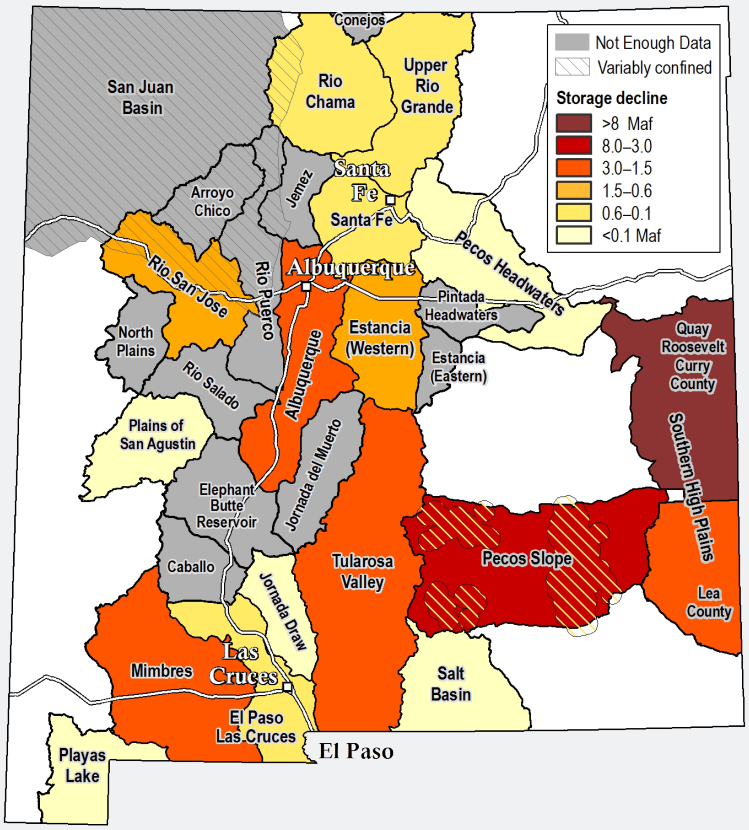
Groundwater Storage Change in New Mexico Aquifers: Pecos Slope and Southern High Plains

Alex Rinehart, Ethan Mamer, Geoffrey Rawling, Ron Broadhead, Trevor Kludt, Brigitte Felix, Cathryn Pokorny and Stacy Timmons.

New Mexico Bureau of Geology and Mineral Resources, at New Mexico Tech
Funding from WRRI State Water Assessment



Declines Across New Mexico

Groundwater storage, which makes up much of the freshwater in New Mexico, has been decreasing across state. This is based on analysis of 60 years of water-level measurements, following a careful review of the data. To date, on the Statewide Water Assessment, we have estimated groundwater storage declines for all of the unconfined Rio Grande basins, the Southern High Plains, the San Juan Basin aquifers, and some of the unconfined alluvial and confined limestone Pecos Slope aquifers.

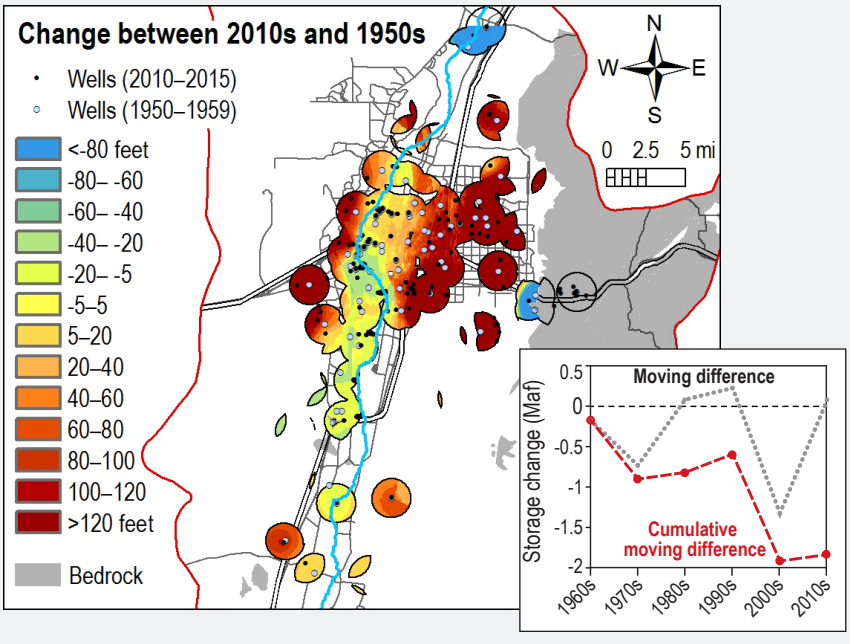
Different aquifers are made up different materials, which are all saturated with water. Alluvial and basin-fill aquifers are made of sands and gravels. These are a source of freshwater throughout the state, and, in areas with a perennial river, is often the only source of freshwater. The limestone aquifers of the Pecos Slope are made of fractured limestone that has been uplifted in the mountains and buried under the Pecos River. These aquifers are a source of irrigation water along the Pecos River.

Many regions studied do not have enough data to reliably estimate groundwater storage changes: San Juan Basin, Conejos, Jemez, Arroyo Chico, North Plains, Rio Salado, Elephant Butte Reservoir, Caballo, Jornada del Muerto, Pintada Headwater and Estancia (Eastern).

Closed basins (Mimbres, Tularosa Valley, Estancia Basin) and the Southern High Plains have some of the largest declines since the 1950s. The Albuquerque basin and the Pecos Slope alluvial aquifer also have large declines since the 1950s. For both of these, groundwater storage has stabilized due to improved management and supplemental surface water.

Albuquerque Basin

The Albuquerque Basin has had large losses of water since the 1950s (map to the right), with up to 250 ft of water level declines in the eastern part of the basin. A hopeful story emerges, however, when we examine the region immediately around the Rio Grande and the groundwater storage change from the 2000s to the 2010s. Around the Rio Grande, it appears that the water moving in toward the river, or recharging from the river has maintained stable water levels (light greens and light yellows) over the last 60 years. In the last ten years, the Albuquerque-Bernalillo Water Authority have begun actively recharging the aquifer in the eastern foothills of Albuquerque. While water-levels have rebounded, they have not recovered to be close to the total change since the 1950s. However, even a few years into the recharge project, there is an observable increase in storage throughout the basin (slight up-tick in red line).



Southern High Plains

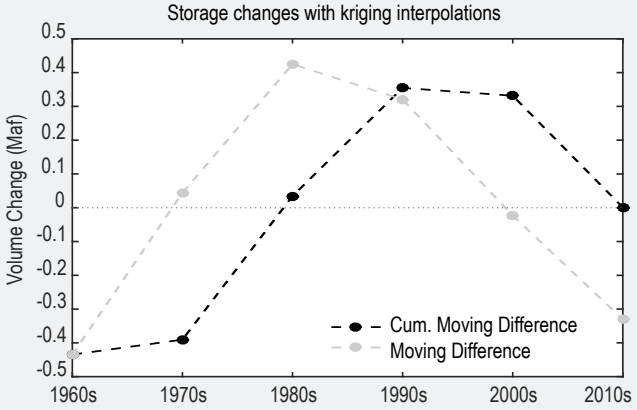
The aquifer in the Southern High Plains, mostly in the Ogallala Formation, has little recharge and is nearly the only source of freshwater in the region. In the Plains around Clovis and Portales, much of the aquifer has nearly no saturated thickness (dark grey), while much of the remaining region around these cities has less than 30 ft of saturated thickness—roughly the minimum thickness to operate high capacity groundwater pumps. In Lea County, there have been declines in saturated thickness, but much of the county shows significant thickness left with smaller regions having no to less than 30 ft of saturated thickness.

Pecos Slope Aquifer System

The Pecos Slope aquifer system studied goes from the crest of the Sacramento Mountains at Cloudcroft to Roswell and toward the Southern High Plains. It has two aquifer systems: a variably confined fractured limestone/bedrock aquifer, and an unconfined alluvial aquifer. Both aquifers show positive impacts from improved management. The limestone aquifer shows an increase in storage partly due to increased well networks but also due to better management of existing. The alluvial aquifer shows storage declines ceasing. In both cases, these positive changes occur at the time of improved management by the Roswell Basin Artesian District and the NM Office of the State Engineer to meet Pecos River compact requirements.

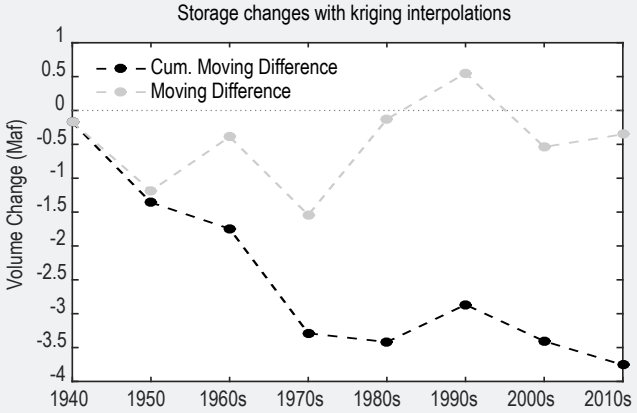
Pecos Slope limestone aquifer

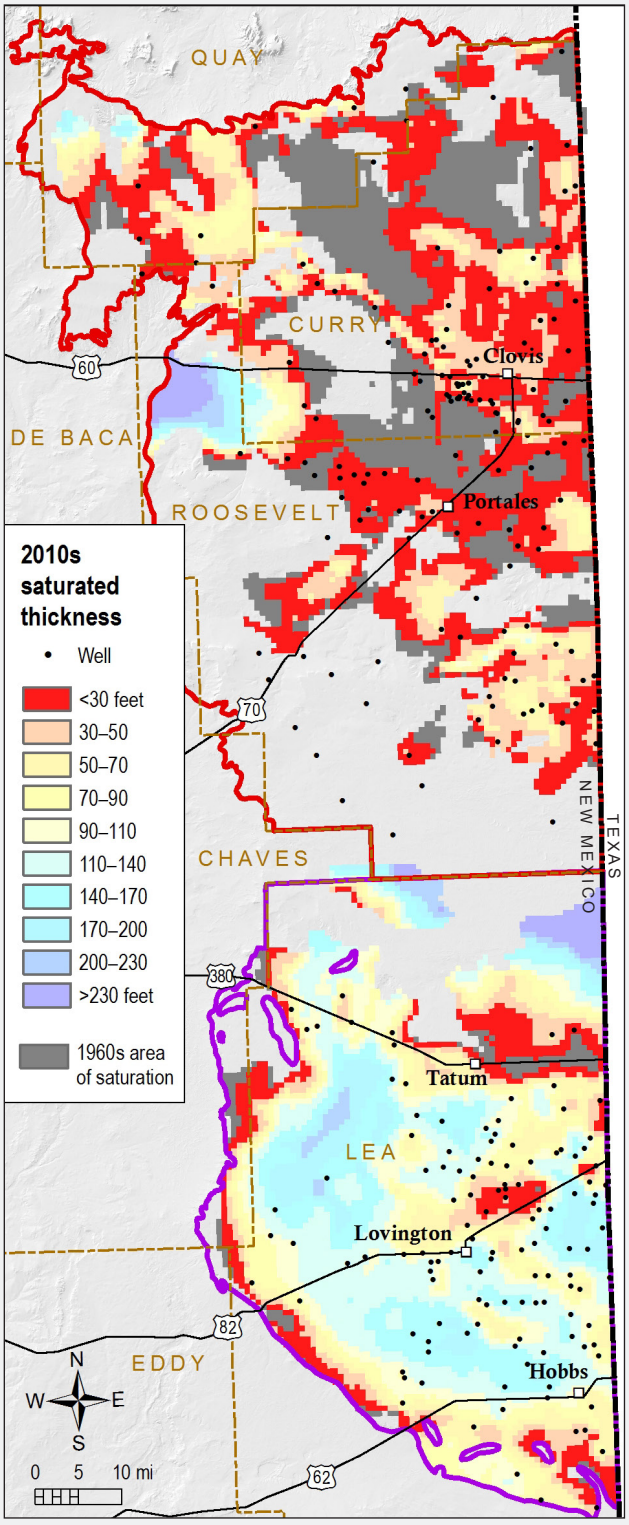
Storage changes with kriging interpolations



Pecos Slope alluvial aquifer

Storage changes with kriging interpolations





NEW MEXICO WATER RESOURCES RESEARCH INSTITUTE
MSC 3167
New Mexico State University
P.O. Box 30001
Las Cruces, NM 88003-8001

New Mexico Bureau of Geology and Mineral Resources
New Mexico Tech
Earth Science for the 21st Century