

The Nature of the Obed River Watershed

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Obed Watershed Community Association

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Physiography

Tableland: Cumberland County lies in the Cumberland Plateau physiographic province of Tennessee. The terrain on the plateau is distinguished by flat to rolling upland areas (less than 10 percent slope), deeply incised river gorges, and a long line of cliffs that separate it from the lower elevations of the Ridge and Valley Province. The area is drained by a dendritic (fan-shaped) system of streams that flow through the narrow valleys.

Most of the Obed Watershed is influenced by the rolling uplands on the plateau that exhibits a gentle regional slope, varying from about 2000 feet MSL (mean sea level) near Crossville to 1300 feet MSL at Wartburg. Some gorge sections are quite narrow, only 800 feet across, and have near vertical sides, up to 400 feet high.

The Cumberland Plateau's tablelands and open low mountains are about 1000 feet higher than the Eastern Highland Rim to the west, and receive slightly more precipitation with cooler annual temperatures than the surrounding lower-elevation ecoregions. The plateau surface is less dissected with lower relief compared to the Cumberland Mountains or the Plateau Escarpment. Elevations are generally 1200-2000 feet, with the Crab Orchard Mountains reaching over 3000 feet. Pennsylvanian-age conglomerate, sandstone, siltstone, and shale are covered by mostly well drained, acidic soils of low fertility. The region is forested, with some agriculture, coal mining, and expanding housing development activities.

Escarpment: The Plateau Escarpment is characterized by steep, forested slopes and high velocity, high gradient streams. Local relief is often 1000 feet or more. The geologic strata include Mississippian-age limestone, sandstone, shale, and siltstone, and Pennsylvanian-age shale, siltstone, sandstone, and conglomerate. Streams have cut down into the limestone, but the gorge talus slopes are composed of colluvium with huge angular, slabby blocks of sandstone. Vegetation community types in the ravines and gorges include mixed oak and chestnut oak on the upper slopes, more mesic forests on the middle and lower slopes (beech-tulip poplar, sugar maple-basswood-ash-buckeye), with hemlock along rocky streamsides and river birch along floodplain terraces.

Soils

Soils of the Cumberland Plateau are primarily derived from sandstone, shale, and siltstone. These are predominantly loamy soils with moderate infiltration rates. Soil depths of less than 1 to 5 feet occur over most of the plateau such that overburden soil rarely serves as a source of groundwater in upland areas. Along the steep slopes of the mountains and escarpment, soil depths might range from 1 to 2 feet near the top to 7 feet on the slopes. The erosion potential on the slopes is great and can be severe if vegetation is removed.

Geomorphology

All of middle Tennessee was at one time capped by a thick sequence of Pennsylvanian sandstones, conglomerates, and shales. Today, only in the Cumberland Plateau area does the

caprock continue to protect the underlying Mississippian limestones from relatively rapid dissolution. The present topography has been formed by continuous lowering of the surface by erosion, a process that involves slope retreat on beds of different resistance. Pennsylvanian sandstones were removed by erosion from the Central Part of the Nashville Dome (structural high along the Cincinnati Arch) during the Mesozoic Era and the underlying Mississippian limestones were exposed. Slope retreat by limestone dissolution then began forming an escarpment and initiated its subsequent retreat in all directions away from the dome. Erosion continued both downward and outward and a plain-like surface developed upon the more cherty and erosion resistant lower Mississippian rocks during the late Cretaceous period.

The resistant Mississippian Fort Payne formation was breached by erosion during the Tertiary and Quaternary Periods, exposing the underlying Ordovician limestones. This resulted in the Highland Rim escarpment that is presently retreating as the Central Basin expands. Dissolution of the underlying limestones is primarily responsible for the steep slope angles along the Highland Rim and Cumberland Plateau escarpments. Apparently, stream erosion is occurring at about the same rate along the Cumberland Plateau. Abundant caves and other karst features associated with both escarpments appear to have formed under very similar conditions.

The Obed River watershed is immediately underlain by gently dipping Pennsylvanian sandstones, siltstones, shales, some conglomerates, and coals. These rocks have a thickness of about 1,500 feet. The Pennington Formation of Mississippian age is a transition from the basal Pennsylvanian sandstone and shale to underlying Mississippian carbonate rocks that are along the Sequatchie Valley escarpment, Grassy Cove, and smaller cove areas south-southeast of the watershed boundary.

The same mountain-building forces that resulted in the Southern Appalachian Mountains and deformed the rocks of the Valley and Ridge formed the structures of the Cumberland Plateau. Rocks along the eastern escarpment of the plateau and many miles westward along some zones were extensively faulted and folded. The structural trend is SWNE like the Southern Appalachians. The Sequatchie Valley, one of the largest and most spectacular anticlinal valleys in the world, owes (in part) its origin to these forces. At the northeastern end of the anticline, massive sandstone forms the Crab Orchard Mountains. The anticline diminishes to the northeast and disappears at the Emory River Fault zone. This fault zone is part of a long belt of structural deformation northwest of the Crab Orchard Mountains. The belt is largely a series of thrust faults that are connected by cross faulting and anticlines.

The Obed River and Tributaries

The Obed River is within the Emory River Watershed. The Emory Watershed, with 1,283 stream miles, drains 872 square miles and flows into the Clinch River embayment of Watts Bar Reservoir. The four principal streams of the Emory - the Obed River, Clear Creek, Daddys Creek, and the upper Emory River - are high gradient streams, similar to most other streams on the Cumberland Plateau. Stream gradients, with drops averaging 19 feet to 34 feet per mile, are steepest in downstream sections. They have a distinct meander pattern, developed on a higher surface when the streams had reached a temporary base level (perhaps on the resistant

Rockcastle Conglomerate).

The Obed River is the largest tributary of the Emory River and has a total drainage area of 520 square miles. Nearly half the watershed lies within Cumberland County. Its headwaters are located a few miles northwest of Crossville and the stream flows easterly through a narrow valley toward its junction with the Emory River. The two principal tributaries, Clear Creek and Daddys Creek, join the Obed a few miles above its mouth.

In the northwest portion of the watershed lies the 173 square mile area drained by Clear Creek. The stream flows northeasterly from its source near Campbell Junction to a point near the Fentress-Cumberland-Morgan county line, then southeasterly to its junction with the Obed River about four miles above the junction of the Obed and Emory Rivers.

Daddys Creek, the largest tributary of Obed River, drains an area of 175 square miles. Its headwaters are located south of Crossville, near the Bledsoe County line. From there the creek flows northeasterly to its junction with the Obed River about nine miles above the mouth.

Protected Habitat within the Watershed

Obed National Wild and Scenic River

Parts of Clear Creek, Daddy's Creek, the Emory River, and the Obed River have been designated as part of the National Wild and Scenic River System. The National Wild and Scenic Rivers System was created by Congress in 1968 in an effort to preserve streams in their free-flowing condition. The portions designated are,

- The segment of the Obed from the western edge of the Catoosa Wildlife Management Area (WMA) to the confluence with the Emory River,
- The segment of Clear Creek from the Morgan county line to the confluence with the Obed,
- Daddy's Creek segment from the Morgan county line to the Obed River, and
- The Emory River from the confluence with the Obed River to the Nemo Bridge. .

Outstanding National Resource Waters

A portion of the Obed River, Daddy's Creek, and Clear Creek have been designated Outstanding National Resource Waters.

Nationwide Rivers Inventory

The Nationwide Rivers Inventory, required under the Federal Wild and Scenic Rivers Act of 1968, is a listing of free-flowing rivers that are believed to possess one or more outstanding natural or cultural values. Exceptional scenery, fishing or boating, unusual geologic formations, rare plant and animal life, cultural or historic artifacts that are judged to be of more than local or regional significance are the values that qualify a river segment for listing. The Tennessee Department of Environment and Conservation and the Rivers and Trails Conservation Assistance branch of the National Park Service jointly compile the Nationwide Rivers Inventory from time to time (most recently in 1997). Under a 1980 directive from the President's Council on Environmental Quality, all Federal agencies must seek to avoid or mitigate actions that would have an adverse effect on Nationwide Rivers Inventory

segments.

The most recent version of the Nationwide Rivers Inventory lists portions of four streams in the Emory River Watershed:

- Crab Orchard Creek. Remote, scenic stream that flows through Catoosa Wildlife Management Area.
- Clear Creek. Designated component of the National Wild and Scenic River System; remote, rugged stream partially within the Catoosa Wildlife Management Area. Mild whitewater, abundance and variety of flora and fauna.
- Emory River. (River mile 27, confluence with Obed River, to river mile 47, headwaters in Frozen Head State Park near Anderson county line). Scenic pastoral stream that flows through impressive gorge area, supports game fishery, designated component of National Wildlife and Scenic River System.
- Emory River. (River mile 14, Roane county line, to river mile 25, one mile below Nemo bridge). Scenic pastoral stream.

Interpretive Areas

Some sites representative of the cultural heritage are under state or federal protection:

- Cumberland Mountain State Park, a 1720 acre park located in Crossville.
- Obed Wild and Scenic River National Recreational Area, which has 45 miles of streams available for swimming, fishing, whitewater rafting, and kayaking.
- Cumberland Trail State Park, established in 1998 as a linear park with trails to extend 17 miles through the Obed Wild and Scenic River National Recreation area.
- Mount Roosevelt State Forest offers hiking and backpacking trails through breathtaking scenery.

In addition, many local interpretive areas are common, most notably, Lake Tansi; Crossville Recreation Park, Cumberland County Obed River Park, and Cumberland Homestead Project, the location of a historic subsistence project community that predominantly used building material of locally mined Crab Orchard Stone.

Wildlife Management Area.

The Tennessee Wildlife Resources Agency manages the Catoosa, Luper Mountain, and Mount Roosevelt Wildlife Management Areas. Catoosa WMA includes 80,000 acres of public access property in Cumberland and Morgan counties.

Resources: Source National Park Service, Water Resources Division; TN Department of Conservation, Division of Water Pollution Control.

The Obed Community Association has as its purpose community appreciation and volunteer involvement in ongoing research of the natural and cultural heritage of the Obed River watershed within Cumberland County. Louise Gorenflo, OWCA director, produced this fact sheet. Those wanting to join this membership organization or more information may contact OWCA at 484-2633 or at 185 Hood Drive, Crossville, TN 38555