun	TN	Knox	14,859	19,601	31.9
	TN	Blount	14,156	17,098	20.8
	TN	Loudon	12,733	15,569	22.3
Average			**14,588**	**18,837**	**29.1**
Tellico	TN	Blount	14,156	17,098	20.8
	TN	Loudon	12,733	15,569	22.3
	TN	Monroe	9,792	12,602	28.7
Average			**12,928**	**15,860**	**22.7**
Watts Bar	TN	Loudon	12,733	15,569	22.3
	TN	Roane	14,175	16,016	13.0
	TN	Rhea	11,973	13,040	8.9
	TN	Meigs	10,812	12,611	16.6
Average			**13,075**	**14,984**	**14.6**
Chickamauga	TN	Bradley	12,436	16,868	35.6
	TN	McMinn	11,716	14,394	22.9
	TN	Meigs	10,812	12,611	16.6
	TN	Rhea	11,973	13,040	8.9
	TN	Hamilton	15,413	19,853	28.8
Average			**14,308**	**18,275**	**27.7**
Nickajack	TN	Marion	11,457	13,878	21.1
	TN	Hamilton	15,413	19,853	28.8
Average			**15,103**	**19,372**	**28.3**
Eastern Tributary Reservoirs[2]					
South Holston	TN	Sullivan	14,056	17,794	26.6
	VA[3]	Washington	12,591	16,004	27.1
Average			**13,598**	**17,244**	**26.8**
Ft. Patrick Henry	TN	Sullivan	14,056	17,794	26.6
	TN	Washington	13,659	17,199	25.9
Average			**13,904**	**17,560**	**26.3**
Boone	TN	Sullivan	14,056	17,794	26.6
	TN	Washington	13,659	17,199	25.9
Average			**13,904**	**17,560**	**26.3**
Wilbur	TN	Carter	10,574	13,176	24.6
Average			**10,574**	**13,176**	**24.6**
Watauga	TN	Carter	10,574	13,176	24.6
	TN	Johnson	9,373	9,966	6.3
Average			**10,316**	**12,450**	**20.7**
Norris	TN	Anderson	15,103	18,587	23.1
	TN	Campbell	10,855	11,846	9.1
	TN	Claiborne	10,851	12,559	15.7
	TN	Grainger	8,518	11,910	39.8
	TN	Union	9,142	11,579	26.7
Average			**12,315**	**14,827**	**20.4**

[1]Source: U.S. Department of Commerce, Bureau of Economic Analysis (1994).

[2]Not commercially navigable.

[3]Includes Washington County and independent city of Bristol.

Table O-1 (Cont.). Per Capita Income in Counties Along TVA Reservoirs, 1980-1992 (1992 $).[1]					
Reservoir	**State**	**County**	**1980**	**1992**	**Percent Increase**
Eastern Tributary Reservoirs (Cont.)[2]					
Cherokee	TN	Grainger	8,518	11,910	39.8
	TN	Hamblen	11,428	15,948	39.6
	TN	Hawkins	10,129	14,767	45.8
	TN	Jefferson	10,897	14,100	29.4
Average			**10,563**	**14,681**	**39.0**
Douglas	TN	Cocke	9,824	13,412	36.5
	TN	Hamblen	11,428	15,948	39.6
	TN	Jefferson	10,897	14,100	29.4
	TN	Sevier	12,297	15,749	28.1
Average			**11,251**	**15,069**	**33.9**
Fontana	NC	Graham	10,541	11,256	6.8
	NC	Swain	9,686	11,509	18.8
Average			**10,037**	**11,410**	**13.7**
Ocoee Project	TN	Polk	10,955	13,152	20.1
Average			**10,955**	**13,152**	**20.1**
Apalachia	NC	Cherokee	9,617	12,465	29.6
Average			**9,617**	**12,465**	**29.6**
Hiwassee	NC	Cherokee	9,617	12,465	29.6
Average			**9,617**	**12,465**	**29.6**
Chatuge	GA	Towns	8,639	13,440	55.6
	NC	Clay	9,526	13,011	36.6
Average			**9,116**	**13,222**	**45.0**
Nottely	GA	Union	**8,573**	13,430	56.7
Average			**8,573**	**13,430**	**56.7**
Blue Ridge	GA	Fannin	10,390	12,988	25.0
Average			**10,390**	**12,988**	**25.0**
Western Commercially Navigable Waterway Reservoirs					
Guntersville	AL	Jackson	11,447	15,724	37.4
	AL	Marshall	12,404	15,957	28.6
	TN	Marion	11,457	13,878	21.1
Average			**11,893**	**15,524**	**30.5**
Wheeler	AL	Marshall	12,404	15,957	28.6
	AL	Morgan	13,497	18,119	34.2
	AL	Madison	15,006	20,876	39.1
	AL	Limestone	11,944	16,570	38.7
	AL	Lawrence	10,410	13,821	32.8
	AL	Lauderdale	12,627	16,182	28.2
Average			**13,480**	**18,367**	**36.3**
Wilson	AL	Colbert	13,163	15,584	18.4
	AL	Lauderdale	12,627	16,182	28.2
	AL	Lawrence	10,410	13,821	32.8
Average			**12,399**	**15,537**	**25.3**
Pickwick	TN	Hardin	10,848	12,891	18.8
	MS	Tishomingo	12,198	12,337	1.1
	AL	Colbert	13,163	15,584	18.4
	AL	Lauderdale	12,627	16,182	28.2
Average			**12,523**	**15,171**	**21.1**

[1]Source: U.S. Department of Commerce, Bureau of Economic Analysis (1994).

[2]Not commercially navigable.

Table O-1 (Cont.). Per Capita Income in Counties Along TVA Reservoirs, 1980-1992 (1992 $).[1]

Reservoir	State	County	1980	1992	Percent Increase
Western Commercially Navigable Waterway Reservoirs (Cont.)					
Kentucky	TN	Hardin	10,848	12,891	18.8
	TN	Perry	10,555	12,579	19.2
	TN	Decatur	10,490	12,739	21.4
	TN	Humphreys	13,346	14,022	5.1
	TN	Benton	12,067	13,945	15.6
	TN	Houston	10,863	11,640	7.2
	TN	Henry	12,768	15,221	19.2
	TN	Stewart	10,262	12,524	22.0
	TN	Wayne	10,589	11,965	13.0
	KY	Calloway	12,670	16,125	27.3
	KY	Trigg	13,592	14,275	5.0
	KY	Marshall	14,314	16,650	16.3
	KY	Lyon	11,243	12,145	8.0
	KY	Livingston	13,303	15,674	17.8
Average			**12,251**	**14,310**	**16.8**
Western Tributary Reservoirs[2]					
Bear Creek Project	AL	Franklin	13,184	14,969	13.5
	AL	Marion	10,480	13,310	27.0
	AL	Winston	11,098	13,815	24.5
Average			**11,602**	**14,036**	**21.0**
Beech River Project	TN	Decatur	10,490	12,739	21.4
	TN	Henderson	10,562	13,861	31.2
Average			**10,538**	**13,503**	**28.1**
Normandy	TN	Bedford	12,780	15,589	22.0
	TN	Coffee	13,625	17,429	27.9
Average			**13,269**	**16,633**	**25.4**
Tims Ford	TN	Franklin	11,028	14,586	32.3
	TN	Moore	11,510	13,659	18.7
Average			**11,088**	**14,473**	**30.5**

[1]Source: U.S. Department of Commerce, Bureau of Economic Analysis (1994).

[2]Not commercially navigable.

Table O-2. Total Employment in Counties Along TVA Reservoirs (Including Self-Employed), 1980-1993.[1]

Reservoir	State	County	1980	1993	Percent Increase
Eastern Commercially Navigable Waterway Reservoirs					
Melton Hill	TN	Anderson	31,072	46,897	50.9
	TN	Roane	23,595	26,485	12.2
	TN	Loudon	10,123	13,440	32.8
	TN	Knox	177,217	225,864	27.5
Total			**242,007**	**312,686**	**29.2**
Ft. Loudoun	TN	Knox	177,217	225,864	27.5
	TN	Blount	27,540	37,373	35.7
	TN	Loudon	10,123	13,440	32.8
Total			**214,880**	**276,677**	**28.8**
Tellico	TN	Blount	27,540	37,373	35.7
	TN	Loudon	10,123	13,440	32.8
	TN	Monroe	9,401	13,585	44.5
Total			**47,064**	**64,398**	**36.8**
Watts Bar	TN	Loudon	10,123	13,440	32.8
	TN	Roane	23,595	26,485	12.2
	TN	Rhea	12,966	12,975	0.1
	TN	Meigs	1,968	2,726	38.5
Total			**48,652**	**55,626**	**14.3**
Chickamauga	TN	Bradley	31,476	42,059	33.6
	TN	McMinn	20,258	22,847	12.8
	TN	Meigs	1,968	2,726	38.5
	TN	Rhea	12,966	12,975	0.1
	TN	Hamilton	171,442	199,742	16.5
Total			**238,110**	**280,349**	**17.7**
Nickajack	TN	Marion	6,784	8,561	26.2
	TN	Hamilton	171,442	199,742	16.5
Total			**178,226**	**208,303**	**16.9**
Eastern Tributary Reservoirs[2]					
South Holston	TN	Sullivan	78,238	88,880	13.6
	VA[3]	Washington	31,712	38,384	21.0
Total			**109,950**	**127,264**	**15.7**
Ft. Patrick Henry	TN	Sullivan	78,238	88,880	13.6
	TN	Washington	47,362	62,491	31.9
Total			**125,600**	**151,371**	**20.5**
Boone	TN	Sullivan	78,238	88,880	13.6
	TN	Washington	47,362	62,491	31.9
Total			**125,600**	**151,371**	**20.5**
Wilbur	TN	Carter	13,127	15,630	19.1
Total			**13,127**	**15,630**	**19.1**
Watauga	TN	Carter	13,127	15,630	19.1
	TN	Johnson	5,975	6,013	0.6
Total			**19,102**	**21,643**	**13.3**
Norris	TN	Anderson	31,072	46,897	50.9
	TN	Campbell	10,935	12,076	10.4
	TN	Claiborne	9,011	13,285	47.4
	TN	Grainger	4,668	6,249	33.9
	TN	Union	2,407	4,666	93.9
Total			**58,093**	**83,173**	**43.2**

[1]Source: U.S. Department of Commerce, Bureau of Economic Analysis (1994).
[2]Not commercially navigable.
[3]Includes Washington County and independent city of Bristol.

Table O-2 (Cont.). Total Employment in Counties Along TVA Reservoirs (Including Self-Employed), 1980-1993.[1]

Reservoir	State	County	1980	1993	Percent Increase
Eastern Tributary Reservoirs (Cont.)[2]					
Cherokee	TN	Grainger	4,668	6,249	33.9
	TN	Hamblen	27,580	37,559	36.2
	TN	Hawkins	14,152	17,324	22.4
	TN	Jefferson	12,379	14,827	19.8
Total			**58,779**	**75,959**	**29.2**
Douglas	TN	Cocke	9,854	12,049	22.3
	TN	Hamblen	27,580	37,559	36.2
	TN	Jefferson	12,379	14,827	19.8
	TN	Sevier	18,849	32,887	74.5
Total			**68,662**	**97,322**	**41.7**
Fontana	NC	Graham	3,245	3,096	-4.6
	NC	Swain	5,659	6,562	16.0
Total			**8,904**	**9,658**	**8.5**
Ocoee Project	TN	Polk	4,499	4,484	-0.3
Total			**4,499**	**4,484**	**-0.3**
Apalachia	NC	Cherokee	8,401	9,622	14.5
Total			**8,401**	**9,622**	**14.5**
Hiwassee	NC	Cherokee	8,401	9,622	14.5
Total			**8,401**	**9,622**	**14.5**
Chatuge	GA	Towns	1,618	2,717	67.9
	NC	Clay	1,663	2,412	45.0
Total			**3,281**	**5,129**	**56.3**
Nottely	GA	Union	3,447	5,771	67.4
Total			**3,447**	**5,771**	**67.4**
Blue Ridge	GA	Fannin	3,801	5,651	48.7
Total			**3,801**	**5,651**	**48.7**
Western Commercially Navigable Waterway Reservoirs					
Guntersville	AL	Jackson	24,616	23,349	-5.1
	AL	Marshall	29,080	43,750	50.4
	TN	Marion	6,784	8,561	26.2
Total			**60,480**	**75,660**	**25.1**
Wheeler	AL	Marshall	29,080	43,750	50.4
	AL	Morgan	42,525	55,569	30.7
	AL	Madison	108,286	170,013	57.0
	AL	Limestone	18,278	28,234	54.5
	AL	Lawrence	8,883	11,124	25.2
	AL	Lauderdale	28,971	40,129	38.5
Total			**236,023**	**348,819**	**47.8**
Wilson	AL	Colbert	29,759	28,161	-5.4
	AL	Lauderdale	28,971	40,129	38.5
	AL	Lawrence	8,883	11,124	25.2
Total			**67,613**	**79,414**	**17.5**
Pickwick	TN	Hardin	8,787	10,079	14.7
	MS	Tishomingo	11,977	9,068	-24.3
	AL	Colbert	29,759	28,161	-5.4
	AL	Lauderdale	28,971	40,129	38.5
Total			**79,494**	**87,437**	**10.0**

[1]Source: U.S. Department of Commerce, Bureau of Economic Analysis (1994).

[2]Not commercially navigable.

Table O-2 (Cont.). Total Employment in Counties Along TVA Reservoirs (Including Self-Employed), 1980-1993.[1]

Reservoir	State	County	1980	1993	Percent Increase
Western Commercially Navigable Waterway Reservoirs (Cont.)					
Kentucky	TN	Hardin	8,787	10,079	14.7
	TN	Perry	2,232	3,101	38.9
	TN	Decatur	4,955	5,713	15.3
	TN	Humphreys	8,171	7,692	-5.9
	TN	Benton	4,708	6,575	39.7
	TN	Houston	1,980	2,784	40.6
	TN	Henry	14,834	15,752	6.2
	TN	Stewart	3,947	3,985	1.0
	TN	Wayne	4,326	6,654	53.8
	KY	Calloway	12,637	18,428	45.8
	KY	Trigg	4,059	4,530	11.6
	KY	Marshall	10,852	12,890	18.8
	KY	Lyon	1,838	2,833	54.1
	KY	Livingston	2,984	3,205	7.4
Total			**86,310**	**104,221**	**20.8**
Western Tributary Reservoirs[2]					
Bear Creek Project	AL	Franklin	10,412	14,166	36.1
	AL	Marion	13,111	14,436	10.1
	AL	Winston	10,567	13,857	31.1
Total			**34,090**	**42,459**	**24.5**
Beech River Project	TN	Decatur	4,955	5,713	15.3
	TN	Henderson	8,458	12,179	44.0
Total			**13,413**	**17,892**	**33.4**
Normandy	TN	Bedford	13,766	16,779	21.9
	TN	Coffee	21,022	29,865	42.1
Total			**34,788**	**46,644**	**34.1**
Tims Ford	TN	Franklin	9,974	12,909	29.4
	TN	Moore	1,977	2,022	2.3
Total			**11,951**	**14,931**	**24.9**

[1]Source: U.S. Department of Commerce, Bureau of Economic Analysis (1994).

[2]Not commercially navigable.

APPENDIX P

METHODOLOGY FOR ESTIMATION OF POPULATION IMPACTS

METHODOLOGY FOR ESTIMATION OF POPULATION IMPACTS

In order to estimate population impacts of the alternatives, the number of lakefront lots and backlots along the reservoirs were first estimated for each of the alternatives. The number of lots was estimated as a function of the additional miles of shoreline that could be developed under each alternative (Section 4.2) and the current number of residential lots per shoreline mile, as estimated from a sample of existing shoreline subdivisions (Section 3.4.5).

Additional Miles of Shoreline Available. Under Alternatives A and B1, 5,510 additional miles of shoreline could be developed with residential shoreline alterations. Alternative C1 could result in 3,864 additional miles. And under Alternatives B2, C2, D, and the Blended Alternative, 2,809 miles potentially could be added to what is currently developed.

Number of Lots per Mile. As of 1995, reservoir subdivisions averaged 33.1 lakefront lots per mile of shoreline. Of this total, 20.8 lots per mile were developed. In addition, these subdivisions have 1.1 backlots for each lakefront lot.

High End of Population Range. For this scenario, it was assumed that new residential lots would be developed along the additional shoreline at the existing rate of 33.1 total lots per mile and that there would continue to be 1.1 backlots for each lakefront lot. As of 1995, there were also 14,031 undeveloped lakefront lots in existing reservoir subdivisions. It was assumed that all of these undeveloped lots would eventually be developed. Developed does not necessarily mean, however, that the lot will have a full-time residential structure. Some lots will have a structure that is used part-time or may have only a boat dock or perhaps only a path to the lake. Therefore, it was assumed that 80 percent of the shoreline lots and 90 percent of the backlots would be full-time residences. The 80 percent is based on a Gallup Poll (Larsen, 1993a), while the 90 percent is the best judgment of TVA.

Low End of Population Range. For this scenario, it was assumed that lots would be developed at the current rate of development, or about 20.8 lots per mile. It was also assumed that none of the undeveloped lots in existing subdivisions would be developed. Other assumptions remained the same.

Medium End of Population Range. The number of lakefront lots per mile was assumed to be the average of the high and low rates (33.1 and 20.8, respectively). This assumption resulted in an estimate of about 27.0 developed lots per mile of additional shoreline. It was also assumed that one-half (7,016) of the undeveloped lots in current subdivisions would be developed. Other assumptions remained the same.

The 1995 estimate of average household size in full-time residential units was 2.67 persons (U.S. Department of Commerce, 1995). For each scenario and alternative, the average household size was multiplied by the total number of additional residential lots used as full-time residences to yield the population projections presented in *Table P-1*.

Table P-1. Projections of Additional Population[1] by Alternative[2] and Scenario.

Alternative	Additional Population (000s)		
	Low	Medium	High
A	551	746	938
B1	551	746	938
B2	278	396	513
C1	382	530	678
C2	278	396	513
D	278	396	513
Blended	278	396	513

[1]Persons living on lakefront lots or associated backlots.

[2]Within the next 25 years.