

**4.19 Visual Resources**

**4.19.1 Introduction**

Scenic resources are an important component in the management of TVA reservoirs and associated shoreline environments. The factors affecting the visual resources issues that are associated with a change in reservoir operations are:

- The barren zone or “bath tub ring” that occurs immediately around the shoreline as reservoir levels are drawn down.
- Exposure of reservoir bottoms and flats at lower pool levels.
- Shoreline development and land use patterns that are a component of the existing reservoir landscape character.

<b>Resource Issues</b>
▶ Scenic attractiveness
▶ Scenic integrity
▶ Landscape visibility

The first two factors are direct effects of lower pool levels while the third factor, for this study, is associated with indirect effects. As identified in Section 5.15, Land Use, proposed changes in reservoir operations could accelerate shoreline residential development around tributary reservoirs by enhancing their recreational and aesthetic appeal. An increase in development ultimately could lead to a reduction in the scenic quality of shoreline environments. All three identified factors are influenced by the timing and duration at which the reservoirs are at or near their full summer pool levels.

Evaluating the visual effects of pool level fluctuations was based on detailed reviews and analyses of nine representative reservoirs, which are identified in Table 4.19-01. These reservoirs were selected to represent the variety in landscape character associated with the different physiographic regions of the project area. The attributes of landform and vegetation combined with the land use patterns occurring in these regions define the landscape character of the different reservoir and tailwater environments.

The greatest differences in landscape character and scenic quality occur between the tributary reservoirs located in the steeper hills and mountainous terrain of eastern Tennessee, North Carolina, and northern Georgia and the mainstem reservoirs located in the flatter terrain of central and western Tennessee, northern Alabama, and western Kentucky.

The selection of specific reservoirs for study was also based on representation of mainstem and tributary reservoirs, different extremes in pool level fluctuation and the resulting range of conditions affecting scenic quality. Variations in recreational and other land uses that could influence users’ perceptions of the landscape’s visual importance were also considered. Field observations were made at different pool elevations and from a range of viewing locations that included a variety of recreational, residential, and highway settings.

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**Table 4.19-01 Primary Visual Attributes of Representative Reservoirs**

Reservoir	Physiographic Region	Pool Level Fluctuation (feet) <sup>1</sup>	Present Land Uses
<b>Tributary Reservoirs</b>			
Boone	Valley and Ridge	26.0	Recreation, residential, forest/conservation
Cherokee	Valley and Ridge	44.0	Recreation, residential
Fontana	Blue Ridge	78.0	Recreation, forest/conservation
Tims Ford	Highland Rim	18.0	Recreation, residential, urban, forest/conservation
Watauga	Blue Ridge	26.0	Recreation, forest/conservation
<b>Mainstem Reservoirs</b>			
Chickamauga	Valley and Ridge	7.5	Recreation, residential, urban
Guntersville	Cumberland Plateau	2.0	Recreation, residential, urban, industrial, forest/conservation
Kentucky	Highland Rim Coastal Plain	5.0	Recreation, residential, urban, industrial, forest/conservation
Wheeler	Highland Rim	6.0	Recreation, residential, urban, industrial, forest/conservation

<sup>1</sup> Values represent the approximate differences in targeted elevations between summer and winter pool levels under the existing operations policy.

Run-of-river projects were also considered when selecting representative reservoirs. The minimal fluctuation in water levels that characterizes these projects does not result in noticeable visual effects. All nine reservoirs in Table 4.19-01 are classified as storage projects. In this group, however, fluctuation levels for Guntersville are comparable to those found in run-of-river projects. These fluctuations are minimal when compared to the greater changes in pool levels that are associated with other storage projects.

### 4.19.2 Regulatory Programs and TVA Management Activities

#### Regulatory Programs

The SMI (TVA 1998) established an integrated management approach that conserves, protects, and enhances shoreline resources, including visual resources. The upgraded standards and specific guidelines adopted under this plan promote the use of best management practices for construction of docks, management of vegetation, stabilization of shoreline erosion, and other shoreline alterations. The SMI also promotes the voluntary establishment of conservation easements to protect scenic landscapes.

### TVA Management Activities

TVA classifies the quality and value of scenery using criteria adapted from a Scenery Management System (SMS) developed by the U.S. Forest Service (USFS) (USDA 1995). TVA has integrated this modified evaluation method into its current planning and environmental review processes. Most TVA reservoir LMPs written or updated since the SMI reflect the SMS process in the descriptions of the existing conditions for visual resources. Visual attributes identified through the SMS process are further used during lands planning to allocate lands or parcels with distinct visual characteristics as Sensitive Resource Management and Natural Resource Conservation Zones. This evaluation method was also used for the ROS EIS.

### 4.19.3 Descriptions of Scenic Value

TVA's scenic value criteria that were used to describe and assess the visual resources within the scope of this project address three key areas of scenic importance: scenic attractiveness, landscape visibility, and scenic integrity. Table 4.19-02 summarizes the current scenic conditions for each of the representative reservoirs according to these parameters, as described in the following sections.

#### Scenic Attractiveness

Scenic attractiveness is a measure of scenic quality and its importance based on the perception of natural beauty that is expressed in the features of a landscape. An important attribute of scenic attractiveness for the project area is the distinct shoreline that is present for each reservoir, as these are clearly visible zones where the water features make their mark on the land (Burton et al. 1974). The highest level of scenic attractiveness is present when the shorelines exhibit a positive and natural-appearing relationship within the landscape. This includes both the shoreline edge and the adjacent visible land along the reservoir shore.

Research has indicated that lines or edges in a landscape composition, such as those created by shorelines, tend to be focus points when one first observes a specific view (Burton 1984). The more contrasting the shoreline, the higher is its probability of being a primary focus point. This factor is important to viewing the shorelines of both tributary and mainstem reservoirs, but the more dramatic drawdown levels of the tributary reservoirs tend to make the shoreline contrast more distinctive for these waterbodies.

#### KEY AREAS OF SCENIC IMPORTANCE

**Scenic Attractiveness**—a measure of scenic quality and its importance is based on the perception of natural beauty that is expressed in the features of a landscape.

**Landscape Visibility**—a combination of several factors that include the context of those viewing the landscape and the concern they have toward the scenic value of the land.

**Scenic Integrity**—the measure of disturbance to a landscape and the degree to which the landscape deviates from the character and quality that are desired and valued for its scenic attractiveness.

**Table 4.19-02 Existing Scenic Conditions for Representative Reservoirs**

Reservoir	Scenic Attractiveness	Landscape Visibility	Existing Scenic Integrity
<b>Tributary Reservoirs</b>			
Boone	<ul style="list-style-type: none"> <li>• Moderate to high</li> <li>• Substantial forested, natural-appearing shoreline surrounded by hills</li> </ul>	<ul style="list-style-type: none"> <li>• High concern level</li> <li>• High opportunity for viewing</li> <li>• Recreational use</li> <li>• Substantial residential development</li> </ul>	<ul style="list-style-type: none"> <li>• Typical drawdown is 26 feet</li> <li>• Compared to other reservoirs, high water level is held longer (mid-May to early September)</li> <li>• Low water levels create ring effect and expose flats</li> <li>• High amount of shoreline residential development and related facilities</li> </ul>
Cherokee	<ul style="list-style-type: none"> <li>• Moderate to high</li> <li>• Flat to gently rolling terrain</li> <li>• Wooded hillsides and rural countryside; island and bluffs present</li> </ul>	<ul style="list-style-type: none"> <li>• Moderate to high concern level</li> <li>• High opportunity for viewing</li> <li>• High amount of recreational use, with many public access areas, county and municipal parks, resorts, state parks, and a wildlife management area</li> <li>• Residential development present</li> <li>• High elevation viewpoint present (Panther Creek Vista)</li> </ul>	<ul style="list-style-type: none"> <li>• Typical drawdown is 44 feet</li> <li>• Substantial drawdown creates highly contrasting ring effect and large area of flats</li> <li>• High water elevation is of short duration</li> <li>• Ring effect is evident most seasons of year</li> <li>• Moderate shoreline development</li> </ul>
Fontana	<ul style="list-style-type: none"> <li>• High</li> <li>• Remote and isolated</li> <li>• Steep forested slopes in mountainous terrain</li> <li>• Mostly natural-appearing shoreline</li> </ul>	<ul style="list-style-type: none"> <li>• Moderate to high concern level</li> <li>• Limited opportunity for viewing but presence of several higher elevation view points</li> <li>• Moderate recreational use (wilderness hikers and campers)</li> <li>• Crossing of Appalachian Trail at dam</li> <li>• Reservoir bordered by Great Smoky Mountains National Park</li> </ul>	<ul style="list-style-type: none"> <li>• Typical drawdown is 78 feet</li> <li>• Exhibits highly visible and contrasting ring effect</li> <li>• High water level is maintained from end of May through early July</li> <li>• Little shoreline development</li> </ul>

**Table 4.19-02 Existing Scenic Conditions for Representative Reservoirs (continued)**

Reservoir	Scenic Attractiveness	Landscape Visibility	Existing Scenic Integrity
<b>Tributary Reservoirs (continued)</b>			
Tims Ford	<ul style="list-style-type: none"> <li>• Moderate to high</li> <li>• Rural area with attractive reservoir</li> <li>• Flat to gently rolling terrain with high amount of natural-appearing vegetated shoreline</li> </ul>	<ul style="list-style-type: none"> <li>• Moderate to high concern level</li> <li>• Moderate opportunity for viewing</li> <li>• Moderate recreational use (especially canoeing and kayaking)</li> <li>• Residential development present</li> <li>• Two communities on tailwaters</li> </ul>	<ul style="list-style-type: none"> <li>• Typical drawdown is 18 feet</li> <li>• Exhibits contrasting ring effect and some bottom or flats exposure</li> <li>• Maximum pool levels are maintained from mid-May through mid-October</li> <li>• Moderate shoreline development</li> </ul>
Watauga	<ul style="list-style-type: none"> <li>• High</li> <li>• Mostly forested, natural-appearing shoreline surrounded by steep, mountainous terrain</li> <li>• Identified as one of the most scenic reservoirs in the Tennessee River watershed</li> </ul>	<ul style="list-style-type: none"> <li>• Moderate to high concern level</li> <li>• Moderate opportunity for viewing</li> <li>• Recreational use</li> <li>• Crossing of Appalachian Trail at dam</li> <li>• Surrounded by Cherokee National Forest</li> </ul>	<ul style="list-style-type: none"> <li>• Typical drawdown is 26 feet</li> <li>• Exhibits highly contrasting ring effect</li> <li>• High water elevation is of short duration</li> <li>• Ring effect is evident most seasons of the year</li> <li>• Little shoreline development</li> </ul>
<b>Mainstem Reservoirs</b>			
Chickamauga	<ul style="list-style-type: none"> <li>• Moderate</li> <li>• Some rock outcrop, bluff formations, and wetlands but no unique features</li> </ul>	<ul style="list-style-type: none"> <li>• Moderate</li> <li>• High opportunity for viewing</li> <li>• High recreational use</li> <li>• Residential development present</li> </ul>	<ul style="list-style-type: none"> <li>• Typical headwater drawdown is from 5.5 to 7.5 feet</li> <li>• Some exposed bottom is evident at low water elevations, including the Patten Island–Harrison Bay area (with high scenic value)</li> <li>• Pool elevation is held at higher water levels from mid-April through first of October</li> <li>• Mixed land uses, including industrial and urban</li> </ul>

**Table 4.19-02 Existing Scenic Conditions for Representative Reservoirs (continued)**

Reservoir	Scenic Attractiveness	Landscape Visibility	Existing Scenic Integrity
<b>Mainstem Reservoirs (continued)</b>			
Guntersville	<ul style="list-style-type: none"> <li>• Moderate to high</li> <li>• Attractive islands, rock bluffs, secluded coves, wetlands, agricultural lands, and wooded ridges</li> <li>• Substantial amount of undisturbed shoreline and natural-appearing landscape</li> </ul>	<ul style="list-style-type: none"> <li>• Moderate to high concern levels</li> <li>• High opportunity for viewing</li> <li>• High recreational use</li> <li>• Residential development; some on ridgeline, with opportunity for high elevation views</li> </ul>	<ul style="list-style-type: none"> <li>• Typical headwater drawdown: the reservoir is virtually stable at 1 to 2 feet</li> <li>• 1-foot fluctuation occurs from April 1 through November 1</li> <li>• Noticeable development; several communities and urban areas located adjacent to reservoir</li> </ul>
Kentucky	<ul style="list-style-type: none"> <li>• Moderate to high</li> <li>• Narrow southern half that is more characteristic of a river (Large extent of undeveloped, natural-appearing vegetated shoreline)</li> <li>• Wide expanse of water in northern half, with higher level of development present but large extent of natural-appearing shoreline remaining</li> </ul>	<ul style="list-style-type: none"> <li>• Moderate to high</li> <li>• Low to moderate opportunity for viewing in southern half</li> <li>• Moderate to high opportunity for viewing in northern half</li> <li>• State parks, commercial recreational developments, Land Between the Lakes National Recreation Area in northern half</li> </ul>	<ul style="list-style-type: none"> <li>• Typical headwater drawdown is 5 feet</li> <li>• High water level is maintained from late April through end of June</li> <li>• Flood conditions occasionally occur</li> <li>• Moderate shoreline development evident around northern half</li> <li>• Industry is present</li> </ul>

**Table 4.19-02 Existing Scenic Conditions for Representative Reservoirs (continued)**

Reservoir	Scenic Attractiveness	Landscape Visibility	Existing Scenic Integrity
<b>Mainstem Reservoirs (continued)</b>			
Wheeler	<ul style="list-style-type: none"> <li>• Low to moderate</li> <li>• Primarily level to slightly rolling terrain</li> <li>• Riverine character in upper third of reservoir, with little erosion, numerous high rock bluffs, and natural-appearing shoreline</li> <li>• More lake-like setting in mid portion; Wheeler National Wildlife Refuge on north shore</li> <li>• Less developed in remaining portion, with more natural-appearing shoreline; highly eroded main channel</li> <li>• Areas of scenic interest provided by embayments</li> </ul>	<ul style="list-style-type: none"> <li>• Low to moderate concern level</li> <li>• High opportunity for viewing</li> <li>• Does not support residential densities of other TVA reservoirs</li> <li>• Lower boating and recreational use than other reservoirs</li> </ul>	<ul style="list-style-type: none"> <li>• Typical headwater drawdown is from 4 to 6 feet</li> <li>• High water elevation is maintained from mid-April through August 1</li> <li>• Numerous areas of flats are evident at maximum drawdown levels</li> <li>• City of Decatur is a highly visible urban area along the shoreline</li> <li>• Industry is present</li> <li>• Overhead utility lines are highly visible</li> </ul>

Sources: TVA 1985, 1988, 1999a, 1999b, 2001a, 2001b, and 2001c; TVA Resource Group 1995; TVA Resource Development Group 1989.

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### **Landscape Visibility**

Landscape visibility is a combination of several factors that include the context of those viewing the landscape and the concern they have toward the scenic value of the land. Other factors include duration of view; number of viewers; viewing distance; and discernible details that can be influenced by light/shadow, atmospheric conditions, and air quality.

The highest user concern levels related to scenic values are associated with recreational uses and residential areas. Users in these categories have expressed that longer durations of pool levels at the higher elevations would be more desirable for the maintenance of scenic values of the reservoirs. Landscapes related to recreational and residential uses are most often viewed within the foreground zone, where detail is highly evident. In general, there was also greater opportunity to make observations from high-elevation viewpoints with respect to tributary reservoirs, because of the steeper terrain surrounding these features.

The primary period for scenic viewing of and from the reservoirs occurs in late spring through late fall. The fall foliage season, starting in mid- to late-October is an important time for viewing landscapes associated with the Tennessee River Valley and its tributaries. During this period, most tributary reservoirs are under unrestricted drawdown, and lower pool levels are a part of existing scenic views.

The lowest pool levels are observed from late fall to early winter; pools reach their lowest elevation points in late December. During this period, the deciduous vegetation has dropped its leaves and the visibility of reservoir shorelines is higher than at other times of the year. In addition, recreational and seasonal home use is at its lowest point.

### **Scenic Integrity**

Scenic integrity is the measure of disturbance of a landscape and the degree to which the landscape deviates from the character and quality that are desired and valued for its scenic attractiveness. Scenic integrity is influenced by both the type and degree of shoreline development and pool elevations. Water fluctuations vary widely within the TVA system and produce different visual effects; some result in high visual contrast in the landscape. Attributes that affect scenic integrity are discussed in the following sections that describe the affected environment for each visual resource issue.

#### **4.19.4 Barren Drawdown Zone or Shoreline Ring**

##### **Existing Conditions**

Fluctuation of pool levels, in combination with the steeper slopes of the tributary reservoirs, exposes what is referred to as the bathtub ring or barren drawdown zone around the shoreline (Figure 4.19-01). Soil coloration also affects the visual impact of the exposed shoreline; the light brown to orange colors contrast with those of the water and shoreline vegetation.





August reservoir level in 2002 - 1,698 feet



January reservoir level in 2003 - 1,642 feet (56 feet lower than August level)

Source: Thomas Kokx Associates 2003.

**Figure 4.19-01 The "Ring Effect" from Lower Water Levels - Observed from Fontana Reservoir at an Overlook Site near the Dam**

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This ring may be evident at any time throughout the year. The degree of contrast created is in proportion to the drop in water level and amount of shoreline exposed. Contrast becomes maximized in reservoirs such as Fontana that experience the largest difference in pool elevations. In some cases, especially when the effects are extreme, the contrast may be observed in a different context and viewed as a point of interest. This occurs when a large amount of highly contrasting shoreline takes on a layered sculpture appearance.

The ring effect also occurs, but usually is not as dramatic, in the flatter terrain associated with the mainstem reservoirs such as Chickamauga and Wheeler. These reservoirs have occasional steeper slopes or rock bluffs. On rock bluffs, the ring effect may be more evident as discoloration of the rock.

Although the ring effect distracts from the natural appearance of the shoreline, a threshold between 3 and 6 feet of normal full pool level for tributary reservoirs seems to be an acceptable part of the landscape associated with reservoir operations. Beyond this range and, depending on other reservoir attributes, the integrity of the shoreline starts to diminish and continues to decline as the water levels drop further. The ring effect is less of an issue with mainstem reservoirs. It was noted during field observations that the presence of erosion contributes to reduced visual integrity, especially when erosion occurs in combination with the ring effect.

### **Future Trends**

No trends are in place to change the existing occurrences of the ring effect.

### **4.19.5 Exposure of Reservoir Bottoms and Flats**

#### **Existing Conditions**

Lower winter pool levels often result in the exposure of reservoir bottoms and flats. This visual change in reservoir character is created in shallower portions of the reservoir and becomes most evident in the tailwater and embayment areas (Figure 4.19-02). Tailwater areas often revert to characteristics common of the original river environment, including wide, barren shorelines, and may create discoloration of rock bluffs along the river channel (Figure 4.19-03). Exposure of reservoir bottom areas is common to both tributary and mainstem reservoirs but occurs more frequently in the mainstem reservoirs.

The visual effect for mainstem reservoirs from lower winter pool levels can range from the occurrence of sandbars and small islands to extensive flat areas that are dry with exposed ground. Many of these large, exposed flat areas are associated with wildlife management areas or other natural areas that exhibit wetland characteristics. Consequently, their appearance tends to blend in an acceptable degree with the surrounding landscape. In other cases, the flats are a notable part of residential viewsheds, where the change in landscape character is not as acceptable and was interpreted as creating a lower level of scenic integrity.



August reservoir level in 2002 - 1,382 feet



January reservoir level in 2003 - 1,361 feet (21 feet lower than August level)

Source: Thomas Kokx Associates 2003.

**Figure 4.19-02 The Effects of Lower Pool Levels on Exposing Reservoir Bottom and Flats-- Boone Reservoir Observed from a Rural Road Adjacent to a Residential Area**

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The upper and lower photos illustrate a summer and winter elevation difference of 21 feet.



Source: Thomas Kokx Associates 2003.

**Figure 4.19-03 The Effects of Lower Pool Levels - Upper Boone Reservoir Observed from Highway 11E near Bluff City**

Each reservoir exhibits its own combination and degree of visual effects with respect to its operating plan. In comparison to the major pool elevation differences for Fontana Reservoir, Guntersville Reservoir exhibits little difference in pool level fluctuation—resulting in minimal effects on scenic integrity. Its existing character and level of scenic attractiveness is maintained throughout the year. The same can be said for reservoirs classified as run-of-river projects. Cherokee Reservoir and reservoirs with similar landscape characteristics display a combination of effects related to both shoreline rings and exposed reservoir bottoms. These combinations create lower levels of scenic integrity.

It was noted during field observations that exposed shorelines or reservoir bottoms alone do not create the lowest level of scenic integrity, but rather exposure of other visible elements from lower water levels. Woody debris, trash, riprap, underwater structures such as rubber tires used for fish habitat, and floating structures sitting on the bottom add unattractive visual contrast to the area viewed (Figure 4.19-04).

It is also important to note that, for some of the mainstem reservoirs, flood conditions create shoreline conditions that do not appear natural. For example, vegetated areas, normally above water, are covered; shoreline structures float higher than their moorings; and parking lots or other recreational facilities are submerged in water.

### **Future Trends**

Introduction of new floating structures associated with residential development, construction of additional fish habitat structures, and other new shoreline structures allowed under current guidelines would create new visible and potentially distracting elements in the viewed landscape that, in combination with exposed reservoir bottoms and flats, would further decrease visual integrity over time.

### **4.19.6 Shoreline Development**

#### **Existing Conditions**

Various combinations of development and land use patterns that are present in the viewed landscapes contribute to the overall visual character of the project area. These can range from the more urban and industrial developments often associated with the mainstem reservoirs to residential developments that are common to both mainstem and tributary reservoirs. Urban and industrial developments, such as those found around Decatur, Alabama on Wheeler Reservoir, generally create a lower level of scenic integrity. Residential areas and water-related facilities that include docks, boathouses, stairways, and shoreline protection structures are becoming more common in the project area. The presence of these facilities in the landscape reduces scenic integrity.

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Boat docks sitting on exposed reservoir bottom at a marina on Boone Reservoir



Exposed fish habitat structures viewed from a rural road on Boone Reservoir

Source: Thomas Kokx Associates 2003.

**Figure 4.19-04 Effects of Floating Structures Sitting on Exposed Reservoir Bottom and Other Exposed Structures, Resulting in Lowered Scenic Integrity**

### **Future Trends**

The SMI (TVA 1998) noted that continued conversion of natural-appearing shorelines to residential or other uses is a factor contributing to lower scenic integrity levels. The initiative provided guidelines related to shoreline vegetation management, dock and other water use facilities, shoreline stabilization, and land based structures that help to reduce the visual impacts of continued residential development on the shoreline environment. These guidelines recognize the importance of shoreline aesthetics and the benefits of maintaining a more natural-appearing shoreline. A substantial amount of reservoir land still retains a naturally attractive character and an undisturbed appearance. These qualities contribute to the current desirability and demand for home sites, even with the visual changes of seasonal water fluctuation. Present trends of residential development are anticipated to continue in the future regardless of changes in the present operational practices.

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