

FINAL ENVIRONMENTAL ASSESSMENT

**PRIVATE WATER USE FACILITIES
ON THE
FRENCH BROAD RIVER MILES 3.7 TO 32.3
AND
HOLSTON RIVER MILES 4.4 TO 52.3
JEFFERSON, KNOX, SEVIER, AND GRAINGER COUNTIES,
TENNESSEE**

TENNESSEE VALLEY AUTHORITY

MARCH 2003

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PURPOSE AND NEED FOR ACTION

Background

The Tennessee Valley Authority (TVA) is receiving an increasing number of requests for approval under Section 26a of the TVA Act for private water use facilities along the lower French Broad River Miles (FBRMs) 3.7 to 32.3 and lower Holston River Miles (HRMs) 4.4 to 52.3. This increase is expected to continue as farms are subdivided for residential development to accommodate local population growth. Typical private water use facilities requiring TVA Section 26a approval in this area include floating and fixed docks, access ramps and shoreline protection.

The snail darter (*Percina tanasi*) and the pink mucket (*Lampsilis abrupta*) occur in the lower French Broad and Holston Rivers. In reviewing the potential environmental impacts of recent Section 26a approvals of private water use facilities in this area, TVA has determined that adverse impacts to the snail darter, pink mucket and other sensitive resources do not typically result from approval of any individual Section 26a request and subsequent facility construction, provided these facilities are installed properly. However, TVA recognizes that the construction of private water use facilities could potentially cause adverse cumulative effects on the aquatic environment. Both the National Environmental Policy Act (NEPA) and the Endangered Species Act specifically require consideration of cumulative impacts. TVA proposes to implement criteria for private water use facilities along portions of the French Broad and Holston Rivers. These criteria are designed to minimize the potential for cumulative effects on sensitive aquatic resources.

The Decision

TVA will decide whether or not to establish specific standards for issuing approvals under Section 26a of the TVA Act for the construction of private water use facilities in the lower French Broad River between FBRM 3.7 and 32.3 and in the lower Holston River between HRM 4.4 and 52.3. Most private water use facility approvals qualify as a categorical exclusion under Section 5.2.26 of TVA's NEPA Procedures. However, private water use facility permitting in these river reaches may have the potential to cumulatively impact sensitive aquatic species, including the snail darter, listed as threatened under the Endangered Species Act, and the pink mucket, listed as endangered under the Endangered Species Act. TVA has prepared this Environmental Assessment (EA) in order to better assess the potential direct,

indirect and cumulative impacts of approving Section 26a requests within the subject river reaches.

Scope of the Environmental Review

The scope of the analysis of this EA is limited to those potential effects resulting from TVA's approval of shoreline private water-use facilities along the subject reaches of the Holston and French Broad Rivers and the effects of the subsequent construction and operation of these shoreline facilities. Due to the nature of the action, approval of private water-use facilities on these two river reaches along with their resulting construction and operation would not have any direct or cumulative effect on several resources. Thus, analysis of potential effects was not conducted with respect to: air quality, production of hazardous wastes, generation of solid waste or special materials (e.g., radioactive waste), generation of wastewater, noise, electromagnetic fields, contamination of groundwater, or the loss of farmland. Based on the Shoreline Management Initiative (SMI) Environmental Impact Statement (TVA, 1998), potential adverse effects of such private water-use facilities to transportation, recreation, floodplains and visual character were determined to be either lacking altogether or insignificant.

Six other resources (i.e., wetlands, historic structures, historic sites, archaeological resources, terrestrial ecology, threatened and endangered terrestrial animals and plants and their habitats) occur on a very site-specific basis. Potential effects to these resources cannot be addressed appropriately in an area-wide review. For this reason, the determination of potential effects to these resources will continue to be a part of the environmental and Section 26a review process for each application.

The five potentially affected resources addressed in this EA include: 1) water quality (specifically, surface water), 2) aquatic ecology, 3) threatened and endangered aquatic species, 4) significant managed areas and 5) Wild and Scenic River values. The potential direct, indirect and cumulative effects of TVA's approval of private water-use facilities along the lower French Broad and Holston Rivers on these resources were considered.

This EA addresses the potential effects of private water use facilities in the form of boat docks. The excavation of boat channels has the potential to impact water quality and aquatic communities through the removal of shallow water habitats and by siltation. Channel excavations in conjunction with private water-use facilities are not expected to occur in these reaches of the French Broad and Holston Rivers. Therefore, consideration of potential effects from channel excavations was considered beyond the scope of this environmental review. For similar reasons, the use of jetties for shoreline stabilization purposes was considered to be beyond the scope of this review. Water quality and interbasin transfer of water are expected to become issues in the future. However, Section 26a requests for construction of facilities such as municipal water intakes as well as intakes for smaller livestock watering and irrigation systems will be reviewed on a case-by-case basis and are not within the scope of this environmental review.

Other Pertinent Environmental Reviews

Hydro Modernization of Turbines at Douglas Dam - Environmental Assessment (TVA, 1995a). -To meet anticipated peak generation capacity, TVA considered modernization, rehabilitation and No Action alternatives. Following an environmental review, TVA determined that implementation of the preferred alternative, which would increase the generation capacity to 46 megavolt amps (MVA), would have insignificant environmental impacts. Dissolved oxygen (DO) injection would be increased if required to meet commitments of the Lake Improvement Plan.

Hydro Modernization of Turbines at Cherokee Dam - Environmental Assessment (TVA, 1995b). -In this environmental review, TVA reviewed modernization, rehabilitation and No Action alternatives to meet anticipated peak generation capacity from Cherokee Dam. The preferred alternative, which would increase the generation capacity to 45 MVA, would result in insignificant environmental impacts. DO injection would be increased if necessary to meet commitments of the Lake Improvement Plan.

Biological and Water Quality Responses in Tributary Tailwaters to Dissolved Oxygen and Minimum Flow Improvements - Implementation of the Reservoir Releases Improvements Program / Lake Improvement Plan (TVA, 1996). -This study reported early findings regarding the effects of re-aeration and minimum flow on the biota of river segments below 13 tributary dams and the methods employed to improve water quality.

Environmental Assessment and Finding of No Significant Impact - Private Water Use Facility Construction Standards and Guidelines for the Hiwassee River, Miles 20-42.5, Polk, McMinn, and Bradley Counties, Tennessee (TVA, 1999). -This review established construction standards to minimize the potential impact of private water use facilities on the federal endangered snail darter in the Hiwassee River.

Final Environmental Assessment: Optimizing the Scheduling and Use of Hydropower Generation During Periods of High Cost Replacement Energy (Peak Generation Periods) (TVA, 2000). -This review assessed the effects of modifying generation schedules for 22 hydropower plants, including Douglas and Cherokee. TVA examined the potential environmental effects of scheduling the operation of these plants to generate the maximum electric power during periods of peak energy demand based on the projected market cost of power.

Final Environmental Impact Statement (FEIS) - Shoreline Management Initiative (SMI) (TVA, 1998). -This FEIS is a programmatic review of the potential impacts of residential shoreline development. Although this review was focused on reservoir shorelines, many of its conclusions are applicable to riverine (i.e., river-like) environments such as the portion of the French Broad and Holston Rivers considered in this EA. This EA, therefore, tiers from the SMI FEIS.

Public Involvement

A public notice announcing a 30-day comment period for project scoping appeared in the Knoxville News Sentinel newspaper and on the TVA web site on March 15,

2000. A single comment was received from the general public. This individual cautioned against further impacts to the environment along Tennessee Valley rivers and encouraged a 10-year moratorium on development. Because TVA has no jurisdiction over the use of private land for residential development, this option was not considered to be a viable alternative within the scope of this environmental review.

The draft EA (DEA) was sent to state and federal agencies for comment on February 15, 2001. In a March 23, 2001, letter (see Attachment 1), the Knoxville office of the Tennessee Department of Environment and Conservation (TDEC) noted that loss of riparian habitat is a concern and that no information was provided in the DEA that predicts anticipated densities of ramps and docks. TDEC further suggested that no criteria are provided for determining permitting limits should cumulative impacts from riparian habitat losses be identified. TDEC stated concerns about water quality in the Holston and French Broad Rivers, including increasing sewage treatment discharges, and encouraged TVA to factor these concerns into its planning and enforcement efforts. In response, information on the densities of docks and ramps was added to the EA. Additional information was provided concerning development-related effects and the potential for TVA action to contribute to the loss of riparian habitat.

In a letter dated March 15, 2001 (see Attachment 2), the U.S. Fish and Wildlife Service (USFWS) recommended a new alternative based on community water use facilities instead of individual facilities. However, the riverine configurations of the rivers with many rock shelves creating pools of limited size, the narrowness of the rivers, and the private ownership patterns of the shoreline restrict the use of large scale community facilities. In such conditions, large community docks could hinder safe recreational navigation. Therefore, this alternative was considered impractical. However, TVA will continue to encourage the use of community water use facilities on the rivers and reservoirs where this is a practical option. USFWS requested additional analysis of potential cumulative effects. USFWS did not concur with TVA's "not likely to adversely affect" determination for the snail darter and the pink mucket and recommended a continuation of informal consultation under Section 7 of the Endangered Species Act. In response to these comments, the final EA was revised to provide additional discussion of potential cumulative effects.

In a letter dated September 25, 2002, USFWS reiterated concerns about potential water quality degradation from residential development and the need to avoid adverse impacts to aquatic species and their habitats. USFWS stated a preference for community water use facilities over individual ramps and docks, but determined that these facilities would have minimal effects on riverine habitats if the measures described in the EA are properly implemented and enforced. Periodic inspections were encouraged. USFWS clarified its position regarding the need for consultation under Section 7 of the Endangered Species Act in a letter of December 12, 2002.

The National Park Service (NPS) was contacted in accordance with the Presidential directive concerning agency coordination regarding the National Wild and Scenic Rivers Act. Mr. Jeff Duncan of the NPS responded via e-mail on November 27, 2000. NPS encouraged additional emphasis on the use of shoreline buffers and bioengineering techniques for bank stabilization.

ALTERNATIVES

The two alternatives considered in this EA are the Action Alternative, which would establish a set of customized construction guidelines and conditions applicable to private water use facilities on the lower French Broad and Holston Rivers, and the No Action Alternative. These alternatives are described below.

The Action Alternative

Under the Action Alternative, TVA would establish and implement a set of private water use facility Construction Guidelines and Special Conditions specific for this reach of the French Broad and Holston Rivers (see below). In addition, all of the General Conditions for Section 26a and Land Use, as well as Standard Conditions 6a, 6b, 6d, 6e, 6f, 6g, 6h and 6i (see Attachment 3) would be included in 26a approvals on this stretch of the river. The proposed guidelines and conditions deal with dock standards, stream bank stabilization and vegetation management. These guidelines and conditions have been designed to reduce the potential to adversely affect the habitat of the snail darter, pink mucket, and other sensitive aquatic species while allowing restricted, but reasonable access to the water. The proposed guidelines and special conditions applicable to the lower French Broad and Holston Rivers are outlined below.

Construction Guidelines

1. A maximum allowable footprint of 400 square feet is prescribed for all private water use facilities in this reach of the French Broad and Holston Rivers. All docks, boat slips, or other water-use facilities associated with a particular lot shall be contained within a 400-square-foot rectangle or square area at the river-ward end of the access walkway that extends from shore to dock. The space occupied by the access walkway is not included in the 400 square foot allowance.
2. Private water use facilities in areas continuously exposed to strong river currents and drifting logs and other debris shall be restricted to the area immediately adjacent to the river bank. In no case shall the combined length of the private water use facility and access walkway extend more than 25 feet from the shoreline, or one-tenth the distance from the bank at maximum operating level to the opposite shore, whichever is less. Opposite shore is defined to include the opposite bank or edge of the closest island.
3. Both fixed and floating water use facilities may be permitted (fixed piers, floating dock, and fixed or floating single boat slip). All fixed facilities shall have deck elevations at least 24 inches above the maximum operating water level. To the extent practicable, structures shall be constructed during low water conditions with a minimal amount of substrate disturbance.
4. A well graded, Class I or Class II (50- to 125-pound nominal size) rock with a mixture of smaller rock is the preferred method for installing riprap. Filter fabric shall be placed between the rock and the protected slope.
5. Loss of vegetation shall be minimized, and removal of trees on the river bank must be kept to a minimum.

6. Unless demonstrated to be impracticable, boat-launching ramps shall be constructed at an angle perpendicular to the stream, or angled toward downstream.

Special Conditions

1. Water use facilities may not have a roof or side walls.
 2. Water use facilities may not have any enclosed storage spaces.
 3. All anchoring cables or spud poles shall be anchored in a way that does not accelerate bank erosion. Anchoring to trees is prohibited.
 4. The method of shoreline stabilization, in the order of preference, will be: a combination of riprap and live plantings (biostabilization), riprap revetment, or gabions.
 5. Guidelines developed by the U.S. Fish and Wildlife Service (1987) will be used to design protection strategies for bald eagles.
 6. To minimize impacts to riparian areas and associated habitat of sensitive species a vegetation restoration plan will be prepared by TVA. Property owners seeking 26a approval will be required to follow this plan to restore vegetation affected as a result of the permitted action (see Vegetation Management Section).
- **Dock Standards** - These guidelines define the acceptable limits, including maximum size, of docks and other private water-use facilities that would be approved by TVA (see Construction Guidelines above). The size and type of proposed docking facilities are selected by the applicant. Property owners are responsible for submitting drawings of proposed private water use facilities to TVA for review and approval. TVA would make available sample drawings for docks. Property owners may either use these drawings or create their own drawings to reflect personal preferences. TVA would work with the applicant to explore acceptable options.

The lower French Broad and Holston Rivers are subject to considerable changes in surface water elevation. Private water use facilities constructed along this reach are subject to periodic routine flooding and must be constructed to withstand flood conditions. If the facility design or construction configuration is such that it is likely to wash away, it could contribute to changes in the riverine environment such as obstructing the river flow or increasing sedimentation, and consequently impacting sensitive aquatic species. Facility failure is likely associated with the failure of the facility's anchoring system, which may affect the stream bank stability. Design configurations which TVA has determined can contribute to facility failure in flood prone areas include covered roofs, enclosed storage areas and large overall size (i.e., the smaller, the better). TVA has also determined that facilities that extend too far out into the river (up to one-third of the channel width under the SMI guidelines) are more likely to catch floating logs and debris, which may increase their probability of failure. These factors are addressed in Construction Guidelines 1 and 2 and Special Conditions 1 and 2. The more restrictive dock standards proposed for the French Broad and

Holston Rivers would also reduce potential aesthetic impacts and impacts to recreational boaters.

- **Stream Bank Stabilization** - TVA requires that property owners take appropriate measures to minimize disturbance of the stream bank vegetation when installing private water use facilities. The establishment and maintenance of stream bank vegetation, including the trees and understory vegetation, are important for a stable river bank and to prevent erosion of a landowner's property into the river. Biostabilization with natural materials and riparian plants is the preferred method of bank stabilization. However, TVA has allowed applicants to choose between riprap, biostabilization, gabions, or a combination of these approaches. To be effective, any of these methods must be placed several feet above and below the normal water level of the river and along the surface of the eroded area, and they must be in accordance with construction guidelines.

Because of the ecological benefits of biostabilization, TVA would continue efforts to increase property owner awareness of this approach, with the expectation that biostabilization will become more widely adopted. Moderate bank contouring would be allowed to provide conditions suitable for planting vegetation. TVA recommends suitable native plant materials such as willow stakes and silky dogwoods to be planted along the surface of eroding areas.

Retaining walls typically require extensive site disturbance and generally reduce aquatic habitat conditions. Wall failure due to improper design can result in further site disturbance and stream siltation. For these reasons, retaining walls are not an acceptable method of bank stabilization along the subject reaches of the French Broad and Holston Rivers. The acceptable methods of stream bank stabilization are addressed in Construction Guideline 4 and Special Condition 4.

- **Vegetation Management** - When a property owner submits a request for a private water use facility, TVA performs a site inspection as part of the review. A member of the appropriate TVA Watershed Team would be available to meet with the property owner and to discuss the results of this EA and the importance of stream bank stabilization and vegetation management. TVA will prepare a site-specific vegetation restoration plan for shoreline areas affected by the permitted action. As described in Special Condition 6, any vegetation affected as a result of the permitted action must be restored according to this vegetation restoration plan. TVA would also work with interested property owners to prescribe a shoreline vegetation enhancement plan for any other shoreline areas not affected by the permitted action. The purpose of the shoreline vegetation enhancement plan is to promote a healthy stand of large woody vegetation along the shoreline. Once established, this vegetation protects water quality by filtering out sediments and pollutants from runoff before they reach the river, stabilizes the shoreline and prevents erosion, provides terrestrial and aquatic habitats, and improves the aesthetic character of the shoreline.

As part of the process of reviewing a 26a request, TVA seeks to minimize potential impacts to sensitive resources, including stream bank vegetation, through the mandatory adherence to General and Standard conditions (see Attachment 3). General conditions 1, 9, 10, and 14 and standard conditions 6a,

6b, 6d, 6f, 6g, 6h and 6i would be required for approval of private water use facilities in the subject reaches of the lower French Broad and Holston Rivers. These conditions, as well as Construction Guideline 5 and Special Conditions 3 and 4, included in the Action Alternative, would help maintain shoreline vegetation and its benefits.

The No Action Alternative

Under the No Action Alternative, the baseline specifications for approvable private water use facilities on the lower French Broad and Holston Rivers would continue to be the standards and guidelines presently described in the General and Standard Conditions listed in Attachment 3. TVA recognizes that some of these standards and guidelines may not be applicable to the riverine conditions found on the lower French Broad and Holston Rivers. Thus, TVA would continue to evaluate each individual 26a request, including an appropriate environmental review, on a case-by-case basis. This review includes consultation with the USFWS on each proposed action that may affect threatened or endangered species or their habitat.

Comparison of Alternatives

TVA has determined that adverse impacts to the snail darter, pink mucket, and other sensitive aquatic resources do not typically result directly from any individual Section 26a approval of private water use facilities and subsequent facility construction. However, such approvals in the lower French Broad and Holston Rivers taken together could potentially result in cumulative impacts that could adversely affect the snail darter and the pink mucket. If TVA chooses the No Action Alternative, requests for Section 26a approval would continue to be reviewed individually as they are received. Similarly, potential cumulative impacts would be assessed on a case-by-case basis with each review. Under either alternative, each application for Section 26a approval would be subjected to an appropriate level of environmental review.

If TVA chooses the Action Alternative, TVA would review 26a requests in the lower French Broad and Holston Rivers as a class of actions for which the recommended construction guidelines and required general and standard conditions would help avoid or minimize cumulative impacts to sensitive resources. The findings of this EA would be incorporated into those reviews, thereby simplifying the environmental review process for some applications for 26a approval. Specifically, those Section 26a requests for private water use facilities that conform to the specifications in the Action Alternative would be subjected to environmental review with respect to potential effects to wetlands, cultural resources (i.e., archaeological resources, historic sites and historic structures) and terrestrial biological resources (including terrestrial threatened and endangered species). Conversely, Section 26a requests that do not comply with the specifications in the Action Alternative would undergo a conventional (i.e., more extensive) environmental review.

With the implementation of these protective construction guidelines and required conditions of approval, TVA anticipates that snail darters, pink muckets, and other sensitive resources would be protected. Further protection of these resources would result if the prescribed vegetative management plans were implemented.

AFFECTED ENVIRONMENT

Site Description

The river reaches under consideration in this EA include the lower French Broad River from FBRM 3.7 to FBRM 32.3 near Douglas Dam and the lower Holston River from HRM 4.4 to HRM 52.3 near Cherokee Dam. These rivers join above Knoxville to create the Tennessee River and Fort Loudoun Reservoir.

Shorelines on these river sections are almost entirely privately owned lands in Knox, Jefferson, Sevier and Grainger Counties, Tennessee. The population of these counties has grown over the last decade, and two of the counties have some of the largest population growth in the state (see Table 1). TVA has issued 70 Section 26a approvals for private water use facilities on these river sections. Approximately a third of these approvals have been issued within the last 2 years. Currently, there are about 0.6 permitted water use facilities per mile of developable shoreline on these river sections.

Table 1. Population increase from 1990 to 2000.

County	Percent Increase
Grainger	20.8
Jefferson	34.2
Knox	13.8
Sevier	39.4
Tennessee Average	16.7

Source: U.S. Census Bureau

Several streams enter the French Broad River between FBRM 3.7 and FBRM 32.3. The largest of these are the Little Pigeon River at FBRM 27.40, Flat Creek at FBRM 33.27 and Dumplin Creek at FBRM 19.93. Islands occur at various locations between FBRMs 8.2 and 29.7.

Several streams enter the Holston River between HRM 4.4 and 52.2. The largest of these are Buffalo Creek at HRM 45.9, Richland Creek at HRM 27.0, and Flat Creek at HRM 14.0. Islands of various sizes occur at several locations between HRMs 4.4 and 47.1.

Average annual flow of the French Broad River near Knoxville at the mile 7.5 stream gage is about 7,720 cubic feet per second (cfs), and flood flows may exceed 75,600 cfs. Normal summer water level is approximately 818.9 feet above mean sea level (msl) and routinely fluctuates between 817.1 to 820.1 feet. Ten-year, 50-year, 100-year, and 500-year flood elevations at FBRM 7.5 are approximately 828.9 msl, 833.4 msl, 835.8 msl and 844.1 msl, respectively. This represents flood elevations of 10.0 feet, 14.5 feet, 16.9 feet and 25.2 feet, respectively, above the normal water level.

Average annual flow of the Holston River near Knoxville at the mile 5.5 stream gage is around 4,870 cfs, and flood flows may exceed 31,400 cfs. Normal summer water level is approximately 820.0 msl, and routinely fluctuates between 818.2 to 821.2 feet. Ten-year, 50-year, 100-year and 500-year flood elevations at Holston River

mile 5.5 are approximately 825.9 msl, 829.6 msl, 831.5 msl and 837.2 msl, respectively. This represents flood elevations of 5.9 feet, 9.6 feet, 11.5 feet and 17.2 feet, respectively above the normal water level.

River Bank and Shoreline Conditions

The Cherokee tailwater section of the Holston River starts at the discharge from Cherokee Dam at HRM 52.3 and extends to the head of the Fort Loudoun Reservoir pool, upstream of the confluence of the Holston and the French Broad River at HRM 0, i.e., at Tennessee River Mile (TRM) 652.1. In this reach, the river has a low gradient, with an average slope of 0.04 percent. The river meanders through its valley. Sinuosity (i.e., the ratio of river length to valley length) is high, at 2.2. Average flow width at full generation (13,975 cfs discharged from Cherokee Dam) is 460 feet.

The Douglas tailwater section of the French Broad River starts at the discharge from Douglas Dam at FBRM 32.3 and extends to the confluence with the Holston River at FBRM 0 (TRM 652.1). This reach also has a low gradient, with an average slope of 0.05 percent. Sinuosity is moderately high, at 1.9. Average flow width at full generation discharge from Douglas Dam is 600 feet.

The valleys formed by both the Holston and French Broad Rivers are narrow. Many of the bends in the rivers are restricted by limestone bluffs. Alluvial soils exist in a narrow band that is typically less than 200 feet wide. Above this floodplain are intermittent narrow terraces and rolling hills.

The alluvial soils of the banks and floodplains are moderately to highly susceptible to erosion when not protected by vegetation. They have moderately low structural strength and steep or high-cut slopes. Embankments are subject to sliding or slumping. Many of these soils are subject to internal erosion from subsurface water flow (i.e., "piping").

Soils at the base of bluffs are typically stony and are also fairly easily eroded. Rock fragments and boulders frequently reduce the effective erodibility and can form an armor layer that limits the extent of erosion in these areas.

Where the floodplain and terrace are wide enough or lower hill slopes flat enough, both river valleys are largely used for agriculture. Steeper areas are generally forested. Based on field observations from recent erosion potential surveys (Hagerman, 2000a; 2000b), approximately 58 percent of the land adjacent to the stream (148 miles of the bank of both rivers) is used for agriculture, mostly hay or pasture, and about 30 percent is wooded or bluffs. About 10 percent of the adjacent land is occupied primarily by residential areas, most of which are in or near Knoxville. About 4 percent is in mixed use, including roads and quarries.

TVA surveys (Hagerman, 2000a; 2000b) evaluated riparian buffer zone width, canopy cover, bank side slope, and bank height along a total of 124 miles of the stream bank of both rivers. The evaluation did not include bluffs and rocky hillsides. About 31 percent of the stream bank evaluated has a wooded riparian buffer zone greater than 59 feet (18 meters) wide, 32 percent has a buffer from 20 to 59 feet (6 to 18 meters) wide, and about 37 percent has little or no wooded riparian buffer.

Most of the residential areas have little or no wooded riparian buffer. Both of these rivers have some canopy cover over most of their length. A little over half of the river bank evaluated has a dense canopy (greater than 60 percent cover).

Much of the bank is steeper than 1:1, with significant areas of vertical bank. Most of the high sheer-stress areas at the outside of bends are restricted by rocky bluffs and hill sides. Bedrock controls bed elevation in many locations, preventing bed downcutting.

The bank in the non-bluff areas is predominantly low, at approximately the elevation of the maximum generation discharge. The low bank is frequently a bench at the toe of a higher bank. The higher bank is at the approximate elevation of the river banks as they existed before upstream dams reduced flows higher than maximum generation. In the Douglas tailwater, the low bank appears to be just above or a few feet higher than maximum generator level. However, in the Cherokee tailwater, much of this low bank is at or below generation level and is subject to intermittent inundation and erosive forces.

Erosion of stream banks is more pronounced within the upper 20 miles of the Cherokee tailwater than in areas further downstream. In nearly all of these cases, the erosion process was initiated by external factors such as livestock access, adjacent land use practices and buffer zone removal. Water level fluctuations as well as the fact that discharges have low concentrations of suspended sediments are two operational factors that could be having an effect in this reach.

TVA-approved private water use facilities include 33 docks, 27 ramps, and 38 shoreline stabilization actions at 70 locations. Most of the docks and ramps are clustered in existing residential areas near the larger communities, especially Knoxville. The existing shoreline stabilization is most often near a dock or ramp or on the larger accessible land tracts.

Land use practices have contributed to many erosion problems. Most of the bank adjacent to grazing lands is unfenced, and cattle access appears to be a direct cause of much of the bank erosion. Narrow or absent woody buffers are also associated with accelerated bank erosion. Nearly all of the bank with unstable toe and upper bank is adjacent to agricultural areas.

Water Quality

The French Broad River upstream of FBRM 7.5 drains an area of about 5,101 square miles. The upper half of the drainage is in North Carolina. The upper basin arises in the Blue Ridge Province and is underlain primarily by sedimentary and metamorphic rock. The water is moderately hard and relatively high in nutrients. Concentrations of phosphorus are high at the monitoring site above Douglas Reservoir, resulting in excessive algae productivity in the reservoir. Water quality in the reservoir is adversely affected by strong thermal stratification, hypolimnetic hypoxia (i.e., low levels of DO in the deeper water) and high nutrient loadings. Below Douglas Dam at FBRM 32.3, water quality of the lower French Broad River derives its characteristics primarily from releases from the dam. Since 1993, water quality below Douglas Dam has been improved by re-aeration of reservoir releases and setting restrictions on allowable minimum flows downstream.

The Holston River above HRM 5.5 drains an area of about 3,775 square miles. The major portion of the headwater is in the Ridge and Valley Province in Southwestern Virginia, with a smaller portion joining from the Blue Ridge Province in North Carolina. The upper basin is underlain primarily by limestone and dolomite. Thus, the water has high concentrations of dissolved minerals. At the fixed station monitoring site upstream of Cherokee Reservoir, water quality is depressed by excessive nutrients, primarily phosphorus and nitrate+nitrite-nitrogen. Water quality in Cherokee Reservoir is affected by strong vertical stratification during summer months and a deep-water oxygen deficit, which results from long reservoir retention times and excessive nutrient inputs. Below Cherokee Dam at HRM 52.3, the river derives its water quality characteristics primarily from releases of the dam. Since 1995, water quality below the dam has been improved by re-aeration of reservoir releases and establishment of allowable minimum flows downstream.

Average values for water quality characteristics as measured quarterly by TVA at FBRM 77.5 during calendar year 1999 include temperature (13.9 degrees C), DO (10.0 milligrams per liter [mg/l]), pH (7.3 standard units), hardness (21.2 mg/l), total suspended solids (11.6 mg/l), conductivity (83 micro-ohms/centimeter [$\mu\text{ohm/cm}$]), and total dissolved solids (58 mg/l). These values are within applicable state water quality standards.

Average values for water quality characteristics as measured quarterly by TVA at HRM 118.7 during calendar year 1999 include temperature (16.9 degrees C), DO (9.8 mg/l), pH (8.7 std. units), hardness (116 mg/l), total suspended solids (4.2 mg/l), conductivity (329 $\mu\text{ohm/cm}$), and total dissolved solids (200 mg/L). These values are also within applicable state water quality standards.

According to the draft 2002 Status of Water Quality in Tennessee (303(d) List), a 4.9-mile reach of the French Broad River below Douglas Dam only partially supports its designated uses of fish and aquatic life, livestock watering and wildlife, and recreation. Owing to its characteristics as a tailwater, this river stretch has suffered historically from flow alteration, organic enrichment, and low DO problems. Some of these problems were corrected with TVA's Reservoir Releases Improvements (RRI) program in 1993 with re-aeration of turbine discharges to 4 mg/l DO at the dam and establishment of a minimum flow of 585 cfs downstream. During 1997, the DO deficit (expressed as mg/L-days below 4 mg/l) was reduced from a historic mean of 225 mg/l-days (occurring over 113 days) to 2.6 mg/l-days, equivalent to a 99 percent improvement (unpublished TVA data). Currently, the tailwater extending from the dam to the State Route 66 bridge (FBRM 28.2) experiences low DO levels.

The 25-mile stretch of Cherokee tailwater from the dam to the confluence of Richland Creek is also designated on the section 303(d) list as partially supporting its designated uses. Like the Douglas tailwater, this stretch has experienced flow alteration, organic enrichment and DO problems. RRI improvements corrected some of these problems in 1995 with re-aeration of turbine discharges to 4 mg/l DO at the dam and establishment of a minimum flow of 325 cfs downstream. According to unpublished TVA data, during 1997, the DO deficit was reduced from a historic mean of 306 mg/l-days (occurring over 122 days) to only 0.5 mg/l-days, a virtual 100 percent improvement.

Aquatic Ecology

Prior to the construction of Douglas and Cherokee dams, the lower portions of the French Broad and Holston Rivers both had diverse aquatic communities. This diversity was heavily impacted by the operation of the dams. Following recent changes in dam operations carried out through TVA's RRI program, the aquatic communities in both rivers have improved. The recent changes and current status of the fish, benthic (bottom-dwelling) invertebrate, and mollusk communities are described below.

Fish - Despite the fact that both of these river segments are hydropower tailwaters, which are subject to daily fluctuations in flow, and until fairly recently suffered from low DO concentrations and lack of minimum flows, they are currently inhabited by reasonably diverse fish communities (see Attachment 4). Since the RRI monitoring program began in 1987, over 70 species have been collected at Saffell Island in the Douglas tailwater. Nearly as many were found at Seven Islands (60 species) and Campbell Islands (67 species) in recent years. To date, not as many fish species have been collected in the Cherokee tailwater. Forty-five species have been found at Nance Ferry and McKinney Island since sampling began in 1989, while 44, 41, and 38 were found at Monday Island, I-40 Bridge, and Blue Springs, respectively.

Presumably because re-aeration devices at Cherokee Dam were not operational until the summer of 1995, biological improvements have taken longer to appear in Cherokee tailwater (see Figure 1) than in the Douglas tailwater (Figure 2). As in Douglas tailwater, fish communities in the Cherokee tailwater generally improved further downstream from the dam. Before 1997, there was no consistent pattern of fish community change. However, between 1997 and spring 2000, all five stations showed increases in the tailwater fish index (TFI). The TFI is a metric of the quality of the fish community based on species diversity, the proportion of fish with various feeding habits, and other factors (Scott, 1998).

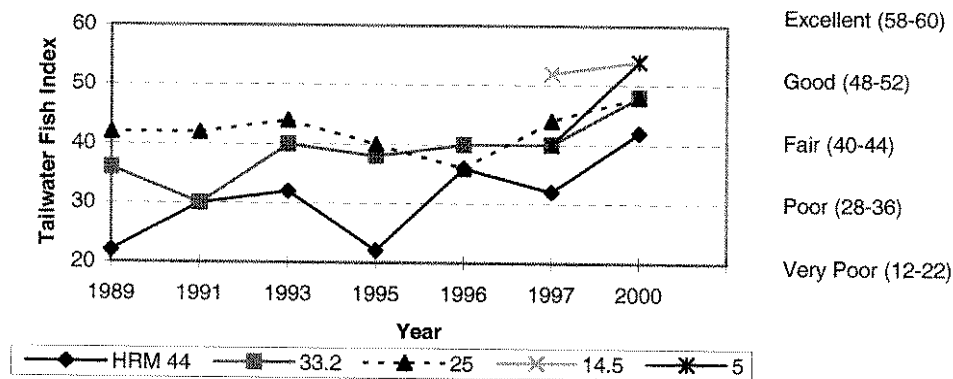


Figure 1. Tailwater fish index values for fish communities at three sites in the Cherokee tailwater, 1989 - 2000.

Benthos - Benthic invertebrate communities have improved recently in the Douglas tailwater. Tailwater benthic community indices (TBI, a metric analogous to the TFI described above) at four sampling stations were rated as fair (i.e., 30-40) in 1990, while another was rated as poor (less than 30), as shown in Figure 3. By 1995, indices at four of the five stations had improved to the good range (i.e., greater than

40). The furthest upstream station lagged behind, and was still rated as fair in 1995. Of the three sites sampled in 1997, the lowermost station (FBRM 8.1, Campbell Islands), remained in the good range, while the two uppermost sites (FBRM 29.6 and 27.1) were rated fair. The other two sites were not sampled due to high water in 1997.

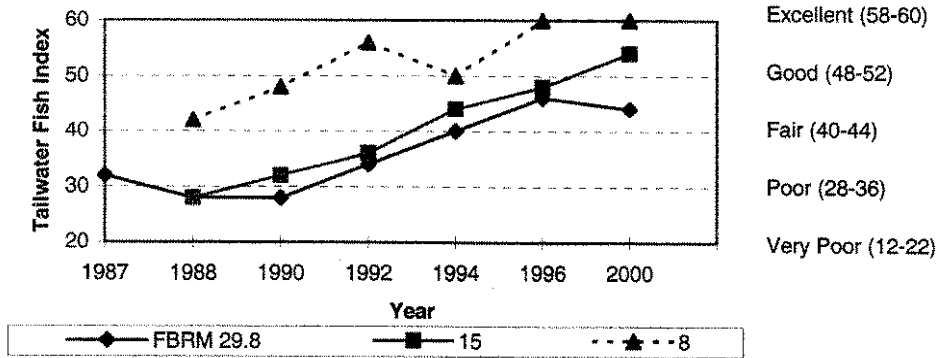


Figure 2. Tailwater fish index values for fish communities at three sites in the Douglas tailwater, 1987 – 2000

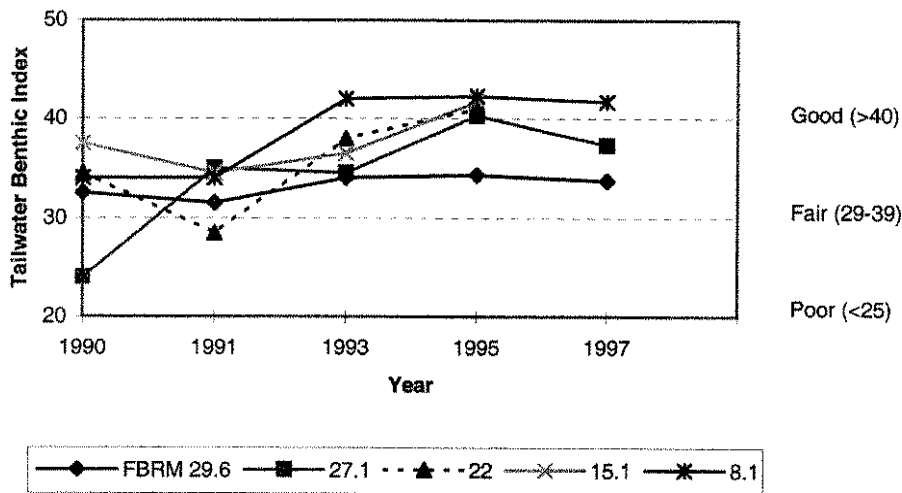


Figure 3. Tailwater benthic index values for benthic macroinvertebrate communities at five sites in the Douglas tailwater, 1990 - 1997.

Benthic macroinvertebrate communities in the Cherokee tailwater also showed general improvement between 1990 and 1997 (Figure 4). As in the Douglas tailwater, healthier benthic communities were found further downstream from the dam, except for HRM 18.3, where benthic communities suffered between 1990 and 1994. The inconsistent trends before 1995 suggest that minimum flows alone were insufficient to produce stable, healthy communities. In 1997, after two seasons of consistent re-aeration, all sites sampled showed a clustering of benthic communities in the upper fair and lower good range, suggesting that this improvement is attributable to improved oxygen concentrations.

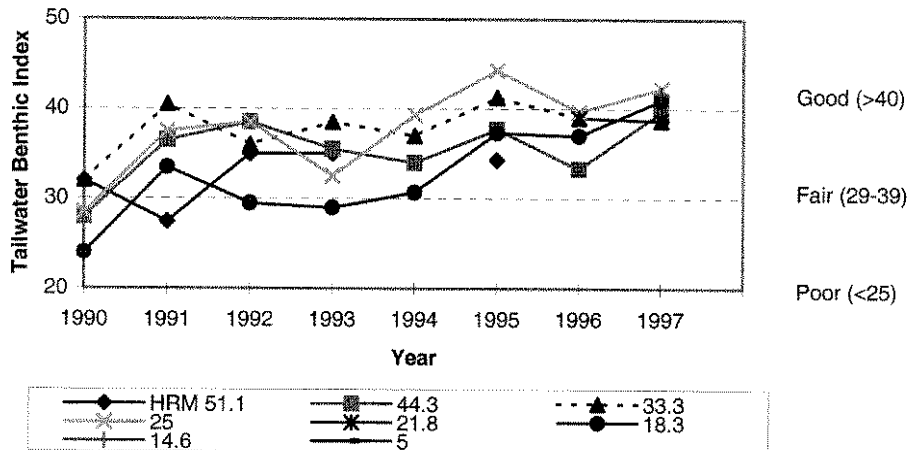


Figure 4. Tailwater benthic index values for benthic macroinvertebrate communities at five sites in the Cherokee tailwater, 1990 - 1997.

Mussels - Freshwater mussels are very sensitive to pollution and habitat alteration and are generally very rare in tributary tailwaters. Their persistence in Cherokee and Douglas tailwaters is largely due to the warm temperatures of releases from those two dams. Sparse mussel communities of primarily very old individuals are found in the lower half of the Douglas tailwater and the lower middle third of the Cherokee tailwater.

A survey by Dr. James Layzer (personal communication, October 1998) found approximately 120 live mussels of seven species at Seven Islands (FBRM 15.5) during October 1998 (see Table 2). Another species also occurs at this site, bringing the total to eight extant species known to inhabit the middle portion of the Douglas tailwater as of 1998. On October 2, 2000, two additional mussel species of note were found at the Seven Islands transplant site during routine U.S. Geological Survey (USGS) monitoring activities. Most important was the discovery of a live pink mucket, a federal endangered species. Also discovered for the first time in the Tennessee River system upstream from Watts Bar Dam was the pistolgrip mussel. Two individual pistolgrips were found at Seven Islands, and both were only 4 to 5 years old, indicating that this species has recently invaded the Douglas tailwater. Although the present total species diversity of non-transplanted mussels at Seven Islands stands at ten, the vast majority of living mussels are of only one species, the elephantear.

At least three mussel species are thought to be reproducing presently in the Douglas tailwater. Based on collections of fairly young individuals, those species include fragile papershell, pink heelsplitter, and giant floater. In addition, a gravid black sandshell was found by the USGS in 1998 at Seven Islands (J. Layzer, personal communication, 1998).

Table 2. Listing of freshwater mussel species recently found in or transplanted to the Douglas and Cherokee tailwaters, 1998 - 2000.

Common Name	Scientific name	Douglas Tailwater		Cherokee Tailwater			
		Seven Islands FBRM 15.5	Transplants to three sites FBRMs 8, 10, 15	Byerly Island HRM 26.1	McKinney Island HRM 25.5	Transplants to McKinney Island HRM 25.5	Trent Island HRM 21.5
Mucket	<i>Actinonaias ligamentina</i>			26	30		
Threeridge	<i>Amblema plicata</i>		X	1		29	
Purple Wartback	<i>Cyclonaias tuberculata</i>		X	1	2	97	
Butterfly	<i>Ellipsaria lineolata</i>		X				
Elephantear	<i>Elliptio crassidens</i>	~100	X	1			
Spike	<i>E. dilatata</i>			3	1		
Ebonysell	<i>Fusconaia ebena</i>		X			490	
Wabash Pigtoe	<i>F. flava</i>		X			88	
Washboard	<i>Megaloniais nervosa</i>		X			21	
Pink Mucket ¹	<i>Lampsilis abrupta</i>	X ²			2		
Wavyrayed Lampmussel	<i>L. fasciola</i>		X				
Pocketbook	<i>L. ovata/cardium</i>	1		4	2		2
Fragile	<i>Leptodea fragilis</i>	~5	X				
Papershell							
Black Sandshell	<i>Ligumia recta</i>	1		1	1		
Threehorn Wartback	<i>Obliquaria reflexa</i>		X				
Sheepnose	<i>Plethobasus cyphus</i>			4	7		
Ohio Pigtoe	<i>Pleurobema cordatum</i>	1	X	3	1		
Pyramid Pigtoe	<i>P. rubrum</i>				1 (relic)		
Round Pigtoe	<i>P. sintoxia</i>			8	1		
Pink Heelsplitter	<i>Potamilus alatus</i>	~10	X	1		6	
Giant Floater	<i>Pyganodon grandis</i>	2					
Monkeyface	<i>Quadrula metanevra</i>		X			114	
Pimpleback	<i>Q. pustulosa</i>	1	X	1	1	155	
Pistolgrip	<i>Tritogonia verrucosa</i>	X ²	X				
Deertoe	<i>Truncilla truncata</i>		X				
Mountain Creekshell	<i>Villosa vanuxemensis</i>			1			
	Number of specimens	~120	10,000+	55	49	1000	2
	(Number of species)	(8)	(16)	(13)	(11)	(8)	(1)

¹Federal endangered species

²Found during mussel transplant monitoring, 10/02/00.

Biological improvements in fish and benthic macroinvertebrate communities have created interest in restoring extirpated mussel species to the Douglas tailwater. Since 1998, over ten thousand mussels of 16 common species have been transplanted from Kentucky Reservoir to three sites in the lower half of the Douglas tailwater (J. Layzer, personal communication, July 2000). The spiny riversnail (*Io fluviialis*) has also been released at FBRM 8 in recent years. Early assessments of transplant success are positive, and future transplants may include federal listed endangered and/or threatened species. Future reintroductions of federal listed mussel species would be designated by the USFWS as "experimental, non-essential populations."

Mussel surveys were conducted at two Cherokee tailwater sites during minimum flow operations during April 2000 (see Table 2). A total of 55 live mussels representing 13 species were collected at Byerly Island (HRM 26.1). The most

common species by far was the mucket, with 26 individuals collected. Most other species were rare, as seven of the species encountered were represented by only a single individual. Mussels were all large, generally eroded, and apparently aged adults. No federal listed species were found. Only one Cumberlandian species, the mountain creekshell, was collected. Mussels generally occurred in run areas at a depth of approximately 2 feet or greater, and shallow riffles surveyed were devoid of mussels. Further downstream at Trent Island (HRM 21.5), only two live mussels were found, and both were pocketbooks.

Although native mussels are still extant in the Cherokee tailwater, no evidence of recent reproduction was seen. Because mussels were only found in the deeper portions of prime habitat, they may have been eliminated from shallow riffles during periods of no flow prior to minimum flow implementation in 1987. Recently collected live mussels have shown a different pattern of shell growth in the outer 10-15 percent of the shell. This could indicate new growth and better health as a result of improved water level, temperature and DO conditions since the RRI program was implemented. If mussel populations are recovering, then reproduction may once again occur in the lower Holston River.

On October 12, 2000, the first mussel transplant to the Cherokee tailwater was made in a cooperative effort between USGS, Tennessee Wildlife Resources Agency (TWRA), and TVA. A brief search for existing mussels was made in the pool above McKinney Island (HRM 25.5) immediately before the transplanted mussels were released. In about 2 person-hours of searching, approximately 48 live mussels and 1 relic (recently living) mussel of 11 species were found, indicating this was a relatively densely populated area for mussels. Most notable among the species found were two pink muckets; one of which was a gravid female, and the other was a male. The reproductive condition of the female, along with the recently improved growth patterns described above, indicates present conditions for mussels in the Cherokee tailwater are conducive to their health and survival. Following the search, one thousand mussels of eight common species were released in an experimental grid at the density of ten mussels per square meter.

Threatened and Endangered Aquatic Species

The lower French Broad and Holston Rivers support a large population of the snail darter, a fish currently listed under the Endangered Species Act as threatened. This population is likely the result of transplants by TVA and the USFWS of 533 snail darters from the Little Tennessee River to the Monday Island site (HRM 14.5) on the lower Holston River (Biggins and Eager, 1983). These transplants were made in 1979-80, when the snail darter was first listed as an endangered species. The population in the lower French Broad was discovered in 1988 at FBRM 8.0 during fish community surveys for the RRI program, and it has since expanded its range in the French Broad upstream as far as FBRM 29.8. RRI sampling in the lower Holston River found snail darters as far upstream as HRM 14.5 in 1997 and March 2000. To date, none have been reported further upstream in the Cherokee tailwater. However, aquatic habitat and water quality improvements related to the RRI program were begun more recently in the Cherokee tailwater than in Douglas, and trends (upstream expansion of the snail darter population and improvement of the aquatic community) similar to those observed in the Douglas tailwater are expected.

As a likely result of the TVA and USFWS transplants in the 1970s and early 1980s, the snail darter has been found in seven or eight Tennessee River tributaries, and downstream as far as the lower Paint Rock River in northern Alabama. Periodically, adults have also been observed in the mainstream impoundments near the mouths of these tributaries (Biggins and Eager, 1983). Because of the health of the Hiwassee River population, as well as the discovery of snail darters in other streams, the snail darter was reclassified as a threatened species in 1984 (Biggins, 1984).

The snail darter inhabits larger East Tennessee waterways where it frequents clean-swept sand and gravel shoal areas for spawning and feeding. Spawning takes place on sand and gravel shoals in medium to large free-flowing streams from February to April. Newly hatched larvae drift with the downstream river currents, and they often occur in deeper portions of rivers and reservoirs where current is present. Snail darters feed primarily on small pleuocerid river snails (Etnier and Starnes, 1993).

Because of the snail darter's migratory life history strategy, long-term maintenance of snail darter populations in the French Broad and Holston Rivers depends upon continuity of appropriate habitats in these migratory corridors of snail darters. Important habitat characteristics in these corridors include relatively stable bottom sediments and a relatively low level of suspended sediments. Such conditions ensure snail darters suitable places to rest and hide along with an adequate supply of food items.

The pink mucket, a mussel listed under the Endangered Species Act as endangered, was found in October 2000, in both the lower French Broad and Holston Rivers during mussel transplant activities by the USGS. The pink mucket inhabits large rivers with sand and gravel substrates. Although it is relatively widespread in the Tennessee River system, the pink mucket has always been considered rare. Its habitat has been reduced by dam construction, pollution and gravel dredging (USFWS, 1980).

Other aquatic species of importance identified in this river reach include the tangerine darter (*Percina aurantiaca*), currently known in the French Broad River between FBRMs 29.8 and 8.0, and the blue sucker (*Cycleptus elongatus*) reported at FBRM 12.0 and FBRM 22. The former of these two species is listed by the state of Tennessee as "In Need of Management," while the latter is listed as "Threatened." Recent water quality improvements and subsequent biological responses have facilitated the recent reintroduction of other rare aquatic species, such as the lake sturgeon (*Acipenser fulvescens*).

Significant Managed Areas

A review of the TVA Natural Heritage database indicated that there are two proposed and one designated managed areas either adjacent to or within 1 mile of the lower French Broad River.

- Trotter Bluff TVA Small Wild Area (Proposed) on the Douglas Dam Reservation is owned and managed by TVA. It is located on the left descending bank of the French Broad River from Douglas Dam to FBRM 32. This approximately 30-

acre area, the first area proposed to be designated as a natural area on Douglas Reservoir, boasts a mature forest, shallow limestone sinkholes, and abundant spring wildflowers. A loop-trail has been installed recently to enhance public use of the area.

- The confluence of the Tuckahoe Creek State Scenic River and the French Broad River occurs on the right descending bank at FBRM 14.5. TDEC has established a 7-mile section of Tuckahoe Creek as a Class III Partially Developed River Area. TDEC encourages management practices on Class III rivers that prevent further loss of scenic value, improve existing scenic aspects, and restore water quality.
- Seven Islands Park is a 395-acre area located on the right descending bank of the French Broad River at FBRM 15. This park is managed by Knox County as a wildlife sanctuary, and it offers river access facilities. Native mussels and snail darters have been identified here, and there is ongoing research with transplanted experimental populations of native mussels. In July 2000, lake sturgeon were reintroduced at this site. The USFWS is considering this site for future reintroduction projects involving other aquatic species.

A review of the TVA Natural Heritage database indicated that there are three managed areas within 1 mile of the lower Holston River.

- Buffalo Springs State Fish Hatchery/State Wildlife Management Area is located 0.5 mile north of the Holston River at HRM 46. TWRA owns and manages this 342-acre area. The hatchery produces trout used to stock state lakes, while the surrounding land offers hunting opportunities.
- Indian Cave Protection Planning Site is located on the right descending bank at HRM 40. Tennessee Protection Planning Sites are compiled by the Tennessee Protection Planning Committee, a cooperative effort of government land managers and private individuals knowledgeable about the biota of the state. This 2.42-mile long cave was once habitat for two federal endangered species. However, human disturbance has led to the decline of these populations and the cave's suitability as habitat. Although the cave is privately owned, it has been operated commercially since 1930 and is open for tours. This site has been put on the Tennessee Protection Planning Committee's inactive list.
- Mascot Cedar Glade Protection Planning Site is located 0.3 mile north of the Holston River at HRM 16.3. Tennessee Protection Planning Sites are compiled by the Tennessee Protection Planning Committee. This 40-acre site consists of an open cedar glade surrounding by a red cedar forest. Although the glade does not support endemic species, it may harbor up to 250 plants and represents the last distinct cedar glade community in east Tennessee. This site is on the Tennessee Protection Planning Committee's inactive list.

Wild and Scenic Rivers Values

The subject segments of both the Holston and French Broad Rivers are listed on the Nationwide Rivers Inventory (NRI). The NRI is a list, maintained and compiled by the National Park Service, of those streams having "outstandingly remarkable

values,” and therefore potentially eligible to be considered for status as a National Wild and Scenic Rivers System. Both segments of the Holston and French Broad Rivers from their mouths to Cherokee and Douglas Dams are listed on the NRI for the outstandingly remarkable values of scenery, recreation, geology, fish, wildlife, history and cultural with the following descriptions:

- Holston River, HRM 0 to HRM 52 - Scenic stream segment affording excellent duck hunting and fishing.
- French Broad, FBRM 0 to FBRM 32 - Archaeological sites; supports game fishery; upper segment is mountainous stream with good whitewater and scenic gorge area; numerous rock gardens, boulder beds, rapids, islands, and ledges; diversity of flora and fauna.

The National Wild and Scenic Rivers Act requires that “In all planning for the use and development of water and related land resources, consideration shall be given by all Federal agencies involved to potential national wild, scenic and recreational river areas...”, (see 16 United States Code, Section 1276 (d)). Under the Presidential directive of August 2, 1979, agencies are required to consult with the National Park Service prior to taking action which could effectively foreclose wild, scenic, or recreational status of rivers on the NRI. Small docks and bank stabilization are on the NRI procedure guideline list of developments potentially impacting the values of listed rivers.

ENVIRONMENTAL CONSEQUENCES

Evaluation of Impacts

Private water use facilities permitted under either alternative are not anticipated to adversely impact floodplains or socioeconomic conditions. The specifications proposed under the Action Alternative would provide more protection of the river's scenic and recreational qualities than would the guidelines associated with the No Action Alternative.

Future residential and commercial development on the shorelines of the Lower Holston and French Broad Rivers is expected to increase regardless of the alternative selected. Some of these property owners will request approval from TVA for private water use facilities. Over the Tennessee Valley Region, TVA has experienced a 6 percent annual increase in the number of requests for the approval of private water use facilities (TVA, 1998). In concentrated areas such as subdivision developments, estimates of the density of private water use facilities could approach approximately 20 facilities per mile of shoreline.

Under either alternative, TVA will conduct site-specific reviews for individual Section 26a requests to determine if wetlands and cultural resources could be impacted. Site-specific environmental reviews will also continue to be conducted to determine potential impacts to shoreline vegetation, wildlife, terrestrial threatened and endangered species, and navigation. If these reviews identify potential impacts, the request will either be denied, or its approval will be conditioned such that potential adverse impacts are either avoided or minimized.

Water Quality, Aquatic Ecology, and Threatened and Endangered Aquatic Species

Because virtually all the shoreline is privately owned, residential development and its associated environmental impacts could occur on any accessible shoreline of the subject river reaches under either alternative without TVA action or approval. During residential shoreline development, penetrable spaces (i.e., those areas where rainfall can penetrate the soil surface), which include vegetated and open forested areas, are converted to land uses that usually increase the extent of impenetrable surfaces. Natural vegetative cover may be removed, and cut-and-fill activities may be undertaken to enhance the development potential of the land. As development increases, there are usually corresponding increases in the volume and rapidity of runoff during storm events (TVA, 1998). Regardless of the alternative selected, there will likely be some incremental increases in aquatic nutrient levels due to increased number of residential sewage/septic systems and from residential vegetation management practices.

Many components of the aquatic ecosystem, as well as the snail darter and other protected aquatic species, are dependent on good water quality. Physical barriers may also affect general habitat conditions. For example, river channel obstructions may interfere with the snail darter's ability to successfully complete its life cycle. Specifically, such obstructions may impede the drifting of larval snail darters into deep pools or impounded areas, as well as the subsequent upstream migration by juveniles to sand-gravel shoals.

Compared to the No Action Alternative, the Action Alternative would provide a higher level of protection and a lower level of cumulative impacts to aquatic resources, including non-listed fish species, mussels, snails, and other benthic macroinvertebrates, by establishing a set of specifications for private water use facilities that have been customized for the riverine conditions of the lower French Broad and Holston Rivers. The features of these customized specifications, and the manner in which they would avoid or mitigate adverse impacts, are described in detail in the Special Conditions section under the Action Alternative. Potential impacts to snail darter and pink mucket habitat, aquatic ecology and water quality are expected to be insignificant if the construction guidelines and the required approval (general and standard) conditions described in the measures to mitigate adverse impacts discussion are taken. This would ensure that migratory and spawning habitat of the snail darter is maintained and that any suspended sediment caused by construction is kept to a minimum. TVA has determined that with these measures in place, its issuance of approvals for private water use facilities on the lower French Broad and Holston Rivers, individually and cumulatively, is not likely to adversely affect these federal listed species. In a letter dated September 25, 2002 (see Attachment 5), the USFWS stated that: "If proposed water use facilities are constructed as described in the environmental assessment, with all protective measures implemented and enforced, and if the above-described recommendations are implemented, we believe that federally listed species will not be adversely affected." In a USFWS letter dated December 12, 2002 (see Attachment 6), USFWS clarified its recommendation for consultation on future proposals. Consultation is recommended in those cases where the proposed facility is not consistent with the proposed Construction Guidelines or Special Conditions. In

cases where the proposal is consistent, consultation with USFWS would not be required.

Significant Managed Areas

Significant effects to managed areas are not expected under either alternative. Because of the additional protective measures incorporated into the Action Alternative, potential impacts to managed areas along the water under the Action Alternative would likely be less than those resulting under the No Action Alternative.

The Trotter Bluff TVA Small Wild Area and Tuckahoe Creek are both located upstream of any potential private water use development on the French Broad River, and neither would be impacted by any 26a actions under the proposed guidelines.

The Buffalo Springs State Fish Hatchery/State Wildlife Management Area and the Mascot Cedar Glade Protection Planning Site are located 0.5 and 0.3 mile, respectively, north of the Holston River. Implementation of the proposed guidelines is not expected to affect either of these two areas.

The use of construction guidelines, special conditions, and individual reviews for any proposed 26a activities in the vicinity of the Indian Cave Protection Planning Site would help prevent further degradation of the site. Thus, potential effects to this area would be insignificant under the Action Alternative.

Shoreline or stream modification activities directly upstream and/or adjacent to the Seven Islands site could affect the area by altering the flow of the river or increasing erosion. Adoption of the Action Alternative, including the implementation of construction guidelines, special conditions, and individual reviews for proposed 26a actions would not result in significant effects to the Seven Islands area.

Wild and Scenic Rivers Values

Under either alternative, the installation of private water use facilities such as docks, ramps, and shoreline stabilization would result in a minor alteration of the free flowing nature of the rivers. The specifications proposed under the Action Alternative as the Construction Guidelines and the Special Conditions have been designed to protect the river's scenic value, water quality and recreational resources. Future Section 26a approvals would be conditioned accordingly to protect these values.

Because of shallow water and the river-like nature of the subject reaches of the Holston and French Broad Rivers, most water-based recreation tends to occur near private docks, and small boats such as canoes and john-boats are preferred over larger boats having heavier drafts. Although the issuance of additional Section 26a approvals for private water use facilities (i.e., boat docks) would result in some additional recreational use, the potential for over-crowding or other potential adverse effects on recreation are expected to be minor and insignificant.

Thus, TVA has determined that adoption of the Action Alternative would not significantly adversely affect the aesthetic character or the natural, cultural, or

recreational values of the two river segments, nor would it foreclose the designation of these river segments for their wild, scenic and recreational values. In his e-mail of November 27, 2000, Mr. Jeff Duncan of the National Park Service concurred with this determination.

Cumulative Impacts

Land use changed the original forest cover along much of French Broad and Holston Rivers to woodlots and farms in the 1800s. During the mid-1900s, additional forest clearing occurred for expansion of livestock grazing and other agricultural or domestic use. Similar to many other riverine or lake access areas in the region, much of this land now is being converted to residential use. If current population and migration trends continue, much of the available property on the river could eventually be developed for residential use as development becomes economically feasible and additional infrastructure becomes available. The potential for cumulative adverse environmental effects will likely increase as area population and development increases. This type of development is likely to reduce existing riparian vegetation along the shorelines of these rivers regardless of the alternative selected.

Under the Action Alternative, the proposed guidelines would provide for efficient reviews of private water use facilities and would condition such approvals to avoid, minimize, or mitigate their individual and cumulative effects. Implementation of the proposed guidelines would allow reasonable access to the water while encouraging the use of BMPs, vegetative management zones and other measures expected to maintain or enhance water quality. Implementation of the proposed guidelines would reduce the possibility for potential adverse effects to sensitive aquatic species from private water use facilities and would reduce current and future impacts from residential development.

Because implementation of the Action Alternative and the associated permitting guidelines would neither cause nor contribute to adverse trends on water quality and associated aquatic life in the subject reaches of the Holston and French Broad Rivers, TVA has determined that the incremental and cumulative effects of adoption of the Action Alternative, when added to the past, present, and reasonably foreseeable future actions, are insignificant.

PREFERRED ALTERNATIVE

TVA's preferred alternative is the Action Alternative. Selection of this alternative would establish construction guidelines and would require the imposition of appropriate (general and standard) conditions to protect the snail darter, pink mucket and other sensitive aquatic resources.

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Tennessee Wildlife Resources Agency, Nashville, Tennessee

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Department of Environment and Conservation, Division of Natural Heritage,
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Attachment 1



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March 23, 2001

Mr. Jon M Loney, Manager
NEPA Administration
Tennessee Valley Authority
400 West Summit Hill Drive
Knoxville, TN 37902-1409

RE: Draft Environmental Assessment – Private Water Use Facilities on the French Broad and Holston Rivers

Dear Mr. Loney:

The following are comments on the proposed EA

The EA reviews the existing environment, but seems to largely ignore the impacts of the anticipated development associated with the streamlined permitting process.

These areas of the two river reaches are currently undeveloped. As the Knoxville and surrounding counties become more urban, considerably more development pressure will be felt along these river systems.

Loss of riparian habitat is of critical concern in the Holston and French Broad rivers. No information is provided that identifies the anticipated density of docks and boat ramps in these areas. No criteria are provided for determining how the permits might be limited should cumulative impacts of riparian loss and loss of canopy be identified. Given the NRI designation and the 303(d) listing of some portions of the riverine systems, it seems critical that these impacts along with those from the already increasing sewage treatment discharges be factored into the Agency's planning and enforcement.

Although the changes in permitting may not be significant on their face, we remain concerned that the Agency has not anticipated the cumulative impacts of heavy development in the area. We encourage the expansion of this EA to include a more comprehensive evaluation of the rivers and potential mitigation of the inevitable increases in impacts.

423 632 6855 P. 02/03

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PPR-02-2001 15:29

Attachment 1

TOTAL P.03

If I can be of further assistance in this matter, please contact me at (865) 594-5529.

Sincerely,



M. Paul Schmierbach
Environmental Program Manager
Division of Water Pollution Control

423 632 6855 P.03/03

PLANNING

TWR ENV POL

APP-02-2001 15:38

Attachment 2



United States Department of the Interior

FISH AND WILDLIFE SERVICE
446 Neal Street
Cookeville, TN 38501

March 15, 2001

Mr. Jon M. Loney
Environmental Policy and Planning
Tennessee Valley Authority
400 West Summit Hill Drive
Knoxville, Tennessee 37902-1499

Subject: Draft Environmental Assessment for Private Water Use Facilities on the French Broad River, Miles 3.7 to 32.3, Jefferson, Knox, and Sevier Counties, Tennessee; and Holston River, Miles 4.4 to 52.3, Jefferson, Knox, and Grainger Counties, Tennessee.

Dear Mr. Loney

Fish and Wildlife Service personnel have reviewed the subject draft Environmental Assessment. The assessment covers the Tennessee Valley Authority's (TVA) proposed issuance of Section 26a permits for private water use facilities along the lower French Broad and Holston rivers. It focuses on potential impacts, particularly cumulative impacts, to endangered and threatened species. TVA has determined that the issuance of permits for private water use facilities, in accordance with the standards and guidelines proposed in the assessment, is not likely to adversely affect the federally threatened snail darter (*Percina tanasi*) or the federally endangered pink mucket pearly mussel (*Lampsilis abrupta*).

We are concerned regarding conflicting conclusions contained within the document regarding impacts to endangered species. Under the section entitled "Comparison of Alternatives," TVA states that adverse impacts to the snail darter, pink mucket, and other sensitive resources would not likely result from an individual Section 26a permit. However, it also states in this section that these permit approvals in the lower French Broad and Holston Rivers could potentially result in cumulative impacts that would adversely affect both the snail darter and the pink mucket. Nowhere in the document are these cumulative impacts addressed. TVA has apparently justified the Action Alternative by stating that the Section 26a permit requests for these rivers would be reviewed as a class of actions for which the recommended construction guidelines and required permit conditions would help avoid or minimize impacts to sensitive resources. This statement implies that there would still be cumulative impacts that may adversely affect threatened or endangered species and other sensitive resources. We recommend that TVA provide more information on the cumulative impacts from private water use facilities in these two rivers.

Attachment 2

Our agency has long advocated that community water use facilities should be located within public waters instead of a large number of individually owned facilities. The cumulative impacts would be less for the fewer number of community facilities than for the large number of individual facilities that would result from the Action Alternative chosen by TVA in this environmental assessment. We recommend that a third alternative be assessed that would result in the development of community water use facilities instead of individual facilities.

We are presently unable to concur with your "not likely to adversely affect" finding for the snail darter and the pink mucket pearly mussel. We do agree with your conclusion that cumulative impacts could potentially adversely affect these species. We recommend that informal consultation continue for these two species until the questions raised about cumulative impacts of private water use facilities are adequately addressed.

Please contact Timothy Merritt (telephone 931/528-6481, ext. 211, or e-mail timothy_merritt@fws.gov) of my staff if you have questions regarding the information provided in this letter.

Sincerely



Lee A. Barclay, Ph.D.
Field Supervisor

Attachment 3

GENERAL AND STANDARD CONDITIONS Section 26a and Land Use

General Conditions

1. You agree to make every reasonable effort to construct and operate the facility authorized herein in a manner so as to minimize any adverse impact on water quality, aquatic life, wildlife, vegetation, and natural environmental values.
2. This permit may be revoked by TVA by written notice if:
 - a) the structure is not completed in accordance with approved plans;
 - b) if in TVA's judgment the structure is not maintained as provided herein;
 - c) the structure is abandoned;
 - d) the structure or work must be altered to meet the requirements of future reservoir management operations of the United States or TVA, or;
 - e) TVA finds that the structure has an adverse effect upon navigation, flood control, or public lands or reservations.
3. If this permit for this structure is revoked, you agree to remove the structure, at your expense, upon written notice from TVA. In the event you do not remove the structure within 30 days of written notice to do so, TVA shall have the right to remove or cause to have removed, the structure or any part thereof. You agree to reimburse TVA for all costs incurred in connection with removal.
4. In issuing this Approval of Plans, TVA makes no representations that the structures or work authorized or property used temporarily or permanently in connection therewith will not be subject to damage due to future operations undertaken by the United States and/or TVA for the conservation or improvement of navigation, for the control of floods, or for other purposes, or due to fluctuations in elevations of the water surface of the river or reservoir, and no claim or right to compensation shall accrue from any such damage. By the acceptance of this approval, applicant covenants and agrees to make no claim against TVA or the United States by reason of any such damage, and to indemnify and save harmless TVA and the United States from any and all claims by other persons arising out of any such damage.
5. In issuing this Approval of Plans, TVA assumes no liability and undertakes no obligation or duty (in tort, contract, strict liability or otherwise) to the applicant or to any third party for any damages to property (real or personal) or personal injuries (including death) arising out of or in any way connected with applicant's construction, operation, or maintenance of the facility which is the subject of this Approval of Plans.
6. This approval shall not be construed to be a substitute for the requirements of any federal, state, or local statute, regulation, ordinance, or code, including, but not limited to, applicable electrical building codes, now in effect or hereafter enacted.
7. The facility will not be altered, or modified, unless TVA's written approval has been obtained prior to commencing work.
8. You agree to notify TVA of any transfer of ownership of the approved structure to a third party. Third party is required to make application to TVA for permitting of the structure in their name.
9. You agree to stabilize all disturbed areas within 30 days of completion of the work authorized. All land-disturbing activities shall be conducted in accordance with Best Management Practices as defined by Section 208 of the Clean Water Act to control erosion and sedimentation to prevent adverse water quality and related aquatic impacts. Such practices shall be consistent with sound engineering and construction principles; applicable federal, state, and local statutes, regulations, or ordinances; and proven techniques for controlling erosion and sedimentation, including any *required* conditions.
10. You agree not to use or permit the use of the premises, facilities, or structures for any purposes that will result in draining or dumping into the reservoir of any refuse, sewage, or other material in violation of applicable standards or requirements relating to pollution control of any kind now in effect or hereinafter established.

Attachment 3

11. The facility will be maintained in a good state of repair and in good, safe, and substantial condition. If the facility is damaged, destroyed, or removed from the reservoir or stream for any reason, or deteriorates beyond safe and serviceable use, it cannot be repaired or replaced without the prior written approval of TVA.
12. You agree that if any historical or prehistoric archaeological material (such as arrowheads, broken pottery, bone or similar items) is encountered during construction of this facility you will immediately contact this office and temporarily suspend work at that location until authorized by this office to proceed.
13. The Native American Graves Protection and Repatriation Act and the Archaeological Resources Protection Act apply to archaeological resources located on the premises. If LESSEE (or licensee or grantee (for easement) or applicant (for 26a permit on federal land) discovers human remains, funerary objects, sacred objects, objects of cultural patrimony, or any other archaeological resources on or under the premises, LESSEE (or licensee, grantee, or applicant) shall immediately stop activity in the area of the discovery, make a reasonable effort to protect the items, and notify TVA by telephone (phone ____). Work may not be resumed in the area of the discovery until approved by TVA.
14. On TVA land, unless otherwise stated on this permit, vegetation removal is prohibited.

Standard Conditions: (Items that pertain to your request have been checked.)

1. Structures and Facilities

- a) TVA number ____ has been assigned to your facility. When construction is complete, this number shall be placed on a readily visible part of the outside of the facility in the numbers not less than three inches high.
- b) The 100-year flood elevation at this site is estimated to be ____-feet mean sea level. As a minimum, your fixed facility should be designed to prevent damage to stored boats by forcing them against roof during a 100-year flood event.
- c) You agree that the float will be temporarily connected (i.e., by slip pin/ropes) and not permanently attached to nonnavigable houseboat.
- d) You agree that this ____ shall have no side enclosures except wire mesh or similar screening.
- e) Buildings or other enclosed structures containing sleeping or living accommodations, including toilets and related facilities, or that have enclosed floor area in excess of 25 square feet, are prohibited.
- f) Ski jumps will not be left unattended for extended periods of time. All facilities will be tied to the shoreline or to a boathouse or pier fronting your property at the completion of each day's activities.
- g) For all electrical services permitted, a disconnect must be located at or above the ____-foot contour that is accessible during flooding.
- h) You should contact your local government official(s) to ensure that this facility complies with all applicable local floodplain regulations.
- i) The entire closed-loop coil heating and air conditioning system and its support apparatus must be either placed below elevation ____ (to provide a five-foot clearance for water craft at minimum pool elevations of ____) or located underneath a TVA approved water use facility or other TVA approved structure. The supply and return lines must be buried as they cross the reservoir drawdown zone in areas of water depth less than five feet (minimum pool). The liquid contents of the closed-loop heating and air conditioning system must be propylene glycol or water, and the applicant or authorized agent must provide TVA with written verification of this fact.

Attachment 3

- j) You agree that only those facilities which have been approved by TVA prior to construction will be placed within the harbor limits and that permanent mooring buoys, boat slips, or other harbor facilities will not be placed outside the harbor limits.
- k) You agree that the ___ facility hereby approved will be used for ___ and for no other purpose unless approved in writing from TVA.
- l) You agree that the construction project covered by this permit will be completed by the following date:___.
- m) You agree to securely anchor all floating facilities to prevent them from floating free during major floods.
- n) You are responsible for accurately locating your facility, and this authorization is valid and effective only if your facility is located on or fronting property *owned* or *leased* as shown on your application.

2. Ownership Rights

- a) No fill will be placed higher than elevation ___ maximum shoreline contour (msc), and every precaution will be taken not to disturb or alter the existing location of the ___-foot contour elevation through either excavation or placement of fill.
- b) It is understood that you own partial interest in the land at this location. Therefore, you should be aware that, if objections to this structure are received by the other owners of partial interest at this site, that action may be cause for TVA to consider revoking this permit.
- c) You are advised that TVA retains the right to flood this area and that TVA will not be liable for damages resulting from flooding.
- d) You shall notify TVA of any sale or transfer of land, which would affect the landward limits of harbor area, as far in advance of such sale or transfer as possible.
- e) This approval of plans is only a determination that these harbor limits will not have any unacceptable effect on TVA programs or other interests for which TVA has responsibility. Such approval does not profess or intend to give the applicant exclusive control over the use of navigable waters involved.
- f) You recognize and understand that this authorization conveys no property rights, grants no exclusive license, and in no way restricts the general public's privilege of using shoreland owned by or subject to public access rights owned by TVA. It is also subject to any existing rights of third parties. Nothing contained in this approval shall be construed to detract or deviate from the rights of the United States and TVA held over this land under the Grant of Flowage Easement. This Approval of Plans does not give any property rights in real estate or material and does not authorize any injury to private property or invasion of private or public rights. It merely constitutes a finding that the facility, if constructed at the location specified in the plans submitted and in accordance with said plans, would not at this time constitute an obstruction unduly affecting navigation, flood control, or public lands or reservations.

3. Shoreline Modification and Stabilization

- a) For purposes of shoreline bank stabilization, all portions will be constructed or placed, on average, no more than two feet from the existing shoreline at normal summer pool elevation.
- b) You agree that spoil material will be disposed of and contained on land lying and being above the ___-foot contour. Every precaution will be made to prevent the reentry of the spoil material into the reservoir.
- c) Bank, shoreline, and floodplain stabilization will be permanently maintained in order to prevent erosion, protect water quality, and preserve aquatic habitat.
- d) You agree to reimburse TVA \$___, which is the current value of the ___ acre feet of power storage volume displaced by fill into the reservoir.

4. Water Intake

- a) If the reservoir falls below the elevation of the intake, the applicant will be responsible for finding another source of raw water.

Attachment 3

- b) You must install and maintain a standard regulatory hazard buoy at the end of the intake to warn boaters of the underwater obstruction. The word "intake" should be added to the buoy and be attached using a five-foot cable.
- c) The screen openings on the intake strainer must be 1/8-inch (maximum), to minimize the entrapment of small fish.
- d) This approval does not constitute approval of the adequacy or safety of applicant's water system. TVA does not warrant that the water withdrawn and used by applicant is safe for drinking or any other purpose, and applicant is solely responsible for ensuring that all water is properly treated before using.

5. Bridges and Culverts

- a) You agree to design/construct any instream piers in such a manner as to discourage river scouring or sediment deposition.
- b) Applicant agrees to construct culvert in phases, employing adequate streambank protection measures, such that the diverted streamflow is handled without creating streambank or streambed erosion/sedimentation and without preventing fish passage.
- c) Concrete box culverts and pipe culverts (and their extensions) must create/maintain velocities and flow patterns which offer refuge for fish and other aquatic life, and allow passage of indigenous fish species, under all flow conditions. Culvert floor slabs and pipe bottoms must be buried at least one foot below streambed elevation, and filled with naturally occurring streambed materials. If geologic conditions do not allow burying the floor, it must be otherwise designed to allow passage of indigenous fish species under all flow conditions.
- d) All natural stream values (including equivalent energy dissipation, elevations, and velocities; riparian vegetation; riffle/pool sequencing; habitat suitable for fish and other aquatic life) must be provided at all stream modification sites. This must be accomplished using a combination of rock and bioengineering, and is not accomplished using solid, homogeneous riprap from bank to bank.
- e) You agree to remove demolition and construction by-products from the site--for recycling if practicable, or proper disposal--outside of the 100-year floodplain. Appropriate BMPs will be used during the removal of any abandoned roadway or structures.

6. Best Management Practices

- a) You agree that removal of vegetation will be minimized, particularly any woody vegetation providing shoreline/streambank stabilization.
- b) You agree to installation of cofferdams and/or silt control structures between construction areas and surface waters prior to any soil-disturbing construction activity, and clarification of all water that accumulates behind these devices to meet *state water quality criteria at the stream mile where activity occurs* before it is returned to the *unaffected portion of the stream*. Cofferdams must be used wherever construction activity is at or below water elevation.
- c) A floating silt screen extending from the surface to the bottom is to be in place during excavation or dredging to prevent sedimentation in surrounding areas. It is to be left in place until disturbed sediments are visibly settled.
- d) You agree to keep equipment out of the reservoir or stream and off reservoir or stream banks, to the extent practicable (i.e., performing work "in the dry").
- e) You agree to avoid contact of wet concrete with the stream or reservoir, and avoid disposing of concrete washings, or other substances or materials, in those waters.
- f) You agree to use erosion control structures around any material stockpile areas.
- g) You agree to apply clean/shaken riprap or shot rock (where needed at water/bank interface) over a water permeable/soil impermeable fabric or geotextile and in such a manner as to avoid stream sedimentation or disturbance, or that any rock used for cover and stabilization shall be large enough to prevent washout and provide good aquatic habitat.

Attachment 3

- h) You agree to remove, redistribute, and stabilize (with vegetation) all sediment which accumulates behind cofferdams or silt control structures.
- i) You agree to use vegetation (versus riprap) wherever practicable and sustainable to stabilize streambanks, shorelines, and adjacent areas. These areas will be stabilized as soon as practicable, using either an appropriate seed mixture that includes an annual (quick cover) as well as one or two perennial legumes and one or two perennial grasses, or sod. In winter or summer, this will require initial planting of a quick cover annual only, to be followed by subsequent establishment of the perennials. Seed and soil will be protected as appropriate with erosion control netting and/or mulch and provided adequate moisture. Streambank and shoreline areas will also be permanently stabilized with native woody plants, to include trees wherever practicable and sustainable (this vegetative prescription may be altered if dictated by geologic conditions or landowner requirements). You also agree to install or perform additional erosion control structures/techniques deemed necessary by TVA.

Attachment 4

Fish Species Collected in Fish Community Samples in Douglas and Cherokee Tailwaters, 1987 - 2000

Common Name	Scientific Name	Douglas Tailwater			Cherokee Tailwater				
		Saffell Island	Seven Islands	Campbell Islands	Blue Springs	Nance Ferry	McKinney Island	Monday Island	I-40 Bridge
Ohio lamprey	<i>Ichthyomyzon bdellium</i>		X	X					
Chestnut lamprey	<i>Ichthyomyzon castaneus</i>	X	X						
American brook lamprey	<i>Lampetra appendix</i>			X					
Spotted gar	<i>Lepisosteus oculatus</i>	X	X	X	X		X		
Longnose gar	<i>Lepisosteus osseus</i>	X	X	X	X	X	X	X	
Mooneye	<i>Hiodon tergisus</i>	X	X	X	X		X		X
Skipjack herring	<i>Alosa chrysochloris</i>	X		X	X	X			
Alewife	<i>Alosa pseudoharengus</i>								
Gizzard shad	<i>Dorosoma cepedianum</i>	X	X	X	X	X	X	X	X
Threadfin shad	<i>Dorosoma petenense</i>	X	X	X	X	X	X		
Largescale stoneroller	<i>Camptostoma oligolepis</i>	X	X	X	X	X	X	X	X
Whitetail shiner	<i>Cyprinella galactura</i>	X	X	X		X		X	
Spottfin shiner	<i>Cyprinella spiloptera</i>	X	X	X	X	X	X	X	X
Goldfish	<i>Carassius auratus</i>	X							
Grass carp	<i>Ctenopharyngodon idella</i>			X					
Common carp	<i>Cyprinus carpio</i>	X	X	X	X	X	X	X	X
Bigeye chub	<i>Hybopsis amblops</i>	X		X	X	X		X	
Striped shiner	<i>Luxilus chrysocephalus</i>	X				X		X	
Warpaint shiner	<i>Luxilus coccogenis</i>						X		
Speckled chub	<i>Macrhybopsis aestivalis</i>	X	X	X			X		
Silver chub	<i>Macrhybopsis storeriana</i>	X							
River chub	<i>Nocomis micropogon</i>		X	X	X		X	X	X
Golden shiner	<i>Notemigonus crysoleucas</i>	X		X					X
Emerald shiner	<i>Notropis atherinoides</i>	X							
Tennessee shiner	<i>Notropis leuciodus</i>		X						
Silver shiner	<i>Notropis photogenis</i>								
Rosyface shiner	<i>Notropis rubellus</i>	X	X	X					
Sand shiner	<i>Notropis stramineus</i>	X							
Telescope shiner	<i>Notropis telescopus</i>		X						
Mimic shiner	<i>Notropis volucellus</i>	X	X	X					
Bluntnose minnow	<i>Pimephales notatus</i>	X	X	X	X	X	X	X	X
Fathead minnow	<i>Pimephales promelas</i>	X			X	X			
Bullhead minnow	<i>Pimephales vigilax</i>		X	X					
Blacknose dace	<i>Rhinichthys atratulus</i>			X		X			
River carpsucker	<i>Carpodius carpio</i>	X	X	X	X		X		X
Quillback	<i>Carpodius cyprinus</i>	X	X	X	X		X	X	
Blue sucker ¹	<i>Cyclepterus elongatus</i>		X						
Northern hog sucker	<i>Hypentelium nigricans</i>	X	X	X	X	X	X	X	X
Smallmouth buffalo	<i>Ictiobus bubalus</i>	X	X	X	X	X	X	X	X
Black buffalo	<i>Ictiobus niger</i>	X	X	X	X	X	X	X	X
Spotted sucker	<i>Minytrema melanops</i>	X	X			X			X
Silver redhorse	<i>Moxostoma anisurum</i>		X	X	X	X	X	X	X
River redhorse	<i>Moxostoma carinatum</i>	X	X	X			X	X	X
Black redhorse	<i>Moxostoma duquesnei</i>	X	X	X			X	X	X
Golden redhorse	<i>Moxostoma erythrurum</i>	X	X	X	X	X	X	X	X
Shorthead redhorse	<i>Moxostoma macrolepidotum</i>	X	X	X	X	X	X	X	X
Black bullhead	<i>Ameiurus melas</i>	X		X					
Yellow bullhead	<i>Ameiurus natalis</i>	X	X	X		X			
Brown bullhead	<i>Ameiurus nebulosus</i>	X		X					
Blue catfish	<i>Ictalurus furcatus</i>	X							
Channel catfish	<i>Ictalurus punctatus</i>	X	X	X	X	X	X	X	X
Mountain madtom	<i>Noturus eleutherus</i>		X	X					
Fiathead catfish	<i>Pylodictis olivaris</i>	X	X	X	X		X	X	
Rainbow trout	<i>Oncorhynchus mykiss</i>	X	X		X	X			
Brown trout	<i>Salmo trutta</i>	X							
Blackstripe topminnow	<i>Fundulus notatus</i>	X	X	X					
Western mosquitofish	<i>Gambusia affinis</i>		X	X		X		X	
Brook silverside	<i>Labidesthes sicculus</i>	X	X	X			X	X	X
Banded sculpin	<i>Cottus carolinae</i>	X	X	X	X	X	X	X	X
White bass	<i>Morone chrysops</i>	X	X	X		X			X
Yellow bass	<i>Morone mississippiensis</i>	X	X	X			X	X	
Striped bass	<i>Morone saxatilis</i>	X	X	X					
Rock bass	<i>Ambloplites rupestris</i>	X	X	X	X	X	X	X	X
Redbreast sunfish	<i>Lepomis auritus</i>	X	X	X	X	X	X	X	X
Green sunfish	<i>Lepomis cyanellus</i>	X	X	X		X		X	X
Warmouth	<i>Lepomis gulosus</i>	X		X		X		X	X
Bluegill	<i>Lepomis macrochirus</i>	X	X	X	X	X	X	X	X
Redear sunfish	<i>Lepomis microlophus</i>	X	X	X		X		X	X
Smallmouth bass	<i>Micropterus dolomieu</i>	X	X	X	X	X	X	X	X
Spotted bass	<i>Micropterus punctulatus</i>	X	X	X		X		X	X
Largemouth bass	<i>Micropterus salmoides</i>	X	X	X	X	X	X	X	X
White crappie	<i>Pomoxis annularis</i>	X	X	X		X		X	
Black crappie	<i>Pomoxis nigromaculatus</i>	X	X	X	X	X	X	X	X
Greenside darter	<i>Etheostoma biennioides</i>	X	X	X	X	X	X	X	X
Bluebreast darter	<i>Etheostoma camurum</i>			X		X		X	X
Stripetail darter	<i>Etheostoma kennicotti</i>	X							
Redline darter	<i>Etheostoma rufilineatum</i>	X	X	X	X	X	X	X	X
Snubnose darter	<i>Etheostoma simoterum</i>	X	X	X	X	X	X	X	X
Banded darter	<i>Etheostoma zonale</i>	X	X	X	X	X	X	X	X
Yellow perch	<i>Perca flavescens</i>	X		X					

Attachment 4

Fish Species Collected in Fish Community Samples in Douglas and Cherokee Tailwaters, 1987 - 2000 (continued)

Common Name	Scientific Name	Douglas Tailwater			Cherokee Tailwater				
		Sattel Island	Seven Islands	Carmel Islands	Blue Springs	Nance Ferry	McKinney Island	Monday Island	I-40 Bridge
Tangerine darter ¹	<i>Percina aurantiaca</i>	X							
Logperch	<i>Percina caprodes</i>	X	X	X	X	X	X	X	X
Gilt darter	<i>Percina evides</i>	X						X	X
Dusky darter	<i>Percina sciera</i>		X	X				X	X
Snail darter ³	<i>Percina tanasi</i>	X	X	X				X	X
Sauger	<i>Stizostedion canadense</i>	X	X	X	X	X	X	X	X
Walleye	<i>Stizostedion vitreum</i>	X			X	X	X	X	X
Freshwater drum	<i>Aplodinotus grunniens</i>	X	X	X	X	X	X	X	X
TOTAL SPECIES		71	60	67	38	45	45	44	41

¹Listed in Tennessee as "Threatened"

²Listed in Tennessee as "In Need of Management"

³Federally listed as "Threatened"



United States Department of the Interior

FISH AND WILDLIFE SERVICE
446 Neal Street
Cookeville, TN 38501

RECEIVED
Environmental Policy and Planning

SEP 27 2002

September 25, 2002

Doc Type: _____
Doc Field: _____
Object Name: _____

Mr. Jon M. Loney
Manager, Environmental Policy and Planning
Tennessee Valley Authority
400 West Summit Hill Drive
Knoxville, Tennessee 37902-1499

Re: FWS #02-2114

Dear Mr. Loney:

Thank you for your letter and enclosure of June 19, 2002, transmitting a copy of the revised draft environmental assessment for private water use facilities on the Holston River and French Broad River in Jefferson, Knox, Sevier, and Grainger counties, Tennessee. Fish and Wildlife Service biologists have reviewed the document and we offer the following comments.

Residential development on the Holston River and French Broad River continues to increase. Such development generally results in construction of boat ramps and floating docks to provide access to the rivers. Poorly or inappropriately constructed river use facilities can have significant adverse impact on riverine habitats and the aquatic species that depend on them. The primary impact results from sediment entering the rivers from eroding riverbanks at the sites of facility construction. Cuts made into the riverbanks and removal of riparian vegetation needed for construction of ramps and docks create areas that are susceptible to erosion if they are not properly stabilized. Additionally, poorly constructed water use facilities can be destroyed and washed downriver by natural or human-induced water level fluctuations (i.e., flood events or releases from upriver dams).

The Holston River and French Broad River appear to be recovering from impacts caused by past land use practices. Both rivers now support populations of the federally threatened snail darter (*Percina tanasi*). Recent transplants of spiny riversnails (*Io fluviatilis*) have been successful in establishing reproducing populations. A proposed rule prepared by the Fish and Wildlife Service's Fish and Mollusk Recovery Coordinator (currently under internal review) includes the Holston River and French Broad River for possible reintroduction of experimental populations of federally listed fish and mussel species. Consequently, we believe that it is important to ensure that proposed activities on the Holston and French Broad Rivers be conducted in a way that avoids adverse impacts to aquatic species and their habitats.

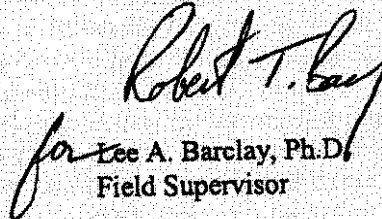
Attachment 5

Although we still maintain that community water use facilities that provide river access to numerous residents along the rivers would be significantly less environmentally damaging than individual ramps and docks, construction of these facilities should have minimal impact on riverine habitats if the protective measures described in the environmental assessment are properly implemented and strictly enforced. We therefore recommend that you consult with us on future proposals to construct individual boat ramps, docks, or other water use facilities on the Holston River and French Broad River. Permits should contain the appropriate protective measures described in the environmental assessment as required conditions. Periodic inspections of completed facilities should be made to ensure that the protective measures were implemented and were effective. If problems are observed, the homeowners should be contacted and recommendations for remedial actions made.

If proposed water use facilities are constructed as described in the environmental assessment, with all protective measures implemented and enforced, and if the above-described recommendations are implemented, we believe that federally listed species will not be adversely affected. In view of this, we believe that the requirements of section 7 of the Endangered Species Act will be fulfilled. Obligations under section 7 must be reconsidered, however, if: (1) new information reveals that construction of water use facilities on the Holston River or French Broad River may affect listed species in a manner or to an extent not previously considered, (2) construction of water use facilities is subsequently modified to include activities which were not considered during this review, or (3) new species are listed or critical habitat designated that might be affected by construction of water use facilities. Finally, if our recommendations are not acceptable, we recommend that consultation continue.

Thank you for the opportunity to comment. If you have any questions, please contact Jim Widlak of my staff at 931/528-6481, ext. 202.

Sincerely,


Lee A. Barclay, Ph.D.
Field Supervisor

Attachment 6



United States Department of the Interior

FISH AND WILDLIFE SERVICE
446 Neal Street
Cookeville, TN 38501

December 12, 2002

Mr. Jon M. Loney
Manager, Environmental Policy and Planning
Tennessee Valley Authority
400 West Summit Hill Drive
Knoxville, Tennessee 37902-1499

Dear Mr. Loney:

On November 12, 2002, Mr. Jim Williamson of your agency spoke with Jim Widlak of my staff about the environmental assessment prepared in June 2002 for private water use facilities on the French Broad River and Holston River in Jefferson, Knox, and Grainger counties, Tennessee. We reviewed that document and responded by letter of September 25, 2002, concurring that proposed private water use facilities on those rivers are not likely to adversely affect federally listed or proposed endangered or threatened species, provided that such facilities are constructed and maintained in compliance with provisions in the environmental assessment, including appropriate protective measures described in the environmental assessment. During the November 12 telephone conversation, Mr. Williamson requested clarification concerning consultation requirements under section 7 of the Endangered Species Act with regard to Section 26(a) permits for construction of private water use facilities on the French Broad and Holston rivers.

If a permit request for construction of a private water use facility on the French Broad River or Holston River is in compliance with the provisions of the June 2002 environmental assessment, including appropriate protective measures, the proposed facility is covered under our September 25, 2002, concurrence and no further section 7 consultation is required. We would, however, appreciate it if you would submit an annual summary of all such actions processed during the year. Any proposed water use facility that is not in compliance with the environmental assessment requires consultation on a case-by-case basis. Additionally, case-by-case section 7 consultation will be required if: (1) new information reveals that construction of private water use facilities may affect listed species in a manner or to an extent not previously considered, (2) construction of private water use facilities is subsequently modified to include activities which were not considered during our previous review, or (3) new species are listed or critical habitat designated that might be affected by construction of private water use facilities.

Attachment 6

I hope this answers Mr. Williamson's question. Your concern for the protection of endangered and threatened species in the French Broad River and Holston River is greatly appreciated. If you have any other questions or if we can be of further assistance, please contact Jim Widiak at 931/528-6481, ext. 202.

Sincerely,



Lee A. Barclay, Ph.D.
Field Supervisor

xc: Mr. James Williamson, TVA, Norris, TN