



- TVA's Integrated Reservoir System
- Flood Damage Reduction
- 2013 Rainfall and Runoff
- July 2013 Reservoir Status
- Chattanooga Impacts



Benefits of Integrated Tennessee River System



Navigation



Water Supply



Flood-Damage Reduction



Recreation



Power Generation

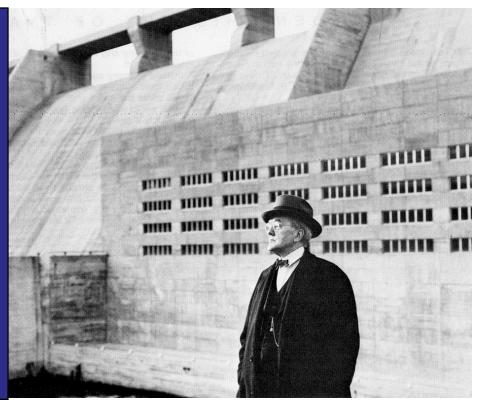


Water Quality

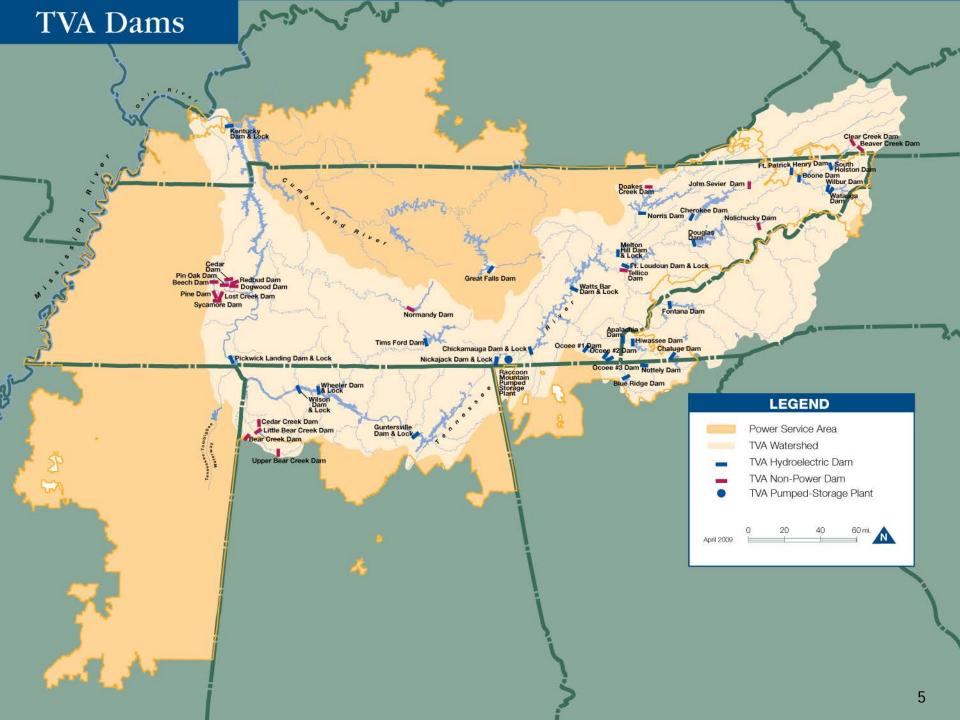


River system assigned multipurpose role through TVA Act in 1933

(section 9a) ...to regulate the stream flow primarily for the purposes of promoting navigation and controlling floods. So far as may be consistent with such purposes, ...for the generation of electric energy...



"Father of TVA," Senator George Norris





TVA River Operations is responsible for operating and maintaining 49 projects



Tributary Storage (Norris)



Tributary Run-of-River (Melton Hill)



Main River (Fort Loudoun)



Tributary Non-Power (Upper Bear)



Wall Flood Damage Reduction

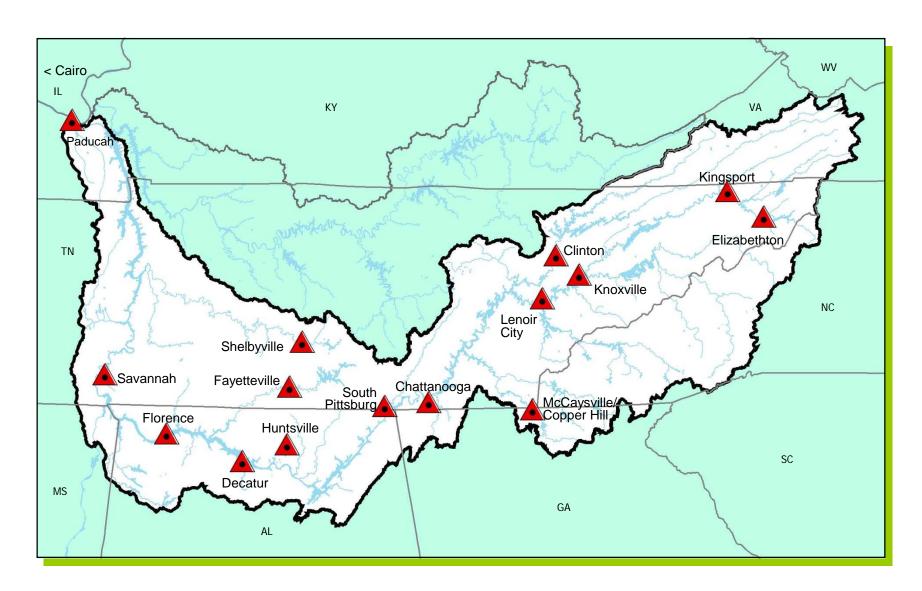




- Maintain flood-storage allocation
- Store water during flood to reduce crest
- Issue flood forecast for regulated streams
- Release water at non-flood rate after crest
- All downstream riparian areas receive some flood-reduction benefits
- Annual average flood damages averted are nearly \$260 million (\$6.7 billion to date)
- Floodplain management



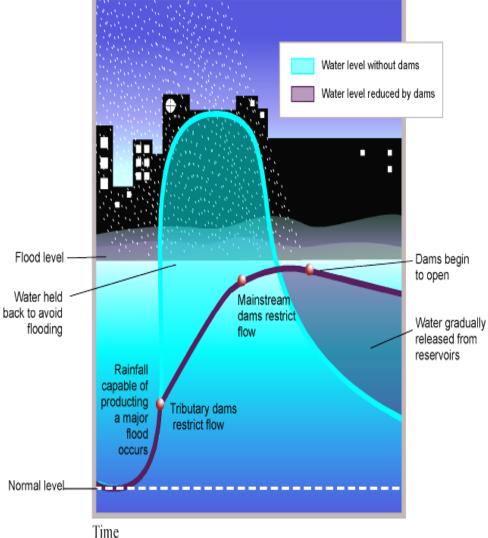
Wall Flood Damage Reduction Centers





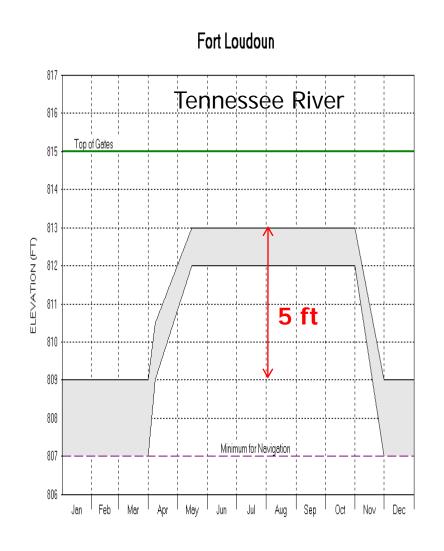
M Flood Damage Reduction

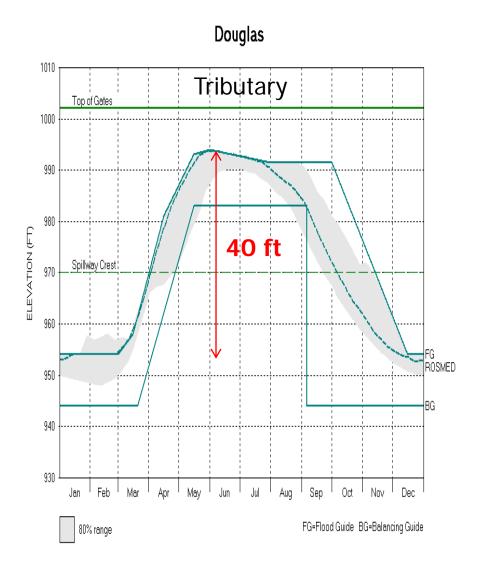






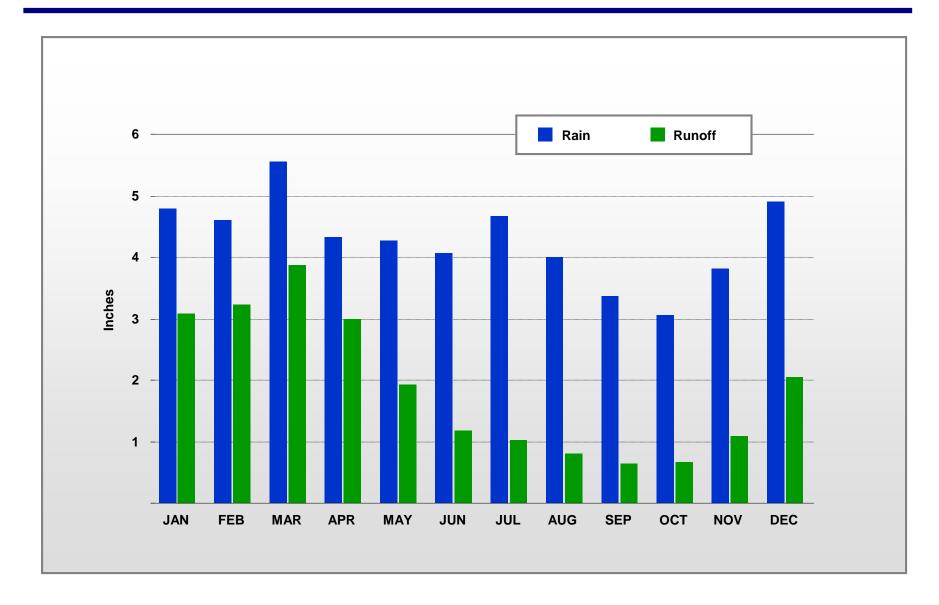
Reservoir Operating Guides





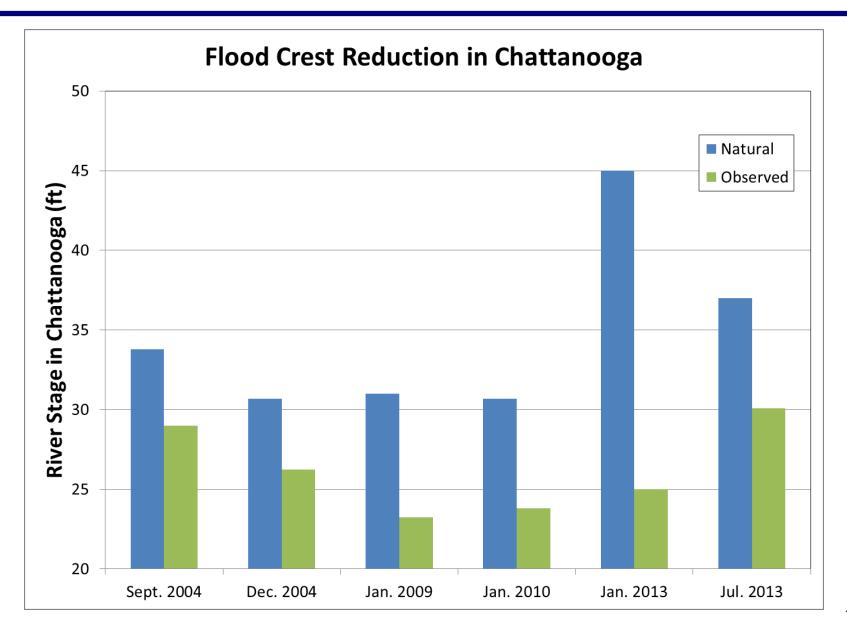


Main and Runoff





Flood Control Successes





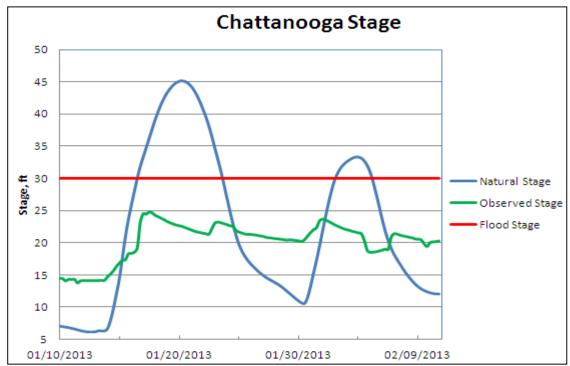
January 2013 Damage Reduction

Flood Damage Reduction

- Over \$780 million in damages averted in the TN Valley during January 2013
- About \$710 million in damages averted at Chattanooga in January 2013
- Since the 1936 closure of Norris Dam, approximately \$5.6 billion in damages have been averted at Chattanooga

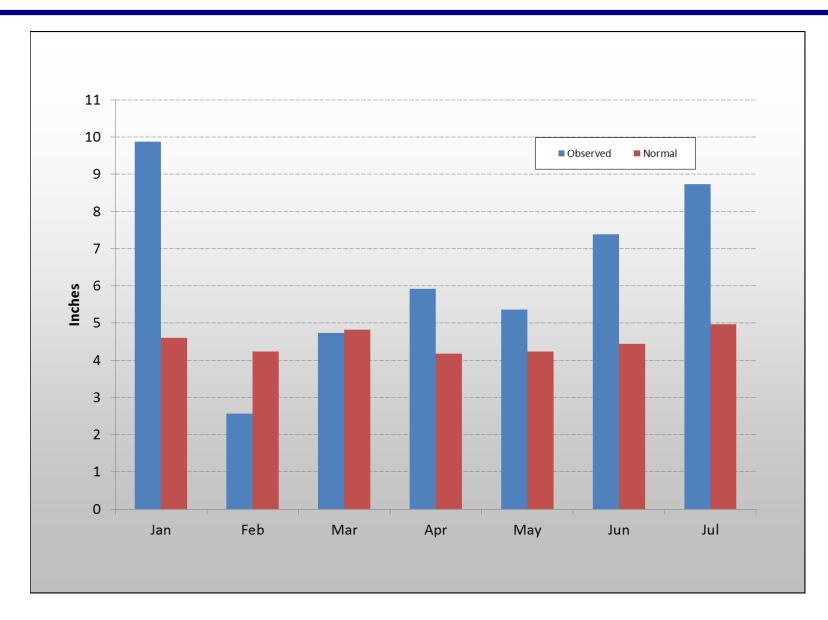
Chickamauga Dam





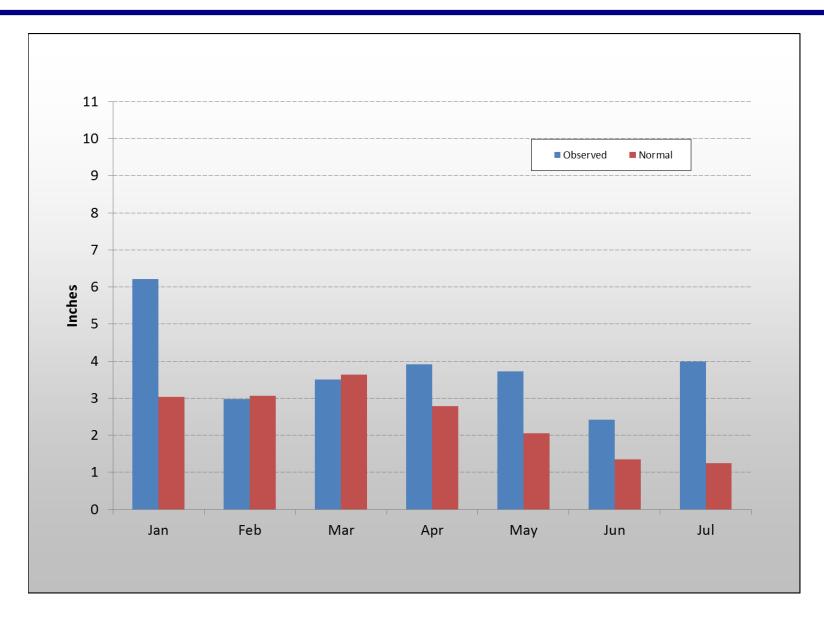


2013 Above Chattanooga Observed Rainfall



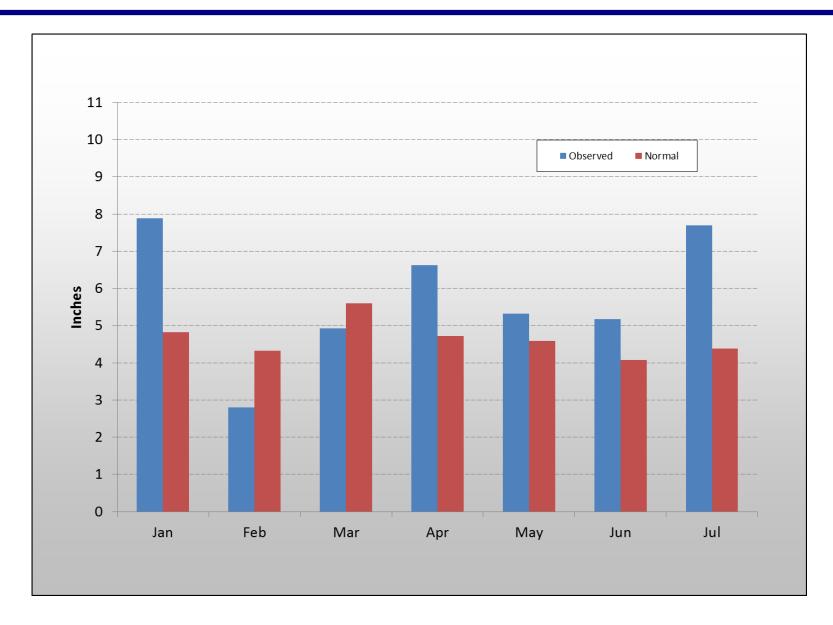


2013 Above Chattanooga Observed Runoff



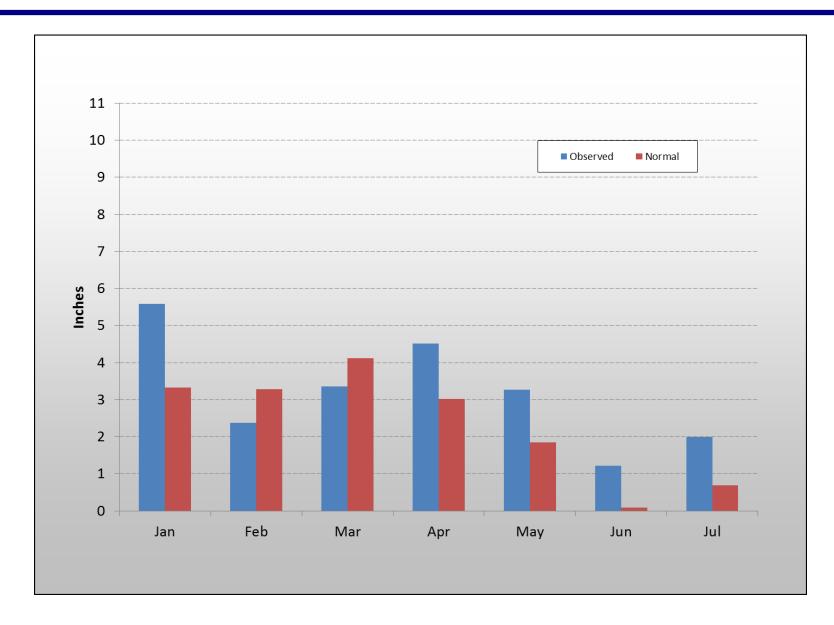


2013 Below Chattanooga Observed Rainfall





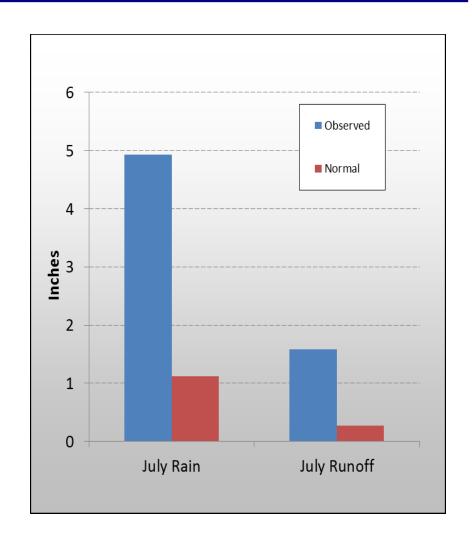
2013 Below Chattanooga Observed Runoff





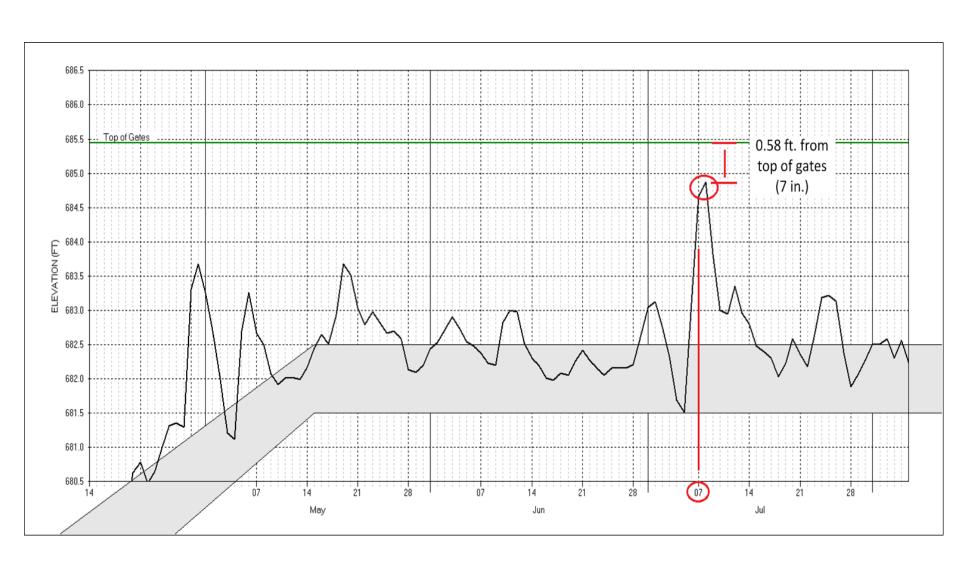
July 7 Above Chattanooga Stats

- First 7 days of July
- 4.93 in Rainfall
 - 441% Rainfall
- 1.58 in Runoff
 - 583% Runoff
- Chickamauga Flow
 - Started at 96K cfs
 - Increased to 166K cfs
 - Peaked on July 8-185K cfs



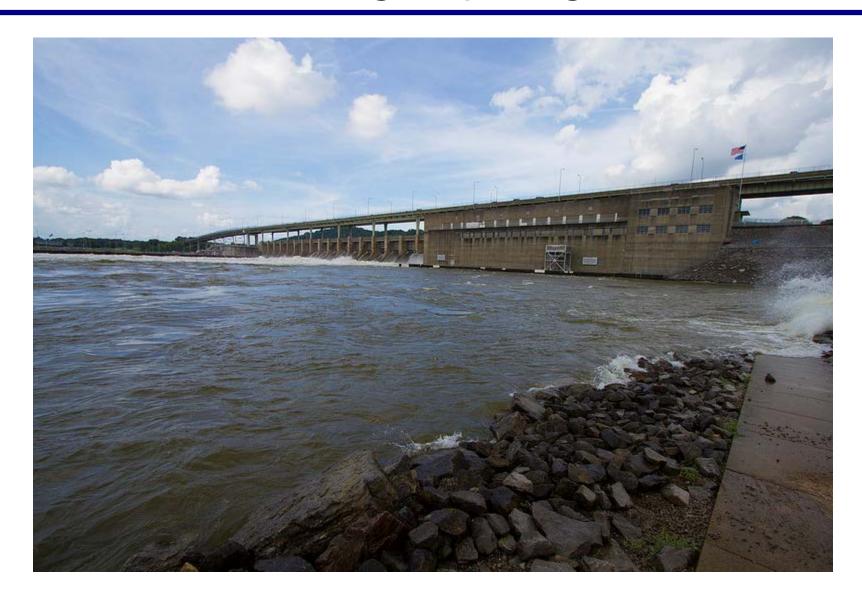


Chickamauga Headwater Elevations



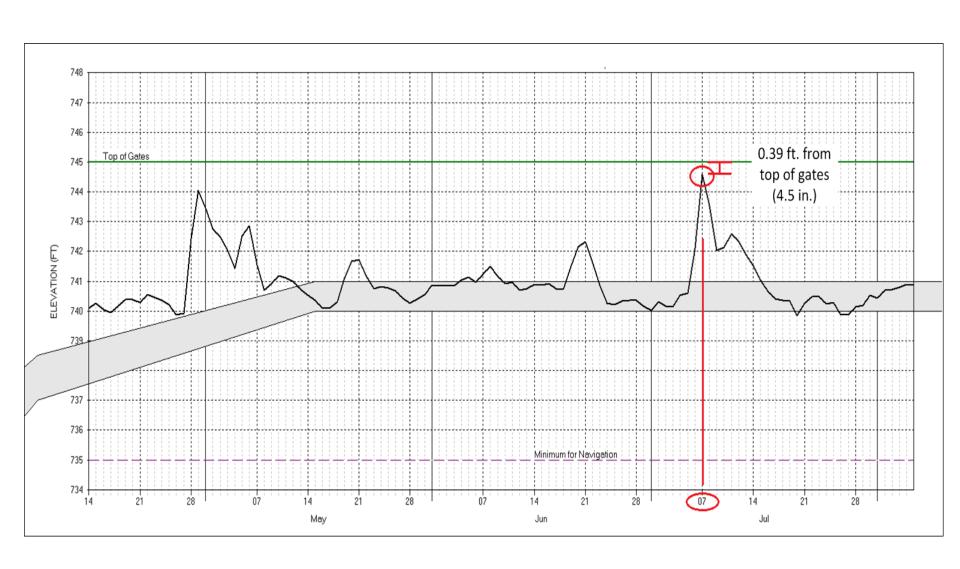


Chickamauga Spilling





Watts Bar Headwater Elevations



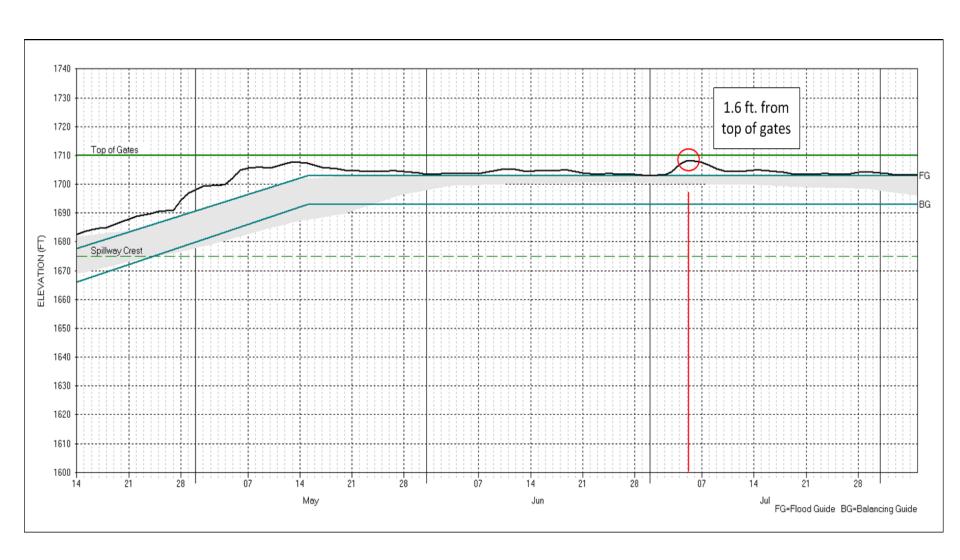


Watts Bar Spilling





Fontana Headwater Elevations





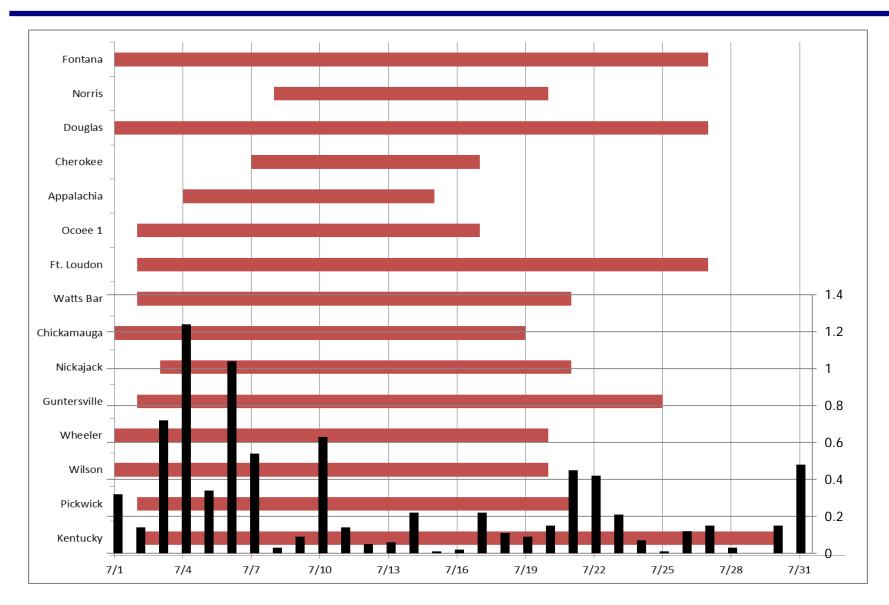
Fontana Spill







Above AVG Flows vs Rainfall





Chattanooga Impacts of July Flood

- Tennessee River Crested on 7/8/13 at 30 ft. (elev. 751.1')
 - Largest flood of record 1867 with crest of 58 ft.
 - Largest regulated flood in 1973. Crest observed at 37 ft.
 with a natural model crest at 52 ft.
- July 2013 Naturals Model Stage 37 ft.
 - Flood Crest Reduction of Approximately 7 ft.
- Estimated Averted Damages of \$44 million at Chattanooga

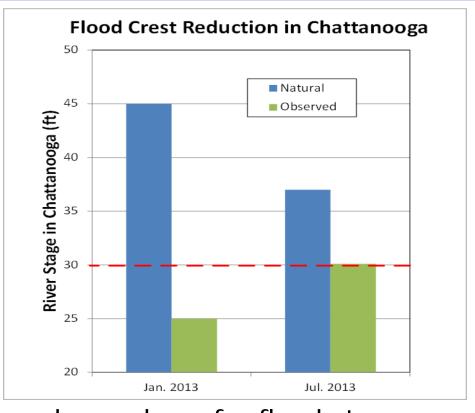






Difference in January and July

- January
 - Naturals Model 45 ft
 - Observed 25 ft
- July
 - Naturals Model 37
 - Observed 30
- Time of year
 - During winter reservoirs are drawn down for flood storage
 - During summer reservoirs are raised for recreation
- We could have reduced the July event more if we had storage





Benefits of Integrated Tennessee River System



Navigation



Water Supply



Flood-Damage Reduction



Recreation



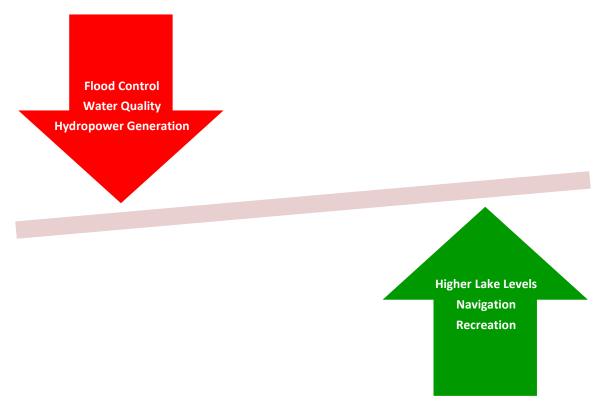
Power Generation



Water Quality



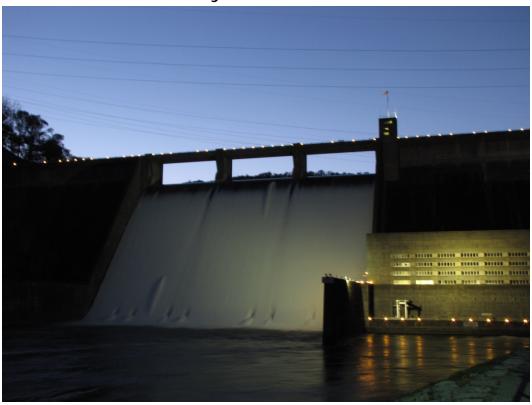
- Balancing the competing demands on the system and the overall value to the public
- Lack of understanding of the trade-offs associated with individual wants
- Example: Can you keep my reservoir higher, longer?





In Summary

- The Tennessee River Reservoir System operated by the TVA is crucial to the life of the Tennessee Valley providing multiple benefits to all stakeholders
- Without the integrated reservoir system there would be greater flood events in the Tennessee Valley







Kentucky Dam Operations

- Last dam in Tennessee River System
- When flood stage at Cairo, Illinois reaches 35 ft. and expected to reach 40 ft. Kentucky Dam operations handed over to USACE to reduce flooding on Mississippi
- Kentucky Dam Operations handled by USACE from X-X
- Challenges
 - Increased flooding on TVA reservoirs
 - Water still coming downstream with nowhere to go