

5A.4 Expanded Use of Existing Sources

The various alternatives that would involve an expanded use of existing supplies included concepts that would change the operation or use of existing facilities, primarily surface reservoirs, such that additional water, on average over the period of record could be realized. These would typically not involve major capital investments, unless some were needed to effect the operational changes. Examples would include the coordination of multiple sources, such as multiple reservoirs or reservoirs and groundwater. It could also involve variations in the operating policy for reservoirs. The potential alternatives were developed by reviewing the existing facilities throughout the region and comparing these with areas for which deficits had been determined. Three potential alternatives were delineated:

- Coordinated use of Lake Leon water supply with local groundwater;
- Coordinated use of Fort Phantom Hill and Hubbard Creek Reservoirs; and
- Coordinated use of Lakes Sweetwater, Trammel, and Oak Creek.

The first two are described in more detail in the following sections. Their locations are shown in Figure 5A.4-1. A brief review of a 1983 study was done to assess the possibility of coordinating the use of Lakes Sweetwater, Trammel, and Oak Creek. It would require adding a small pump station and pipeline to allow for water from Trammel and Oak Creek to be stored in Lake Sweetwater. It would add only about 110 acft/yr and was not considered cost effective.

5A.4.1 Coordinated Use of Lake Leon Water Supply with Local Groundwater

5A.4.1.1 Description of Option

This alternative would coordinate the usage of water supply from Lake Leon in Eastland County with groundwater usage. The shortages in Eastland County that would be addressed by this alternative include an agricultural shortfall of about 8,000 acft/yr and a current municipal shortage for the City of Cisco of about 316 acft/yr that drops to 185 acft/yr by the year 2030. The alternative would increase the use of water supply from Lake Leon when the reservoir is relatively full then decrease the demand when the lake is lower and then replace the shortage with a temporary increase in the groundwater pumpage. To compensate, the normal groundwater usage in wetter years would need to be lowered such that the average use over the period of record would meet the sustainable yield of the groundwater supply. Over the period of record, this process tends to increase the average amount withdrawn from Lake Leon.

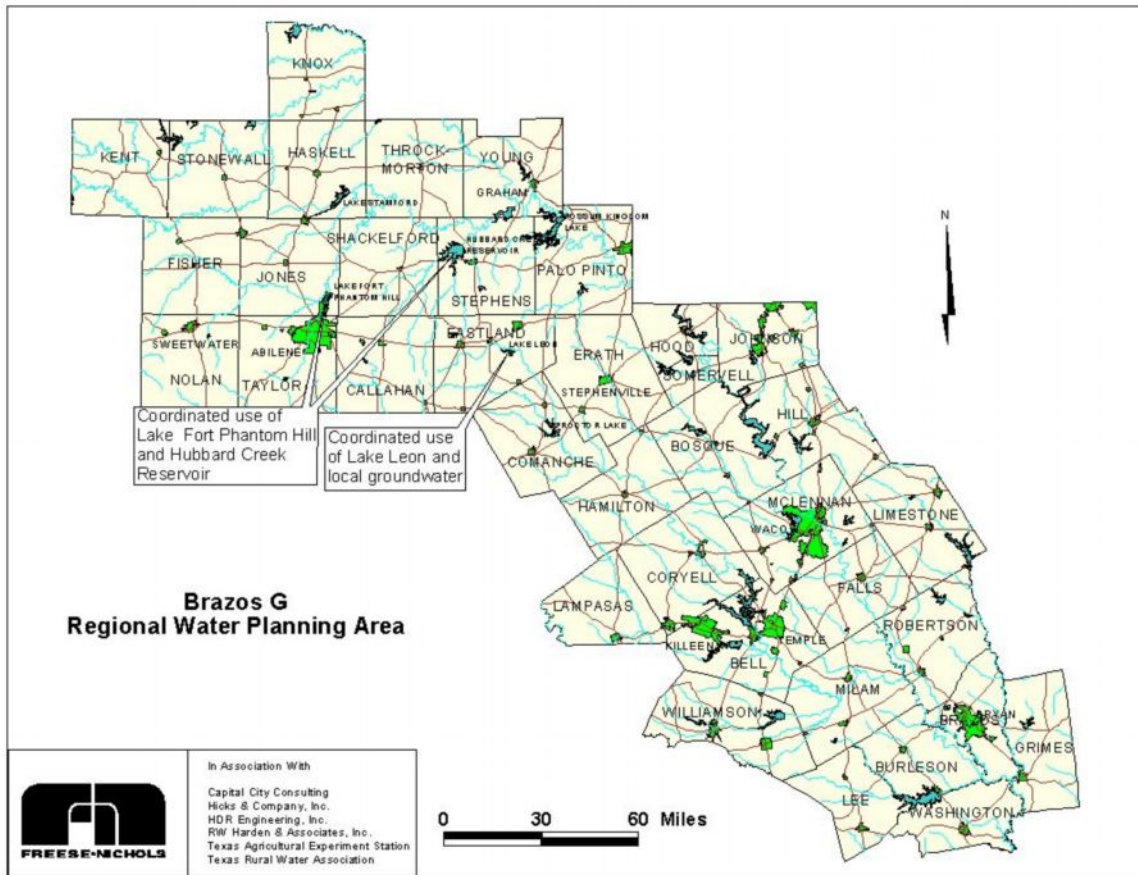


Figure 5A.4-1. Expanded Use of Existing Supplies – Alternatives Reviewed

5A.4.1.2 Available Yield

The updated yield for Lake Leon is 9,100 acft/yr, considerably more than the 4,500 acft/yr listed in the 1990 and 1997 *State Water Plans*. This is also more than the permitted withdrawal rate of 6,301 acft/yr. Several various combinations of increased withdrawal rates over this revised yield were reviewed, each with a different resulting level of additional supply. The most promising combination seemed to be to increase the withdrawal rate to 11,400 acft/yr with up to 2,400 acft/yr of supplemental groundwater used whenever the lake dropped below 40 percent of its storage capacity. Over the 34-year period of record reviewed, the total supplemental groundwater withdrawn would be 13,800 acft, equating a reduction of 406 acft/yr in normal groundwater usage to keep the average unchanged at the sustainable supply level. This would reduce the average increase in use of 2,300 acft/yr for a net gain of 1,900 acft/yr usage. These values are preliminary and may be adjusted upon further study.

5A.4.1.4 Engineering and Costing

Infrastructure will need to be sufficient to allow for the supplemental groundwater to be included in the water supply system for Lake Leon withdrawals. If the water is to be moved from Lake Leon to Cisco, covering this 15-mile distance will take a pipeline and a pump station that would cost roughly \$6 million. The infrastructure needed to use the additional surface water for irrigation would involve a system of small pipelines and pump stations throughout the area, with construction costs probably ranging from \$5 million to \$10 million. For the 1,900-acft/yr incremental benefit, this would equate to a unit cost of about \$325 to \$650 per acft for the raw water supply. If some of the water that may be available over the current allocation were used as well, this unit cost would tend to go down.

5A.4.1.5 Implementation Issues

This water supply Option has been compared to the plan development criteria, as shown in Table A-10, and the option meets each criterion.

**Table 5A.4-1.
Comparison of Lake Leon Coordinated Use Option to Plan Development Criteria**

<i>Impact Category</i>	<i>Comment(s)</i>
A. Water Supply: 1. Quantity 2. Reliability 3. Cost	1. Sufficient to meet needs 2. Highly reliable 3. Low to moderate
B. Environmental factors 1. Environmental Water Needs 2. Habitat 3. Cultural Resources 4. Bays and Estuaries	1. None or low impact 2. Low impact 3. Low impact 4. None or low impact
C. Impact on Other State Water Resources	• No apparent negative impacts on state water resources; no effect on navigation
D. Threats to Agriculture and Natural Resources	• Could increase irrigation supply
E. Equitable Comparison of Strategies Deemed Feasible	• Option is considered to meet municipal, industrial, and agricultural shortages
F. Requirements for Interbasin Transfers	• Not applicable
G. Third Party Social and Economic Impacts from Voluntary Redistribution	• None

Several factors will need to be addressed for implementation of this alternative. These would include an amendment of the water rights permit for additional diversions from Lake Leon. This will have to take into account the difference between the recently calculated yield and the current allocation of water rights, as well as the impacts on downstream water rights holders. This may change the amount of water supply available.

Construction of the network of distribution pipes, key pump stations, and main trunk lines would present a challenge as several different farming entities would likely have to switch from groundwater supply to surface water supply, and coordination of their needs within a viable funding mechanism will present some challenges.

5A.4.2 Coordinated use of Fort Phantom Hill and Hubbard Creek Reservoirs

5A.4.2.1 Description of Option

Coordination of the use of Lake Fort Phantom Hill, owned by the City of Abilene, and Hubbard Creek Reservoir, owned by West Central Texas Municipal Water District, would involve the City of Abilene using additional water from Fort Phantom Hill during times that the reservoir is at higher levels and supplementing that water with larger drafts of water from Hubbard Creek when it is low. This would tend to reduce spills from the lake and, on average, increase the total system supply for the City of Abilene and its customers. It would also, on average, keep Hubbard Creek Reservoir at a higher level. Though Abilene is not currently shown with a long-term shortage, there are several entities in the region that do have a deficit, and purchasing water from Abilene may be a viable alternative for them. The alternative was reviewed for this possibility.

5A.4.2.2 Available Yield

The current firm yield for Lake Fort Phantom Hill is 26,872 acft/yr, and the firm yield for Hubbard Creek Reservoir is 43,339 acft/yr. In a 1989 report by Freese and Nichols, Inc., various combinations of pumping rates from both reservoirs were reviewed in order to both reduce total pumping costs and increase available supply. Though different yield calculations and operating assumptions were utilized in the study, a total increase in the system yield of 7,200 acft/yr was determined. The operating method and its improvements to system yield would have to be updated to be consistent with the most recent yield calculations, if this alternative is studied further.

5A.4.2.3 Engineering and Costing

The recommended operating scenario would have no major capital program, since existing pumping facilities were assumed in the analysis. It would save on average pumping costs over the long run, though the amount varies widely from year to year.

5A.4.2.4 Implementation Issues

This water supply option has been compared to the plan development criteria, as shown in Table 5A.4-2, and the option meets each criterion.

Table 5A.4-2.
Comparison of Fort Phantom Hill Coordinated Use Option to Plan Development Criteria

<i>Impact Category</i>	<i>Comment(s)</i>
A. Water Supply: 1. Quantity 2. Reliability 3. Cost	1. Sufficient if used in coordination with other strategies 2. Slightly lower reliability than new supply sources 3. Low
B. Environmental factors 1. Environmental Water Needs 2. Habitat 3. Cultural Resources 4. Bays and Estuaries	1. Reduces instream flows -- low to moderate impact 2. Potentially moderate impact 3. No impact 4. None or low impact
C. Impact on Other State Water Resources	• No apparent negative impacts on state water resources; no effect on navigation
D. Threats to Agriculture and Natural Resources	• None or low
E. Equitable Comparison of Strategies Deemed Feasible	• Option is considered to meet municipal and industrial shortages
F. Requirements for Interbasin Transfers	• Not applicable
G. Third Party Social and Economic Impacts from Voluntary Redistribution	• None

Though the infrastructure is in place and permitted withdrawals are sufficient for the operations, current contractual agreements between the City of Abilene and West Central Texas Municipal Water District do not allow for the operation to take place. Adjustments to the contractual agreements, including appropriate consideration of the associated concerns of the four member cities of the District, would have to be made to allow for the change.

5A.4.3 Environmental Issues

The three options in this category would entail relatively few capital improvements. The first option, *Coordinated Use of Lake Leon Water Supply with Local Groundwater*, would involve withdrawing water for municipal and industrial use in excess of current firm yield limitations, with increased pumping of groundwater as needed to account for seasonal hydrologic deficiencies. This would affect the amount and timing of downstream releases, as well as minor modifications in the height and variability of reservoir pool elevations. It is assumed no new wells or pipelines would be required to increase the quantity of water pumped from the aquifer. *Coordinated Use of Fort Phantom Hill and Hubbard Creek Reservoirs* would similarly affect downstream flows below these reservoirs, with possible minor variations in reservoir pool elevations. *Coordinated Use of Lakes Sweetwater, Trammel, and Oak Creek Reservoirs* would include these same effects as well as construction of a short pipeline in the case of Lake Sweetwater. The evaluation summarized in Table 5A.4-3 was based on a wide range of natural resource data bases on threatened and endangered species, and on riparian (stream bank) and littoral (lake side) habitats.

Potential environmental effects of these three options would be generally similar, with potential adverse impacts on environmental water needs/instream flows and on aquatic and riparian habitats downstream of the reservoirs. Beneath the Fort Phantom Hill Reservoir, instream and riparian effects would be concentrated along the approximately 4-mile length of Elm Creek from the dam to its confluence with the Clear Fork of the Brazos River. The effects of an altered flow regime below Fort Phantom Hill are considered to have possible moderate effects on instream and riparian habitats. The construction of a short pipeline and pump station near Lake Sweetwater may affect possible habitat of the Black-capped vireo, a federally listed endangered species. Increased pumping of groundwater in coordination with expanded use of Lake Leon water would have localized effects on water levels in the Trinity Aquifer.

This preliminary identification of environmental issues is based on an evaluation of the general characteristics of the water management options. Site specific investigations of the potentially affected environments would be necessary to provide detailed evaluations of possible habitat and cultural resources impacts of modified pool elevations. A quantitative estimate of the magnitude and seasonal distribution of the reduced downstream flows implied in the *Expanded Use* options would be needed to further assess the environmental water needs/instream flow and fish and wildlife effects of these options.

