

## **5A.20 BRA System Operation**

### **5A.20.1 Description of Option**

Significant additional water supply can be made available throughout the Brazos River Basin by efficiencies available to the Brazos River Authority (BRA). Development of this additional water supply would require permit action by the Texas Commission on Environmental Quality (TCEQ) and implementation of a comprehensive Water Management Plan. No new infrastructure is needed to create the supply.

BRA holds 15 water rights in the Brazos Basin, 13 of which are associated with reservoirs. These permits authorize diversion of 796,551 acre-feet per year and 2,484,491 acre-feet of storage, with 661,901 acre-feet of diversions and 2,222,949 of storage located in Region G. Lake Alan Henry, Possum Kingdom Lake, Lake Granbury and Lake Limestone are owned and operated by the BRA. The remaining reservoirs are owned by the U.S. Army Corps of Engineers. Of these Corps reservoirs, BRA is the sole water right holder from these reservoirs with the exception of Lake Belton, which it shares with water rights for Fort Hood. The two remaining permits are associated with use of excess flows in the Brazos Basin and interbasin transfer of water released from BRA reservoirs.

A key feature of many of the BRA's water rights is the System Operation Order which allows coordinated operation of all the BRA's reservoirs except Lake Alan Henry and Allens Creek Reservoir. The system order allows BRA to:

- Use the bed-and-banks of the Brazos River to deliver water to downstream customers.
- Release or divert water on a non-priority basis from any system reservoir in excess of its priority diversion up to a specified limit in each reservoir.
- Make use of available flows in the lower basin, again on a non-priority basis.

The System Operation Order has several restrictions, including:

- Total diversions are limited to the total priority authorization of the system reservoirs, currently 661,901 acre-feet per year<sup>1</sup>.
- Each reservoir has a specified annual amount of water available for use.
- If a reservoir is less than 30% capacity and other system reservoirs are more than 30% capacity, that reservoir may not be used for system operation until all reservoirs are below 30% capacity.

<sup>1</sup> The System Operation Order does not include Lake Alan Henry or Allens Creek Reservoir.

Non-priority use of available flows is authorized by Certificate of Adjudication 5166, known as the 'Excess Flows' permit. This water right allows the BRA to divert, on a non-priority basis, up to 650,000 acre-feet per year of the available flows in Austin and Fort Bend Counties. Water is not actually diverted or released from a reservoir; it is only assigned to a reservoir for accounting purposes. Although this right allows the BRA to make use of available flows, it does not allow any supply benefit for the BRA system by having access to such flows.

The existing System Operation Order allows the BRA some flexibility in the operation of its reservoir system, and the Excess Flows permit allows access to available flows in the lower portion of the basin without actually releasing water from BRA reservoirs. However, the existing water rights do not allow the BRA to utilize potential operational efficiencies and additional yield available from system operation. With implementation of this water management option and through more efficient operation, additional yield from the system could be made available, without new infrastructure and with negligible impact on other water rights holders in the Brazos Basin. The increased water supply available from this management option accrues primarily due to full utilization of the BRA reservoir system. Only through the use of system storage, is there any additional reliable supply available in the Brazos Basin, unless there were to be significant investment in new infrastructure or additional storage.

With the implementation of this water management strategy, the BRA has the potential of the following:

- A new appropriation of state water for multiple uses, including domestic, municipal, agricultural, mining, industrial, and other beneficial uses on a firm basis, as well as the ability to dedicate part of this firm supply to develop interruptible supply.
- Use of current and future return flows to the extent that such return flows continue to be discharged or returned into the bed and banks of the Brazos River, its tributaries, and BRA reservoirs.
- Use of any source of water available to the BRA to satisfy the diversion requirements of senior water rights to the same extent that those water rights would have been satisfied by passing inflows through the BRA's reservoirs on a priority basis
- Ability to release, pump, and transport water from any of the BRA's reservoirs for subsequent storage, diversion, and use throughout the BRA's service area.

Through this management strategy, the BRA would be fulfilling its legislative mandate to efficiently manage the limited water resources of the Brazos River Basin. Implementation of this strategy would require many factors to be taken into account when managing these resources and

to address these issues the BRA would need to develop a comprehensive Water Management Plan.

**5A.20.2 Available Yield**

Estimated yields available from this strategy are based on hydrologic analyses of the Brazos Basin using the TCEQ Water Availability Model of the Brazos Basin and San Jacinto-Brazos Coastal Basin (Brazos WAM). For the system operation analyses, the Brazos WAM was modified to incorporate system operation of BRA reservoirs. Using this model, it was determined that an additional firm yield of up to 421,449 acre-feet of water can be generated by the BRA system using system operation. The total yield from implementation of this strategy is dependent upon the location where the supply is used. To illustrate how supply varies with location, water availability was evaluated at three points:

- USGS Gauge 08091000, Brazos River near Glen Rose
- USGS Gauge 08098290, Brazos River near Highbank
- Brazos River at the Gulf of Mexico

Table 5A.20-1 summarizes the additional water available from system operation at the three analysis points.

**Table 5A.20-1**  
**Additional Water**  
**Available through System Operation by Location**  
*(Values in Acre-Feet per Year)*

Location	Additional Firm Supply from System Operation without Interruptible Supplies	Additional Supply from System Operation with Interruptible Supplies <sup>b</sup>		
		Firm Supply	Interruptible Supply	Total Supply
Glen Rose	150,538	60,538	157,000	217,538
Highbank	144,306	54,306	303,000	357,306
Gulf of Mexico	421,449	331,449	670,000	1,001,499

a With 2060 return flow conditions and Lyons bypass criteria

b Interruptible supply meets the 75/75 criteria.

**5A.20.3 Environmental Issues**

Because system operation does not involve any new infrastructure or storage, there are no major environmental issues associated with the strategy. Any new infrastructure required to deliver water would be evaluated on a case-by-case basis. Because much of the water generated by system operation will be delivered via the bed and banks of the Brazos River, as demand increases, flows during dry periods could improve in much of the basin.

Reservoir elevations during extreme drought could be somewhat lower in some reservoirs. However, it may take many years for demands to reach levels where significant impacts will be seen in most reservoirs. Bay and estuary flows may be reduced because of increased use of unappropriated flows. The Brazos River has a very small estuary and impacts are expected to be minimal.

**Table 5A.20-2.  
Environmental Issues: BRA System Operation**

<b>Water Management Options</b>	<b>Implementation Measures</b>	<b>Environmental Water Needs / Instream Flows</b>	<b>Bays and Estuaries</b>	<b>Fish and Wildlife Habitat</b>	<b>Cultural Resources</b>	<b>Threatened and Endangered Species</b>
System Operation of BRA reservoirs	Application to TCEQ, coordination with Region G and Region H	Probable positive impacts below BRA reservoirs <sup>1</sup>	Possible Low Impacts	Probable positive impacts below BRA reservoirs <sup>1</sup>	None expected	Negligible Impacts
<sup>1</sup> Assumes increase in instream flows below BRA reservoirs as more water is delivered using the bed-and-banks of the Brazos River and its tributaries.						

**5A.20.4 Engineering and Costing**

Because no new infrastructure is required to implement system operation, no design work or capital costs are necessary. BRA estimates that the studies and permitting process will cost \$4.5 million. Water cost is estimated to be similar to current new contracts for BRA system water. Pending implementation of the Water Management Plan, it was assumed that 100,000 acre-feet of supply from this strategy would be available during the planning period.

**Table 5A.20-3.  
Cost Estimate Summary for  
BRA System Operation  
(Fourth Quarter 2004 Prices)**

<i>Item</i>	<i>Estimated Costs</i>
<b>Capital Costs</b>	
	— \$0
<b>Total Capital Cost</b>	<b>\$0</b>
Water Rights Permit from TCEQ	\$4,500,000
<b>Total Project Cost</b>	<b>\$4,500,000</b>
<b>Annual Costs</b>	
Water cost <sup>1</sup>	\$ 250,000
<b>Total Annual Cost</b>	<b>\$ 250,000</b>
<b>Available Project Yield (acft/yr)</b>	<b>421,449</b>
<b>Annual Cost of Water (\$ per acft) Raw Water from System Operation</b>	<b>\$ 2.50</b>
<b>Annual Cost of Water (\$ per 1,000 gallons) Raw Water from System Operation</b>	<b>\$0.008</b>
<small><sup>1</sup> Assuming 100,000 acre-feet of water from system operation contracted to customers during the planning period.</small>	

#### **5A.20.5 Implementation Issues**

1. Required studies and application to TCEQ allowing system operation
2. Amendments of existing Brazos G and Region H water plans.
3. Water Management Plan to address operational and environmental implementation of system operation.

**Table 5A.5-4.  
Comparison of BRA System Operation Option to Plan Development Criteria**

<b>Impact Category</b>	<b>Comment(s)</b>
A. Water Supply: 1. Quantity 2. Reliability 3. Cost	1. Significant quantity available 2. High reliability 3. Very Low
B. Environmental factors 1. Environmental Water Needs 2. Habitat 3. Cultural Resources 4. Bays and Estuaries	1. Low impacts 2. Low impacts 3. None anticipated 4. Low impact
C. Impact on Other State Water Resources	<ul style="list-style-type: none"> <li>No apparent negative impacts on state water resources; no effect on navigation</li> </ul>
D. Threats to Agriculture and Natural Resources	<ul style="list-style-type: none"> <li>No threats to agriculture; possible increases in instream flows during drought</li> </ul>
E. Equitable Comparison of Strategies Deemed Feasible	<ul style="list-style-type: none"> <li>Option is considered to meet municipal and industrial shortages</li> </ul>
F. Requirements for Interbasin Transfers	<ul style="list-style-type: none"> <li>Not applicable</li> </ul>
G. Third Party Social and Economic Impacts of system operation	<ul style="list-style-type: none"> <li>None</li> </ul>

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