Appendix D9

Inter-Basin Transfers—A Sensitivity Analysis

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An inter-basin transfer (IBT) occurs when water is moved from one watershed to another watershed. In 2000, the 13 IBTs from the Tennessee River watershed diverted 5.61 million gallons per day (mgd). These IBTs have been included as part of the Base Case, and the impacts of these withdrawals were considered in the impact assessments for the relevant resource areas. In addition, for this analysis, it was assumed that operation of the locks through the Tennessee–Tombigbee Waterway would eventually reach the level projected when the waterway was authorized. This additional IBT, which would divert an additional 600 mgd from the TVA reservoir system and the Tennessee River watershed, was also included in the impact assessments. This assumption is conservative and may result in overstated related impacts.

There are increasing demands on available water supplies in the Southeast. Alabama, Georgia, Mississippi, and Florida are already involved in disputes over water supply use. Inquiries that have been made about the availability of water from the Tennessee River system to meet demands outside the watershed could result in additional IBTs from the TVA reservoir system. Because TVA does not know the location, timing or magnitude of potential IBTs, TVA decided not to speculate about potential additional IBTs in its primary ROS analyses. When requests to approve additional IBTs under Section 26a of the TVA Act are received, TVA would analyze the environmental, economic, and operational effects of these requests both individually and in the aggregate. TVA would also work closely with potentially affected states and communities in these assessments.

Although specific IBTs are too speculative to address in the ROS, TVA conducted an initial sensitivity analysis to investigate whether the policy alternatives allowed for the potential of large IBTs from the TVA system occurring in the future. The results of that analysis are reported in this appendix.

Bohac (2003) discussed the possibility that water-short areas external to the Tennessee River watershed could look to the Tennessee River for water supply in the future. Based on a review of water needs in areas outside the watershed, requests for IBT withdrawals were assumed to be received from the Blount County/Birmingham, Alabama, area; the 18- to 20-county area comprising the Atlanta Metropolitan Area; North Georgia; and Northeast Mississippi. The point of withdrawal for these areas would likely be Chickamauga, Guntersville, and Pickwick Reservoirs, which all are mainstem storage reservoirs. Table D9-01 shows the potential amount of withdrawals for those areas for 2030. These amounts were used to determine the sensitivity of the Base Case and the policy alternatives to large transfers of water from the Tennessee River.

Table D9-01 Potential Inter-Basin Transfers by 2030

Assumed Water Transfer Destination	Point of Withdrawal	Assumed Transfer (2030) (mgd)
North Georgia and Atlanta	Chickamauga	264
Blount County–Birmingham, Alabama	Guntersville	180
Northeast Mississippi	Pickwick	17

TVA used the Weekly Scheduling Model (WSM) to conduct the sensitivity analysis for IBT withdrawals (see Appendix C for a brief description of the WSM). Reservoir levels from the model results for the Base Case were compared to reservoir levels for the policy alternatives to identify the policy alternative that showed the greatest change in median reservoir elevations. Reservoir Recreation Alternative B showed the greatest change in median reservoir elevations.

Water withdrawals for the IBTs were added as an input to the WSM, and a second-iteration model run was completed. Table D9-02 shows the effect of withdrawals from Chickamauga, Guntersville, and Pickwick Reservoirs at upstream tributary storage reservoirs. The results shown are based on analysis of the 90th and 10th percentile ranges of reservoir elevations—that is, the reservoir elevation that would be exceeded at least 10 percent of the time but not exceeded 90 percent of the time. Reservoir elevations outside this range would occur infrequently due to drought or extremely wet weather conditions. The general seasonality of these effects is also shown. The analysis found that, for both the Base Case and Reservoir Recreation Alternative B, no change in median reservoir elevations would be likely should the IBTs be implemented.

Table D9-02 Weekly Scheduling Model Results That Include Potential Inter-Basin Transfers under the Base Case and Reservoir Recreation Alternative B

Reservoir	Base Case		Reservoir Recreation Alternative B	
	Elevation Difference – 90th Percentile (feet)	Elevation Difference – 10th Percentile (feet)	Elevation Difference – 90th Percentile (feet)	Elevation Difference – 10th Percentile (feet)
Watauga	0 to 1 (August-October)	0	0	Less than 0.5 (July)
South Holston	0 to 1 (August-October)	0	0	Less than 0.5 (October)
Cherokee	0 to 0.5 (October)	0	0	0 to 1 (July-September)
Douglas	0 to 0.5 (October)	0 to 2 (June-July)	0	0 to 1 (July-September)
Norris	0 to 0.5 (October)	0 to 0.5 (June)	0	0 to 1 (July-November)
Fontana	Less than 0.5	0	0	0
Chatuge	Less than 0.5	0	0	0
Nottely	0 to 1 (November)	0	0	Less than 0.5 (August)
Blue Ridge	0	0 to 0.5 (June-July)	0	0 to 2 (March - September)
Chickamauga	0	Less than 0.5 (April)	0	0

Table D9-02 shows that the effect of the IBTs would be to reduce some tributary reservoir levels by a small amount under infrequent conditions. Under the Base Case, during unusually wet conditions in which reservoir levels were above normal (90th percentile or no more than 10 percent of the time), IBTs would cause some tributary reservoirs to fall from 0 to 1 foot below their elevations without the transfers for a period of 1 to 3 months. This would likely occur in the late summer and fall periods. Similarly, during unusually dry conditions (10th percentile, or no more than 10 percent of the time) in which reservoir elevations were already below normal, IBTs could cause some tributary reservoirs elevations to fall an additional 0.0 to 0.5 foot for 1 to 2 months during summer. One reservoir (Douglas) was up to 2 feet below where it would have been without the transfers for 1 to 2 months. Under the Base Case, no impacts on mainstem reservoirs were noted except on Chickamauga Reservoir. In approximately 1 year in 10, Chickamauga Reservoir would be delayed in being filled by about 1 week. Otherwise, no effect was observed for mainstem reservoirs.

Under Reservoir Recreation Alternative B, IBTs would not affect reservoir elevations in unusually wet years. During dry conditions, when reservoir elevations were below normal, IBTs would cause some tributary reservoirs to drop up to 1 foot below their levels without the transfers for one to several months during summer. One reservoir (Blue Ridge) was as much as 2 feet below its level without a transfer for 1 to 2 months. No impacts on mainstem reservoirs were noted.

This sensitivity analysis shows that IBTs are not likely to substantially affect future reservoir elevations, under either the Base Case or the most conservative assumptions for the policy alternatives under most hydrologic conditions. However, this conclusion is only valid for the assumptions used. IBTs with other withdrawal points or withdrawal quantities might result in different outcomes. It must also be recognized that the reservoir elevation differences discussed above would occur about 1 year in 10. Under very dry conditions, which would occur less often than 1 year in 10, IBTs might cause more significant elevation differences than discussed above.

Literature Cited

Bohac, C. E. 2003. Water Supply Inventory and Needs Analysis. Tennessee Valley Authority, Navigation and Hydraulic Engineering. Draft. Chattanooga, TN. December.

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