Tennessee’s Water Resources

Managing Current and Future Challenges

Tennessee Advisory Commission on Intergovernmental Relations
Tennessee’s Water Resources

Having It All~

~*Where* you need it
~*When* you need it
~*of the* **Quality** you need
~*in the* **Quantity** you need
With less than a tenth of an inch of rain so far this month, and more than 14 days with high temperatures at or above 100°F, water in retention ponds has been decreasing to record levels. This one is nearly dry. Water restrictions are currently in effect. Photo courtesy of Jordan Gerth.

Source: National Drought Mitigation Center
When You Need It?

Tennessee Statewide Z Index*
January 1998 - August 2007

National Climatic Data Center / NESDIS / NOAA

*Palmer Z Index
Short-Term Drought

Dry Spell
Wet Spell
## Statewide Precipitation Ranks for Tennessee, 2006-2007

<table>
<thead>
<tr>
<th>Period</th>
<th>Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aug</td>
<td>2(^{nd}) driest</td>
</tr>
<tr>
<td>Jul-Aug</td>
<td>4(^{th}) driest</td>
</tr>
<tr>
<td>Jun-Aug</td>
<td>2(^{nd}) driest</td>
</tr>
<tr>
<td>May-Aug</td>
<td>1(^{st}) driest</td>
</tr>
<tr>
<td>Apr-Aug</td>
<td>1(^{st}) driest</td>
</tr>
<tr>
<td>Mar-Aug</td>
<td>1(^{st}) driest</td>
</tr>
<tr>
<td>Feb-Aug</td>
<td>1(^{st}) driest</td>
</tr>
<tr>
<td>Jan-Aug</td>
<td>1(^{st}) driest</td>
</tr>
<tr>
<td>Dec-Aug</td>
<td>1(^{st}) driest</td>
</tr>
<tr>
<td>Nov-Aug</td>
<td>1(^{st}) driest</td>
</tr>
<tr>
<td>Oct-Aug</td>
<td>1(^{st}) driest</td>
</tr>
<tr>
<td>Sep-Aug</td>
<td>2(^{nd}) driest</td>
</tr>
</tbody>
</table>

Source: National Climatic Data Center/NESDIS/NOAA. 
[http://www.ncdc.noaa.gov/oa/climate/research/prelim/drought/st040dv00pcp.html](http://www.ncdc.noaa.gov/oa/climate/research/prelim/drought/st040dv00pcp.html)
Tennessee Counties in Which Water has Been Restricted or Required to have Additional Treatment as of September 21, 2007

Legend

- No Restrictions or Additional Treatment
- Mandatory Restrictions
- Voluntary Restrictions
- Voluntary Restrictions (from News Article)
- Mandatory and Voluntary Restrictions
- Additional Treatment

Source: Tennessee Emergency Management Agency and News Articles from around Tennessee

Note: Restrictions and treatment requirements are not county-wide as depicted by county level shading.
Where & When You Want It?

U.S. Drought Monitor

June 26, 2007
Valid 8 a.m. EDT

The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. See accompanying text summary for forecast statements.

http://drought.unl.edu/dm

Released Thursday, June 28, 2007
Author: Douglas Le Comte, CPC/NOAA
Where & When You Want It?

Monthly Average Stream Flow

August 2007

Explanation - Percentile classes

- Low: <10
- Normal: 10-24
- Above normal: 25-75
- Much above normal: 76-90
- High: >90

No Data
Stored Water vs. Natural Water Droughts

- **Stored water droughts** occur when large stores of water in man-made reservoirs, natural lakes, and groundwater aquifers depleted by very long, unusually low periods of precipitation.

- **Natural water droughts** quickly and fairly frequently follow just a few weeks or months of below-normal rainfall.

How Stored Water Droughts Happen

- People without enough stored water build reservoirs or tap into surface (natural lakes and streams) or groundwater (aquifers) storage.
- Reliable water supports population growth and more diverse water uses:
  - Hydro-power dams create popular fishing and boating lakes and valuable lake view property.
  - Reservoir operating policies ensure minimum flows for fish and wastewater dilution when there would not otherwise be enough water in the stream.
  - Cities and farmers increase their withdrawals as they prosper and grow.

How Stored Water Droughts Happen

An unusually long dry period forces reservoir operators to draw down man-made lakes to
- support withdrawals for cities and farms,
- produce hydropower,
- and keep enough water in navigation channels for barges to float.

But
- homes and businesses around the lake now have views of mud flats,
- boat ramps no longer reach the water, and
- lake fisheries suffer when releases are made for riverine species.

Center Hill Dam
Right Abutment Seepage

Source: U.S. Army Corp of Engineers, Nashville District.
No one can tell when it will rain enough to reverse this trend, so water deliveries have to be reduced, *but to whom first and by how much*?

- There may be a conflict between fairness and good economic policy in making water allocations.
- The newest water uses may generate more income and tax revenue than the oldest established uses.

*Such conflicts are normally resolved on a case-by-case basis.*

Normandy Dam

TVA’s Duck River “Balancing Act”

Normandy Reservoir is located on the Duck River in south central Tennessee. The 17-mile-long reservoir was completed in the 1970s to aid in the economic development of the upper Duck River region.

Initial Project Goals

Identify

- water resource challenges
- processes in place to manage them
- gaps between challenges and processes
Water Resource Policy

Challenges

- Needs of Tennessee residents
  - Domestic consumption
  - Recreation
  - Power generation

- Needs of Business and Industry
  - Consumption
  - Navigation
  - Power generation

- Demands in other states that share watersheds

Managing competing interests!
Source, Use, and Disposition of Water in Tennessee in 1995

Total of 10.1 billion gallons per day.

The Sunday Tennessean—Water MIA  
23 September 2007

A look at the water that goes missing from some utilities in the Nashville area.*

*Utility Water bought, pumped or treated (gallons per month, unless noted otherwise)

<table>
<thead>
<tr>
<th>Utility</th>
<th>Water bought, pumped or treated (gallons per month)</th>
<th>Average proportion of water unaccounted for or unbilled per month</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>DAVIDSON COUNTY</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Metro Water Services</td>
<td>2.67 billion</td>
<td>24.90%</td>
</tr>
<tr>
<td><strong>RUTHERFORD COUNTY</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Consolidated Utility District</td>
<td>295.1 million</td>
<td>18%-25%</td>
</tr>
<tr>
<td>Murfreesboro city</td>
<td>321 million</td>
<td>26%</td>
</tr>
<tr>
<td>Smyrna city</td>
<td>316.6 million</td>
<td>7%</td>
</tr>
<tr>
<td><strong>SUMNER COUNTY</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Castalian Springs-Bethpage Utility District</td>
<td>28 million</td>
<td>32%</td>
</tr>
<tr>
<td>Gallatin Water Department</td>
<td>195 million</td>
<td>15%</td>
</tr>
<tr>
<td>Hendersonville Utility District</td>
<td>148.3 million</td>
<td>28%</td>
</tr>
<tr>
<td>Portland Water System</td>
<td>1.8 million</td>
<td>27%-30%</td>
</tr>
<tr>
<td>White House Utility District</td>
<td>10.7 million</td>
<td>20%</td>
</tr>
<tr>
<td><strong>WILLIAMSON COUNTY</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Brentwood Water Department</td>
<td>249 million</td>
<td>13%</td>
</tr>
<tr>
<td>Milcrofton Utility District</td>
<td>37 million</td>
<td>24%</td>
</tr>
<tr>
<td>Mallory Valley Utility District</td>
<td>100 million</td>
<td>10%</td>
</tr>
<tr>
<td>Nolensville-College Grove Utility District</td>
<td>66 million</td>
<td>20%</td>
</tr>
<tr>
<td>HB &amp; TS Utility District</td>
<td>67 million</td>
<td>16.75%</td>
</tr>
<tr>
<td><strong>WILSON COUNTY</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gladeville Utility District (for the first 8 mos of 2007)</td>
<td>30 million</td>
<td>15.5%</td>
</tr>
<tr>
<td>Lebanon Water System (gallons per day)</td>
<td>7.5 million</td>
<td>15%-25%</td>
</tr>
<tr>
<td>West Wilson Utility District</td>
<td>150 million</td>
<td>20%</td>
</tr>
<tr>
<td>Water and Wastewater Authority of Wilson County</td>
<td>30 million</td>
<td>Generally around 10%</td>
</tr>
</tbody>
</table>

* Some utilities did not return calls for comment last week, including the cities of Franklin, La Vergne and Westmoreland, and LaGuardo Utility District.
“There is only so much water on this mountain.”
Crossville city attorney Lanny Colvard

- Crossville, the county seat of Cumberland County, the 5th fastest-growing county in Tennessee, faces conflict with its neighbors as it seeks to provide for its own future water needs. Its city council recently approved a plan to restrict further expansions by other utility districts that purchase city water. Worried that its own sources of supply are barely adequate for anticipated needs, Crossville officials are seeking to limit the ability of neighbors to tap into local reservoirs. Meanwhile, Cumberland County has sought help in the form of a $5 million federal grant to develop a regional pilot program and feasibility study of various water supply options and implement a long-term solution.

- Crossville has been pinning hopes for additional water on a dam to be constructed on the Caney Fork River. As of this writing, there appears little chance that a permit will be issued for such a project due, in part, to environmental opposition. Enlargement of the city’s current Meadow park Lake Dam is another option being explored in lieu of the Caney Fork proposal. While the ultimate choice of water supply alternative remains uncertain, it appears likely that some combination of pumping water uphill from TVA’s Watts Bar Reservoir on the Tennessee River, storing rainwater in new lakes and ponds, or building new dams on nearby creeks and streams may be adopted.

Memphis and its Light, Gas & Water Division have been sued by the state of Mississippi. The lawsuit was filed in the U.S. Federal District in Oxford in February 2005. (It was expected to go to trial in August 2007, according to the Commercial Appeal.)

Mississippi claims that one-third of the water Memphis pumps—about 60 million gallons a day—comes from south of the state line. This water is "unreasonably and unlawfully diverted," causing harm to the aquifer, it says.

Source: U.S. Water News Online.
Water Disputes in the Southeast and Their Impact on Tennessee

- Growing competition by different users over the same surface and groundwater supplies is increasingly taking the form of “up” versus “downstream” use and dependence on water supply sources that extend over several jurisdictions and even states.

- Land use changes, population growth, rapid urbanization, and regional climate variation are imposing new, largely unanticipated pressures on the region’s water and reveal the impossibility of separating, and discretely managing, water supply and water quality.

- Protecting local water supplies and keeping them safe, clean, and available—while promoting economic growth—are proving to be difficult-to-reconcile goals in rapidly growing metropolitan areas and smaller communities that seek to broaden their tax base and economically diversify.

Managing Water Resources

Complicating Factors

- Interests within and between states compete more and more for the same resource as we grow and develop.
- State boundaries don’t recognize watersheds.
- Watersheds don’t recognize state boundaries.
- The weather doesn’t always cooperate.
The Hydro-illogical Cycle

Source: National Drought Mitigation Center, University of Nebraska, Lincoln, Nebraska, USA.
Overall Project Goals

~Identify the Following~

- water resource management challenges
- processes in place to manage them
- gaps between challenges and management processes
- ways to fill gaps
  - Tennessee’s experts
  - Other state’s policies and plans
  - Other studies
Tennessee’s Water Resource Management Framework

- State laws and regulations
- State agencies—first among them, TDEC
- Federal laws and regulations
- Lead federal agencies—TVA and the Corp
- Interstate and interagency compacts and agreements
“And it never failed that during the dry years the people forgot about the rich years, and during the wet years they lost all memory of the dry years. It was always that way.”

—John Steinbeck

*East of Eden*