

Brazos G Regional Water Plan
SURFACE WATER AVAILABILITY FOR LAKE MEXIA

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1. Description of the Lake

Lake Mexia and Bistone Dam are located on the Navasota River in Limestone County, about seven miles west of the City of Mexia, as shown in Figure 1. The reservoir was completed in 1961 with a capacity of 10,000 acre-feet, covering an area of 1,200 acres at the top of conservation pool of 448.3 feet.

The Bistone Municipal Water Supply District owns and operates the Lake. The District is the owner of the Certificate of Adjudication 5287, which authorizes the impoundment of 9,600 acre-feet in Lake Mexia and a diversion of 2,887 acre-feet per year for municipal use and 65 acre-feet per year for industrial purposes. The priority date is April 15, 1957.

2. Estimates of Sedimentation

The future reliable supply from Lake Mexia will depend on the capacity lost due to sedimentation. Generally, the sedimentation rate in existing reservoirs is determined by the difference in capacity between two volumetric surveys. The Texas Water Development Board surveyed Lake Mexia in May 1996. This survey determined the capacity to be 4,806 acre-feet at the top conservation pool elevation of 448.3 feet¹, equivalent to a loss of 52% of the initial conservation volume.

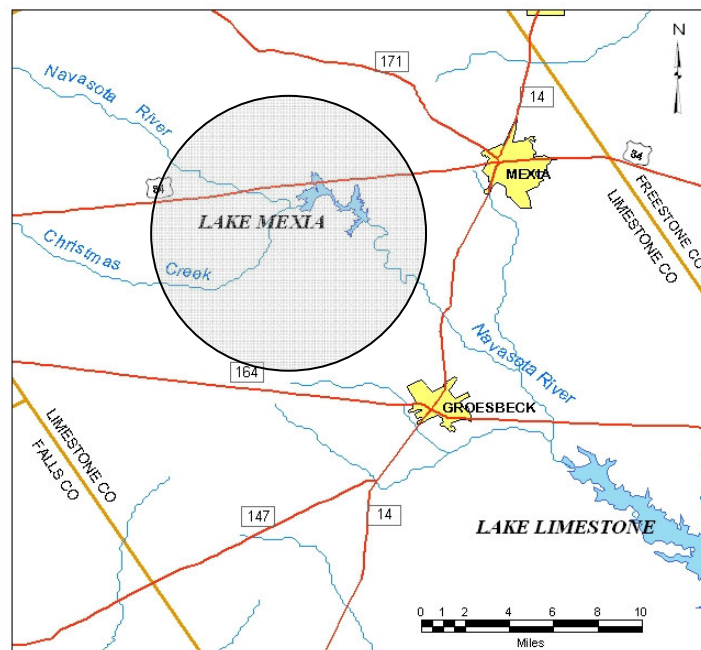


Figure 1
Location of Lake Mexia

¹ Texas Water Development Board. "Volumetric Survey of Lake Mexia". August 1996.

Based on the 1996 TWDB survey, the average annual sedimentation rate was estimated to be 0.76 acre-feet per square mile of contributing watershed. This rate of 0.76 may be slightly lower than the actual rate of sediment production in the watershed because some portion of the sediment may have accumulated in the flood zone, which was not measured in the 1996 survey.

Although the rate of sediment production in the watershed is likely to remain generally consistent, the rate at which volume is accumulated in the conservation pool is expected to decrease over time. As the conservation capacity is reduced, water elevations above 448.3 will be more frequent, increasing the frequency of spills and the sediment accumulation in the flood pool and decreasing the trap efficiency of the reservoir.

Freese and Nichols estimated the area-capacity characteristics of Lake Mexia for 2000 and 2060 assuming that 0.76 acre-feet of sediment per acre of drainage area would initially accumulate below the conservation pool. The computations assumed that this rate will decrease with time because a larger proportion of sediment will be deposited each year in the flood pool or exit through spills and less sediment will be accumulated in the conservation pool. The estimated capacities are 4,330 and 1,163 acre-feet for 2000 and 2060 respectively. Corresponding area-capacity tables for these estimates are found in Attachment A.

3. Firm Yield Results

Freese and Nichols evaluated the firm yield of Lake Mexia using a version of the Texas Commission on Environmental Quality (TCEQ) Water Availability Model (WAM) of the Brazos River Basin, as modified by HDR Engineering for the Brazos G Regional Planning Group. The results are summarized in Table 1.

**Table 1
 Capacity and Firm Yield of Lake Mexia for 2000 and 2060**

	Year 2000	Year 2060
Capacity (acre-feet)	4,330	1,163
Permitted Diversion (acre-feet per year)	2,952	2,952
Firm yield (acre-feet per year)	1,180	144
Demand projection for the City of Mexia ²	1,213	1,479

The firm yield for 2060 is 2,808 acre-feet per year less than the current permitted diversion from Lake Mexia, and 1,335 acre-feet per year less than the projected municipal demand for the City of Mexia for 2060.

² TWDB, 2006 Regional Water Plan Data. Board- Approved Municipal and Non-Municipal Water Demand Projections

ATTACHMENT A
Area Capacity Tables

Area Capacity Characteristics for Lake Mexia for 2000 Conditions

Elevation (Feet)	Area (Acres)	Capacity (Acre-Feet)
415.0	0	0
438.0	67	67
440.0	154	287
441.0	184	456
442.0	249	672
443.0	292	943
444.0	435	1,307
445.0	508	1,778
446.0	700	2,382
447.0	823	3,143
448.3	1,000	4,330

Assumed Area Capacity Characteristics for Lake Mexia for 2060 Conditions

Elevation (Feet)	Area (Acres)	Capacity (Acre-Feet)
415.0	0	0
445.0	0	0
446.0	363	380
447.0	272	698
448.3	660	1,164