

Water Supply Planning in the Duck River Watershed After The Fleecing

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William W. Wade, Panel Moderator

This paper follows-up the recent NBC story about the removal of Columbia Dam and introduces topics that will be addressed by the three panelists:

- Mr. Randal Braker, General Manager, Duck River Utilities Commission
- Mr. Jim Clark, General Manager, Columbia Power and Water
- Mr. Larry Murdock, Executive Director, Duck River Development Agency

Randal Braker, “Normandy Reservoir Water Quality and Water Level Requirements”

Before endangered mussels in the Duck River became an insurmountable problem for Columbia Dam, TVA was committed to building two-dams that comprised the Duck River Project. The purpose was to provide for water supplies, water quality control/waste assimilation, recreation and flood protection. Like water projects in the West, a stated aim of the project was to support economic growth. Unlike projects in the West, the second dam—Columbia Dam at River Mile 136—was never finished.

Economic growth came anyway—stimulated by the Saturn Plant in Maury County. With only Normandy Reservoir in place, State water managers face the challenge of providing water supplies to meet growing downstream needs while protecting upstream minimum streamflows to meet water supply, flood control, recreation, and water quality/waste assimilation requirements.

Without Columbia Dam, Normandy Dam operations are caught in a squeeze that will only worsen with growing downstream demand requirements. Originally slated to meet Manchester, Tullahoma Shelbyville water supply needs, provide flood protection below the dam and water quality/waste assimilation, Normandy will be pressed into service to provide for Columbia’s growing demand as a stepchild to releases to meet Shelbyville’s supply and assimilative demands. During drought, releases to meet Shelbyville’s requirements already threaten Manchester’s and Tullahoma’s drinking water quality—or, at least, their pocketbooks to provide more advanced intake water treatment.

Water quality in Normandy Lake has never been very good. Soils in the region are naturally rich in iron and manganese. The inflow of nutrients from the watershed, including Manchester’s waste effluent, and the natural process of thermal stratification, act to create anoxic conditions in the deeper waters of Normandy, which causes the metals in the silt and sediments to dissolve. Algal



growth on the surface increases the potential for taste and odor in water supplies and increases the concentration of THMs as a chlorine byproduct.

Poor quality water from both the lower and upper layers of the lake create a water quality management problem for the Duck River Utility Commission (DRUC), which withdraws water to provide to Manchester and Tullahoma. DRUC's desired solution is keeping as much water behind the dam as possible. Therein lies the problem.

Prior to Shelbyville's application for NPDES recertification in 1991, TVA had operated Normandy to provide 80 cfs minimum stream flow during the winter months December-May since the drought of 1981. Shelbyville was found to have trouble meeting the effluent toxicity requirement of the NPDES permit at the reduced winter flow. Scrutiny revealed that TVA was not in conformance with one of the original purposes of the project: provide 155 cfs minimum stream flow to Shelbyville to maintain water quality below the effluent discharge. In a compromise agreement, reluctantly supported by DRUC, TVA agreed to increase the minimum flow during the winter months to 120 cfs and Shelbyville received its NPDES permit. Shelbyville's alternative was expensive reengineering of wastewater treatment, the avoidance of which had been counted as a benefit of the original Duck River Project.

With the higher winter minimum streamflows, Figure 1 shows that only four consecutive years of above normal rainfall allowed TVA to meet its release obligations, which are reflected by reservoir levels in Figure 2. The June, 1999, spike in rainfall, seen on Figure 2, filled the reservoir to meet 1999 requirements during the drought that ensued during the rest of 1999. Normandy Lake would be at record low elevation at yearend but for the June spike. In fact, Figure 3 shows that regional rainfall has been above normal nine years of the past 11. A cycle of low rainfall could impose expensive reengineering of DRUC's intake water treatment, unless instream releases are reduced.

Jim Clark, "Downstream Demand Requirements"

Releases to maintain water quality by diluting Shelbyville's effluent provide water supply benefits downstream. In 1996, the Division of Water Pollution Control set a standard of 100 cfs as the minimum flow requirement downstream of Columbia to assure both a water supply to Columbia and water quality in the Duck River for recreation and environmental quality. In fact, the Columbia wastewater treatment requirements assume 130 cfs minimum streamflow. Streamflows below this level will impose more stringent and more expensive wastewater treatment requirements. This may be needed early in the new century.

TVA water demand forecasts ("Water Supply Needs Analysis," TVA 1998) show that the combined requirements of Bedford, Marshall, Maury and Southern



Williamson Counties will outgrow the existing capacity of the Duck River to supply those demands during critical drought periods by 2015.

Columbia is last in line. Inadequate streamflows will not yield sufficient water supplies to the city and meet the 100 cfs minimum instream flow requirement. Columbia has a problem. The removal of the last vestiges of the Columbia Dam during 1999 emphasizes the water-short legacy of those mussels.

TVA has been studying alternatives to increase water supplies on the Duck River. From a starting point of 35 suggested alternatives, four have emerged to study in detail:

- Raise Normandy Dam;
- Fountain Creek Reservoir;
- Downstream Water Intake Alternative;
- Tims Ford Pipeline.

None of these projects offers the perfect solution. Raising the Normandy Dam—the lowest cost alternative—may improve upstream water quality and flow regimes, but will not provide enough water supply to meet Columbia’s 50-year demand forecast without water conservation measures. A new dam on Fountain Creek—the highest cost alternative—may encounter water quality problems and more leakage than can be economically controlled, while imposing significant social and environmental cost. This alternative might create a very attractive recreation destination in Maury County with attendant benefits. A new intake downstream of Columbia places the water supply intake downstream of the wastewater effluent. The Tims Ford Pipeline is an interbasin transfer, which will increase the flows in the Duck River at the expense of flows on the Elk River.

An EIS is in progress. But TVA will not build the project.

Larry Murdock, “Regional Problems / Regional Solutions . . . The Rest of the Story”

Removing the Columbia Dam imposed a Herculean challenge on water planners.

Problems abound in the Duck River Watershed. The Duck River watershed is a mind-boggling array of geologic, hydrologic, biologic, climatologic, social, political, and economic challenges. Increasing populations of people, decreasing populations of endangered species, growing pollution and treatment problems, failing wells and septic systems, a decade of above average rainfall followed by a summer drought that may be the harbinger of a new cycle, are all pieces of the puzzle.



The Duck River region has one distinct advantage when it comes to solving water problems--a remarkably large number of farsighted, clear thinking and fair-minded citizens. In the early sixties a group of concerned citizens recognized that the economic life of the region was constrained by the availability of water. In 1965 their efforts led to an act of the Tennessee Legislature that created the then Upper Duck River Development Agency for the purpose of promoting economic development including the development of water resources in the Upper Duck River watershed. By the combined efforts of the Agency and the political will of the region's citizens, Congress authorized TVA to build the two-dam Duck River Project.

All of America knows about the failed dam. Left out of this tale of an expensive failure is that one dam was built and today Normandy Lake is all that stands between the citizens of the region and water-less summers. Before Normandy Dam regulated flows, the Duck River ran as low as 30 cfs at Columbia during droughts of record—a mere trickle. The popular telling of this tale of fleecing misses the story of success and due process in a nation of laws--where everyone from environmental activist to land developer had their say.

DRA spent many years working with TVA and others to overcome the environmental concerns associated with Columbia Dam. When it became clear that Columbia Dam would not be built, focus shifted to the remaining paramount need for a new water supply in the Columbia area. The Duck River Development Agency has been revitalized to build the next project to meet future water demand.

The DRA Board refocused the Agency and adopted a new clear mission statement:

"To develop, protect, and sustain a clean and dependable Water Resource for all the citizens of the Duck River Region."

TVA made an extraordinary agreement with DRA last June. That agreement, approved by the State and the Water Systems who formed DRA years ago¹, achieves five objectives:

1. Establishes a protective corridor along the river by transferring to the State of Tennessee, with deed restrictions, land purchased by TVA for the Columbia Dam (6,800 acres);
2. Sets aside the land purchased by TVA for the Columbia Dam that would be

¹ City of Manchester; Tullahoma Utility Board; Shelbyville Power, Water and Sewerage Board; City of Lewisburg; City of Columbia Public Utilities Board, and Bedford County Utility District (collectively "Water Systems").



needed for an impoundment at Fountain Creek (3,800 acres);

3. Provides funding to TVA for the completion of the Water Supply EIS, which can be the basis for a project to meet the already identified future water supply needs of the region;
4. Provides for the funds in Trust Fund A, over \$8 million owed to TVA for the completion of Normandy Dam, to be put into a new Water Projects Escrow Account to be used only for water supply infrastructure projects in the Duck River area;
5. Requires the establishment of a Water Supply Fund to receive funding from DRA to settle contract compliance audit issues.

By approving the Agreement each water system waived its claim to its share of approximately \$1.6 million in Trust Fund B that would have been returned to them under the old DRA/TVA contract, for which there are many local project needs. Not only did the Water Systems waive their claim to the funds already collected, they agreed to continue financial support of a regional solution by signing an amended agreement with DRA. They further committed to regional cooperation by authorizing their managers to serve as a technical committee to advise DRA.

The rest of the story is a story of success. In spite of conflicting needs, all of the Duck River Water Systems support the planning process. Stakeholders upstream and downstream recognize that no one gets better unless all get better together. All parties recognize that the competing water needs along the river only can be resolved on a regional basis.



Figure 1
Duck River Utility Commission
Monthly Actual vs. Normal Cumulative Rainfall
1996 - 1999, Inches

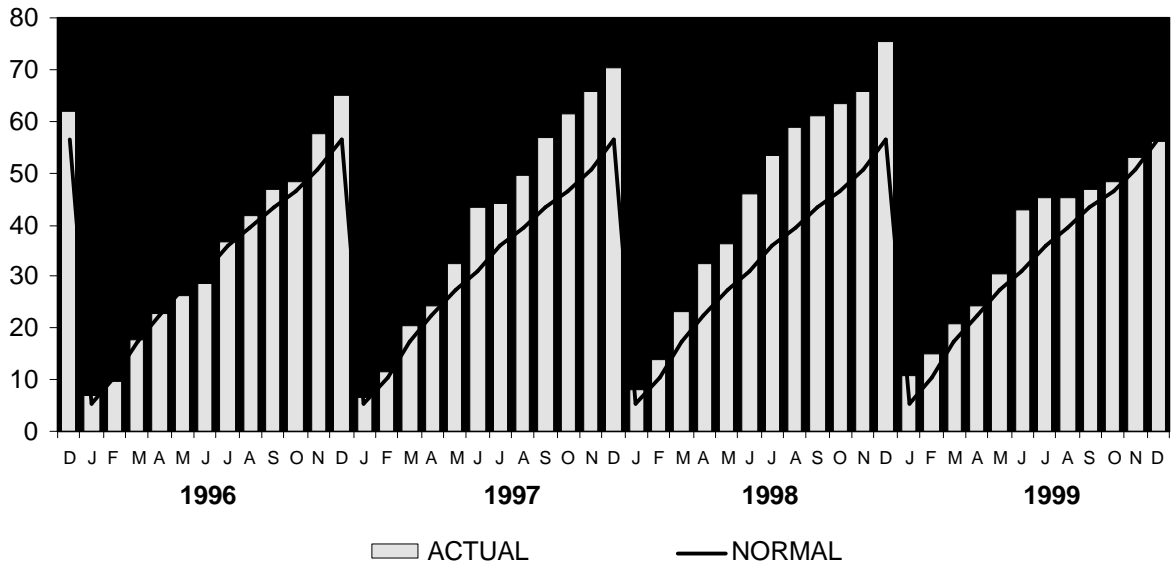


Figure 2
Reservoir Actual vs. Normal Levels
1994 - 1999, Reservoir Elevation (Feet)

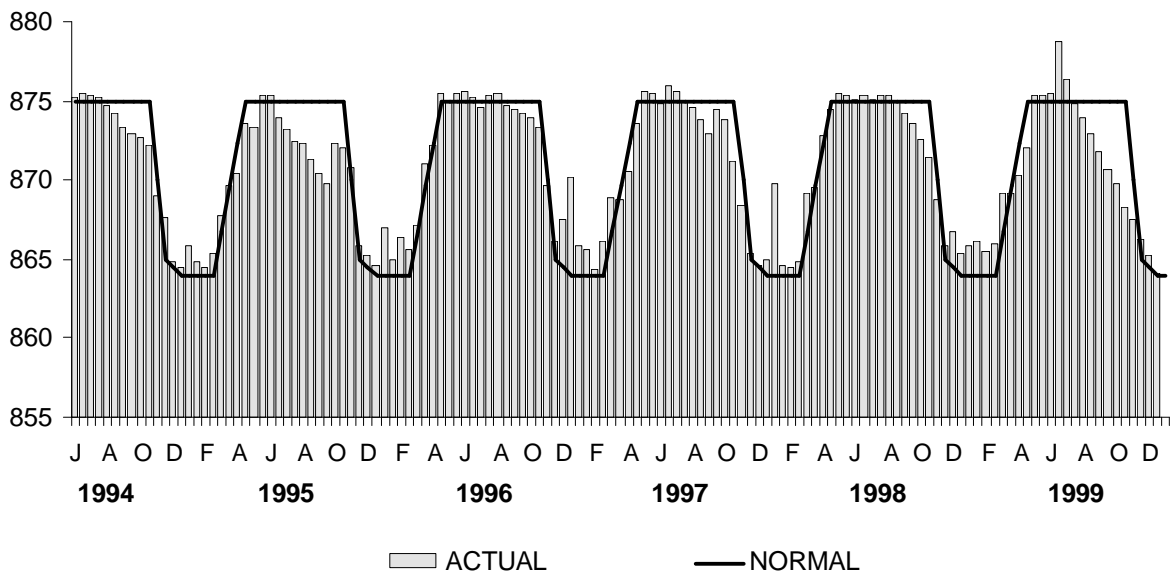


Figure 3
Annual Rainfall Totals
1989 - 1999, Inches Annually

