

Hydrology of Mesilla-Rincon Basins in New Mexico

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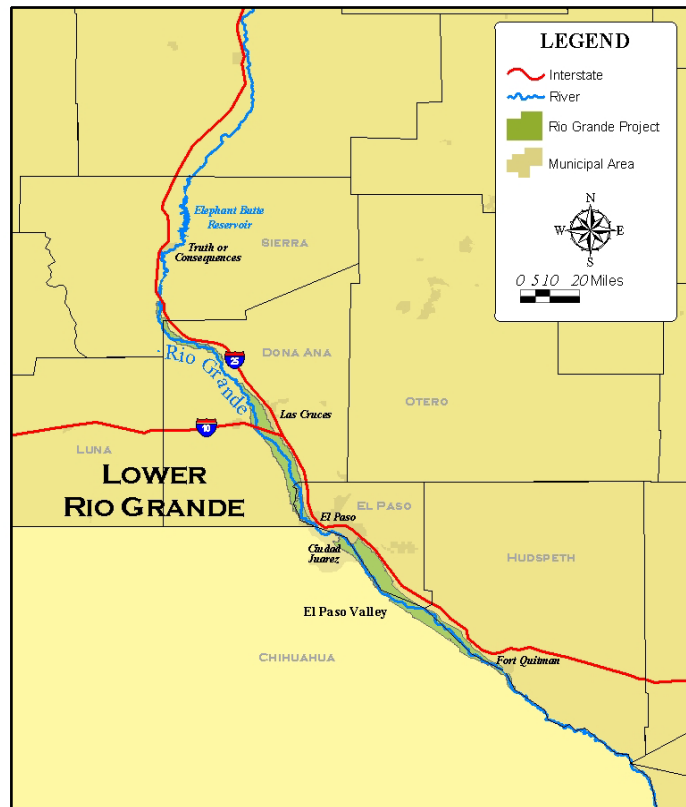
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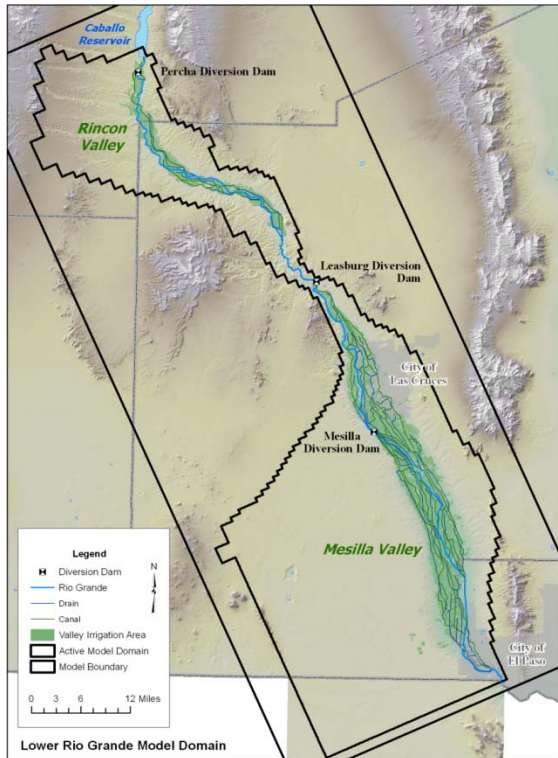
1) General Overview

a. Surface water supply: Rio Grande

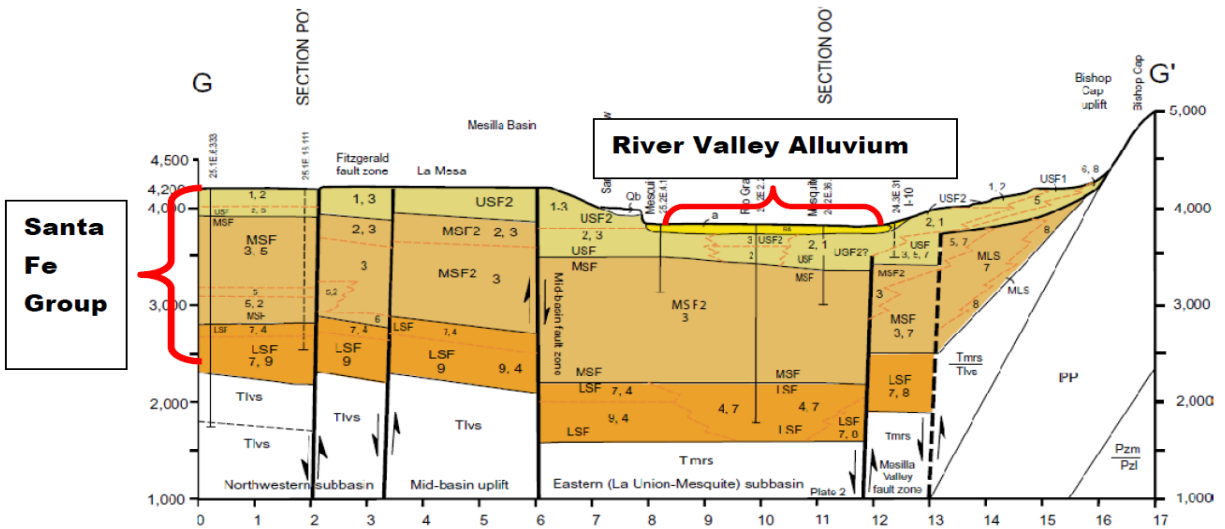
- i. Variable supply, dependent on conditions in northern New Mexico and Colorado.
- ii. In the LRG, the flows of Rio Grande are managed by Rio Grande Project which supplies water to
 1. Mexico (International Treaty)
 2. Irrigated lands in New Mexico (EBID)
 3. Irrigated lands in Texas (El Paso Water Utilities and EPCWID)
 4. Under a Miscellaneous Purposes contract provides water to El Paso Utilities



b. Groundwater: Rincon and Mesilla Basin Alluvial Aquifers



i. Mesilla Basin cross-section (from west to east, to a depth of ~3000 feet) of the aquifer system near La Mesa, south of Las Cruces, from Hawley and Kennedy, 2004, Hydrogeologic Framework of the Mesilla Basin.



3a. Section G-G' - Eastern Mesilla Basin and Valley: West Mesa and Santo Tomas volcanic center to Bishop Cap uplift.

ii. River Valley Alluvium

1. A few miles wide, in river valley, following the Rio Grande
2. Only ~80 feet thick (deep)

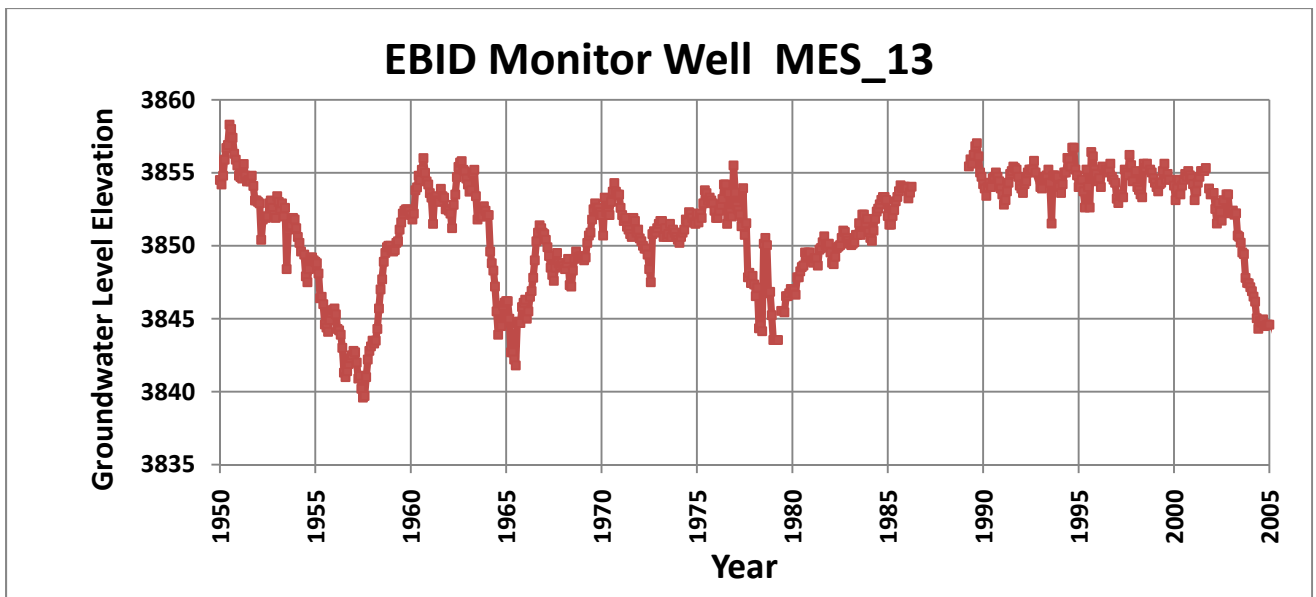
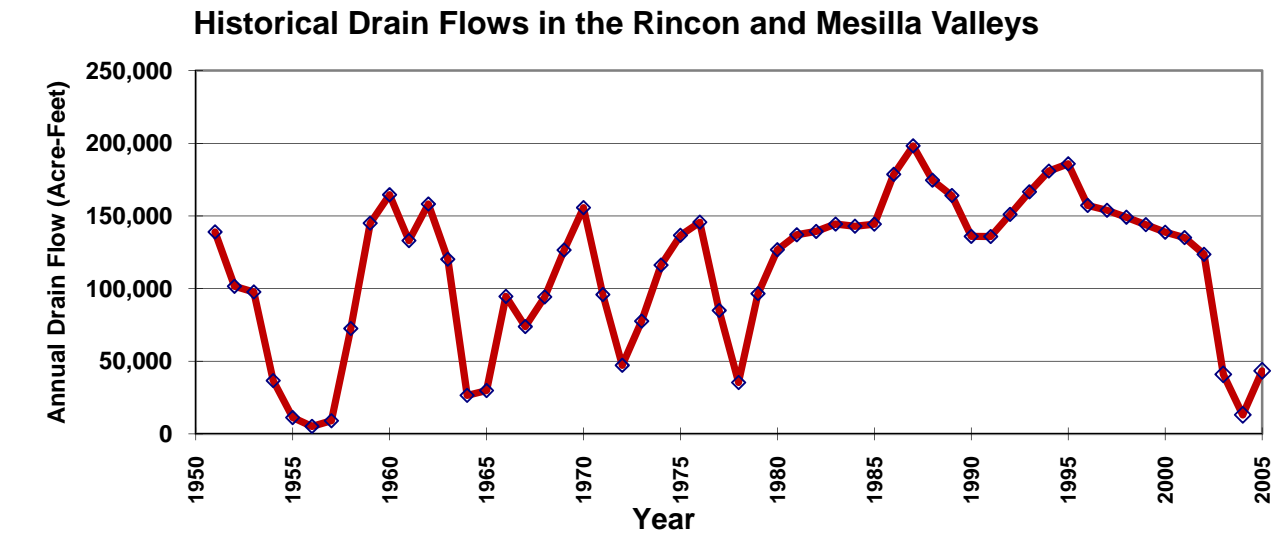
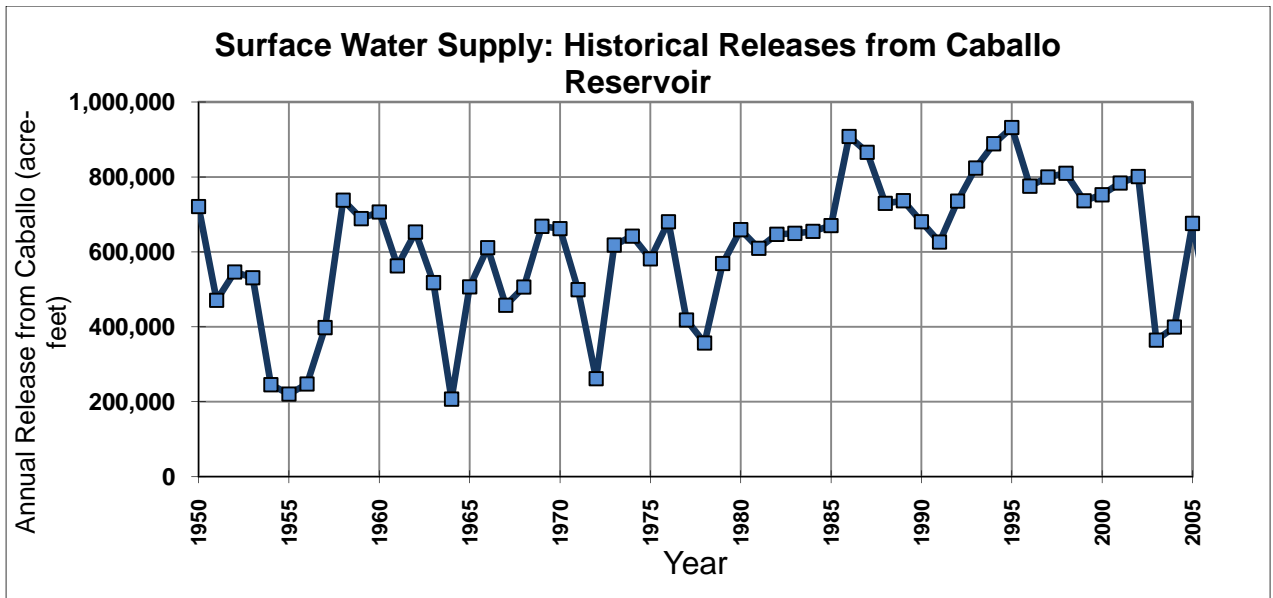
- 3. Highly transmissive.
- iii. Santa Fe Group Alluvium
 - 1. Extends farther east and west of River Valley
 - 2. Generally thousands of feet thick
 - 3. Variable transmissivity and water quality.
 - 4. Poor transmissivity in the Rincon Basin.

2) Recharge to aquifer system

- a. Most recharge to aquifer originates from the flows of the Rio Grande (a small amount of recharge is associated with local precipitation)
- b. Originally the Rio Grande was a meandering river, and the aquifer was recharged by seepage to aquifer from the riverbed and from overbank flooding.
- c. Now recharge is dominated by Rio Grande Project operations
 - i. The river was straightened and shortened by canalization project,
 - ii. Levees now prevent overbank flooding
 - iii. River flows regulated by reservoir
 - iv. River water is diverted into canals
 - 1. Aquifer is recharged by canal seepage
 - 2. Aquifer is recharged by on-farm return flow
 - v. Early in the Project, this recharge caused groundwater levels to rise too close to the surface, and it was necessary to install drains

3) Historical Water Budget

- a. Years of Full Project Supply:
 - i. Recharge to aquifer exceeded discharge (groundwater pumping and other losses)
 - ii. Groundwater levels rose (if below the level of the drains)
 - iii. Excess groundwater discharged from drains.
 - iv. Salt was flushed from groundwater system.
- b. Years of Shortage in Project Water Supply (1950's, mid 60's, mid 70's)
 - i. Groundwater pumping throughout Rio Grande Project increased to meet irrigation demands
 - 1. Total well pumping exceeded recharge
 - ii. Drains dried up
 - iii. Groundwater levels declined.
 - iv. Salt accumulated in aquifer.
- c. Aquifer and Drains would recover following drought.



- 4) Water Supply changes to New Mexico associated with recent Rio Grande Project Operations
 - a. Reduction in EBID full-supply-year allocation of Project Water
 - b. Reduction in EBID Diversion of Project Water
 - c. Reduction in Canal Seepage and on-farm return flow to Rincon and Mesilla basins
 - d. Increased irrigation well pumping needed to supply irrigation demands in Rincon and Mesilla

- 5) New Water Budget (since new Operating Procedures adopted)
 - a. Years of Full Project Supply (2008-2010)
 - i. Recharge to aquifer reduced from previous full-supply years
 - ii. More irrigation well pumping needed than in previous full supply years
 - iii. Water balance changed
 - b. Years of Project Shortage (2011)
 - i. Groundwater pumping will almost certainly exceed recharge

- 6) Hydrologic Effects of the Changed Water Budget
 - a. Reduced recharge and the groundwater pumping associated with reduced EBID surface water supply during recent years (2008-2010) meant that aquifer did not fully recover from 2003-2004 drought, even though 2008-2010 were years of full supply to the Rio Grande Project.
 - b. If the Project has low supply in 2011, groundwater pumping will probably greatly exceed recharge.

