Wyoming

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Introduction

The High Plains aquifer occupies about 8,200 square miles of the southeast corner of Wyoming, translating to less than 10% of the state's area. While the High Plains aquifer system occupies over 170,000 square miles of the United States, less than 5% is within Wyoming. Despite the geographic scale, the High Plains aquifer is the most heavily exploited aquifer in Wyoming.

In Wyoming, the High Plains aquifer consists of Oligocene aged White River Formation, Miocene aged Arikaree and Ogallala, and localized Quaternary-aged deposits. Groundwater monitoring wells and isolated numerical modeling efforts suggest that parts of the High Plains aquifer are in long-term decline whereas other areas are relatively unchanged as compared to pre-development.

State groundwater management is guided by the State Constitution, State Statute, and the Wyoming State Engineer's Office Rules and policies. The Wyoming State Constitution provides that water from natural streams, springs, lakes, and other collections are property of the state. The Constitution also declares that priority of appropriation shall give better rights to water and that no appropriations shall be denied except when a denial is demanded by the public interest (Wyo Const. Art. 8).

In Wyoming, groundwater rights have no statutory guarantee of potentiometric surface. Where surface water and groundwater are so interconnected as to constitute one source of supply, priorities of rights can be correlated and a single schedule of priorities apply to the common water supply. Although early developments for stock and domestic uses were exempt from permitting, statutes amended in 1969 require that a permit be obtained before any water source is developed for beneficial use.

Science and Data

The State Engineer's Office maintains approximately 50 groundwater monitoring wells to measure water levels in the High Plains aquifer. These wells are predominantly located in areas with heavy agricultural groundwater use. Consequently, most of the monitoring wells show seasonal variation associated with irrigation-season pumping. Furthermore, many wells show a steady decline in water levels measured over time.

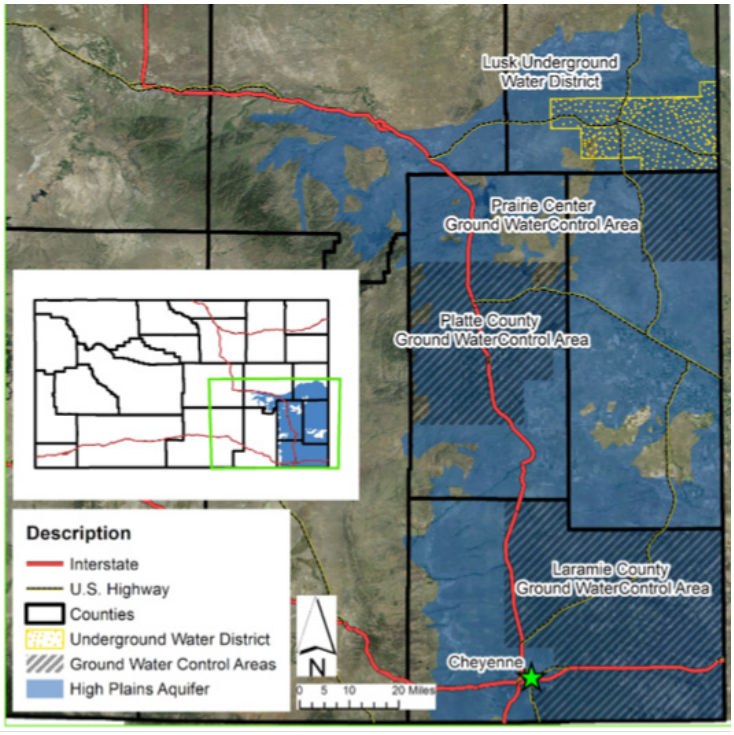

Figure 1: Wyoming High Plains Aquifer System special groundwater management areas.

Additionally, Wyoming has performed or conducted several studies in the past decade to assess changes in water levels over time and help predict future water levels in the High Plains aquifer.

In the northern High Plains aquifer area (also known as the Lusk Underground Water District), water levels from nearly 180 wells were measured and compared to pre-development measurements. The investigation showed that some areas had experienced 30-foot declines in water level; the declines represented about 5% of the total aquifer thickness (Hinckley Consulting, 2009).

In the extreme southeast corner of the state (including the Laramie County Ground Water Control Area, discussed further in the policy section), over 300 High Plains aquifer wells were measured in the spring of 2009 to compare water levels to pre-development and also incorporate lithologic data to more completely characterize the hydrogeologic environment (Bartos, 2011; Bartos, 2013).

The State Engineer's Office completed a hydrogeologic study for the Laramie County Ground Water Control Area in 2014. The backbone of the study was a groundwater flow model which was used to evaluate the effects of current and hypothetical groundwater withdrawals and assess impacts of future administrative controls on groundwater levels. Based on the modeling results, if current production rates are sustained, portions of the High Plains will be exhausted in less than 50 years; however, areas with scant irrigation use showed negligible water level changes over the same 50-year period. Modeling also indicated that, to stabilize current water levels, some areas may need 90% demand reductions. Finally, the modeling demonstrated that modest growth of the last 10 to 20 years imparts a very small impact on future groundwater declines – rather it is production from wells developed through the 1970s (predominantly agricultural) that impacts water levels the greatest (AMEC, 2014).

Within the last decade, the State Engineer's Office has developed and implemented a system to make permits, well logs, and water right certificates publicly available. Within the last two years, the State Engineer's Office has developed an on-line reporting system for collecting groundwater production information, and expects to use those data for groundwater modeling refinement.

Statewide, Wyoming does not have very much groundwater production data. Many wells were permitted before standardized production reporting requirements and, absent a State Engineer's Order, these appropriators are not required to track or report water production. The State Engineer's Office is now collecting groundwater pumping quantities for all wells other than stock or domestic within the Laramie County Control Area. The production reporting burden is placed on the appropriator. Early data suggest approximately one half of the required wells are equipped with totalizing meters.

Policy

The first Wyoming groundwater laws were enacted in 1945 with significant amendments in 1958 and 1969. Control Areas are special groundwater management districts established through Wyoming Statute (W.S. § 41-3-912 through 41-3-915). Control Areas may be established when groundwater levels decline excessively, conflicts occur between water users, etc. Special groundwater production permitting procedures apply in Control Areas.

Once an area is designated a Control Area, the State Engineer may close the area to further appropriation, determine total permissible withdrawal and order apportioned use accordingly, order junior appropriators to cease withdrawals, order rotation of use, or order well spacing requirements for new wells. Additionally, Wyoming Statute provides an avenue by which appropriators of groundwater may voluntarily agree to a method of controlling withdrawals, well spacing, apportionment, rotation or proration (W.S. § 41-3-915); however, no appropriators have availed themselves of the process. Wyoming currently has three Ground Water Control Areas – all overlying the High Plains

aquifer system.

In 2015, the State Engineer issued the Laramie County Control Area Order. The Order required adjudication and meter installation on wells other than stock or domestic use, reporting of water production for those uses, and instituted spacing requirements for new wells based on their location and proposed annual production. In the most severely impacted areas, no new appropriations will be granted which propose to produce greater than five acre-feet per year. No order or spacing restrictions are currently in place for the other Ground Water Control Areas.

The State Engineer also has the authority to determine and establish areas and boundaries of Underground Water Districts including the establishment of subdistricts when parts of an aquifer require separate regulations. In the far northern High Plains aquifer area (Lusk Underground Water District), permit conditions require that new high-capacity wells (over 25 gpm) be installed more than one mile from existing high-capacity wells.

Producer Practice

The Laramie County Conservation District, in cooperation with the U.S. Department of Agriculture, Natural Resources Conservation Service (NRCS), secured funding under the Agricultural Water Enhancement Program (AWEP) for conversion of irrigated cropland to dryland crops or pasture grazing. As a result, over 2,000 acres of land irrigated with groundwater were converted between 2010 and 2013. Unfortunately, this program is no longer available.

Moving Forward

In a time of low revenue and severe budget cuts, Wyoming will need to identify additional resources or tools to encourage producer reporting of volume pumped. Until then, non compliant wells, when discovered in violation of a State Engineer Order, will be foreclosed from pumping. There is also significant need to expand the water-level monitoring program in the High Plains aquifer. Wyoming is very interested in learning how other states collect High Plains aquifer production and water-level information – whether from state or private sources.

References

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