New Mexico

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Introduction

The Ogallala aquifer in New Mexico is the most economically important groundwater source in eastern New Mexico, and is the primary driver for crop production in the High Plains region. The six counties that overlie the Ogallala are responsible for over 1/3 of all agricultural cash receipts in New Mexico, and over 25% of all crop cash receipts. The Ogallala aquifer is heavily pumped for irrigation of various agricultural crops that support farming and livestock industries, which, in turn, sustain the many small- to medium-sized cities dotted throughout eastern New Mexico. Primary crops grown in the region are corn, sorghum, wheat/triticale, and alfalfa. The majority of these crops are utilized as silage, hay, or grain to supply the large dairy industry in both eastern New Mexico and West Texas. There are over 142,000 milk cows in the three major New Mexico counties over the Ogallala aquifer.

Water levels in the New Mexico portion of the Ogallala, like much of the Southern High Plains, have been in a long-term, serious decline for decades. Water usage is unsustainable, as extraction far exceeds the minimal amounts of recharge into the aquifer. Agricultural producers are currently experiencing declining well pumping capacities at an alarming rate, particularly in the more southern stretches of the aquifer range in New Mexico. In addition, decreased water levels in existing municipal wells have led to many wells being shifted from agricultural use to municipal usage in both the Clovis and Portales areas in order to meet municipal water demands. Recent samplings from 2004 to 2007 to 2010 to 2015 of 121 wells in Curry and Roosevelt counties indicated that there has been an estimated loss of close to 2M acre-feet in the aquifer during the time periods, with a 7-year average loss of 277,586 acre-feet per year. Over the sampling period, 75% of the wells experienced a decline in water levels (median well decline of 4.2 feet) (Figure 1). No significant surface water resources exist in the High Plains region of New Mexico.

Science and Data

The primary focus of the majority of research to date has been on finding low water-use cropping alternatives to the current slate of traditional crops grown in the region. Most of the research has been conducted at New Mexico State University's (NMSU) Agricultural Science Center at Clovis. Well capacities are

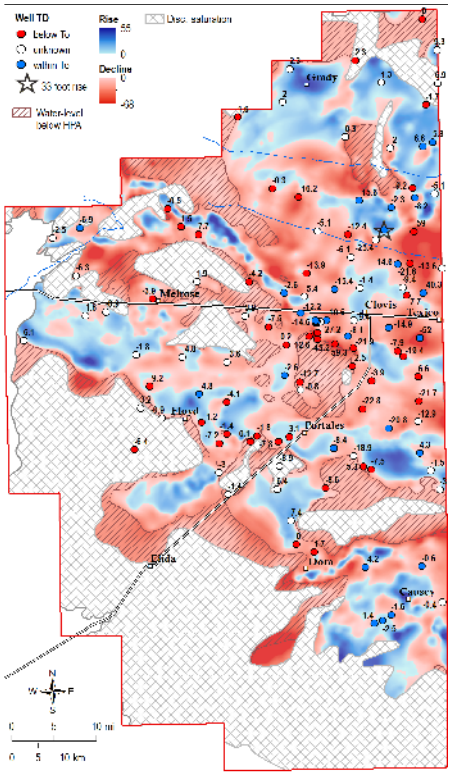

Figure 1: Change of saturated thickness of the Ogallala Formation in Curry and Roosevelt Counties, NM, from 2004–2007 to 2010–2015 (in feet). Source: Rawling, 2016.

increasingly becoming less capable of supplying enough water to grow high water demand crops such as corn.

While corn silage remains a staple component of dairy feeding rations, research has shown that forage sorghums certainly have a fit into the high-energy diets of dairy cows, while saving considerable amounts of water. Extensive testing on sorghum types, varieties, and fertilizer and seeding rates has led to a much-improved understanding of the proper management of this crop, as well as the water-saving benefits and flexibility it provides.

Farming systems in eastern New Mexico are characterized by a small handful of annual cereal crops with limited diversity. As such, broadleaf alternative crops may be able to provide rotational benefits in these systems while stimulating economic impact in the region. Research conducted on winter canola has shown that irrigation may be reduced by as much as 40% (compared to winter wheat dual-purpose systems), while providing both grazing and high-value seed harvest options for producers.

Crop diversification through cover cropping and legume integration in crop rotations could be another strategy to harness soil health and water conservation benefits in the region.

Figure 2: Underground water basins in eastern New Mexico. Source: NM Office of the State Engineer.

Research reveals the need of at least five tons of biomass carbon input to maintain soil organic matter at present levels. Increasing biomass carbon input through cover cropping not only increases soil organic matter, but also increases microbial activity and improved soil health. Cover crop studies under limited irrigation crop rotations have shown improvement in the response of selected soil health indicators by at least 17% without any difference in water use and crop yield.

Farming with limited irrigation is a challenge, and it is a greater challenge to produce crops in a strict dryland situation. However, half of the eastern New Mexico farms have been already turned into dryland production. Research on conventional tillage, strip-tillage, and no-tillage comparison in dryland situations show the many benefits of reducing tillage. Specifically, no-tillage in dryland corn-sorghum rotations has increased soil water storage, reduced soil erosion, and maintained comparable crop yields.

This research provides information to assist farmers as they transition to farming systems that utilize less irrigation water and other crop inputs.

Policy

The Office of the State Engineer (OSE) has authority over the measurement, appropriation, and distribution of all surface and groundwater in New Mexico, including streams and rivers that cross state boundaries. New Mexico State laws govern the appropriation of groundwater and have been developed since the early 1930s. Beneficial use of water is the basic tenet for both surface water and groundwater statutes with priority administration governing in times of shortage. There are seven underground water basins that have been declared by the OSE in the Ogallala aquifer region (Figure 2).

Groundwater rules have been developed that identify more specific detail on the Administration of Groundwater. In addition, Basin Guidelines are used to ensure regional consistency for some of the more active

Groundwater Basins located on the East side of the state. The Basin Guidelines are meant to help give clear procedures for agency staff when reviewing water rights applications filed by farmers, ranchers, and municipalities.

There are approximately 29,000 wells drilled in the Ogallala aquifer in New Mexico. While only approximately 65% of the wells drilled into the Ogallala are currently metered, any new well must be equipped with a totalizing meter and reported to the OSE. All new and replacement wells drilled today are metered as part of an Application to change an element of a Water Right submitted to the agency. There are a total of 329 wells in the measurement program in the Ogallala region.

In critical regions of a basin, the agency has developed hydrologic modeling to evaluate additional requests for appropriations. If a region is experiencing high levels of water withdrawals and thin saturated thickness within the underlying aquifer, then these areas are designated as Critical Management Area's (CMA's). Great lengths to protect these CMA's from additional water level declines are undertaken. When an application for appropriation is requested in a CMA, a regional assessment using the hydrological model is conducted. Any excessive drawdown and reduction of saturated thickness of the Aquifer will result in the denial of the application or the reduction in the amount of water that can be withdrawn or diverted.

In addition, starting July 1, 2017, the State Land Office began reviews of hydrological information before renewing or approving new access to drill wells on trust land that involve the use of fresh water from the Ogallala aquifer for oil and gas production and related activities.

Finally, local, state, and federal funding is being pumped into to a 150-mile pipeline project that is designed to bring billions of gallons of drinking water a year to parts of eastern New Mexico. The Eastern New Mexico Rural Water System Project ("Ute Pipeline"), with an estimated price tag of $500M, has been decades in the making to provide a renewable water source for eastern New Mexico communities, including Clovis and Portales, and to ease the strain on the Ogallala aquifer.

Producer Practice

Agricultural producers on the High Plains of New Mexico have always been a resilient group. Many have experienced and survived multiple year droughts, low commodity prices, and high input costs. Also, many irrigated farmers also practice dryland cropping in this hot, dry, and windy environment. As such, farmers are always looking for new information on best management practices and ways to improve their operations under increasingly harsh growing conditions.

Water conservation techniques such as no-tillage and reduced tillage management, selection of short season, drought tolerant varieties of traditional crops, and planting alternative crops are all currently being integrated into the farming fabric of the region. More efficient irrigation practices such as LEPA and LESA on center pivot systems have been implemented, but subsurface drip irrigation acceptance has been limited, primarily due to initial installation costs and traditionally low-value crops.

Finding adapted and acceptable alternatives has been a challenge. However, canola is an exceptional success story. While the rotational benefits of canola have long been understood, acceptance was limited due to a lack of storage and/or processing facilities nearby. Due to the opening of a canola crusher plant in Lubbock, Texas, growers not only have another good grazing forage option, but also they now have a market outlet for the seed harvest of this dual-purpose crop.

Reference

Rawling, G.C. 2016. A hydrologic investigation of Curry and Roosevelt Counties, New Mexico. Open-file Report 580. New Mexico Bureau of Geology and Mineral Resources. February, 2016.